Universidad de San Andrés

Departamento de Economía

Doctorado en Economía

Economic Regional Dynamics in Argentina during Import Substitution Industrialization: A Comparative Analysis (1914 - 1959)

Autor: Mauricio Rodrigo Talassino

DNI: 33756255

Directores de Tesis:

Tommy E. Murphy

Esteban A. Nicolini

Victoria, Buenos Aires

20 de febrero de 2024

Abstract

Economic Regional Dynamics in Argentina during Import Substitution Industrialization: A Comparative Analysis (1914 - 1959)

Mauricio Rodrigo Talassino

Argentina exhibits significant regional heterogeneity in demography, income, geography (with varying availability of natural resources), and productive specialization. However, economic analyses of regional disparities relying on quantitative evidence for the first half of the 20th century are notably limited. During this period, Argentina, along with much of Latin America, began to engage in Import Substitution Industrialization (ISI), and its impact on the current economy is still a matter of ongoing discussion.

To analyze the regional dynamics during the ISI period in Argentina, the initial phase of this study involves providing comparable GDP estimates for all provinces during this timeframe. Specifically, for selected years in the 1930s and 1940s, provincial GDP is estimated using a top-down approach. This involves distributing each sector of the national GDP among the provinces, relying on allocation indicators derived from provincial variables associated with each sector. By combining the newly derived estimates with those existing for previous and subsequent years, the following step involves a comparative analysis of regional performance in terms of GDP and GDP per capita, spanning from the late 19th to the early 21st centuries. The findings reveal economic and population concentration in the Pampean region, accompanied by relatively high and growing GDP per capita in Capital Federal and Patagonia. At the same time, the poor provinces in the northern part of the country consistently lag behind.

Focusing on the ISI period, this study also examines the presence of economic convergence among provinces and the role played by productivity and productive structure differences in regional disparities. The results indicate that, overall, regional disparities tend to widen, particularly in the first phase of industrialization before World War II. Additionally, the study identifies and characterizes sectoral differences across provinces, revealing that productivity is more heterogeneous across provinces than across sectors. This suggests that while existing sectoral differences may contribute to explaining productivity asymmetries during the Argentine ISI period, other more influential factors may be at play. Among these potential factors, the *study explores the effects of regional interactions on convergence, using spatial econometric tools on departmental GDP data for the 1950s to control for spatial dependence in growth regressions. This approach enables the decomposition of growth regression estimates into direct effects, net of spatial dependence, and indirect effects generated by contagion among regions. The findings indicate that the special effects run in the opposite direction of convergence, and regional responses to exogenous shocks are notably heterogeneous.*

The findings of this thesis underscore the importance of incorporating the regional component in the study of Argentina's economic history and the need for quantitative support in the analysis.

QUAERERE VERUM
Universidad de
SanAndrés

Resumen

Dinámicas Económicas Regionales en Argentina durante la Industrialización por Sustitución de Importaciones: Un Análisis Comparativo (1914 - 1959)

Mauricio Rodrigo Talassino

Argentina es un país que presenta marcadas heterogeneidades regionales en términos de demografía, ingresos, geografía (disponibilidad de recursos naturales) y especialización productiva. Sin embargo, para la primera mitad del siglo XX, los análisis económicos de las disparidades regionales basados en evidencia cuantitativa son limitados. Éste período en particular se destaca por el inicio de un proceso de Industrialización por Sustitución de Importaciones (ISI), tanto en Argentina como en gran parte de América Latina, cuyos impactos en la economía actual aún son sujeto de discusión.

Con el fin de analizar cuantitativamente la dinámica regional dentro de Argentina durante la ISI, el primer paso de este trabajo consiste en generar estimaciones comparables del Producto Bruto Interno (PBI) para todas las provincias del país durante el período. Específicamente, se utiliza un método descendente para realizar estimaciones para años seleccionados de las décadas de 1930 y 1940. Este método consiste en distribuir cada sector del PBI nacional entre las provincias, a partir de la generación de indicadores de asignación derivados de variables provinciales asociadas con cada sector. Luego, combinando las nuevas estimaciones con las existentes para años anteriores y posteriores, el siguiente paso consiste en un análisis comparativo del desempeño regional en términos de PBI y PBI per cápita, que abarca desde finales del siglo XIX hasta principios del XXI. A partir de éste análisis se observa una concentración económica y poblacional en la región pampeana, acompañada de un PIB per cápita relativamente alto y creciente en Capital Federal y Patagonia. Al mismo tiempo, se encuentra que las provincias pobres del norte del fueron quedando rezagadas.

Focalizando en el período ISI, también se estudia la presencia de convergencia económica entre provincias y el papel desempeñado por las diferencias en productividad y en estructura productiva en las disparidades regionales. Los resultados indican que, en general, las disparidades regionales tendieron a ampliarse, especialmente durante la primera fase de la industrialización previa a la Segunda Guerra Mundial. Además, se identifican y caracterizan las diferencias de estructura económica sectorial existente entre las provincias, encontrando además que la pro-

Universidad de San Andrés

ductividad es más heterogénea entre provincias que entre sectores. Esto sugiere que si bien las diferencias sectoriales pueden contribuir a explicar las asimetrías de productividad durante la ISI argentina, también pueden estar en juego otros factores más influyentes. Entre estos factores, se exploran los efectos de las interacciones regionales sobre la convergencia. Para ello se emplean herramientas de econometría espacial sobre datos de PBI departamental para la década de 1950, con el fin de controlar y cuantificar la dependencia espacial en las regresiones de crecimiento. Este enfoque permite descomponer las estimaciones de las regresiones en efectos directos, netos de dependencia espacial, y en efectos indirectos, generados por el contagio entre regiones. Los resultados sugieren que los efectos espaciales actúan en dirección opuesta a la convergencia, y que las respuestas regionales ante shocks exógenos son notablemente heterogéneas.

En general, a partir de los resultados de esta tesis se hace evidente la importancia de la inclusión del componente regional en el estudio de la historia económica argentina y la necesidad de un sustento cuantitativo para su análisis.

QUAERERE VERUM
Universidad de
SanAndrés

To Bibiana, my mom,
who has always been there for me

To Inés, *mi osita*,
my life partner

Universidad de SanAndrés

CONTENTS

QUAERERE VERUM
Universidad de SanAndrés

QUAERERE VERUM
Universidad de
SanAndrés

ACKNOWLEDGEMENTS

I extend my sincere gratitude to those whose unwavering support has been integral to the completion of this thesis.

Heartfelt thanks to my esteemed supervisors, Dr. Esteban Nicolini (director of my CONICET doctoral scholarship) of *Universidad Santo Tomás de Aquino* (UNSTA), *Universidad Nacional de Tucumán* (UNT), and *Universidad Carlos III de Madrid* (UC3M); and Dr. Tommy Murphy of *Universidad de San Andrés* (UdeSA) for their invaluable advice, continuous support, and patience throughout this study.

Words are not enough to thank Esteban for trusting me and welcoming me into his research group (and friends). His support paved the way for my teaching career at UNSTA, and he encouraged me to pursue my Ph.D. Thank you for your advice, thank you for your patience, thank you for believing in me, and thank you for your friendship.

A special acknowledgement for Tommy, since this thesis would not have been completed without his unwavering support. Thanks for enduring the writing process and providing insightful feedback that pushed me to sharpen my thinking, elevating the quality of this work.

The collaborative efforts and financial support from *Consejo Nacional de Investigaciones Científicas y Técnicas* (CONICET), *Universidad de San Andrés* (UdeSA), and *Universidad del Norte Santo Tomás de Aquino* (UNSTA) were vital to the completion of this thesis.

I express my gratitude for the five-year doctoral fellowship awarded by CONICET[1] and the support from UdeSA, which included a partial tuition scholarship. This thesis evolved within the framework of my activities at UNSTA, specifically within the *Centro de Investigaciones Económicas para el Desarrollo Humano* (CIEDH) and the *Servicio de Investigación y Desarrollo*. UNSTA's support extended to include paid licenses, research funds[2], and the provision of a physical space. A special appreciation to the former Dean of the *Facultad de Economía y Administración* (UNSTA), Myriam De Marco.

[1] Doctoral fellowship titled "Evaluation of the economic growth of the Argentine provinces in the central decades of the 20th century", directed by Esteban Nicolini and co-directed by Henry Willebald. Conducted at the *Centro de Investigaciones Económicas para el Desarrollo Humano* (CIEDH), Universidad del Norte Santo Tomás de Aquino (UNSTA), Tucumán, Argentina. Duration: April 2015 to April 2020.

[2] This thesis was conducted within the framework of three PIUNSTA research projects under my supervision, funded by UNSTA: (1) "*Indicadores de actividad económica departamentales para Argentina: elaboración, evolución y análisis*" (RR 322-2018), 2018-2020; (2) "*Dinámica de la actividad económica argentina a nivel departamental: elaboración de indicadores y análisis espacial y temporal*" (RR 689-2020 - Schedule 6), 2020-2022; (3) "*Dinámica económica regional de Argentina: análisis estadístico en el largo plazo*" (RR 550-2023 - Schedule 29), 2023-2025.

Universidad de San Andrés

The funds for *Proyectos de Investigación Científica y Tecnológica* (PICT) provided *by Agencia Nacional de Promoción de la Investigación, el Desarrollo Tecnológico y la Innovación* were also essential[3]. I extend my gratitude to the Department of Statistics in *Facultad de Ciencias Económicas* of *Universidad Nacional de Tucumán* for their support in this thesis.

Special thanks to María Florencia Aráoz, my companion since the early years in CIEDH, for her friendship and support. Thank you for all the cheerful moments and the shared laughs.

I am also grateful to Marcos Herrera from CONICET, *Unversidad de Río Cuarto*, and UdeSA for introducing me to the world of spatial econometrics. His collaboration was crucial for a significant part of this thesis, and I look forward to the possibility that our paths will continue to cross in the future.

I extend my sincere thanks to Gerry della Paolera and Christian Ruzzier, whose trust in me made my admission to UdeSA possible. At UdeSA, my gratitude extends to all the professors I had during my Ph.D.; it was a true luxury to take courses under their guidance. I offer special thanks to my fellow classmates, who made my stay in Buenos Aires unforgettable.

I would also like to express my gratitude to the "Latin America GDP group" for providing me the opportunity to join the team. Special thanks to Herny Willebald, Luis Bértola, Marc Badia-Miró, Daniel Tirado-Fabregat, Anna Carreras-Marín, and José Peres-Cajías. I thoroughly enjoyed all the time we spent together at conferences and workshops.

An important part of the work carried out for this thesis involved the search for historical bibliographical material in several libraries. I extend special thanks to the exceptional staff members in many of these institutions, including *Ministerio de Economía de la Nación*, *Banco Central de la República Argentina*, *Dirección de Estadística de la Provincia de Tucumán*, *Universidad de San Andrés*, *Universidad del Norte Santo Tomás de Aquino*, and, at *Universidad Nacional de Tucumán*, those of *Instituto de Estudios Geográficos*, *Facultad de Filosofía y Letras*, and F*acultad de Ciencias Económicas*. Additionally, my gratitude extends to Cesar Filippone from *Estación Experimental Agroindustrial Obispo Colombres*.

Thanks to Catalina, my beautiful *negrita*, for her love and companionship during the past two years, and for being the most amazing dog in the world.

[3] This thesis was carried out in the framework of two PICT research projects under the direction of Esteban Nicolini: (1) PICT-2013-2429 "*Desarrollo económico de las provincias argentinas en el largo plazo: estructura económica, producción agregada y determinantes del crecimiento en el período 1895-1914*", February 2015 to February 2018; (2) PICT-2019- 02806 "*Determinantes del desarrollo regional y local en el largo plazo: actividad económica, instituciones, niveles de vida y población*". February 2021 to February 2024.

Universidad de San Andrés

I extend boundless gratitude to Bibiana Jarma, my mother. The fulfillment of my career would not have been possible without all the sacrifices she made. Thank you for always being with me and for all your support and love.

Finally, I reserve special appreciation for María Inés Herrero, the woman of my life. Thank you for all your support amid the stressful moments throughout this lengthy process. I am profoundly grateful that you are in my life. I love you.

QUAERERE VERUM
Universidad de SanAndrés

CHAPTER I

INTRODUCTION

1.1- Argentina: The Regional Problem

The existence of economic inequalities is an inherent characteristic of almost every society, both in contemporary times and throughout history. These inequalities, whether in terms of income or wealth, often permeate other key aspects of life, such as education and health. While it can be argued that some level of inequality is essential for the effective functioning of a market economy and for providing incentives for investment and growth (Berg & Ostry, 2017), there is also compelling evidence that excessive inequality can have detrimental effects on various aspects of a society's economy. Beyond normative concerns tied to social preferences, inequality can corrode economic growth, impede poverty reduction, jeopardize social and economic stability, and hinder socially sustainable development (United Nations, 2013; Dabla-Norris et al., 2015).

Within a country, a crucial element contributing to inequality among individuals is the disparity among regions. The existence of stark differences in the living standards among people in different regions of a country is commonly termed "the regional problem" (Le Grand & Robinson, 1976). This issue is prevalent in both underdeveloped and developed countries (Floerkemeier *et al.*, 2021; Gbohoui *et al.*, 2019) and research indicates that spatial inequality within a country accounts for approximately one-third of total inequality in per capita incomes (Kanbur & Venables, 2005). This suggests that a substantial proportion of the income disparities among individuals is not inherently tied to variations in their characteristics, such as ability, but rather stem from their geographic location. Furthermore, regional disparities can lead to adverse circumstances, such as escalating social tensions (Case & Deaton, 2020) and hindering the growth of the national economy (de Dominicis, 2014; Che & Spilimbergo, 2012). The latter is related with the inefficient utilization of resources, as the capabilities of the labor force are likely to be underutilized in low-productivity regions.

In economic literature, multiple hypotheses delve into the causes of regional inequality and its temporal evolution. One contributing factor is the unequal distribution of resources across space, driven by geographic and climatic conditions, resulting in an uneven distribution of economic activities. Another contributing factor is economic growth itself. The early stages of economic development lead to a rapid concentration of economic activity in locations close to more dynamic markets (Floerkemeier *et al.*, 2021). These favored locations typically involve cities, often serving as capitals or primary cities, and leading regions. Consequently, regional disparities are closely linked with economic takeoffs that unfold unevenly across regions. The theoretical landscape diverges on the nature of these inequalities, with some perspectives suggesting a transient nature, and others proposing a more lasting or persistent one. On the one hand, the neoclassical vision asserts that disparities are transitory due to labor and capital mobility within national borders, leading to regional incomes converging over time (Barro & Sala-i-Martin, 1991). In other words, labor force would migrate from poorer areas to richer areas, raising wages in the former, and capital would move in the opposite direction. Another perspective within the same group aligns with the central idea of the well-known Kuznets curve. It predicts that although regional inequalities may escalate in early stages of development, they should also decrease later, following an inverted-U pattern.

On the other hand, theories within the New Economic Geography, pioneered by Krugman (1991), argue that there are forces that act against convergence and lead economic activities to cluster together. This happens because firms benefit from forward and backward linkages with nearby supplier and customer firms, because firms and workers benefit from the development of large pools of skilled labor, and because firms gain insights by observing and learning from nearby competitors. In the same vein, Rice & Venables (2021) further emphasize the limitations of convergence forces relying on labor and capital mobility. They contend that labor markets within a country tend to be nationally integrated, thus limiting the scope for relative wage adjustment, which is a key driver of convergence in neoclassical models. The only relative prices that can move freely are those of immobile factors, mainly land and housing. Since these factors represent a small proportion of firms' costs, they are insufficient to attract inward investment to less developed regions. Moreover, the migration of the youngest and most skilled individuals from these lagging regions makes the remaining workforce less appealing to potential inward investors. Additionally, areas which have experienced negative shocks may exhibit unfavorable skill and demographic characteristics, as well as weak fiscal positions, inadequate public services, and social and health issues. This also works in the opposite direction to the agglomeration economy, as firms are reluctant to locate in such areas. In practice, the empirical evidence either aligns with or challenges the regional convergence hypothesis, contingent upon the period under consideration. For instance, in Europe and the United States, regional inequality witnessed a decline from the early 1900s until about 1980 but has shown an upward trajectory since then (Cörvers & Mayhew, 2021). Therefore, it is evident that regional inequalities manifest diverse patterns over time.

Apart from the temporal variation in inequality, empirical evidence highlights substantial spatial differences. According to the IMF (2019), advanced economies exhibit, on average, a 70% higher real Gross Domestic Product (GDP) per capita in leading regions compared to lagging ones. This gap becomes even more striking in developing economies, where regional disparities are approximately twice as pronounced as those observed in advanced economies. Among developing economies, Latin America and the Caribbean stand out as the region with the highest levels of inequality both within and between countries (Llungo Ortiz, 2018). ECLAC (2016) calculations of within-country ratio of GDP per capita between the richest and poorest regions provide a clear understanding of the differ-

Universidad de San Andrés

ences in regional inequality. In OECD countries, the indicator typically hovers around 1.76 and seldom exceeds 2. In sharp contrast, in Latin America[1], the average surpasses 6, with some countries even exceeding 8.

In addition to variations in intensity of inequality across space, there are discernible differences in the factors that contribute to it. According to Badia-Miró *et al.* (2020), aspects such as inherited population distribution, urbanization level, natural resource locations, commodity price cycles, unequal integration of domestic markets, integration of regions into international markets, the focus of public policies and increased state intervention in the economies played a more significant role in Latin American countries than in European ones.

Argentina is no exception to the aforementioned phenomenon. Throughout its whole history, the country has consistently exhibited strong regional disparities in development levels. These disparities stem from geographic heterogeneities, including differences in natural resource availability and market accessibility, as well as socioeconomic path-dependence. A compelling example of this is Capital Federal, now the Autonomous City of Buenos Aires, which has steadily gained importance since its establishment as the colonial capital in the late 18th century. Over time, it has become the most developed area and the major urban center of the country. The city's development has been influenced not only by its historical significance but also by various geographical and infrastructural factors. Among these are its strategic location, functioning as the principal connection port to international markets, and its proximity to territories with favorable climates and fertile lands, essential for producing the country's main agricultural and livestock exports. These territories correspond to the Pampean region[2], which, in addition to Capital Federal, comprises other significant urban centers, such as *conurbano bonaerense* (the area surrounding Capital Federal in the province of Buenos Aires), Rosario (in Santa Fe province), and Cordoba (the provincial capital). With regard to natural resources, the Patagonian region[3] stands out, where oil exploitation played a pivotal role during much of the 20th century. **Chapter II** delves deeper into these and other cases.

To get an idea of the magnitude of regional asymmetries in the country, at the beginning of the 21st century, GDP per capita of the first and last ranked jurisdictions presents a ratio of approximately 8 to 1. Comparing these figures with those presented above, Argentina emerges as one of the countries with the greatest territorial inequality in Latin America, a region already recognized for its notable disparities. Even authors such as Sawers (2018) find the backwardness of some regions as one of the explanations for the relative lag in country's growth. This relative lag refers to the fact that Argentina,

[1] For the calculations, a sample of seven countries is used, including Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, and Peru.
[2] This region includes the territories of Capital Federal, Buenos Aires, Córdoba, Santa Fe, Entre Ríos, and La Pampa.
[3] This region includes the territories of Neuquén, Río Negro, Chubut, Santa Cruz, and Tierra del Fuego.

which was once among the top ten countries in terms of GDP per capita at the end of the 19th and early 20th centuries, has now fallen below the 50th position in the 21st century[4], a fact that is widely known as the Argentine Paradox (Taylor, 2018).

Figure 1.1 introduces a spatial dimension to the existing regional disparities in Argentina, by showcasing two maps depicting the GDP per capita levels of the country's provincial jurisdictions for the initial and final years with available official data. To categorize the provinces, income groups were established using standard deviations from the GDP per capita simple mean for each year. Thus, the "Rich" group comprises provinces whose GDP per capita is between the mean and the mean plus one standard deviation, while the "Very Rich" group includes those exceeding the mean plus one standard deviation. The maps reveal two discernible patterns; firstly, there is a geographical divide characterized by higher GDP per capita levels in the country's capital and the southern regions, contrasted with lower levels in the north. Secondly, the last year depicted in the maps indicates a more accentuated pattern as the intermediate category "Rich", positioned between "Poor" and "Very Rich", disappears. This suggests that regional disparities have not remained constant over time; instead, they seem to be widening.

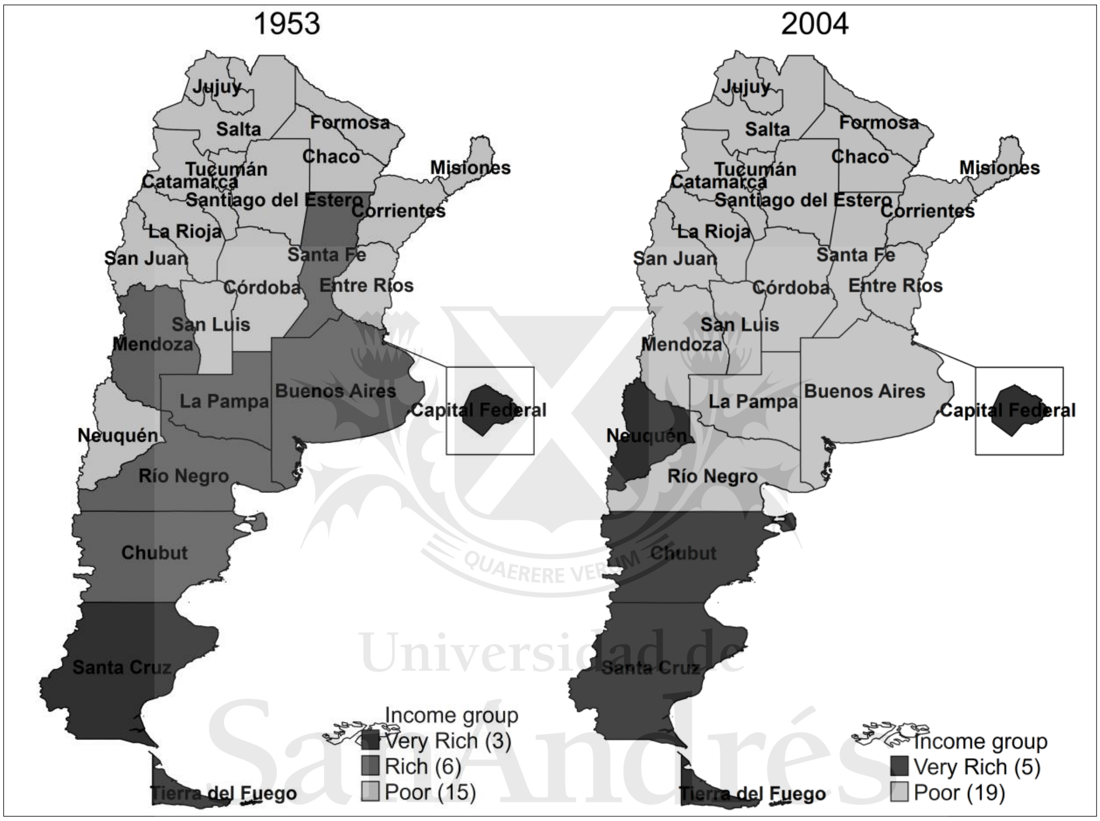
The presence of regional heterogeneities and their evolution over time has been a focal point in numerous studies examining the relative economic performance of different regions in Argentina. Among the cases where provincial GDP data are used for the analysis, some examples are Zalduendo (1975), Manzanal & Rofman (1989), Gatto (2003), and Crovetto (2008). Zalduendo (1975) examines the decades of the 1950s and 1960s, highlighting a substantial difference in terms of GDP per capita between upper-level regions (Capital Federal and Patagonia) and lower-level regions (North of the country), with a tendency for those differences to widen. Nevertheless, he finds a reduction in the gap between regions with intermediate positions, especially between the center of the country and *Cuyo*[5]. Moving into the 1970s, Manzanal & Rofman (1989) identify a relative improvement in less developed provinces. However, these advancements prove insufficient to substantially alter the pre-existing regional disparities. They also note that Patagonian region grew during the decade, which does not contribute to closing the regional gaps since it starts from a high relative GDP per capita level. With regard to the 1990s, Gatto (2003) observes an uneven evolution of GDP distribution across provinces. Despite some divergent performances, the overall landscape dominated by existing disparities persists. Some provinces with smaller GDP shares, such as Formosa, Corrientes, and San Juan, experienced a decline in their participation, while some lagging provinces, such as Catamarca and Neuquén, managed to increase their share fueled by mining and oil industries, respectively. For the same period, Crovetto (2008) highlights a decline in the GDP share of the Pampean region, particularly in Capital

[4] GDP per capita data on Maddison Project Database (Bolt *et al.*, 2018).
[5] Provinces of Mendoza, San Juan, and San Luis.

QUAERERE VERUM
Universidad de San Andrés

Federal and Santa Fe, offset by an increase of the same magnitude in Patagonian region, primarily driven by Neuquén. In terms of GDP per capita, in the 1990s, Gatto (2003) underscores remarkable stability. Despite this, he also notes important cases of improvement, such as Catamarca. At the same time, provinces with the lowest values in 1993 (Formosa, Corrientes, Santiago del Estero, and Chaco) maintained or even reduced their levels.

Figure 1.1: Gross Domestic Product Per Capita (First and Last Years with Official Estimates)



Note: Income groups constructed using standard deviations from the simple average of the GDP per capita of the districts. For instance, the "Very Rich" category comprises districts with GDP per capita exceeding the average GDP per capita plus one standard deviation, and this pattern applies to other groups accordingly.
Sources: Own elaboration based on CFI-ITDT (1965/1962) for 1953 and INDEC (2016) for 2004.

Examining the entire 1953-2000 period, both Gatto (2003) and Crovetto (2008) agree that a comparison of the percentage distribution of GDP by jurisdiction reveals a remarkable stability, a noteworthy observation given the extended timeframe. For instance, the collective GDP share of the five largest jurisdictions (Buenos Aires, Capital Federal, Córdoba, Santa Fe, and Mendoza) underwent only a marginal shift from 80% to 78%. Moreover, Gatto (2003) underscores that, while there were noticeable shifts among smaller GDP provinces, these changes did not fundamentally reshape the national territorial context. He highlights an increased participation in Tierra del Fuego, Neuquén, San Luis, Santa Cruz, and Catamarca, juxtaposed with a decline in Chaco, Corrientes, Entre Ríos, and Tucumán. In terms of GDP per capita, Gatto (2003) indicates a considerable increase in territorial disparities, aligning with the trends depicted in **Figure 1.1**.

In all the studies mentioned above, the quantitative analysis primarily takes a descriptive stance and delves into factors influencing GDP differences, such as the availability of natural resources, infrastructure, and public policies. However, there are also studies that adopt a more technical approach, exemplified by Grotz & Llach (2013) and Figueras *et al.* (2014). These studies leverage econometric tools to scrutinize the tendency for differences in GDP per capita across provinces to narrow, a concept known as convergence. Analyzing data spanning the second half of the 20th century to the early years of the 21st century, their findings predominantly indicate a lack of robust evidence supporting convergence.

The limited availability of comparable economic statistics at a subnational level for periods prior to the 1950s poses a significant constraint on extending the aforementioned studies of regional dynamics over a longer period. While official estimates for Argentina's GDP have been available since 1935, and unofficial estimates date back to the early 19th century, comparable official estimates for all provinces only became available since 1953 (CFI-ITDT, 1965/1962). Until recently, macroeconomic aggregates at the provincial level were largely absent, with a few specific cases being the exception[6]. Aráoz & Nicolini (2016, 2020) have made significant progress in this regard, providing GDP estimates for all provinces for 1895 and 1914. Their approach employs a homogeneous methodology across provinces, and for 1914, they go a step further by publishing sectorally disaggregated figures. Based on their new estimates, Aráoz & Nicolini compellingly demonstrate that the regional disparities mentioned in the previous paragraph were already present at the end of the 19th century. Notably, their findings underscore a significant concentration of GDP in the Pampean region during that period, along with substantial differences in GDP per capita between the northern and southern territories of the country.

Despite the strides made, a comprehensive examination of regional dynamics during the nearly four decades between 1914 and 1953 remains pending. This period holds particular significance as Argentina underwent a crucial transition from an open to a closed economy, accompanied by an increasing state involvement. From the late 19th century to 1930, Argentina's economic growth was rooted in an export-oriented model, focusing on primary products (i.e., agricultural) and foreign capital and labor inflows, with the Pampean region serving as the economic core. Consequently, the nation's economy was susceptible to disruptions in these external flows, a vulnerability exposed during World War I. The economic crisis of 1930, combined with global protectionist policies, played a pivotal role in

[6] Antonelli (2010, 2013) for Salta, Coria-López (2014) for Mendoza, and Ministerio de Economía de Buenos Aires (nd) for Buenos Aires.

steering Argentina, as well as many other countries, from an export-oriented model towards Import Substitution Industrialization (ISI), which was further deepened during World War II. The post World War II period coincides with the first term of President Perón (1946-1952), a crucial subject of study in modern Argentine history (Cortés Conde *et al.*, 2020; Ocampo, 2020). During this period, as developed countries embraced economic openness, Argentina (and other Latin American countries) remained relatively closed (Bulmer-Thomas, 2014). Unlike the previous period, protectionism and industrial policy ceased to be mere reactive measures to adverse external conditions; instead, they became actively endorsed by internal economic policy decisions (Belini, 2012; Debowicz & Segal, 2014). Additionally, Perón's government was characterized by increased state involvement in domestic production, coupled with the implementation of redistributive policies and a push towards industrialization[7]. The impact of ISI was notably felt in urban areas, particularly in the capital and its surroundings in Buenos Aires, though its effects also reached regions with industrial crops in the north and west, as well as areas with oil reserves in the south (Ferrer, 2008). However, the absence of precise statistical data from the pre-1950 period makes it difficult to analyze the relative performance of regions during such transformative events.

Most previous research covering the period 1914-1953 has focused on individual provinces or regions, typically conducted using data on a relevant product, and the labor market and land tenure regime associated with that product. Examples are studies of the north of the country focused on cane sugar (Campi *et al.*, 2015) and in Cuyo region focused on wine (Olguin, 2012). Sawers (2018) and Bandieri *et al.* (2020) provide comprehensive reviews of the economic evolution of the different Argentine regions, drawing from studies as those mentioned above, and incorporating sectoral statistics. However, these reviews lack explicit quantitative comparisons between the regions. Census data for population (1914, 1947, and 1960), the agricultural sector (1914, 1937, 1947, and 1952), and industry (1914 and subsequent years since 1935) have played a crucial role in enabling dynamic comparisons between territories. While some census publications include certain comparisons, it is some additional studies which offer more in-depth analysis. For instance, Recchini de Lattes & Lattes (1974) analyze regional performance in terms of the relative evolution of population and internal migration. Furthermore, Giberti (1959) focuses on regional studies derived from livestock census data. In addition, Ossionak de Sarrailh (1960), Viego (2010) and Borello (1995) utilize provincial data from industrial censuses in their analyses, with the latter also incorporating population data. It is important to note that these works, while valuable, have a limitation as they may not cover the entire economy comprehensively.

Universidad de San Andrés

[7] A comprehensive historical analysis can be found in Gerchunoff & Llach (2018); Belini & Korol (2020); Di Tella & Dornbusch (1989); Díaz Alejandro (1970); Eshag & Thorp (1965); Ferrer (2008); Cortés Conde (2009); Rapoport (2008); Zalduendo (1975).

Furthermore, even though it is worth acknowledging studies attempting a more holistic examination of regional economies, rather than focusing solely on specific sectors, these studies have not been free from methodological challenges. For instance, Bunge (1940) calculates the gross value of the production of the Argentine provinces for 1937, including agriculture, livestock, and industry sectors, yet, it omits tertiary sectors activity entirely. Another example is Zalduendo (1975), who compares provincial GDP per capita and addresses temporal limitation of the available data by including estimates of per capita income for 1946. However, the methodology behind provincial income estimations remains completely unknown[8]. Issues of partial coverage in the economy, methodological obscurity, or even the non-availability of estimates for provincial economic activity have resulted in a lack of comparative regional analyses supported by aggregate economic activity indicators throughout much of the first half of the 20th century. This underscores the need to generate provincial GDP estimates and subject them to analysis for a more comprehensive understanding of Argentina's regional economic dynamics during the 1914-1953 period.

1.2- Contributions

As described in the previous section, the Argentine territory is significantly heterogeneous across various dimensions, including geography, historical development, and living standards. Particularly noteworthy are the long-standing disparities in per capita GDP among different subnational jurisdictions, a trend which seems to have intensified since the second half of the 20th century. While extensive research has delved into this divergence post-1950, the inclusion of earlier periods proves challenging due to limitations in the available data, such as the absence of GDP estimates for all provinces. As a result, these data limitations constrain the scope for comprehensive comparative studies on long-term regional dynamics reliant on quantitative evidence. Therefore, the general objective of this thesis is to generate a set of comparable macroeconomic estimates (GDP) for regions in Argentina during the first half of the 20th century, and analyze the relative long-term regional performances of subnational jurisdictions.

Chapter II starts by providing an overview of the regional differentiation among Argentine provinces, involving factors such as natural resource endowments, production dynamics, and demographics. The chapter then provides a literature review spanning the country's historical context since the colonial era. It emphasizes the diverse impacts of changing circumstances on each region, with special attention given to the methodological approaches employed by researchers to address the

[8] The data origin source is quoted, but unfortunately, it could not be located, and its citation was not found in any other study.

various limitations in regional data over time. The findings reveal that the country's regional economies have followed different paths throughout history, even revealing instances of reversals. One of the most remarkable examples is the northern region, which, despite having been the economic epicenter during much of the colonial period, it experienced a gradual decline, eventually falling far behind Buenos Aires. The chapter also emphasizes the scarcity and imprecision of knowledge regarding relative regional performance during the early stage of the ISI period, which primarily arises from the fact that there are no estimates of aggregated economic activity indicators at the regional level, before 1950. This constitutes a significant knowledge gap, given that the performance of the country during that period is commonly regarded as one of the main factors shaping the national economy throughout much of the 20th century.

To address this statistical gap, in **Chapter III** I construct provincial GDP estimates for the years 1937 and 1946. This section meticulously details the construction process, providing the first transparent, comparable, and replicable GDP figures for all Argentine provinces during the 1930s and 1940s. The estimation methodology involves a breakdown of economic activity into fourteen economic sectors and is based on a diverse array of sources of information, such as population and economic censuses, statistical yearbooks, official reports, and provincial public sector budgets. To verify the reliability of the approach, the estimation is replicated for 1953 in sectors with availability of data, and the results are subsequently compared with the provincial sectoral GDPs estimated by CFI-ITDT (1965/62) for that year. The striking similarity between the figures obtained in both cases not only validates the methodology, but also instills confidence in the reliability of the results.

Universidad de San Andrés

Drawing upon the newly generated GDP estimates for 1937 and 1946, alongside existing estimates for previous years (1895 and 1914) and subsequent years (from 1953 to the early 21st century), **Chapter III** conducts a comprehensive descriptive analysis to trace the long-term evolution of Argentina's regional economies. The findings reveal that, by the end of the 19th century, the key elements of the current regional structure were already discernible, with Capital Federal and the Patagonian territories exhibiting relative affluence, compared to the rest of the country. However, the analysis also underscores the dynamic nature of provincial growth patterns, with provinces following different trends and even revealing shifts over time. Therefore, disparities in terms of GDP per capita among provinces exhibited fluctuations, alternating between narrowing and widening, depending on the specific period under consideration. During the 1895-1914 period, which coincides with the initial wave of international globalization and the onset of Argentina's agro-export era in the late 19th century, the data indicates a reduction in the gap in provincial GDP per capita. Subsequently, during the period of international deglobalization, prompted by World War I and extending until the end of World War II, the trend reversed, resulting in a widening gap. It should be noted that this period also coincided with the initiation of the Import Substitution Industrialization of Argentina, as well as of other Latin American countries, particularly its light phase[9]. The upsurge in regional inequality during this period is driven by the relatively rapid growth of Capital Federal and Patagonian territories. Lastly, from the second postwar period until the early 21st century, specifically, from 1946 to 2004, the results indicate no narrowing of the provincial GDP per capita differences; instead, the wealthiest regions distanced themselves further from the rest.

Chapter IV builds upon the regional analysis outlined in **Chapter III**, focusing specifically on the light phase of Argentine industrialization, during much of the first half of the 20th century. For this purpose, three levels of analysis are employed for the period 1914-1959. The first one is descriptive. The second uses growth regressions to analyze provincial convergence in terms of GDP per capita and per worker. The third shifts the focus to sectoral analysis. As mentioned, previous limitations in regional GDP data have precluded the possibility of conducting this type of study for this period in the literature.

Regarding the first level of analysis, the initial results provide an overview of the regional distribution and evolving patterns of population, GDP, GDP per capita, and GDP per worker across provinces between 1914 and 1959. Aligned with the expectations set by previous literature, the findings confirm the concentration of population and economic activity in the Pampean region, and the existence of pronounced and widening income disparities among regions. Capital Federal and southern territories stand out as high-income regions, contrasting with the more lagging regions in the northern parts of the country. In 1914, the average GDP per capita of the provinces in the richest group was approximately twice that of the poorest group. By 1937, this ratio increased to four times, and this disparity persisted in the subsequent years analyzed. Regarding the province of Buenos Aires, a key focus in the ISI literature, two notable findings emerge. First, its central role seems to be confirmed by the growing concentration of population and GDP in this territory, both of which were already substantial to begin with. Second, this growth has not translated into an increase in GDP per capita relative to the country as a whole; in fact, the ratio exhibits a slight decline.

Universidad de San Andrés

Moving to the second level of analysis, **Chapter IV** undertakes an examination of regional convergence. Convergence hypothesis was first introduced by Neoclassical growth models (such as Solow, 1956; and Swan, 1956) and later empirically developed by Barro & Sala-i-Martin (1992). According to this hypothesis, regions with lower initial levels of GDP per capita should experience higher growth rates compared to those with higher initial levels, ultimately leading to a reduction in regional disparities over the long run. This is usually tested empirically through growth regressions.

[9] The period spanning from 1930 to 1976 in Argentina is characterized by the prevalence of the ISI model. Until about the 1950s, development primarily centered around light and labor-intensive industries. From the 1960s onward, there was a noticeable shift towards a focus on heavier industries.

The results for the Argentine provinces indicate an overall trend of widening regional disparities, especially during the first phase of industrialization before World War II. This can be attributed to the fact that the initially richer territories exhibit substantially higher growth rates compared to their counterparts. The distinctive characteristics of these growing regions manifest diversely: in Capital Federal, growth is intricately linked to the presence of agglomeration economies, while in the southern part of the country, it is closely associated with the exploitation of natural resources, particularly oil. The results also suggest that differences in human capital contribute to explaining the observed variations in growth across regions.

The different sectoral composition of economies is a factor that can potentially lead to regional imbalances. The third level of analysis in **Chapter IV** incorporates this sectoral dimension into the provincial study by utilizing the traditional division of GDP into three sectors: primary, secondary, and tertiary. Initially, the study identifies existing sectoral differences across provinces. As anticipated, the inherently urban nature of Capital Federal manifests in higher participation rates in the secondary and tertiary sectors compared to the rest of the country. However, certain lagging regions also exhibit a significant weight in the tertiary sector, but in this case driven by driven by engagement of the public sector. Subsequently, the study quantifies the effect of differences in sectoral composition on provincial inequalities in terms of GDP per worker. The results suggest that productivity is more heterogeneous across provinces than across sectors. This indicates that while existing sectoral differences could contribute to explaining productivity asymmetries during the Argentine ISI period, other more influential factors may also be at play. Finally, the chapter presents a provincial convergence analysis conducted on sectoral GDP per worker data. Despite the identification of periods of convergence within each sector individually, the results reveals that this phenomenon does not translate into aggregate-level convergence.

Finally, **Chapter V** delves deeper into the convergence analysis, offering additional insights into the outcomes against the absolute convergence hypothesis found in the previous chapter. This is achieved by incorporating interactions among regions through the inclusion of spatial effects in the econometric convergence models. These interactions aim to capture the influence that, in certain contexts, the economic growth of a particular location may experience from either the level of economic activity or the economic evolution of geographically proximate areas. The results of the chapter provide the first quantification of spatial effects on regional convergence for Argentina, using highly geographically disaggregated data available for the 1950s. The results show a higher rate of regional convergence compared to non-spatial estimates. This suggests that a plausible explanation for the lack of convergence (without accounting for spatial effects) could be the existence of spatial spillovers that operate in the opposite direction, counteracting the convergence effect. So far, empirical research using spatial econometrics for Argentine regions has been practically non-existent, and the results obtained in this chapter underscore the importance of spatial interactions in shaping regional economic patterns in the country.

In summary, this thesis strives to make a significant contribution to our understanding of Argentina's regional economic history, emphasizing the intricate landscape of regional economic inequalities. Specifically, it introduces novel quantitative evidence for the ISI period, levering these findings to conduct a comprehensive analysis of the enduring dynamics of regional inequality. Additionally, the thesis explores various factors that may underpin these dynamics, including a detailed examination of the differences in sectoral composition, productivity disparities, and the complex network of interregional linkages. By delving into these aspects, the thesis addresses a gap in the existing literature, where the analysis of relative regional performance over the ISI period based on aggregated indicators of economic activity is largely absent.

1.3- References

ANTONELLI, E. (2010): "Estimación del Producto Interno Bruto regional: el caso de la provincia de Salta (Argentina) 1880-1930". *Ensayos de Economía* 37, pp. 201-231.

ANTONELLI, E. (2013): "Producto bruto geográfico de Salta 1930-1970*". Documento de Trabajo Año 2013 Nº8*. Instituto de Investigaciones Económicas, Facultad de Ciencias Económicas, Jurídicas y Sociales, Universidad Nacional de Salta. Salta, Argentina.

ARÁOZ, M. F. & NICOLINI, E. (2016): "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". *Anales LI Reunión Anual de Asociación Argentina de Economía Política*.

ARÁOZ, M. F. & NICOLINI, E. A. (2020): "Regional growth and the persistence of regional income inequality in Argentina in the first half of the twentieth century". *Journal of Latin American Studies*, 52(2), 293-316.

BADIA-MIRÓ, M., TIRADO-FABREGAT, D. A. & WILLEBALD, H. (2020): "Introduction: Time, Space and Economics in the History of Latin America". In *Time and Space* (pp. 1-15). Palgrave Macmillan, Cham.

BANDIERI, S., CORIA-LÓPEZ, L., DABÚS, C., LLACH, L., MELONI, O., ROSALES-ROSALES, J. & VISINTINI, A. (2020): *Historia económica de las regiones argentinas, 1810-2010*. Buenos Aires: Biblos.

Universidad de San Andrés

BARRO, R. & SALA-I-MARTIN, X. (1991): “Convergence across States and Regions”. *Brookings Papers on Economic Activity*, 1991 No.1, pp.107-182.

BARRO, R. J., & SALA-I-MARTIN, X. (1992): “Convergence”. *Journal of political Economy*, 100(2), 223-251.

BELINI, C. & KOROL, J. C. (2020): *Historia económica de la Argentina en los siglos XX y XXI*. Ed. Siglo XXI.

BELINI, C. (2012): “Industrial exports and Peronist economic policies in post-war Argentina”. *Journal of Latin American Studies*, 44(2), 285-317.

BERG, A. G., & OSTRY, J. D. (2017): “Inequality and unsustainable growth: two sides of the same coin?”. *IMF Economic Review*, 65, 792-815.

BOLT, J., INKLAAR, R., DE JONG, H. & VAN ZANDEN, J. (2018): “Rebasing ‘Maddison’: new income comparisons and the shape of long-run economic development”. *Maddison Project Working paper 10.*

BORELLO, J. A. (1995): “Regional development and industrial promotion in Argentina: A review of events and writings”. *International Journal of Urban and Regional Research*, 19(4), 576-592.

BULMER-THOMAS, V. (2014): *The Economic History of Latin America since Independence.* Cambridge University Press.

BUNGE, A. (1940): *Una nueva Argentina*. Buenos Aires.

CAMPI, D., MOURA FILHO, H. P. D., & BRAVO, M. C. (2015): “Alternativas del intervencionismo estatal en la agroindustria del azúcar: Argentina y Brasil, 1880-1938”. *América Latina en la historia económica*, 22(3), 44-75.

CASE, A. & DEATON, A. (2020): *Deaths of Despair and the Future of Capitalism*. Princeton University Press.

CHE, N. X. & SPILIMBERGO, A. (2012): “Structural reforms and regional convergence”. *SSRN.*

Consejo Federal de Inversiones y Centro de Investigaciones Económicas Instituto Torcuato Di Tella (CFI-ITDT) (1965): *Relevamiento de la estructura regional de la economía argentina*. Buenos Aires: Ediciones CFI. (Reprinted from Universidad Torutato Di Tella, 1962).

CORIA LÓPEZ, L. A. (2014): “El Producto Bruto Geográfico de Mendoza de los últimos 100 años (1914-2013)”. *Anales XLIX Reunión Anual de la Asociación Argentina de Economía Política*.

QUAERERE VERUM
Universidad de
SanAndrés

CORTÉS CONDE R., ORTIZ BATALLA J., D'AMATO L., & DELLA PAOLERA G. (2020): *La economía de Perón*. Edhasa.

CORTÉS CONDE, R. (2009): *The Political Economy of Argentina in the Twentieth Century.* Cambridge University Press, New York.

CÖRVERS, F. & MAYHEW, K. (2021): "Regional inequalities: causes and cures". *Oxford Review of Economic Policy*, 37(1), 1-16.

CROVETTO, N. (2008): "Actividades económicas y reconversión productiva. Los cambios en la base económica, en la estructura social y en la organización espacial". In ROCCATAGLIATA, J. A. (coord.): *Argentina: una visión actual y prospectiva desde la dimensión territorial* (pp. 269-284). Buenos Aires, EMECÉ.

DABLA-NORRIS, M. E., KOCHHAR, M. K., SUPHAPHIPHAT, M. N., RICKA, M. F. & TSOUNTA, M. E. (2015). "Causes and Consequences of Income Inequality: A Global Perspectives", *IMF staff Discussion Note*, SDN/15/13.

DE DOMINICIS, L. (2014): "Inequality and Growth in European Regions: Towards a Place-based Approach". *Spatial Economic Analysis*, 9(2).

DEBOWICZ, D., & SEGAL, P. (2014): "Structural change in Argentina, 1935–1960: the role of import substitution and factor endowments". *The Journal of Economic History*, 74(1), 230-258.

DI TELLA, G. & DORNBUSCH, R. (1989): *The Political Economy of Argentina, 1946–83*. Springer.

DÍAZ ALEJANDRO, C. (1970): *Essays on the economic history of the Argentine Republic*. Yale University Press.

Economic Commission for Latin America and the Caribbean (ECLAC) (2016): *The social inequality matrix in Latin America.* United Nations, Santiago.

ESHAG E. & THORP R. (1965): "Economic and social consequences of orthodox economic policies in Argentina in the post-war years". *Bulletin of the Oxford University Institute of Economics & Statistics*, 27(1), pp. 1-44.

FERRER, A. (2008): *La economía argentina: desde sus orígenes hasta principios del siglo XXI*. Fondo de Cultura económica: Buenos Aires.

FIGUERAS, A. J., CRISTINA, D., BLANCO, V., ITURRALDE, I. & CAPELLO, M. L. (2014): "Un aporte al debate sobre la convergencia en Argentina: la importancia de los cambios estructurales". *Revista Finanzas y Política Económica*, 6(2).

Universidad de San Andrés

FLOERKEMEIER, M. H., SPATAFORA, M. N. & VENABLES, A. (2021): "Regional Disparities, Growth, and Inclusiveness". *International Monetary Fund Working Paper*, No. 2021/038.

GATTO, F. (2003): "Las estrategias productivas regionales. Debilidades del actual tejido empresarial, sistema tecnológico, financiero y comercial de apoyo". *Estudio 1.EG.33.5. Estudios De Competitividad Territorial*. Oficina de la CEPAL-ONU en Buenos Aires.

GBOHOUI, W., LAM, W. R. & LLEDO, V. D. (2019). "The great divide: Regional inequality and fiscal policy". *International Monetary Fund Working Paper*.

GERCHUNOFF, P. & LLACH, L. (2018): *El ciclo de la ilusión y el desencanto: políticas económicas argentinas desde 1880 hasta nuestros días*. Crítica Argentina.

GIBERTI, H. (1959): "Cría de animales". In Aparicio & Difrieri (1959): *La Argentina. Suma de geografía*. Vol IV, Chapter IV. Peuser, Buenos Aires.

GROTZ, M. & LLACH, J. J. (2013): "Coparticipación casi sin convergencia, 1950-2010". *Consecuencias económicas y políticas del federalismo fiscal argentino* (No. 338 (82)(091)). Universidad Nacional de La Plata, La Plata.

Instituto Nacional de Estadística y Censos (INDEC) (2016): "Cuentas Nacionales: Metodología de Estimación: Base 2004 y Serie a Precios Constantes y Corrientes". Ciudad Autónoma de Buenos Aires: Instituto Nacional de Estadística y Censos.

International Monetary Fund (IMF) (2019): "Closer Together or Further Apart? Subnational Regional Disparities and Adjustment in Advanced Economies". In *World Economic Outlook, October 2019. Global Manufacturing Downturn, Rising Trade Barriers.*

KANBUR, R., & VENABLES, A. J. (Eds.) (2005): *Spatial inequality and development*. OUP Oxford.

KRUGMAN, P. (1991): *Geography and trade*. MIT press.

LE GRAND, J. & ROBINSON, R. (1976): *The Economics of Social Problems*. The Macmillan Press Ltd.

LLUNGO ORTIZ, J. (2018): "Desigualdades y políticas regionales en América Latina: una visión actual". *Investigaciones Regionales-Journal of Regional Research*, (41), 11-51.

Maddison Project Database, version 2018. Bolt, Jutta, Robert Inklaar, Herman de Jong and Jan Luiten van Zanden (2018), "Rebasing 'Maddison': new income comparisons and the shape of long-run economic development", Maddison Project Working paper 10

Universidad de San Andrés

MANZANAL, M. & ROFMAN, A. B. (1989): *Las economías regionales de la Argentina: Crisis y políticas de desarrollo*. Centro Editor de América Latina.

Ministerio de Economía de Buenos Aires (nd): PRODUCTO BRUTO INTERNO de la Provincia de Buenos Aires 1935 - 1981.

OCAMPO, E. (2020): "The populist economic policy paradigm: Early peronism as an archetype". *Serie Documentos de Trabajo*, No. 731, Universidad del Centro de Estudios Macro-económicos de Argentina (UCEMA), Buenos Aires.

OLGUIN, P. (2012): "Government, business and regulation. The experience of the wine market regulators of Mendoza (Argentina), 1914-1943". *Revista de Historia Industrial*, (49), 77-110.

OSSIONAK DE SARRAILH, E. (1960): "Industria". In Aparicio & Difrieri (1960): *La Argentina. Suma de geografía*. Vol VI, Chapter II. Peuser, Buenos Aires.

RAPOPORT, M. (2008): *Historia económica, política y social de la Argentina (1880-2003).* Number 982. Editorial Emecé.

RECCHINI DE LATTES, Z., & LATTES, A. (1974): La Población de Argentina. CICRED Series. Buenos Aires.

RICE, P. G. & VENABLES, A. J. (2021): "The persistent consequences of adverse shocks: how the 1970s shaped UK regional inequality". *Oxford Review of Economic Policy*, 37(1), 132-151.

SAWERS, L. (2018): *The other Argentina: the interior and national development*. Routledge, New York.

SOLOW, R. M. (1956): "A contribution to the theory of economic growth". *The Quarterly Journal of Economics*, 70(1), 65-94.

SWAN, T. W. (1956): "Economic growth and capital accumulation". *Economic record*, 32(2), 334-361.

TAYLOR, A. M. (2018): The Argentina Paradox: microexplanations and macropuzzles. *Latin American Economic Review*, 27(1), 1-17.

United Nations (2013): *Inequality Matters: Report on the World Social Situation 2013*. UN.

VIEGO, V. (2010). *Desigualdades regionales y costos de transporte en Argentina*. Tesis de Doctorado en Economía. Universidad Nacional del Sur. Bahía Blanca, Argentina.

QUAERERE VERUM
Universidad de
SanAndres

ZALDUENDO, E. A. (1975): “Las desigualdades económicas entre las regiones de Argentina”. *CEPAL Documento* B/14.

Universidad de SanAndrés

CHAPTER II

THE ARGENTINE REGIONAL CONTEXT

2.1- Regional Patterns in Argentina

Argentina is the world's eighth-largest country by land area. This vastness is associated with a remarkable diversity in climate, geography, and natural resources, leading to distinct demographic and economic specialization patterns across the country's territory. Apart from that, historical events have shaped unique dynamics, in response to the evolving national context. In summary, this chapter aims to provide an understanding of Argentina's regional disparities, both, the relatively static and the more dynamic ones. The first section offers a brief overview of the static regional differences, while the subsequent one delves into the historical transformations that have contributed to the dynamic nature of these regions.

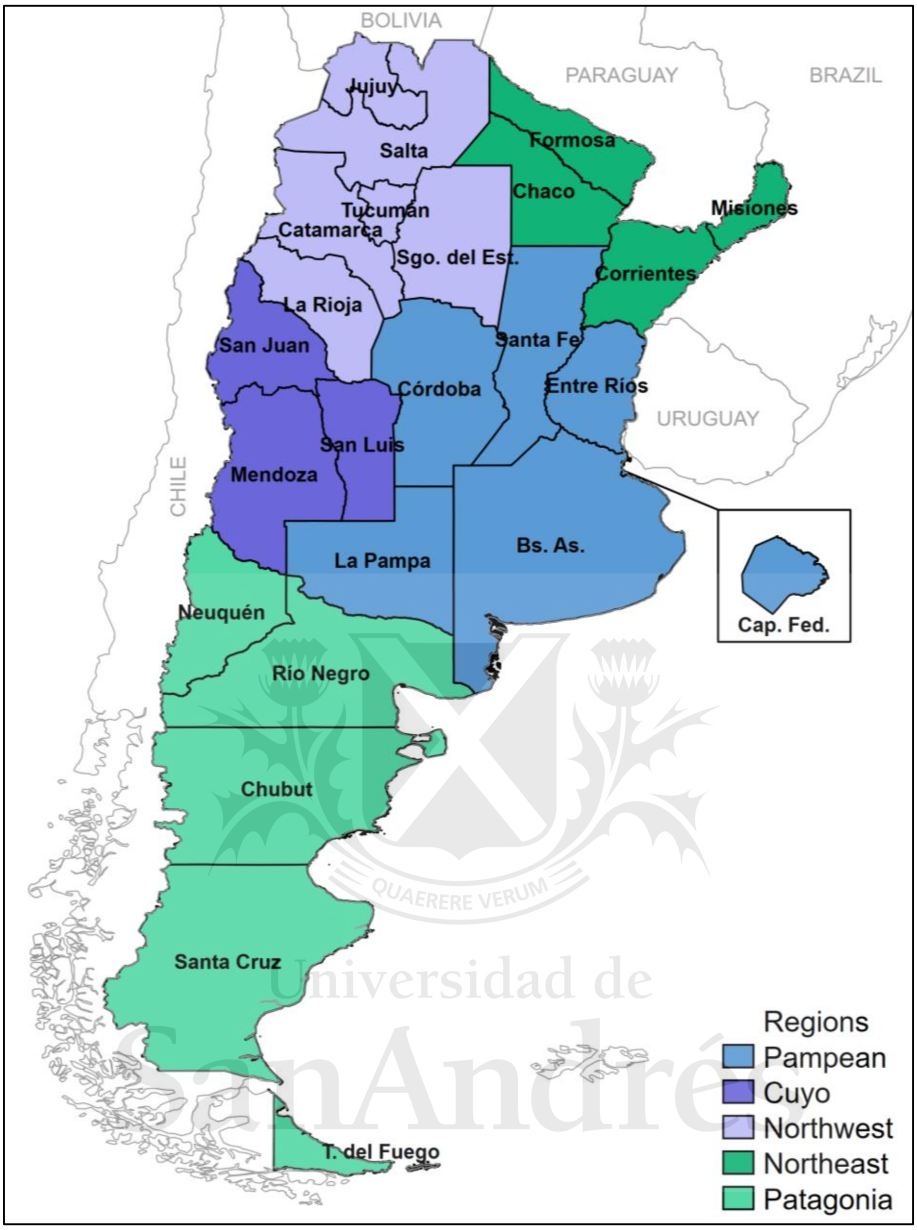
The current political division of Argentina is illustrated in **Figure 2.1**, which showcases 24 first-level administrative units. These consist of 23 provinces and the Autonomous City of Buenos Aires[1] (CABA), also known as Capital Federal[2], which serves as the country's capital. To facilitate a clearer understanding of the different territories of the country, it is practical to categorize the provinces into regions based on shared characteristics. For most of this thesis, a traditional regionalization method (color-coded in **Figure 2.1**) is employed, to enable comparison with existing literature. These regions are constructed by considering various factors, such as geographical similarity, proximity, historical development, and agricultural specialization type, among others (Cao *et al.*, 2003). Naturally, due to the inherent heterogeneity that exists within these regions, alternative regionalization criteria can be proposed without any of them being objectively "superior", as extensively discussed by Cao *et al.* (2003) and Benedetti (2009). As demonstrated later in **Chapter IV**, alternative regional divisions may prove more suitable in specific contexts, emphasizing the need for flexibility in regional analysis.

QUAERERE VERUM
Universidad de San Andrés

[1] Clarification of terminology: Please distinguish between the following terms:
- Autonomous City of Buenos Aires (CABA): It refers to the first-level administrative unit that serves as the capital of Argentina.
- Buenos Aires Province: Another first-level administrative unit, contiguous to CABA, but separate.
- Greater Buenos Aires: It denotes a broader metropolitan area, consisting of the Autonomous City of Buenos Aires and certain second-level administrative units of Buenos Aires Province, which surround the city.

[2] *Ciudad Autónoma de Buenos Aires* is the formal name adopted since 1996.

Figure 2.1: Argentine Provinces and Regions



QUAERERE VERUM
Universidad de San Andrés

Source: Own elaboration.

The Pampean region stands as the cornerstone of Argentina's economic landscape, hosting major urban centers, and the fertile expanse of the *Pampa Húmeda* (Humid Pampas)[3]. Renowned for its favorable climate and rich soil, the *Pampa Húmeda* sustains crucial agricultural activities, including cereal and grain cultivation, as well as livestock raising, which are integral components of the country's exports. The Pampean region is home to the three largest urban agglomerations in the country: Greater Buenos Aires (situated in Capital Federal and part of Buenos Aires province), Greater Rosario (in

[3] The Pampean region is a geographical and statistical region which comprises the provinces outlined in **Figure 2.1**. Within this region, lies the Pampa Húmeda, an ecological region that extends across almost the entire province of Buenos Aires (excluding the southwest), the northeast of La Pampa, the southern part of Córdoba, and the southern half of Santa Fe and Entre Ríos.

Santa Fe province), and Greater Córdoba (in Córdoba province). Throughout the 20th century, these agglomerations accounted for over 30% of the total national population, and the four provinces in which they were located accounted for over 60% of the total national population. Moreover, the concentration of manufacturing and service sectors is particularly pronounced in these provinces, with Greater Buenos Aires emerging as a key hub. This specific area also hosts the country's main port, serving as a crucial gateway to foreign markets.

In contrast, the Patagonia region has a considerably low population density. The northern part of the region, particularly the *Alto Valle de Río Negro*, is primarily characterized by fruit cultivation as its main agricultural activity. Conversely, the southern part experiences a cold and arid climate, rendering it unsuitable for agriculture. Instead, sheep farming dominates this region, complemented by significant hydrocarbon reserves. Notably, unlike other sparsely populated areas in the north of the country, Southern Patagonia, which encompasses Chubut, Santa Cruz, and Tierra del Fuego, exhibits comparatively higher levels of GDP per capita[4].

With the exception of Mendoza, the provinces in the north and west of the country have consistently maintained relatively low levels of GDP per capita, at least since the end of the 19th century. Traditionally, each province in these regions specialized in a few industrial crops, often accompanied by related industrial activities. For instance, in *Cuyo*, a mountainous region in central-western Argentina, the climate favors grape cultivation, leading to a specialization in wine production.

In Northwestern Argentina, the decrease in elevation from west to east gives rise to diverse microclimates, ranging from the cold and arid conditions in *Los Andes* to the subtropical climates in the *yungas* and the plains of *Gran Chaco*. Notably, Tucumán, Salta, and Jujuy have gained recognition for their cane-based sugar production and, to a lesser extent, tobacco cultivation. Tucumán has also embraced lemon cultivation as a distinctive feature since the late 20th century. In Santiago del Estero, cotton cultivation stands out prominently. Salta also boasts hydrocarbon reserves; however, they are not as extensive as those found in Patagonia.

Similar to Patagonia, the Northeast territories exhibited a relatively small population in the late 19th and early 20th centuries, with the exception of Corrientes. However, in contrast to Patagonia, the current characteristic of the Northeast territories is marked by low-income levels. This region has a subtropical climate but is less mountainous and less humid than the Northwest. The presence of forests

[4] This phenomenon can be attributed to the predominant engagement of these territories in non-labor-intensive activities, with a substantial portion of their workforce dedicated to such pursuit.

makes timber exploitation a significant economic activity, particularly in Chaco and Formosa. Additionally, Tobacco cultivation is also widely grown in the northeastern provinces, along with *yerba mate*[5] production in Misiones and rice cultivation in Corrientes.

2.2- Evolution of Argentine Regional Economies: What We Know

The preceding section highlighted relatively static factors over time, such as geography or natural resource endowments, which have played a crucial role in shaping the distinct productive specialization of each region of the country. It is reasonable to anticipate that these factors might influence how each region responds to changes in both national and international contexts, resulting in diverse outcomes. Consequently, fluctuations in international prices, transportation costs, and the nature and intensity of public interventions can deeply impact the exploitation of natural resources and endowments. For instance, the potential placements of goods from each region in international markets can result in varied effects on regions that are well-connected compared to those that are not. Similarly, shifts in the types of goods demanded can prompt a region to transition from being highly connected to international trade to losing that connection.

The political and economic history of Argentina has witnessed numerous and significant shifts. The early 19th century wars of independence marked the onset of a period of political and economic instability, which lasted until the 1870s. During this time, the economic center shifted from the north of the country (linked to the exploitation of the silver mines of *Alto Perú* during the colonial era) to Buenos Aires, (linked to international trade with the Atlantic). In the late 19th century, the consolidation of the national state introduced an economic regime fully open to international trade, capital flows and migration. Subsequently, adverse international trade conditions following the 1930 crisis and the impact of World War II led Argentina towards Import Substitution Industrialization. Initially focused on light industry, it later shifted towards heavy industry, oriented to the domestic market, and characterized by strong state interference in economic activities. In contrast, the last quarter of the 20th century saw the liberalization and opening up of the economy. Finally, the 21st century commenced with the severe 2001 Argentine crisis, one of the most profound in its history[6].

Universidad de San Andrés

[5] Yerba mate, an herb indigenous to South America, is commonly consumed as an infusion and it is a prevalent social practice in Argentina, Paraguay, Uruguay, and Southern Brazil.
[6] Ferrer (2008) offers a comprehensive study of Argentina's economic history from the colonial period to the beginning of the 21st century. Hora (2010) focuses on the period spanning from the end of the colonial era to the early 20th century. Cortés Conde (1979) provides an examination of the so-called agro-export period (1880-1914). Subsequently, extensive literature has covered the period from this agro-export era until now, with notable contributions from Gerchunoff & Llach (2018), Belini & Korol (2020), Cortes Conde (2009), and Rapoport (2008).

As mentioned earlier, it is natural to anticipate that the events outlined above have had consequences in terms of relative regional performance. However, obtaining quantitative evidence for comparing these performances is subject to numerous limitations, particularly acute for the years before the 1950s. This section aims to provide a historical synthesis of the various aforementioned regimes and explore how existing research has attempted to overcome data limitations to conduct quantitative analyses from a regional perspective.

2.2.1- From the Colonial Regime to the Agro-export Model: Reversion from the North to the Center

One of the earliest noteworthy examples of the changing dynamics in Argentina's regional economic development is the shift in the center of economic gravity during the 18th and 19th centuries. Originally located in the northern region during the early colonial period, this economic center moved to the Pampean region and the hinterland of Buenos Aires, which, strikingly, were initially considered among the most underdeveloped regions.

During the colonial period, the present-day Argentine territory was part of the Viceroyalty of Peru and, from 1776 until independence, of the Viceroyalty of the Río de la Plata. Despite its vast size, comparable to that of Western Europe, the population of this territory at the beginning of the 19th century was below half a million, constituting less than 4% of the population of Latin America. At that time, the territory was characterized by scattered small towns and cities across large areas, barely controlled by the colonial authorities. In fact, there were even areas completely outside the domain of the Spanish state, such as the Chaco in the Northeast and the Pampas plains to the south and west of the Salado River (Hora, 2010).

The focal point of colonial economies rested on the silver mining in Potosí (in the current territory of Bolivia), which served as an "attraction pole" for many regions within a vast area of South America. These regions found in the Potosi markets a stimulus for mercantile production and a basis for certain specialization (Assadourian, 1982). Within the current territory of Argentina, various regions played the crucial role of suppliers, providing goods such as mules, fabrics, and wines to Upper Peru and certain Andean regions (Gelman, 2014). The distinctive roles of each region were intricately linked to their geographical location and production capacities (Nicolini, 1992; Hora, 2010).

The Northwest region of the Argentine territory played a pivotal role during the colonial period, constituting approximately 40% of the total population (Ferrer, 2008). Its proximity to the Upper Peru made it a crucial a supplier of fabrics, food, and livestock for transportation purposes, particularly the region of Tucumán. Moving further south, Córdoba also emerged as a significant center for livestock production, serving as a hub for mining centers. *Cuyo* focused on exporting wine, alcohol, and dried fruit to other regions. The Northeast remained largely disconnected from the colonial economy, except for the indigenous populations influenced by Jesuit missions. Patagonia saw no permanent occupation during this period (Ferrer, 2008). The *Litoral*, encompassing Buenos Aires, Santa Fe, Entre Ríos, and Corrientes, was historically the least developed and populated region in Argentina for a considerable part of the colonial era.

The geographical significance of Buenos Aires changed significantly following the implementation of the Bourbon reforms in the 1770s. Previously, silver from Potosí had been routed to Europe via the Lima port. However, the reforms legitimized the commercial monopoly in the port of Buenos Aires, formerly associated with smuggling, especially over the entire southern extreme of the continent. These changes also saw Buenos Aires designated as the capital of the Viceroyalty of the Río de la Plata, elevating it to a major administrative and commercial center (Santilli, 2013; Newland & Ortiz, 2001). Additionally, the export of hides drove the expansion of cattle production in Buenos Aires and its neighboring region, Entre Ríos. This growth was fueled by the increasing international trade and European industrialization, particularly in Great Britain[7]. The shift from the Potosí-Lima commercial axis to Potosí-Buenos Aires benefited some interior cities, as they became important transit points for commercial routes. Moreover, due to its expansion, Buenos Aires emerged as a crucial market for regions facing challenges to reach Potosí, and it served as an alternative market for those that did not, such as Salta, Tucumán, and Córdoba (Gelman, 2010; Nicolini, 1992).

In their efforts to quantitatively compare the sizes and performances of different regions during the colonial period, Gelman (2010), Gelman (2014), and Garavaglia (1987) used data on tithes on agricultural products. This dataset revealed that, despite the fact that Buenos Aires exhibited remarkable growth in the late eighteenth century, it did not significantly outpace other regions. In fact, there were instances where other regions seemed to have grown even faster. For instance, during the final decade of the 18th century, Buenos Aires witnessed a 60% increase in tithes, whereas Córdoba more than doubled its tithe revenues. In terms of size, although Buenos Aires contributed approximately one-third of the total tithes by around 1800, the disparities in comparison to other regions were relatively modest. Córdoba, as the second-largest region in terms of tithes, also held a substantial share of 20%, while smaller regions such as Santa Fe and San Juan each accounted for approximately 7% of the total.

Following the independence wars that began in 1810, Gelman (2014) and Gelman & Santilli (2010) observe a shift in regional dynamics, with Buenos Aires emerging as the dominant region and the oth-

[7] It should be noted that trade was not conducted directly with that country, but rather through the intermediation of the Spanish empire, following the mercantilist scheme, which derived benefits from price differentials.

ers lagging behind. This shift was closely tied to changes in relations with the upper Peruvian and European markets. On the one hand, the silver production in the Upper Peru declined[8]. In addition, the connection between what is now Argentina and the territories of Upper Peru was severed when the latter fell into enemy hands during the war. This had a particularly negative impact on the northern regions of Argentina, which were most connected to this market. On the other hand, the industrial revolution in Europe coupled with reduced maritime transport costs led to an increased demand for raw materials and food from the Atlantic markets[9]. The relative prices of these products experienced a meaningful and sustained increase due to growing demand (Gelman, 2011), which fostered livestock expansion in Buenos Aires and its surrounding provinces, abundantly covered with extensive grasslands for cattle. This, in turn, stimulated a form of export-led economic growth in the region. In contrast, other regions of the country faced higher transportation costs to access the Atlantic markets, as the railroad network was not developed until the last third of the 19th century. Additionally, these regions had less favorable factor endowments for producing the goods demanded by those markets. The loss of the Upper Peruvian market further exacerbated the lagging of these regions behind Buenos Aires for much of the century.

In connection to this, Newland & Cuesta (2018) note that already in 1820, two regions with different dynamics were delineated in the Argentine territory. On the one hand, there was the *Litoral*[10] (Buenos Aires, Entre Ríos, Santa Fe, and Corrientes), focused on the Atlantic economy and livestock production. This economic activity generated high incomes, which subsequently triggered the development of a significant tertiary sector and a relatively high level of urbanization (urbanization rate of 37% in 1819). On the other hand, there were the rest of the interior provinces, which were linked to the lost Upper Peruvian market and exhibited a weaker economic structure, primarily devoted to subsistence activities, resulting in a lower urbanization rate of 18%. In addition to having lost their main market, these provinces also faced difficulties in selling their products in the Buenos Aires market, due to competition from imported European goods. The regional imbalance persisted and deepened over time. Around 1869, the *Litoral* region boasted an urbanization rate of 46%, while the interior region lagged significantly behind at only 16%. This lower proportion compared to 1819 indicated a stagnation in the interior region's economic structure (Newland & Cuesta, 2018).

Despite the acute limitations in terms of quantitative data, Gelman and co-authors (Gelman, 2010, 2011, 2014; Gelman & Santilli, 2010) attempted a comparative analysis of Argentina's regional economic evolution in first half of the 19th century. Their approach involved a creative synthesis of dif-

[8] The production of silver underwent a significant decline, falling from approximately 1,800 tons in 1800 to 840 in 1810, further dropping to 600 in 1825. It stabilized at round 500 tons by 1870 (Irigoin, 2003).
[9] In addition, following independence, trade ceased to be conducted through the intermediation of Spain.
[10] Buenos Aires, Entre Ríos, Santa Fe, and Corrientes.

ferent measures of provincial relative economic importance at three distinct time points: tithes on agricultural production around 1800, livestock stock and rural wealth in the late 1830s (using only data from Buenos Aires and Córdoba data, with the latter considered representative of the country's interior), and total wealth in the mid-1860s. The results suggest widening disparities in the sizes of regional economies over this half-century, leading to a significant gap between Buenos Aires and the rest of the country, which generally lagged behind. Specifically, the provinces of *Litoral* (i.e., Santa Fe, Entre Ríos, and Corrientes) maintained and even increased their economic participation, while *Cuyo* and the rest of the regions lost positions. Particularly, *Tucumán colonial* (present-day Córdoba, Santiago del Estero, Catamarca, La Rioja, Tucumán, Salta, and Jujuy) experienced a substantial decline from representing 43% of tithe collection at the beginning of the century to constituting only 16% of wealth by the middle of the century. It's worth noting that regions with more prosperous economies during this period also experienced higher population growth. However, despite the fact that the results exhibit nuances when examining the variables on a per capita basis, the primary conclusions of the study remain valid.

Much of the regional dynamics in the mid-19th century can be attributed to the fact that the dissolution of the colonial state after the country's independence in 1816 did not automatically lead to the formation of a unified national state (Oszlak, 1997). During this period, internal conflicts arose due to the disproportionate power of Buenos Aires, both in decision-making over the former territories of the Viceroyalty of Río de la Plata, and in shaping policies related to external trade and customs control. These conflicts, which escalated to prolonged civil wars, proved to be significant obstacles to the establishment of institutional, administrative, and political stability (Ferrer, 2008). During this period, regions with conflicting interests strove for dominance. On one side were those regions that could profitably participate into the expanding trade towards the Atlantic, with a focus on exporting agricultural products and importing manufactured goods, while others faced challenges in this regard. The end of the civil wars and the subsequent process of constitutional and political organization initiated in 1853 and solidified during the last quarter of the 19th century, resulting in the predominance of Buenos Aires over the other provinces. This dominance was, however, achieved through compromises with some economies of the interior[11].

In the years that followed, Argentina eagerly embraced global markets for goods, services, and productive factors, emerging as a paradigm of rapid income growth. This growth was primarily driven by the exploitation of abundant fertile land and comparative advantages in the production of primary

[11] In the 1853 national constitution of Argentina, the legislative power was divided into a Senate with fixed representation for each province and a Representative Chamber (*Cámara de Diputados*) where the representation of each province was proportionate to its population. This constitutional arrangement aimed to minimize conflicts between the "large" provinces like Buenos Aires and the "small" provinces like many of the traditional provinces in the North (Gallo & Cortés Conde, 1995).

goods, such as wool, meat, and cereals for international markets (Aráoz *et al.*, 2020). The 1880s marked the onset of the first massive immigration explosion, contributing to a significant increase in the labor supply that complemented the expansion of available productive land. Simultaneously, there was a substantial inflow of foreign investment, mostly in infrastructure and railways, which increased productive capital and reinforced the expansion of agro-pastoral lands. To illustrate the scale of this phenomenon, the 1895 and 1914 censuses reveal that the percentage of foreigners in the country exceeded 25%, reaching almost 50% in Capital Federal. Meanwhile, the length of railway tracks expanded from less than 3,000 kilometers in 1880 to over 30,000 kilometers in 1914. The confluence of these factors resulted in a remarkable growth in the production of maize, wheat, meat, and wool, with the primary sector contributing 36.5% to the Argentine GDP in 1895 (Cortés Conde, 1994).

The expansion of the production of exportable agricultural goods and its concentration in the Pampas, together with the national authorities' adoption of a free trade policy, the rapid development of railways, and the establishment of a national market, transformed this region into the dynamic center of the national economy (Ferrer, 2008). In addition to its favorable factorial endowment, the region's momentum was further reinforced by the favorable location of ports connecting to foreign markets. Additionally, significant population and capital flows from Europe were directed toward the Pampean region, particularly focusing on Buenos Aires. This coincided with a surge in urbanization in the region, leading to the concentration of manufacturing and service industries[12]. This concentration can be explained by several factors, including the presence of a consumer market, the availability of basic services such as energy, sanitation, and transportation, the proximity to import centers for raw materials and intermediate products used by the industry, and the abundance of labor and technical expertise (Ferrer, 2008).

In other regions of the country, traditional artisanal manufacturing such as textiles, which had already been in decline since independence, struggled to compete with European imports (Gerchunoff & Llach, 2018; Sawers, 2018). Consequently, many of the economies in these regions shifted their focus to industrial crops destined to supply the domestic market, including sugar cane in Tucumán and Jujuy, vineyards in *Cuyo*, fruits in Río Negro, cotton in Chaco and Formosa, and yerba mate in Misiones. Many of these activities, some of which have colonial origins such as sugar in Tucumán and wine in Mendoza, continue to play a significant role in the economies of these provinces today. These activities helped to expand average productivity in some regions, enabling them to participate in the overall national economy. However, they had to cope with strong fluctuations in domestic demand, production, and state intervention (Belini & Korol, 2020).

[12] According to the 1914 census data, 33% of foreigners in the country were concentrated exclusively in Capital Federal. Additionally, during the same period, this territory accounted for 34% of the GDP in the secondary sector (Aráoz & Nicolini, 2020).

Despite certain changes and modernization processes in specific provinces within these regions, the consensus in the literature is that they lagged significantly behind the more developed Pampean region (Cao & Vaca, 2006; Díaz Alejandro, 1970; Gerchunoff & Llach, 2018; Ferrer, 2008; Sawers, 2018; Morris, 1972). Consequently, they became peripheral zones dependent on the dynamic centers of the Pampean region. Provinces like La Rioja or Santiago del Estero were unable to develop similar economic activities and fell even further behind. A less-explored case is that of Patagonia, located in the southern part of the country. This sparsely populated region, formerly occupied by native populations, was incorporated into the national government's domain following the military expansion of the *Conquista del Desierto* (1879-1885). Patagonia embarked on economic activities immediately after independence. Initially focused on sheep farming, the region later embraced oil production in the early 20th century.

This period, spanning from the formation of the Argentine state in the late 19th century to the international crisis of 1930, is commonly referred to as the agro-export period. Although historical evidence suggests a striking variation in economic performance across different regions of the country during this time, a formal assessment of these variations proves challenging due to a lack of comparable economic data. As a result, scholars have had to rely on indirect measures to gauge regional performance. The national censuses of 1869, 1895, and 1914 are the most commonly used sources of comparable information, along with data on living standards and markets for specific products of importance in certain regions. Díaz Alejandro (1970) uses provincial mortality and infant mortality rates from 1925-30 to evaluate regional economic standing, but these measures provide only a snapshot of the relative conditions for the final years of the period. Other scholars use provincial fiscal revenue data to approximate the relative economic affluence of the Argentine provinces, such as Llach (2007) and Sánchez (2017).

Universidad de SanAndrés

However, it is worth noting that all the aforementioned sources have limitations when attempting to approximate comprehensive measures of economic activity. For instance, measures based on censuses or data from specific sectors capture only a partial picture of economic activity in regions. Moreover, while mortality rates are expected to correlate with income levels, systematic discrepancies may arise from the prevalence of certain diseases in specific climatic or geographic conditions. With respect to provincial fiscal revenue data, their accuracy in capturing the relative size of regional economies may be affected by differences in tax pressure, opportunities for tax evasion related to the nature of economic activities, or sources of revenue, such as the presence of customs.

Recently, Aráoz & Nicolini (2016, 2020) made a significant breakthrough in the comparative analysis of provinces. Using an array of variables, including census data, information on wages, prices of main products, and sectoral productivity, they estimated the provincial gross domestic product for the years 1895 and 1914. Their findings provided, for the first time, a more comprehensive picture of regional economic dynamics at the end of the period of export-led growth. Echoing previous conclusions, they reveal a noteworthy concentration of both population and GDP in the Pampean region. In 1895, this region accounted for over 65% of the total country's population and 75% of its GDP. By 1914, these figures rose to over 70% of the population and 80% of the GDP. Furthermore, their results indicate that the Pampean region and certain Patagonian territories had a relatively higher GDP per capita as early as 1895. For example, in both 1895 and 1914, the GDP per capita of Capital Federal exceeded the national average by about 30%, and that of Santa Cruz (in Patagonia) was about twice as high. In contrast, northern territories like Catamarca and Santiago del Estero had per capita GDP failing to reach even 50% of the national average.

Despite the relatively high GDP per capita in the Pampean region, Araoz & Nicolini's estimates for Buenos Aires province were unexpectedly lower than anticipated based on previous literature. Additionally, the GDP per capita growth in Buenos Aires from 1985 to 1914 did not exhibit substantial deviations from the simple average of all provinces. Even though these findings might seem surprising at first, they are consistent with the influx of migrants to Buenos Aires that may have generated extensive growth rather than an expansion of per capita income. Furthermore, their research reveals a process of economic convergence in the levels of GDP per capita, indicating a catch-up phenomenon in the most lagged regions. In addition, Aráoz & Nicolini also estimated the provincial GDP at the sectoral level. Unlike the works previously mentioned, their approach enables the incorporation of structural differences in production among provinces into the analysis. Their sectoral analysis suggests that growth in the leading districts was driven by agglomeration economies in the secondary and tertiary sectors, as observed in Capital Federal, while in other cases, particularly in Patagonia, it was influenced by land abundance in the primary sector.

Universidad de SanAndrés

Overall, the recent findings presented by Aráoz & Nicolini emphasize the importance of using formally comparable aggregate economic activity indicators when conducting regional analyses. These indicators provide a more accurate and comprehensive understanding of regional economic dynamics, helping to overcome limitations associated with individual data sources and capturing the complex interplay of various factors that influence regional economic performance. The problems of imprecision introduced by the use of proxy variables for provincial economic size become apparent when comparing the 1914 provincial GDP shares of Aráoz & Nicolini (2020) with the 1913 provincial fiscal revenue shares used as a proxy by Sánchez (2017)[13]. According to Sánchez (2017), the two largest provinces, Buenos Aires and Capital Federal, accounted for 66% of the total fiscal revenue of the districts considered, a figure higher than the 57% of GDP in Aráoz & Nicolini (2020). Even though this

[13] Sánchez (2017) adopts a methodology that excludes the territories directly administered by the national government in the first half of the 20th century. To facilitate comparison, the figures based on Aráoz & Nicolini (2020) in this paragraph were likewise computed, i.e., excluding these territories, which collectively represent less than 4% of the 1914 national GDP.

9% difference may not seem significant at first glance, it exceeds the share of the second largest province in Sánchez's (2017) and the third in Aráoz & Nicolini's (2020) work. Additionally, it surpasses the combined share of the 10 provinces with the lowest weight in Sánchez's subset. Moreover, the difference in the combined share of the two largest provinces leads to substantial differences in the shares of the remaining districts, which are notably smaller. For instance, in Aráoz & Nicolini (2020), Jujuy's weight is three times that in Sánchez (2017), and in Santa Fe, the weight in the former is 79% greater.

2.2.2- The Import Substitution Industrialization (ISI) Period

The beginning of the Great Depression in 1930 marked a pivotal moment for Argentina's economic model, which prompted a paradigm shift. In the aftermath of the crisis, the economy transitioned from a heavy reliance on agricultural exports to a greater emphasis on industrial production, primarily serving the domestic market. During this period, foreign trade contracted due to both external and internal factors, and state intervention in the functioning of the economy increased. Moreover, all of these changes were complex, influenced by other historical events on a global scale, such as the World War II, and on a domestic scale, such as the rise of General Perón and his economic policies (although with characteristics shared with other countries in the region). As noted below, while the literature suggests that the transformations associated with these events were far from homogeneous across the Argentine territory, the details on the actual regional evolution are still missing.

On a macro scale, the global crisis triggered a substantial contraction in international trade, accompanied by a sharp decline in the prices of Argentina's exportable agricultural products (Terranova, 2020, Girbal-Blacha, 2002). These factors reduced the country's import capacity, and, coupled with the various policies adopted to cope the effects of the crisis (i.e., exchange controls, increases in import tariffs, and abandonment of the gold standard) served as protection mechanisms for the manufacturing sector (Barbero & Rocchi, 2002).

Despite the significant role that the international crisis played in the Argentine import substitution process, it should not be assumed that the country's industrial activity was negligible before that. In fact, during the late nineteenth and early twentieth centuries, Argentina stood as the South American industrial front-runner (Della Paolera *et al.*, 2018). Relative to other nations in the region, Argentina possessed higher levels of human capital and enjoyed advantages in urbanization and transportation. What is more, the country had also initiated its industrial development earlier[14], primarily centered on

[14] Della Paolera *et al.* (2018) relies on a compilation of various indicators to illustrate this fact. In 1920, Argentina exhibited a notably lower illiteracy rate of 32%, contrasted with the higher rates observed in other South American countries, such as Brazil (65%), Chile (37%), and Colombia (56%). In the same year, Argentina exhibited an urbanization rate of 54%, surpassing that of Chile (47%), and even exceeding the urbanization rates

the manufacturing of consumer goods, particularly in the food and textile sectors. Industrialization at this time was the result of three key forces: domestic consumption (driven by mass immigration and an increase in GDP per capita), external demand (mainly agricultural-origin manufactures, particularly from cold storage plants), and import substitution (propelled by tariffs and domestic currency devaluation) (Barbero & Rocchi, 2003; Rocchi, 2005). This early industrialization was an endogenous, private sector-led process[15], stimulated by the dynamism of the export economy.

However, the country's growth based on exports of agricultural raw materials began to show signs of exhaustion around the First World War, which began in 1914. By this time, the horizontal expansion of the agricultural frontier of exportable products from the Pampas was reaching its limits (Girbal-Blacha, 2002) and, with the war, the inflow of factors such as labor and capital that had propelled the growth of agro-exporting Argentina was interrupted (Gerchunoff & Llach, 2018). The difficult conditions for overseas transportation during the war limited the competition of European products in the Argentine market, resulting in a boost for some industrial branches. Although primary production continued to dominate the national economic landscape, its relative importance compared to industry gradually diminished post-war, and the 1920s witnessed a shift in both scale and quality. Modern industrial plants increased in number and diversified into the production of new goods. Notably, metallurgical production experienced substantial growth, and new industrial activities including cement, oil extraction and distillation emerged (Barbero & Rocchi, 2003).

The years following the 1930 depression witnessed a transformation in the patterns of industrial evolution, characterized by a reinforcement of import substitution through the official control of foreign exchange and tariff increases (Barbero & Rocchi, 2003; Belini & Korol, 2020). Manufacturing emerged as the sector with the greatest expansion during the decade, led by the growth of cotton textiles, together with oil by-products, motor vehicles, and, to a lesser extent, metals. Remarkably, products that were virtually nonexistent in the previous period, such as rubber, machinery, and electrical appliances, showed impressive growth.

In addition to the transformative effects of the First World War and the 1930 crisis, the Second World War gave a further boost to Argentina's import substitution industry. The sharp decline in the industrial exports of the belligerent nations during this period propelled Argentine industry to a position of considerable prominence within the national economy, surpassing the gross industrial product of the agricultural sector in 1943 (SAE, 1955). In fact, Argentina even succeeded in exporting manufactured goods to other Latin American countries (Rapoport, 2008). However, the downside of this process

of Brazil (31%) and Colombia (29%) in 1940. In terms of transportation infrastructure, Argentina had a higher railway density in 1920, measuring 3,981.7 railway kilometers per million people, outpacing Brazil (833.1), Chile (2,205.5), and Colombia (216.8).

[15] Although during the agro-export period there was tariff protection, it significantly differed from later decades as it was very far from being part of a grand plan for industrial promotion (Barbero & Rocchi, 2003).

was that the challenges associated with importing capital goods led to a labor-intensive industrialization that lacked competitiveness at this stage. Consequently, industrial exports were discontinued after the war (Belini, 2012).

In conjunction with external factors shaping the expansion of Argentine industry in the 1930s and throughout much of World War II, government interventions played a crucial role. However, these interventions lacked coherence, mainly serving as responses to external shocks without integration into any formal industrialization plan (Barbero & Rocchi, 2003; Belini & Korol, 2020; Terranova, 2020; Reche, 2019). This dynamic landscape underwent a significant transformation with the government that came into power after the 1943 coup and especially under Juan Domingo Perón's administration, which began in 1946. Industrialization then evolved into a state policy, marking the postwar period with substantial state involvement in the economy. This involvement took the form of interventions in the financial market (deposit nationalization and credit orientation towards the industrial sector), nationalization of public services, implementation of labor redistribution policies, and regulation of foreign trade through the *Instituto Argentino de Promoción del Intercambio* (IAPI). Moreover, an expansionary fiscal policy was implemented (Cortés Conde, 2009; Cortés Conde *et al*., 2020; Gerchunoff & Llach, 2018; Belini & Korol, 2020).

Until the early 1950s, Argentina's substitutive industrialization is commonly referred to as the "easy" or "light" stage (Terranova, 2020; Reche, 2019). During this phase, the focus was predominantly on the development of light industries, including textiles, food, and durable goods, all characterized by their labor-intensive nature. This industrialization was primarily oriented toward the domestic market, resulting in negligible exports from this sector (Gerchunoff & Llach, 2018). Moreover, Argentina's industries were heavily reliant on imported inputs and capital goods, which, coupled with stagnant agricultural export volumes dating back to before 1930, posed significant constraints on growth. These challenges were further emphasized when international prices for these products experienced a notable decline, well into the second postwar period. As a result, Argentina experienced what economists commonly term as "stop and go" cycles (Brown & Joy, 1968). As the population's income and the manufacturing sector grew, so did the demand for imported goods. With foreign exchange earnings constrained by a stagnant export sector, the country found itself entangled in a balance of payments crisis. To restore equilibrium, the government was forced to devalue the currency, resulting in income redistribution from the urban sector to the primary export sector. Once the balance of payments was restored, and a minimum level of economic activity attained, the cycle began again (Belini & Korol, 2020).

The country's capital shortage, especially in the energy and transport sectors, coupled with an outdated industry which lacked funds for technological renewal, exacerbated the aforementioned issues (Cortés Conde, 2009). To cope with the challenges posed by "stop and go" cycles, the government pursued a strategic shift in development toward heavier industries. Tailored policies were aimed at fostering growth in the oil sector, iron and steel production, transport infrastructure, and energy. After a transitional period in the 1950s, this heavier "second" ISI period consolidated in the 1960s and extended until the mid-1970s (Llach, 2022; Reche, 2019). It was characterized by a cycle of alternation between dictatorial governments and democratically elected civilian administrations that implemented unstable and erratic economic policies (Aráoz *et al.*, 2020). For instance, there were shifts in the direction of fiscal and monetary policies, in the intensity of price controls, and in the attitudes toward foreign investment. In the 1950s, during Perón's second presidency (1952-1955) and specially during the subsequent de facto governments following his overthrow (1955-1958), there were efforts to reverse the direction of economic policy, which involved adopting a less expansionary fiscal regime and reducing state intervention. However, the military and political groups that removed Perón from power lacked a unified economic plan resulting in the failure to implement consistent policies (Belini & Korol, 2020).

At the end of the 1950s, the Frondizi government (1958-1962) was able to implement a strong policy aimed at promoting heavy industry, which combined stabilization measures with strong incentives for certain industrial sectors considered essential. It heavily relied on foreign capital through direct investment in the sector, marking a departure from the preceding period (Gerchunof & Llach, 2018; Belini & Korol, 2020; Petrecolla, 1989; Guadagni, 1989). The promotion of basic industries and the manufacturing of durable consumer goods were integral components of this initiative. To a certain extent, the policies aligned with the unbalanced growth strategy proposed by Hirschman (1958), who argued that a developing economy could stimulate economic growth by concentrating investment in key industries with high backward and forward linkages. The Frondizi program succeeded in reducing imports of certain items, such as oil, which previously accounted for a quarter of the country's imports, despite having reserves. However, the program also resulted in increased imports of inputs for other industries promoted during the period. Specifically, the savings from reduced oil imports were offset by expenditures on imports of inputs for the automobile industry (Gerchunoff & Llach, 2018).

At the same time, in the early 1960s, the exportable sector remained stagnant, leading to a cycle of recession due to external restrictions. However, the second half of the decade witnessed a remarkable surge in productivity within the exportable agricultural sector. This increase was the result of greater modernization, including mechanization and the use of hybrid seeds, which resulted from Argentina's participation (albeit late) in the Green Revolution. This boost in productivity was accompanied by an improvement in the terms of trade. Together with the industrial modernization at the beginning of the decade, these factors were key drivers of the substantial growth observed in the Argentine economy until the first half of the 1970s (Cortés Conde, 2009).

Universidad de San Andrés

The 1976 military coup is often recognized as a turning point, signaling the end of Argentine Import Substitution Industrialization (Belini & Korol, 2020; Ferrer, 2008; Rapoport, 2008). Since then, the evolution of the Argentine economy has been marked by economic instability, soaring inflation, enduring fiscal deficits, currency overvaluation, and efforts to reintegrate into global markets. The economic policies of the military government (1976-1983) deliberately aimed to dismantle key elements of the ISI strategy. These policies included reducing subsidies and tariffs, liberalizing labor and financial markets, and attracting significant capital inflows from international organizations and the private sector. However, this opening to international capital markets eventually led to a debt crisis in the 1980s. In the 1990s, standard liberal measures were further reinforced, including the privatization of public companies, reduction of the public sector, market liberalization, tariff reduction, and the implementation of a fixed exchange rate. Despite a period of considerable economic expansion, the combination of currency overvaluation and persistent deficits in both public and current accounts culminated in a severe crisis in 2001. This crisis was characterized by political turmoil, social unrest, default on public debt, and the most profound recession in Argentina since the 1930s (Gerchunoff & Llach, 2018).

Universidad de San Andrés

2.2.3- The ISI and the Regions

During the agricultural export period that preceded Argentina's ISI, marked regional disparities in provincial GDP per capita were already notable, as highlighted by Aráoz & Nicolini (2016, 2020). Nevertheless, these disparities tended to narrow over the period, indicating a tendency toward convergence among provinces in terms of GDP per capita. Aráoz & Nicolini arrive at this result employing growth regressions, a widely accepted empirical tool popularized by Barro & Sala-i-Martin (1992) to formally examine whether regions with lower initial GDP per capita experienced higher growth rates, a necessary condition for convergence. From a theoretical perspective, the prospect of both, convergence and divergence is plausible. On the one hand, the interplay of diminishing returns to capital and labor, coupled with the mobility of these factors across regions, can lead to convergence in GDP per capita levels (Solow, 1956). Conversely, counteracting forces, such as agglomeration economies (Krugman & Venables, 1995) or disparities in factor endowment could result in divergence (Sokoloff & Engerman, 2000)[16].

Except for Aráoz & Nicolini's (2016) examination of the agro-export period, the analyses of regional convergence in the Argentine literature have focused on the period from the 1950s onward. This temporal limitation arises due to the lack of official provincial GDP estimates before that time. In contrast

[16] **Chapter IV** will further expand on these theoretical issues.

to Aráoz & Nicolini's findings, the majority of these studies report no convergence in per capita product among provinces (Porto, 1994; Elías, 1995; Marina, 2001; Grotz & Llach, 2013)[17]. Brida *et al.* (2013) arrived at similar results by employing an alternative approach that involves cluster analysis techniques on data spanning from 1960 to 2000. Their methodology involved grouping provinces with similar economic performance and provinces in transition that could not be linked to any established patterns. Two main clusters were identified: one comprising low-performing provinces located in the north of Argentina, and the other consisting of high-performing provinces, mainly dependent on agricultural and mining production, located in the center-south of the country. The results suggest that there are no automatic convergence mechanisms among Argentine provinces, at least since the "heavy" ISI period. Such conclusions are consistent with the findings of Aráoz *et al.* (2020) for a similar period, referenced in the next chapter of this thesis, and are also supported by the maps presented in **Chapter I**.

For the early stage of the Argentine ISI, there are significant limitations in conducting regional analyses similar to those mentioned in the previous paragraph with the currently available information. Specifically, there is a nearly 40-year gap between the recent provincial GDP estimates by Aráoz & Nicolini (2020) for 1914 and the earliest official estimate by CFI-ITDT (1965/1962) for 1953. Consequently, provincial GDP data are only available for the beginning and end of the light ISI period, resulting in the exclusion of within-period dynamics in any analysis relying on these data. This is not a trivial matter, given the substantial changes in the pattern of economic development and dominant economic policies during this time frame. After World War I and the 1930 crisis, and especially after World War II, there was an increasing role of defined industrial policies and state intervention. All these historical events and policy shifts could potentially affect each economic sector differently. Given the uneven distribution of sectors across the country, making assessments about regional dynamics without precise data becomes a formidable challenge.

The impact of the aforementioned events on the domestic industry, particularly in connection to import difficulties, holds the potential to disrupt regional dynamics. For example, due to agglomeration effects, industries may exhibit a tendency to cluster in areas that have already undergone some development, further fostering urbanization in those regions. This trend was evident in the Pampean region (Gerchunoff & Llach, 2018; Belini & Korol, 2020; Ferrer, 2008; Rapoport, 2008), where manufacturing and services became the primary sources of employment. Since these activities are concentrated in urban centers, the urbanization that started in the previous period accelerated. This urbanization unfolded through internal migration (no longer international, as in the *Belle Epoque*), mainly to the Greater Buenos Aires area. In particular, the greatest population growth occurred in the Buenos Aires

[17] The only exception is the study by Figueras *et al.* (2014), which identifies a convergence trend between 1990 and 2007.

conurbation, while from a certain point the population of Capital Federal stagnated in absolute terms (Lattes & Andrada, 2004)[18].

The factors that favored the Pampean region coexisted with other counteracting forces. To begin with, the import difficulties that stimulated industrial development also extended to capital goods, resulting in an industry characterized by low productivity (Cortés Conde, 2009). Moreover, the exportable agricultural sector, mainly located in the Pampean region, stagnated during the light ISI period. These factors, together with the previously mentioned population growth in the region fueled by internal migration, may have potentially tempered the region's relative success in terms of GDP per capita compared to the rest of the country.

Regarding the rest of the country, beyond the prevailing perception that most of the economic dynamism was concentrated in the manufacturing sector of the Pampean region, there are instances where the ISI was beneficial to some non-Pampean regions (Díaz Alejandro, 1970; Ferrer, 2008; Cao & Vaca, 2006; Belini & Korol, 2020; Rapoport, 2008). This benefit is often associated with the expansion of activities related to industrial crops intended to supply the domestic market. In some cases, these activities have been described as having a "great dynamism" (Belini & Korol, 2020) or "spectacular" growth (Díaz Alejandro, 1970). Examples include cotton in Chaco, tobacco and yerba mate in Corrientes and Misiones, and rice in Corrientes and Entre Ríos. However, there is also evidence indicating potential constraints in the growth of regions outside the Pampean region. Notably, certain sectors with growing production, such as sugar in Tucumán, Salta, and Jujuy, and wine in Mendoza and San Juan, have faced persistent challenges of overproduction crises and have relied on state protection measures (Sawers, 2018). Despite the connection of all these crops to industrial activities, the literature also underscores a limited industrial development outside the Pampean region (Díaz Alejandro, 1970; Ferrer, 2008). Moreover, by the mid-1950s, the non-Pampean agricultural sector was already supplying the local market, and its subsequent growth was contingent on the expansion of domestic demand, as well as on its limited export capacity (Solbrig, 2002).

Based on the information presented above, it is evident that the literature highlights a deficiency in offering a clear perspective on the relative performance of Argentine regional economies during the light ISI period. The absence of regional indicators for aggregate economic activity during this period renders all existing assessments of regional performance impressionistic, incomplete, and potentially inconsistent. With no provincial GDP data available, the literature has attempted to analyze regional patterns through alternative indicators for cross-province comparisons. Yet, these attempts are not without their own set of challenges and limitations.

Universidad de San Andrés

[18] From the 1947 census to 2010, the total population of this city barely changed.

One example of such attempts can be found in Díaz Alejandro (1970). He compares regional dynamics between 1935 and 1954, using two alternative measures based on the industrial sector. However, his findings reveal some inconsistency. While the use of provincial data on industrial employment indicates a decline in sector concentration in Greater Buenos Aires during this period, this observation loses significance when he shifts to using the provincial share of industrial wages and salaries as a measure.

An alternative perspective on regional economic dynamics involves examining demographic factors, such as population growth or internal migration flows. This approach relies on the idea that more "successful" regions tend to attract population from less developed areas, which expel them. The availability of census data for the years 1914, 1947, and 1960 makes it possible to use this approach for the Argentine regions. In this line, Ferrer (2008) and Cao & Vaca (2006), categorize the provinces into four groups:

- The Pampean provinces, with a high and growing share of the country's total population.

- The Patagonian provinces, with a very low population share, but growing during the period. This growth was linked to the development of oil activities.

- Regions and provinces with "export" activities to the Pampean region, which have been able to generate employment to maintain their population. Provinces like Tucumán, Salta, San Juan, Mendoza, Misiones, Chaco, and Entre Ríos fall into this category.

- Backward regions and provinces, which struggled to develop significant "export" activities to other regions. In these cases, there was a decline in the participation of their populations in the country as a whole. The provinces of Catamarca, La Rioja, Santiago del Estero, Formosa, Corrientes, San Luis, and Jujuy fall within this category.

However, as shown in **Section 2.2.1**, an analysis solely reliant on population evolution or economic size indicators may yield misleading results when compared to a combined approach, such as considering GDP per capita[19].

The limited number of comparative analyses that attempt to use aggregated regional economic indicators (i.e., not limited to a single sector) encounter challenges such as information gaps, incompleteness, or unclear methodology. Bunge (1940) attempted such a comparative analysis by constructing an index of "per capita economic capacity" for each province in 1937. This index was derived from

[19] In the Gelman studies for the post-independence period mentioned in **Section 2.2.1**, the results derived from proxies for economic size are nuanced by relativizing them with respect to the population. Similarly, in the context of the agro-export period Aráoz & Nicolini (2016, 2020) find that the relatively high level of GDP in Buenos Aires is offset by population migration flows. As a result, the GDP per capita relative to the other provinces is lower than would be expected.

census data on the value of industrial and agricultural output, investment in industry, and the number of automobiles. According to his findings, the map of the country resembles a "hand fan", showing a decline in density, population, economic capacity, cultural level, and standard of living as the distance from the capital increases. Bunge also argues that regional imbalances had worsened in the three decades preceding his work due to demographic attraction towards large cities in the Pampean region and the concentration of national fiscal resources in this area. However, it is important to note that this study has a limitation: the indicator used excludes an important part of the tertiary sector of the economy.

Zalduendo (1975) analyzed the period spanning from 1946 to 1968, complementing existing estimates of provincial GDP for 1953, 1959, 1965, and 1968 with an independent estimate of per capita income for 1946. The findings underscore substantial regional disparities in per capita income (or product), especially between the Pampean and Patagonia regions compared to the rest of the country. However, a crucial limitation emerges, as the accuracy of the 1946 estimate cannot be assessed due to the lack of information on the methodology in the publication. Moreover, attempts to locate the primary source to which Zalduendo refers have proven unsuccessful.

Given the substantial limitations in the existing research discussed in the previous paragraphs, crafting a clear and cohesive understanding of the process of regional disparities and economic growth in the central decades of the 20th century, particularly during the period of light industrialization, proves to be a formidable task. The next chapter in this thesis endeavors to overcome these challenges. First, it introduces a new set of consistent, comparable, and methodologically robust estimates of regional GDPs for the years 1937 and 1946. Building on these results, the chapter then proposes initial interpretations and hypotheses that will undergo formal testing in the subsequent chapters.

Universidad de San Andrés

2.4- References

ARÁOZ, M. F. & NICOLINI, E. (2016): "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". *Anales LI Reunión Anual de Asociación Argentina de Economía Política*.

ARÁOZ, M. F., & NICOLINI, E. A. (2020): "Regional growth and the persistence of regional income inequality in Argentina in the first half of the twentieth century". *Journal of Latin American Studies*, 52(2), 293-316.

ARÁOZ, M. F., NICOLINI, E. A., & TALASSINO, M. (2020): "Growth and convergence among Argentine provinces since 1895". In TIRADO-FABREGAT, D., BADIA MIRÓ, M. & WILLEBALD, H. (Eds.): *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 65-95). Palgrave Macmillan, Cham.

ASSADOURIAN, C. S. (1982): *El sistema de la economía colonial: mercado interno, regiones y espacio económico*. Instituto de Estudio Peruanos. Lima, Perú.

BARBERO, M. I., & ROCCHI, F. (2002): "Industry". In DELLA PAOLERA, G. & TAYLOR, A. (Eds.): *A New Economic History of Argentina*. Cambridge.

BARBERO, M. I., & ROCCHI, F. (2002): "La industria (1914-1945)". Academia Nacional de la Historia. Nueva Historia de la Nación Argentina, Vol. 9.

BARRO, R. J., & SALA-I-MARTIN, X. (1992): "Convergence". *Journal of political Economy*, 100(2), 223-251.

BELINI, C. & KOROL, J. C. (2020): *Historia económica de la Argentina en los siglos XX y XXI*. Ed. Siglo XXI.

BELINI, C. (2012): "Industrial exports and Peronist economic policies in post-war Argentina". *Journal of Latin American Studies*, 44(2), 285-317.

BENEDETTI, A. (2009): "Los usos de la categoría región en el pensamiento geográfico argentino". *Scripta Nova*, 13(286), 6-8.

BRAUN, O. & JOY L. (1968): "A Model of Economic Stagnation-A Case Study of the Argentine Economy Author". *The Economic Journal* 78, no. 312: 868–87.

BRIDA, J. G., GARRIDO, N., & LONDON, S. (2013): "Estudio del desempeño económico regional: el caso argentino". *Cuadernos de Economía*, 32(60), 399-427.

BUNGE, A. (1940): *Una nueva Argentina*. Buenos Aires.

CAO, H., & VACA, J. (2006): "Desarrollo regional en la Argentina: la centenaria vigencia de un patrón de asimetría territorial". *EURE* (Santiago), 32(95), 95-111.

CAO, H., RUBINS, R., & VACA, J. (2003): "Clasificaciones y agrupamientos de provincias y territorios de la República Argentina". *Asociacion de Administadores Gubermentales*.

Consejo Federal de Inversiones y Centro de Investigaciones Económicas Instituto Torcuato Di Tella (CFI-ITDT) (1965): *Relevamiento de la estructura regional de la economía argentina*. Buenos Aires: Ediciones CFI. (Reprinted from Universidad Torutato Di Tella, 1962).

Universidad de SanAndrés

CORTÉS CONDE, R. (1979): *El progreso argentino, 1880-1914*. Editorial Sudamericana, Buenos Aires.

CORTÉS CONDE, R. (1994): "Estimaciones Del Producto Bruto Interno de Argentina 1875-1935". Unpublished.

CORTÉS CONDE, R. (2009): *The Political Economy of Argentina in the Twentieth Century*. Cambridge University Press, New York.

CORTÉS, R., ORTIZ, J., D'AMATO, L., & DELLA PAOLERA, G. (2020): *La economía de Perón: Una historia económica (1946-1955)*. Edhasa.

DELLA PAOLERA, G., AMOROCHO, X. H. D., & MUSACCHIO, A. (2018). "The Industrialization of South America Revisited: Evidence from Argentina, Brazil, Chile and Colombia, 1890-2010". *National Bureau of Economic Research* (No. w24345).

DÍAZ ALEJANDRO, C. (1970): *Essays on the economic history of the Argentine Republic*. Yale University Press.

ELÍAS, V. (1995): "Regional economic convergence: The case of Latin American economies". *Estudios de Economía*, 22(2), pp. 159-176.

ELIAS, V. J., ALEM, M., ELIAS, J. J. & MANCINO, M. A. (2013): Argentina's Regional Performance: 1970–2010. In *Regional Problems and Policies in Latin America* (pp. 243-278). Springer, Berlin, Heidelberg.

ENGERMAN, S., & SOKOLOFF, K. L. (2000): "Institutions, factor endowments, and paths of development in the new world". *Journal of economic Perspectives*, 14(3), 217-32.

FERRER, A. (2008): *La economía argentina: desde sus orígenes hasta principios del siglo XXI*. Fondo de Cultura económica: Buenos Aires.

FIGUERAS, A. J., CRISTINA, D., BLANCO, V., ITURRALDE, I. Y CAPELLO, M. L. (2014): "Un aporte al debate sobre la convergencia en Argentina: la importancia de los cambios estructurales". Revista Finanzas y Política Económica, 6(2).

GALLO, E., & CORTÉS CONDE, R. (1995): *Argentina: La República Conservadora*. Buenos Aires: Paidós.

GARAVAGLIA, J. C. (1987): "Crecimiento económico y diferenciaciones regionales: el Río de la Plata a fines del siglo XVIII". *Economía, sociedad y regiones*, 1700-1855.

QUAERERE VERUM
Universidad de
SanAndrés

GELMAN, J. (2010): "La Gran Divergencia. Las economías regionales en Argentina después de la Independencia". In BANDIERI S. (comp.): *La historia económica y los procesos de independencia en la América hispana* (pp. 105-129). Buenos Aires, Prometeo.

GELMAN, J. (2011): "Desequilibrios regionales, desigualdades sociales. Las economías argentinas en el siglo XIX". In GELMAN J. (coord.): *El mapa de la desigualdad en la Argentina del siglo XIX*. Rosario: Prohistoria.

GELMAN, J. (2014): "Economic Inequalities in Nineteenth Century Argentina". *The Journal of European Economic History*, XLII, 11-2014, 47-86.

GELMAN, J., & SANTILLI, D. (2010): "Crecimiento económico, divergencia regional y distribución de la riqueza: Córdoba y Buenos Aires después de la Independencia". *Latin American Research Review*, 121-147.

GERCHUNOFF, P. & LLACH, L. (2018): *El ciclo de la ilusión y el desencanto: políticas económicas argentinas desde 1880 hasta nuestros días*. Crítica Argentina.

GIRBAL-BLACHA, N. (2002): "Agricultura y ganadería (1914-1945)". *Academia Nacional de la Historia. Nueva Historia de la Nación Argentina*, Vol. 9.

GROTZ, M. & LLACH, J. J. (2013): "Coparticipación casi sin convergencia, 1950-2010". In *Consecuencias económicas y políticas del federalismo fiscal argentino* (No. 338 (82) (091)). Universidad Nacional de La Plata, La Plata.

GUADAGNI, A. A. (1989): "Economic Policy during Illia's Period in Office, 1963–6". In *The Political Economy of Argentina, 1946–83* (pp. 147-165). Palgrave Macmillan, London.

HIRSCHMAN, A. O. (1958): *The strategy of economic development*. New Haven: Yale University Press.

HORA, R. (2010): *Historia económica de la Argentina*. Argentina: Siglo Veintiuno Editores.

IRIGOIN, M. A. (2003): "La fabricación de moneda en Buenos Aires y Potosí y la transformación de la economía colonial en el Río de la Plata (1820–1860)". In IRIGOIN, M. A. & SCHMIT, R. (eds.): *La desintegración de la Economía Colonial. Comercio y moneda en el interior del Espacio Colonial (1800–1860)*. Buenos Aires: Biblos.

KRUGMAN, P., & VENABLES, A. J. (1995): "Globalization and the Inequality of Nations". *The quarterly journal of economics*, 110(4), 857-880.

Universidad de San Andrés

LATTES, A. E., & ANDRADA, G. (2004): "El subsistema demográfico de la Ciudad de Buenos Aires". *Población de Buenos Aires,* 1(1), 71-81.

LLACH, J. (2002): "La industria (1945-1983)". *Academia Nacional de la Historia. Nueva Historia de la Nación Argentina,* Vol. 9.

LLACH, L. (2007): *The wealth of the provinces: The rise and fall of the Interior in the political economy of Argentina, 1880–1910*. Harvard University.

MARINA, A. (2001): "Convergencia económica en Argentina: ¿qué nos dice la evidencia empírica?". In *Convergencia económica e integración: La experiencia en Europa y América Latina* (pp. 147-162). Ediciones Pirámide.

MORRIS, A. S. (1972): "The Regional Problem in Argentine Economic Development". *Geography*, 1972, p. 289-306.

NEWLAND, C., & CUESTA, M, G. (2018): "La economía argentina después de la independencia (1810-1870)". In CORTÉS CONDE, R., & DELLA PAOLERA, G. (dir.): *Nueva historia económica de la Argentina*. Buenos Aires: Edhasa.

NEWLAND, C., & ORTIZ, J. (2001): "The economic consequences of Argentine independence". *Cuadernos de economía*, 38(115), 275-290.

NICOLINI, E. (1992): "Circuitos comerciales en Tucumán entre 1825 y 1852. Tensión entre el mercado del Pacífico y el del Atlántico". *Data*, 2, 63-96.

OSZLAK, (1997): *La formación del Estado argentino*. Buenos Aires: Editorial Planeta.

PETRECOLLA, A. (1989): "Unbalanced Development, 1958–62". In *The Political Economy of Argentina, 1946–83* (pp. 108-128). Palgrave Macmillan, London.

PORTO, G. (1994): "Convergencia y política económica: algunos resultados para las provincias argentinas". *Anales de la Asociación Argentina de Economía Política*, 29º: La Plata.

RAPOPORT, M. (2008): *Historia económica, política y social de la Argentina (1880-2003).* Number 982. Editorial Emecé.

RECHE, F. H. (2019): "La Industrialización por Sustitución de Importaciones (ISI): usos y sentidos de una expresión polisémica". *Folia Histórica del Nordeste*, (35), 27-50.

ROCCHI, F. (2005). *Chimneys in the Desert: Industrialization in Argentina During the Export Boom Years, 1870-1930*. Stanford University Press, 2005.

Universidad de San Andrés

SÁNCHEZ, G. (2017). “Evolución económica de las provincias argentinas durante la Belle Époque (1880-1913). Un análisis a través de los recursos fiscales”. *Tiempo y Economía*, 4(2), 89-112.

SANTILLI, D. (2013): “¿Perjudiciales o beneficiosas? La discusión sobre el impacto económico de las reformas borbónicas en Buenos Aires y su entorno”. *Fronteras de la Historia*, 18(2), 247-283.

SAWERS, L. (2018): *The other Argentina: the interior and national development*. Routledge, New York.

Secretaría de Asuntos Económicos (SAE) (1955): Producto e Ingreso de la República Ar-gentina en el período 1935 - 54. Buenos Aires.

SOBRIG, O. (2002): “Agricultura y ganadería (1945-1983)”. *Academia Nacional de la Historia. Nueva Historia de la Nación Argentina*, Vol. 9.

SOLOW, R. M. (1956): “A contribution to the theory of economic growth”. *The Quarterly Journal of Economics*, 70(1), 65-94.

TERRANOVA, L. (2020): “Industrialización por sustitución de importaciones “liviana” en Argentina: caracterización de los establecimientos industriales (1930–1955)”. *Revista de Economía Política de Buenos Aires*, (21), 49-94.

ZALDUENDO, E. A. (1975): “Las desigualdades económicas entre las regiones de Argentina”. *CEPAL Documento B/14*.

QUAERERE VERUM
Universidad de
SanAndrés

CHAPTER III

REGIONAL GDP ESTIMATES FOR ARGENTINA FROM THE DEPRESSION TO THE SECOND POSTWAR PERIOD

3.1- The Regional Statistical Gap

It is well known that Gross Domestic Product (GDP) serves as the main macroeconomic indicator for assessing a country's economic activity. Official GDP estimates are available for Argentina starting in 1935 (BCRA, 1946)[1], and unofficial estimates even reach back to the early 19th century (Ferreres, 2010). However, regarding regional data, comparable official estimates for all first-level administrative subdivisions (i.e., provinces) are only available from 1953 onward, initially produced by the *Consejo Federal de Inversiones y Centro de Investigaciones Económicas Instituto Torcuato Di Tella* (CFI-ITDT, 1965/1962). For years preceding 1953, except in special cases, provincial-level estimates are not available.

Recent contributions by Aráoz & Nicolini (2016, 2020) represent valuable progress in terms of data generation, offering provincial GDP estimates for 1895 and 1914. These new datasets, together with series for the post-1950 period, enable a precise measurement of regional asymmetries, which manifest, for example, in differences in GDP per capita between the north and the south of the country (favoring the latter), as well as in the concentration of GDP in the Pampean region. What is particularly remarkable is the persistence of these differences between the two periods, despite significant variations in terms of levels of openness, average growth, government intervention, and, more generally, development patterns. However, while this consistency is apparent, notable disparities emerge when looking at sectoral information, especially in the profiles of leading provinces. For instance, part of the high GDP per capita observed in the South during much of the 20th century can be primarily attributed to the exploitation of its oil resources. Nevertheless, data from 1914 (i.e., predating the rise of the oil sector) also show that these provinces were among the richest, but because of other factors (namely, extensive sheep raising in a context of land abundance and low population density). Despite these advancements, the lack of data for the almost four decades between 1914 and 1953 poses a considerable obstacle to conducting accurate quantitative studies on the relative evolution of the different regions within the country.

Universidad de San Andrés

[1] Central Bank of the Argentine Republic.

The fact that Argentina has remarkable spatial asymmetries in terms of population density, natural resource availability, infrastructure, and access to markets underscores the importance of incorporating a regional perspective in the analysis of economic development. Failing to consider this aspect would lead to a loss of valuable details, which are essential for understanding the evolution of the country's economy. The most prominent example regarding these asymmetries is the concentration of the population in the city of Buenos Aires, where the main port is located, as well as in its surrounding areas. This large urban agglomeration is located within the Pampean region's territories, which are characterized by their land suitability for the main exportable agricultural products. In contrast, the southern part of the country is sparsely populated but endowed with hydrocarbon reserves. In the northern region, some areas thrive on industrial activities focused on locally grown crops, such as cane sugar, wine, tobacco, and yerba mate, among others, which are primarily intended for the domestic market. Given these and other asymmetries, as detailed in **Chapter II**, it would not be surprising to observe variations in income levels across regions, and distinct growth patterns over time.

As previously noted, the lack of available data hinders the analysis of regional economies during a significant portion of the first half of the 20th century. This period is particularly relevant because Argentina was exposed to several shocks and underwent numerous social, political, and economic transformations that arguably had uneven effects across its territory. These shocks and transformations include World War I, the 1930 economic crisis, World War II, and Perón's interventionist policies, which were marked by increased state involvement in the economy. Given the significant impact of these events on the country's engagement in international trade, it is expected that their effects will vary among regions, depending on whether their production is primarily oriented toward foreign or domestic markets. Moreover, some of the consequences of these events acted as catalysts for industrialization, which tends to have a more pronounced impact on urban areas. Indeed, in Latin American countries, such changes are linked to the shift from an agro-export economy to an industrial market-based one. In Argentina's case, the second quarter of the twentieth century witnessed the light stage of Import Substitution Industrialization (ISI)[2]. Unfortunately, the absence of information on provincial gross domestic product impedes the analysis of potentially different economic growth trajectories across the country during this process. As discussed in **Chapter II**, the literature has proposed alternative analyses based on different types of data for periods lacking regional GDP information, such as assessment based on public sector size (Llach, 2007; Sánchez, 2017, for the *Belle Epoque* period) or demographic movements (e.g., internal migration in Ferrer, 2008; and Cao & Vaca, 2006). However, it is crucial to note that the results obtained from these alternative analyses are generally imprecise.

Universidad de San Andrés

[2] Afterwards, a heavier stage developed, mainly during the third quarter of the century.

While there are some scattered pieces of information on provincial production between 1914 and 1953, as explained in the next section, these are often non-comparable estimates for a few isolated provinces (Antonelli, 2010, 2013; Coria López, 2014; Ministerio de Economía de Buenos Aires, nd), or they are partial in nature, offering indicators only for some sectors of the economy (Bunge, 1940), or they are estimates that prove challenging to replicate due to the unknown methodologies upon which they were based (Zalduendo, 1975). This chapter aims to make a distinctive contribution by presenting the first set of comparable, transparent, and replicable GDP estimates for all the Argentine provinces for the years 1937 and 1946. These estimates are disaggregated into fourteen economic sectors.

The results, discussed in the final section of the chapter and more deeply analyzed in **Chapter IV**, align with patterns observed in other periods with available provincial GDP estimates, including a concentration of GDP in Pampean provinces, and relatively high GDP per capita in Capital Federal and Patagonian provinces. Furthermore, these new estimates offer key insights into specific dynamics within the period 1914-1953. The clearest example is the shift during the 1930s and 1940s, where Buenos Aires lost its leading position to Capital Federal as the jurisdiction with the highest accumulation of GDP. There are also observed shifts in the trend of relative GDP per capita in some northern provinces, narrowing their gap with the relatively rich Pampean provinces. These findings underscore that the new estimates generated in this chapter provide relevant information at a regional level that would be lost if, for instance, the existing GDP values between 1914 and 1953 were simply interpolated.

In formulating the estimation methodology, limitations of available information at the provincial level led to the adoption of an indirect approach, which hinges on pre-existing national GDP figures that are then allocated across the provinces. The employment of any of the three traditional direct approaches to measuring GDP (i.e., expenditure, production or value-added, and income)[3] proved unfeasible. These direct methods stem from the identity derived from the circular flow of income, which can be roughly summarized as follows: expenditure by households equals the value added by firms, which, in turn, equals the income of households, who own the capital and labor used by firms (Sachs & Larrain, 1993). The expenditure approach measures the GDP as the sum of all final demands for output in an economy[4]; the production or value-added approach sums up the value added produced in each sector of the economy[5]; and

[3] Sachs & Larrain (1993) and Goodwin *et al.* (2019) provide an overview of these approaches, and United Nations *et al.* (2009) explain them in detail.
[4] Final consumption plus capital formation plus exports minus imports.
[5] Output minus intermediate consumption plus taxes, minus subsidies on products.

the income approach, measures the GDP by adding up the incomes of all factors (labor and capital) that contribute to the production process[6].

While direct methods are commonly used to measure a country's GDP, they often face challenges when applied at the subnational level because the data needed to implement these approaches are often not available at that level. For instance, the production approach may lack intermediate consumption data for certain sectors, or even output data. The expenditure approach may lack export and import data, especially between provinces, which is crucial for regions specializing in a few products, as observed in Argentina. Lastly, the income approach may lack data on profits. To overcome these limitations, indirect approximations of regional GDP are often made using top-down methods (Eurostat, 1995). This involves starting from previous sectoral GDP estimates for the entire country, and then distributing each sector among the regions using allocation indicators. Such indicators are constructed from available regional data linked to each sector to be distributed, such as regional shares of livestock value to distribute the national livestock GDP, or regional shares of labor remuneration for the construction sector.

In an ideal scenario devoid of data constraints, the allocation indicator that would be used in the top-down method would perfectly align with the provincial GDP obtained under a direct method. Consequently, both direct and indirect approaches would yield identical results. Moreover, in such a scenario, the national GDP would equal the sum of the provincial allocation indicators, rendering the use of a distribution procedure through the indirect method redundant. Nevertheless, in practice, data constraints exist at the subnational level, so the approximation of the indirect method may differ from the result achievable without them. The quality of the indirect approximation of regional GDP is inherently tied to the quality of the allocation indicators used. For example, since soil productivity differs across zones, and crops have different prices, the gross value of agricultural production might serve as a more suitable allocation indicator for the agricultural sector than land area. At the same time, while gross value minus inputs offer a more precise allocation indicator, it requires more data. Higher-quality allocation indicators are expected to exhibit a stronger correlation with the true sectoral GDP of the regions. Therefore, in this context, minor discrepancies between the results obtained indirectly and those achievable through direct methods can be anticipated, assuming no limitations in the data. In general, and specifically in this study, the choice among potential alternative indicators usually depends on regional data availability.

In the realm of retrospective historical estimates of regional GDP, the scarcity of data to implement direct methods is often the norm. Hence, despite the potential limitations associated with

[6] Compensation of employees plus gross operating surplus plus gross mixed income plus taxes, minus subsidies on production and imports.

QUAERERE VERUM Universidad de SanAndrés

the top-down method, it has become a prevalent choice in historical literature due to its relatively low data requirements. The method gained momentum when Geary & Stark (2002) applied it to the United Kingdom for the period 1861-1911. Subsequently, it found application in estimating regional GDPs for countries such as Britain (Crafts, 2005), Belgium (Buyst, 2011), Spain (Rosés *et al*., 2010; Martínez-Galarraga *et al*., 2015), Austro-Hungarian Empire (Schulze, 2007), Italy (Felice, 2011), Portugal (Badia-Miró *et al*., 2012) and Sweden (Enflo *et al*., 2014). More recently, this methodology has extended its reach to Latin American countries, including Chile (Badia-Miró, 2015), Brazil (Bértola & Willebald, 2013), Uruguay (Araujo *et al*., 2015) and Mexico (Aguilar-Retureta, 2015). Two collaborative reference books consolidating the results of many of these investigations are Roses & Wolf (2019) for Europe and Tirado-Fabregat *et al.* (2020) for Latin America[7].

Argentina is not exempt from the lack of data to replicate direct GDP assessments at the provincial level, extending beyond historical estimates and persisting into the present. Notably, even the most recent official provincial GDP estimates by INDEC (2016a) had to resort to a top-down methodology[8]. For the post-World War I and pre-1950s period, for which this chapter aims to provide provincial GDP estimates, provincial data to generate the estimates are available from periodic statistical publications for various economic sectors. Nevertheless, data constraints remain, the most significant being the absence of population censuses for the 1920s and 1930s. This is important to emphasize because while improvements in the top-down methodology have addressed some data limitations compared to direct approaches, the former method remains data-demanding. In this regard, the data that was possible to gather for the Argentine provinces may be deemed insufficient to produce high-quality GDP estimates for the entire period. However, the data contained in economic censuses and additional sources (detailed in **Section 3.3**) for 1937 and 1946 enable the application of a top-down methodology to estimate provincial GDP for those years, with a reasonable degree of confidence.

Universidad de San Andrés

[7] The provincial GDP estimates for the Argentine case presented in this book, in which I actively participated, are derived from the analytical framework developed within the context of this thesis. Notably, while the book provides a brief overview of the estimation methodology, this thesis offers a more detailed and comprehensive explanation.
[8] For example, INDEC (2016a) uses the cultivated area for the distribution of the national GDP of some crops, and even distributors as rudimentary as provincial population in cases like the Removal transport branch.

3.2- Existing Estimations for Argentine Provinces

The first set of consistent and comparable GDP estimates for all Argentina's provinces is provided by CFI-ITDT (1965/1962), offering figures disaggregated into 14 sectors at current values for the years 1953, 1958, and 1959. Depending on sector data availability, provincial values were estimated either directly using the value-added approach (e.g., agriculture, livestock production, manufacturing, and services) or through a top-down methodology (e.g., commerce, finance, transport, and communications). These estimates were based on an extensive dataset, with the research team receiving cooperation from multiple public and private organizations to collect the data. Throughout the 1970s, the 1980s, and part of the 1990s, CFI became the institution responsible for estimating GDP across all provinces in the country.

The only studies that have estimated comparable GDP estimates for all provinces covering years before 1953 are Aráoz & Nicolini (2016) for 1895 and Aráoz & Nicolini (2020) for 1914. Both studies exhibit a meticulous methodology and a great effort in source research. The estimates for 1895 are obtained using an indirect approach (top-down method), outlined in the previous section, and elaborated upon in the following one. Sectoral GDP figures at the national level used as a starting point for the estimates were taken from Cortés Conde (1994), with an opening of eight sectors[9]. The primary source of data for the distribution of value added by sector among the provinces is the 1895 Census[10], which provides provincial information on cultivated area by crops, employment figures, and value capital stock in manufacturing and services, among other metrics. The allocation of the total value added of manufacturing and trade sectors among provinces is based on the value of capital and number of workers in each occupational category in those sectors in each province. To allocate Argentine agricultural GDP, provincial gross agricultural values were used, which were obtained by combining Census information on provincial area by crop along with complementary sources. These sources include agricultural statistics (Ministerio de Agricultura, 1916 - *Estadística Agrícola 1914-1915*) for estimating prices and yields for various crops such as wheat, linen, maize, and barley; Seguí (1898) for determining prices and yields per hectare for alfalfa; and Correa & Lahite (1898) for assessing the prices and yields per hectare for tobacco, sugar cane, and forest trees.

[9] The sectors analyzed by Cortés Conde in 1895 encompass manufacturing, trade, construction, transport, agriculture (crops and livestock) and government. In 1914 he expanded the analysis to include energy and services. It means that Cortés Conde's 1895 breakdown does not explicitly account for the participation of energy and services. Given that the sum of the sectoral participations in 1895 does not reach 100% (Table 1 in p. 6 in Cortés Conde, 1994), Aráoz & Nicolini (2016) hypothesized that the difference corresponds to these two sectors jointly for that year.

[10] República Argentina (1898) - *Segundo Censo de la República Argentina.*

For the year 1914, Aráoz & Nicolini (2020) employed a direct estimation by income approach, adding up the remunerations to labor, capital, and land. Specifically, they assumed that the GDP of each province (GDP_i) is:

$$GDP_i = \begin{array}{c} \sum_{j=1}^{J} wages_{ij} \times Labor_{ij} \\ + \\ \left[rent_{Agr} \times K_{iAgr} + rent_{Liv} \times K_{iLiv} + rent_{Ind} \times K_{iInd} + rent_{Ser\times} K_{iSer}\right] \\ + \\ \left[landrent_{Agr} Land_{iAgr} + landrent_{Liv} Land_{iLiv} + livrent \times Livestock_i\right] \end{array} \qquad (3.1)$$

The first term on the right-hand side of the equation represents the remuneration to labor, equivalent to the sum of all wages paid to workers across 436 different occupations (*J*). The second term in brackets includes the rents (*rent*) paid to physical capital (*K*) in agriculture (*Agr*), livestock production (*Cat*), and establishments in the industry (*Ind*) and services (*Ser*). The third term accounts for the rent (*landrent*) paid to land (*Land*) in agriculture and livestock production. Since the authors assume that the value of the livestock (*Livestock*) generates a return ($livrent$) to its owners, the last term reflects the income flow generated by livestock ($livrent \times Livestock$). The rate of return on capital varies across sectors. The main sources of information for this estimate include the 1914 Census[11], labor department bulletins and yearbooks[12], and Bunge (1917). It should be pointed out that the detailed classification of occupations provided by this census (over 400 categories) allows for leveraging variability in terms of skills and associated salaries, a level of detail not present in later censuses with reduced categories (such as the 1947 census, with fewer than 30 categories). Among the possible limitations of the estimation, the most notable is the use of a uniform rate of return to capital across all provinces. Despite this, the total country GDP obtained by adding the provincial values aligns closely with that estimated by Cortés Conde (1994).

Between 1914 and 1953, there are some estimates of provincial GDP but several issues complicate comparisons among provinces and their shares within the national total. All the cases identified in the literature review are summarized in **Table 3.1**. The problem of comparability arises because the existing estimates for a given year are based on different methodologies. Therefore, when two provinces exhibit different estimated GDP levels, it is unclear how much of that difference is attributed to methodological discrepancies and how much reflects actual differences in levels. This issue is particularly relevant to independently generated estimates made for a few provinces, such as Salta, Mendoza, and Buenos Aires.

Universidad de San Andrés

[11] República Argentina (1916a) - *Tercer Censo Nacional de La República Argentina.*
[12] Departamento Nacional del Trabajo (1907, 1913) - *Boletín del Departamento Nacional del Trabajo* (nº 3 and 25), and República Argentina (1916b) - *Anuario Estadístico del Trabajo.*

Table 3.1: Available Estimates of Provincial GDP between 1914 and 1953 for Argentina

Source	Provinces covered	Years	Valuation	Observations and issues
Bunge (1940)	All provinces	1937	Current prices	Gross production value, not GDP. Estimate excluding tertiary sector.
Asociación de Dirigentes de Ventas (1955) in Zalduendo (1975)	All provinces	1946	Current prices	Income estimate using an unknown methodology.
Grupe (nd)	All provinces	1946-1958	1950 constant prices	Buenos Aires not included in 1946 and 1947 for unspecified reasons, which raises doubts regarding the methodological homogeneity among provinces.
Antonelli (2010)	Salta	1880-1930	2000 constant prices	Value added approach excluding certain economic activities. Using of input-output ratio from 1997.
Antonelli (2013)		1931-1970		
Pérez Mora (2008)	Mendoza	1884-1935	Current prices	Extrapolation based on physical volume indices of representative products of each sector.
Coria López (2014)	Mendoza	1884-2001	1993 constant prices: 1884-2001	Interpolations between Pérez Mora (2008) and Grupe (nd) between 1935 and 1946 using national sector values.
			Current prices: 1914-1964	
Ministerio de Hacienda, Economía y Previsión - Provincia de Buenos Aires (1957)	Buenos Aires	1935-1954	Current prices	Top-down method estimates.
Ministerio de Economía de Buenos Aires (nd)	Buenos Aires	1935-1981	Current prices and 1950 constant prices	Data before 1954 taken from Ministerio de Hacienda, Economía y Previsión - Provincia de Buenos Aires (1957).
Dirección de Estadística e Investigaciones de la Provincia de Buenos Aires (1960)	Buenos Aires	1948-1958	Current prices and 1950 constant prices	Methodology not published.

Source: Own elaboration

QUAERERE VERUM
Universidad de
SanAndrés

For Salta, Antonelli (2010) and Antonelli (2013) offer estimates for the periods 1880-1930 and 1931-1970, respectively, using the value-added approach at 2000 constant prices. However, there are some concerns regarding these estimates, including the omission of certain economic sectors and the use of an input-output ratio from 1997, which implies the assumption of similar technology between periods that are more than half a century apart. When comparing Antonelli's results with those of CFI-ITDT (1965/1962), notable differences emerge. For instance, according to Antonelli's figures for 1953, the ratio of Salta's GDP per capita to that of Argentina is 0.23, while according to CFI-ITDT this ratio is more than double, at 0.58.

For Mendoza, Coria López (2014) provides estimates covering the period 1884-2001, using a complex methodology that involves combining, interpolating, and correcting data from various sources. Some of these sources include estimates made by Pérez Mora (2008) for 1884-1935 and Grupe (nd) for 1946-1958. When comparing Coria López's Mendoza GDP at current values with other series mentioned above, discrepancies of approximately 41% are observed concerning the figures for 1914 by Aráoz & Nicolini's (2020), and -9% and 9% with respect to those by CFI-ITDT (1965/1962) for 1953 and 1959, respectively.

Ministerio de Hacienda, Economía y Previsión - Provincia de Buenos Aires (MHPPBA) (1957) provides estimates for the province of Buenos Aires, for the period 1935-1954[13]. These estimates result from the application of the indirect method to each sector of the national GDP. A comparison with the GDP share reported by CFI-ITDT (1965/1962) for 1953 reveals a difference of 2.5% (29.0% for MHPPBA and 31.5% for CFI-ITDT). While this difference may seem negligible, it is crucial to note that a third of the country's jurisdictions held shares below 2.5% in that year. In fact, even when combining the GDP shares of the six jurisdictions with the lowest values, they did not collectively reach a share of 2%. Additionally, the Dirección de Estadística e Investigaciones de la Provincia de Buenos Aires (DEIBA) (1960) also provides GDP estimates for Buenos Aires spanning the period 1948-1958, though without disclosing methodological details. For most of the years covered by MHPPBA (1957) and DEIBA (1960), the differences in values are minimal. It should be noted that, unlike MHPPBA, in this thesis and in CFI-ITDT (1965/1962) for certain sectors, an indirect method is used to estimate specific years instead of a longer series. Focusing on fewer years allows the use of allocation indicators of better quality than those of MHPPBA, especially in Personal Services and Commerce sectors[14].

Universidad de San Andrés

[13] Ministerio de Economía de Buenos Aires (nd) published GDP data for the province for 1935-1981, but figures prior to 1954 were taken from MHPPBA (1957).
[14] MHPPBA's estimates for Personal services are based on population shares, and those for Commerce are based on shares of other sectors in the economy. In this thesis, the estimates are based, respectively, on census data on labor linked to the sector and sales in commercial establishments (details in **Section 3.3**).

There are additional estimates made simultaneously for all provinces covering a portion of the period between 1914 and 1953, but they are not exempt from methodological challenges. One case is Grupe (nd), linked to the above-mentioned CFI-ITDT (1965/1962) study. Grupe made preliminary provincial GDP estimates for the period 1946-1958 at 1950 constant prices. However, despite the study's methodological section suggesting the uniform use of the same methodology for all provinces, inconsistencies exist between that section and the content of published tables and their footnotes. For example, the 1946 and 1947 estimates for Buenos Aires province are not included, and the reasons for this omission are not specified. Furthermore, the footnotes of the published tables clarify that "the values reported for Buenos Aires province correspond to the calculation made by *Dirección de Estadística e Investigaciones de la Provincia de Buenos Aires*", an important methodological aspect not addressed in the corresponding section[15]. These observed inconsistencies suggest the possibility of a different methodology being employed for Buenos Aires province (with no justification provided), compromising comparability with the rest of the country. Considering the importance of this province (more than 30% of the national GDP in 1953, according to CFI-ITDT, 1965/1962), this is not a minor concern.

Other sources introduce even more ambiguity. For example, Zalduendo (1975), in a comparative analysis of provincial GDP, resorts to per capita income estimates for 1946 due to lack of per capita GDP data. However, the cited data source (Asociación de Dirigentes de Ventas, 1955) could not be traced anywhere. Lastly, Bunge (1940) provides estimates for the 1937 gross production value (not added value) for Argentine provinces. Although these estimates were made using a homogeneous methodology for all provinces, besides not being GDP estimates per se, they are incomplete. In particular, while Bunge's estimates include important sectors such as agriculture, livestock, and industry, they also exclude sectors such as transport, communications, finance, and others.

As previously mentioned, starting from 1953, official GDP estimates for all provinces become available, beginning with the CFI-ITDT (1965/1962) figures for 1953, 1958, and 1959. For the 1960s, Argentina's official statistical agency (*Instituto Nacional de Estadística y Censos*, INDEC) published a report providing provincial GDPs disaggregated into ten economic sectors (INDEC, 1975a). Although this report excludes the figures for the provinces of Salta, Santa Cruz and Tucumán, they are included in the 1973 national statistical yearbook produced by the same agency (INDEC, 1974 - *Anuario Estadístico de la República Argentina 1973*), but only

[15] The GDP at current values published by DEIBA (1960) for Buenos Aires coincides in 1950 with the value published by Grupe (nd) in his estimates at 1950 values. Also, since both estimates start in 1948, it could be inferred that Grupe used a deflated version of DEIBA's estimates for this province.

for the year 1965 and not by economic sector. Despite their official status, the absence of information regarding the methodology used to estimate provincial GDPs in both reports underscores the need for caution when using these figures.

For the 1970s, CFI (1983) provides sectoral GDP estimates for all provinces employing direct methods for nine economic sectors[16]. Martínez (2004) uses estimates and interpolations based on data from CFI, SAREP (*Secretaría de Asistencia para la Reforma Económica Provincial del Ministerio del Interior de la Nación*) and *Ministerio de Economía* to provide estimates for the 1980-2006 period at 1986 constant prices and at 1993 constant prices. Finally, the latest available GDP estimate not independently conducted for the provinces come from INDEC (2016a) for 2004, using the top-down method for 53 branches of activity.

In summary, official GDP estimates for all provinces are available from the first half of the 20th century to the first decade of the 21st, with at least one data point for each decade covered. Before this period, Aráoz & Nicolini (2016, 2020) provided estimations for 1985 and 1914. Despite being unofficial, these estimates were made using a thorough and detailed methodology. To address the gap for the 1914-1953 period, this chapter aims to provide estimates for one data point for the 1930s and 1940s decades. The next section outlines the methodology for these new estimates.

QUAERERE VERUM Universidad de SanAndrés

3.3- Methodology and Sources

In the context of estimating GDP for regions within a country, and especially when dealing with retrospective historical estimates, data availability constraints are typically much more severe than in the case of national estimates. Consequently, the choice of estimation method at the regional level is often subject to these constraints. This is evident in Díez-Minguela & Sanchis Llopis (2020). They present an overview of the various methods used to reconstruct historical subnational GDPs for several Latin American countries. Based on the regional information collected for Argentina, the top-down method seems to be the most appropriate one for the estimates between 1914 and 1953.

As indicated in **Section 3.1**, this method consists of starting from pre-existing sectoral estimates of GDP at the national level and then distributing each sector among the provinces. This distribution is achieved by constructing allocation indicators derived from regional-level data related

[16] The economic sectors considered by CFI (1983) are agriculture, forestry, hunting and fishing; mines and quarries; manufacturing; electricity, gas and water; construction; wholesale, retail, and restaurants and hotels; transport, storage and communications; financial establishments, insurance, real estate, and services provided to companies; community, social and personal services.

to each sector. Specifically, **Table 3.2** provides the national values that will be used as a starting point. The table contains Argentina's GDP for 1937 and 1946, disaggregated into 14 economic sectors (details on national GDP are given later in this section). Therefore, with specific data from each year, the proposed method is applied to each of the sectors. Formally, given a sector s of the national GDP in year t (GDP_{st}), this product is distributed among the N provinces i using an allocation indicator a_{ist}:

$$GDP_{ist} = \frac{a_{ist}}{A_{st}} \times GDP_{st} \tag{3.2}$$

with $A_{st} = \sum_{i=1}^{N} a_{ist}$, where a_{ist}/A_{st} represents the share of national GDP of sector s in year t assigned to province i.

Table 3.2: Sectoral Gross Domestic Product Used as Starting Point for Provincial Estimates

Sector	National GDP at factor cost (millions of current m$n) (a)		Share (%)	
	1937	**1946**	**1937**	**1946**
Agriculture	1,733	3,447	17.34	14.29
Livestock	1,123	2,127	11.24	8.82
Fishing	10	32	0.10	0.13
Mining	129	248	1.29	1.03
Manufacturing	1,492	5,570	14.93	23.09
Electricity, gas and water	188	326	1.88	1.35
Constructions	256	909	2.56	3.77
Transport (b)	801	1,636	8.02	6.78
Communications (b)	114	244	1.14	1.01
Finance (c)	969	1,786	9.70	7.40
Housing (c)	181	386	1.81	1.60
Commerce	1,408	3,923	14.09	16.26
Personal services	805	1,757	8.06	7.28
Government services	783	1,732	7.84	7.18
Gross Domestic Product	**9,992**	**24,123**	**100.00**	**100.00**

Notes:

(a) The *peso moneda nacional* (m$n) was the currency of Argentina from November 5, 1881, to January 1, 1970. The equivalence with the current *peso* ($) is given by: 1 $ = 10^{13} m$n.

(b) In the original source (Secretaría de Asuntos Económicos, SAE, 1955) these sectors are grouped, but in a posterior official compilation (BCRA, 1976a) they are published disaggregated.

(c) In SAE (1955) and BCRA (1976a) the values of these two sectors are grouped. In sectoral GDP estimates of BCRA (1946) for 1937 and CEPAL (1958) for 1946, these two sectors are presented separately. The values of SAE (1955) were distributed proportionally.

Source: Own elaboration based on SAE (1955), BCRA (1976a), BCRA (1946) and CEPAL (1958).

Universidad de San Andrés

The Commerce sector is a good example to illustrate key aspects of the methodology used. The construction of the allocator indicator and the consulted sources for this and each of the other sectors are thoroughly discussed in the following subsections. The national GDP of the Commerce sector can be understood as the difference between the total sales of the commercial enterprises and the value of intermediate consumption, including the value of inputs such as goods purchased for sale, electricity consumed in establishments, or services provided by third parties. Ideally, if provincial-level data on both sales and intermediate consumption were available, they could be used to formulate the allocation indicator a_{ist}, and distribute the national GDP of the sector among the $N = 24$ provinces, according to equation (3.2).

However, while data on provincial sales by commercial establishments for 1946 were collected, this was not the case for intermediate consumption. Faced with a similar situation, Aguilar-Retureta (2015) addresses this constraint by directly using sales as an allocation indicator for the Mexican case. An alternative, based on the income approach, involves constructing a_{ist} using provincial sector data on remunerations and returns to capital (e.g., rental value of premises used for sales). Yet, data constraints arise, as only provincial values of the first component (remunerations) were gathered. Cases encountering a similar restriction, such as Badia-Miró (2020) for Chile and De Corso & Tirado-Fabregat (2020) for Venezuela, employ remuneration directly as an allocation indicator, based on Geary & Stark's (2002) methodology.

For Argentina, it is possible to determine which alternative provides a better approximation for the year 1953, given that provincial data are available for both sales and remuneration within the sector for that year, as well as the CFI-ITDT (1965/1962) provincial GDP for the sector. Since sales yielded a slightly better fit, it was decided to apply this criterion for 1946 as well. So, in this case a_{ist} can be expressed as:

$$a_{i\ commerce\ 1946} = sales_{i\ 1946} \tag{3.3}$$

Consequently, the Commerce sector GDP for a province i in 1946 is given by:

$$GDP_{i\ Commerce\ 1946} = \frac{sales_{i\ 1946}}{\sum_{i=1}^{N} sales_{i\ 1946}} \times GDP_{Commerce\ 1946} \tag{3.4}$$

By successively applying the procedure to all 14 economic sectors, using appropriate variables for the distribution of each sector (such as using the labor remuneration or the cement consumption for the construction sector), the total GDP of each province (GDP_{it}) can be easily obtained. For a given province i and year t, this is achieved by simply summing the provincial values estimated for each of the 14 sectors:

$$GDP_{it} = \sum_{s=1}^{14} GDP_{ist} \tag{3.5}$$

Revisiting the Commerce sector example, it was made clear that sales do not equate to value-added, since the latter is obtained by subtracting intermediate consumption from the former. The accuracy of Commerce's provincial GDP estimates is based on the assumption that each province's sales shares are equal (or at least a good approximation) to its value-added shares. The further away from reality this assumption is, the less reliable the estimates will be. This is more likely to be the case the more restrictive the data are at the provincial level.

Given the data limitation, constructing the allocation indicator for 1937 in some sectors required extrapolating the values obtained for 1946. This extrapolation, in turn, requires provincial data on an alternative variable related to the sector in question for both 1946 and 1937. Commerce in particular proved to be one of the most problematic sectors in terms of finding an appropriate extrapolation variable. In this case, after unsuccessfully exploring alternative strategies such as sales tax, extrapolation was done roughly by provincial population change, using population as an indicator of market size:

$$a_{i\ commerce\ 1937} = sales_{i\ 1946} \times \frac{population_{i\ 1937}}{population_{i\ 1946}} = a_{i\ commerce\ 1946} \times \frac{population_{i\ 1937}}{population_{i\ 1946}} \tag{3.6}$$

This is equivalent to extrapolating the provincial GDP of the sector from 1946 to 1937 based on population change (as a proxy for market size change) and then proportionally rescaling the resulting values to ensure their sum equals the national GDP of the sector. In contrast to this example, where the criteria are far from uncontroversial, in the majority of cases requiring extrapolation, more sector-specific variables were employed. For example, provincial budgets were used to extrapolate the Government sector.

The following subsections provide a detailed explanation of the construction of a_{ist} for each sector and the corresponding data sources used. A brief summary is presented in **Table 3.3**. The data sources consist primarily on national population and economic censuses and, along with other publications from national institutions (such as, including yearbooks and sector reports). To ensure better comparability across provinces, a preference has been given to national sources with provincial data over provincial sources. This choice is based on the assumption that data construction in national sources follows uniform criteria for all provinces. However, this decision involves compromising accuracy for provinces with more detailed local information sources.

The national GDP selected as a starting point is, of course, a relevant issue in the top-down methodology. A significant aspect on this selection is the valuation criteria. For example, manufacturing industry's share of the 1937 GDP at current prices is 15% (**Table 3.2**), which is lower than the 20% from estimates at 1950 prices. Using the latter as a starting point, the top-down method results in a higher relative GDP in provinces more specialized in manufacturing. Given marked regional specialization patterns, a price increase in a sector would be expected to translate into an improvement in the relative income of provinces specialized in that sector. However, this improvement would not be reflected in the provincial GDP if the national GDP at constant values were used as the starting point for its estimation, as it implies a unique set of prices. In this case, changes in GDP only reflect changes in quantities.

For illustration, let us consider two provinces: Tucumán, specialized in sugar cane, and Mendoza, specialized in wine. If the quantities of both products are kept constant, an increase in the price of sugar would imply a relative improvement in Tucumán compared to Mendoza. This improvement, though, wouldn't be reflected in the data under constant prices, where only changes in quantities are captured, but it does become evident when considering current prices. For this reason, the decision was made to use the sectoral participation obtained from estimates at current prices as the starting point for the top-down estimates. Similar observations are made by Felice (2019), who recommends using GDP at current values for sectorization.

Therefore, the latest official national GDP at current values estimates available for 1937 and 1946 are used as a starting point (**Table 3.2**). SAE (1955) provides methodological details on the estimation of these national figures. Moreover, these estimates have the advantage of using the same sectoral disaggregation as the CFI-ITDT (1965/1962) provincial figures for 1953, 1958, and 1959, which facilitates subsequent comparative analyses.

Other estimates of national GDP available that could serve as a starting point were disregarded because of their use constant prices and a much smaller disaggregation than the 14 sectors of SAE (1955). That is the case of sources such as IEERAL (1986), della Paolera & Taylor (2003), ARKLEMS, and Maddison Project Database (Bolt *et al*., 2018). Ferreres (2010), a widely used source of long-term data series in Argentina, has the same sectoral shares as SAE (1955) between 1935 and 1949. BCRA (1966) has an even larger sector disaggregation than SAE (1955), but its estimates were made at 1960 constant prices, leading to the issues mentioned in above.

Universidad de San Andrés

Table 3.3: Allocation Indicators for Sector Distribution

Sector		Allocation indicator
Agriculture		Gross value of agricultural production based on crops quantities and prices.
Livestock		Value of livestock calculated based on live cattle, sheep, pork, goats, and poultry.
Fishing		Value of maritime and fluvial fishing products, including maritime hunting.
Mining		Industrial census value-added of each sector.
Manufacturing		
Electricity, gas and water		
Construction		Total wages paid by construction companies.
Transport	Railways	Railway companies' revenues for passengers' transport, excess baggage, and loads transportation.
	Navigation	Tons of incoming and outcoming cargo from sea and river ports as a result of domestic and foreign trade.
	Trucks	Stock of trucks.
	Buenos Aires transportation	Subsector totally assigned to Capital Federal.
	Transportation of people in the interior, taxis and *mateos*	Stock of buses.
	Aircraft	Passenger traffic of the internal flights of 1953.
Communications	Post and wire businesses	Revenues published in the postal and telegraph reports.
	Telephones	Telephones quantity.
Finance		Sum of deposit and loan balances.
Housing		1946: Imputed rental on owned and rented homes. 1937: Extrapolation of 1946 by $(1+h_i)\times(1+r_i)$; where r_i is the rents change rate in a province i and h_i is their population change.
Commerce		1946: Sales from commerce census. 1937: Extrapolation of 1946 by the provincial population change.
Personal services		1946: Sum of wages paid in service provider establishments, liberal profession workers income, and domestic service workers' wages. 1937: Extrapolation of 1946 by the provincial population change.
Government services		1946: imputation of average wages paid in 1946 by commercial and services establishments in each province (from the commerce census) to the 1947 population census employees in "Activities of the national, provincial, and municipal states". 1937: Extrapolation using provincial budgets (for provinces) and population (for national territories).

Source: Own elaboration.

QUAERERE VERUM
Universidad de San Andrés

Regarding the territorial division (see **Section 2.1** in **Chapter II**), the data presented in this thesis uses the current political division, consisting of 24 major subnational jurisdictions: 23 provinces and *Capital Federal* (the country's capital, currently *Ciudad Atónoma de Buenos Aires*[17]). Before 1955, some jurisdictions were under the administration of the national government and called "National Territories" instead of provinces[18], due to their low populations. Unless explicitly stated (as in the section on government sector estimates, where the distinction is necessary), the term "province" will be used for the 24 geographical units henceforward.

It is necessary to clarify that differences exist in the territorial divisions of 1937, 1946, and the present day due to the dissolution of certain jurisdictions and the subsequent distribution of their territories among the provinces. These cases include *Territorio Nacional de Los Andes*, which held no economic or demographic weight during the period studied[19], and *Zona Militar de Comodoro Rivadavia*, a territory known for its oil reserves. To maintain a consistent division, when data sources contain values for these territories, they were allocated among the provinces to which they currently belong (details in maps of **Figure A3.1** and **Tables A3.1** and **A3.2**, in the appendix)[20].

To express the GDP estimates in per capita terms and given that the nearest population censuses correspond to the years 1914 and 1947, an adapted version of the official provincial population estimates from the *Dirección Nacional de Estadística y Censos* (DNEC, 1956) was used. The provincial values and the adjustments made to account for the changes in territorial divisions mentioned earlier are presented in **Table A3.3** in the appendix.

The following subsections outline the methodology used for the allocation of each of the 14 economic sectors of the national GDP among the 24 Argentine provinces for the years 1937 and 1946. **Tables A3.4** and **A3.5** in appendix show the percentages finally assigned to each province in each sector of the national GDP, that is, the allocation indicators for each of these years. The provincial sectoral GDPs were derived by applying these shares to the national GDPs at the current values presented in **Table 3.2** (equation 3.2). Additionally, the total provincial GDPs were

Universidad de San Andrés

[17] Autonomous City of Buenos Aires.
[18] Chaco, Formosa, and Misiones, in the northeastern limit of the country; and Neuquén, La Pampa, Río Negro, Chubut, Santa Cruz, and Tierra del Fuego, in the south. The latter, unlike the rest, maintained its status as a National Territory until 1991.
[19] In 1947 the departments that integrated it represented 1.07% of the joint population of Jujuy, Salta and Catamarca and less than 0.5% of the Argentine total.
[20] The 1914 estimates by Aráoz & Nicolini (2020) include GDP values for the Territorio Nacional de Los Andes, which in 1943 was disaggregated among the provinces of Catamarca, Jujuy, and Salta. In the context of this thesis, when these estimates are used, the 1914 Los Andes GDP is allocated based on the population proportion of the territory corresponding to each one of the three provinces according to the 1914 Population Census.

computed by summing these sectoral values for each province (equation 3.5), as detailed in **Tables A3.6** and **A3.7** in the appendix, for the years 1937 and 1946, respectively.

3.3.1- Agriculture

The national GDP estimate for this sector includes a variety of agricultural products, namely grains and flax, industrial crops, fruits, vegetables, legumes, flowers, and nurseries (SAE, 1955). The allocation indicator used to distribute this sector among the provinces is the gross value of agricultural production. The calculation of this allocation indicator is based on provincial quantities produced during the cropping seasons of 1936/1937 and 1945/1946, valued at current national prices. Forestry activity and forage crops are not included in the GDP estimates by SAE (1955) and CFI-ITDT (1965/1962), being the latter included in livestock sector. These crops, as well as floriculture[21], are also excluded from the calculation of the provincial allocator, the latter due to lack of available data.

Some caveats to this approach should be noted. Firstly, it assumes a comparable relationship between the gross value and the added value for each crop. The plausibility of this assumption is supported by CFI-ITDT (1965/1962), which provides data on the provincial added value and gross value of agriculture for 1953, revealing minimal disparities in their shares (see **Figure A3.2** in the appendix). Secondly, it is important to consider that national prices are used, instead of regional prices. However, the pronounced regional specialization in the main crops in Argentina mitigates the relevance of this latter concern.

The 1937 agricultural census includes provincial data on quantities produced for various crops[22] and the gross value of production of such crops at the national level for the 1936/1937 cropping season[23]. The national gross value of each crop was distributed among the provinces based on the quantity produced of each crop. This procedure accounts for 96.2% of the national gross value published in the census[24]. A special case, representing 3.5% of the national gross agricultural value of the census, pertains to certain small-scale horticultural crops. The national gross value data for such crops are published under the category "*huerta propiamente dicha*". However, the census also provides provincial data on the cultivated area for this crop category, which was used to distribute the corresponding national gross value among the provinces.

[21] This crop can be considered of minor importance. The share of fruits and flowers on national agricultural value-added was less than 5%, according to the BCRA (1966) estimates for 1937 and 1946. Presumably, flowers have very low participation compared to fruits.
[22] Ministerio de Agricultura (1939a) - *Censo Nacional Agropecuario 1937. Agricultura.*
[23] Ministerio de Agricultura (1940) - *Censo Nacional Agropecuario 1937. Economía Rural.*
[24] Calculated based on the total excluding forage and forestry.

The crops constituting the remaining 0.3% of the national gross agricultural value for 1937 are reported in groups in the census, rather than individually for each crop[25]. However, the census does provide provincial quantities produced for each of these crops individually, enabling a two-step allocation of the national gross agricultural values to the provinces. Firstly, a provincial gross value for each group was estimated using the provincial data on quantities produced for each crop, valued at national prices for 1949/50 from BCRA (1976b). Secondly, the national gross value for each group was distributed among the provinces according to the estimated gross value. It should be clarified that for certain minor crops, where prices were reported in units of weight and production in units of quantity (or vice versa), or where a price was not available for 1949/50, an average unit weight was imputed for the former case, and a price from a comparable crop was used for the latter[26].

For the 1945/46 cropping season, data on crop quantities produced by province were obtained from the Monthly Statistical Synthesis of the Argentine Republic[27], and current prices were gathered from various sources[28] (see **Table A3.8** in the appendix). In some instances, the sources of production data aggregated values from provinces with limited participation under the label "Rest of the country". However, the 1947 agricultural census[29] offers different types of provincial data for each crop, allowing the proportional allocation of this "rest" to the provinces in the group. The type of provincial data published varies depending on the crop, but includes information on production, harvested area, cultivated area, or plants in production. In cases

Universidad de San Andrés

[25] The groups include industrial crops grouped under "various minor production crops" (anise, hemp fiber, hemp seed, cumin, "*formio*", guinea corn straw, guinea corn seed, cassava, mates, olive for oils, pyrethrum, sugar beet, soybeans, spurge, tea, and tung); fresh and dried peas; garlic and onion; vegetables and legumes grouped under "others of minor production" (artichoke, eggplant, pumpkin "*calabaza*", corn, asparagus, broad beans, lentil, lupine, cucumber, carrot, and squash "*zapallito*"); and "other fruits of minor production" (almond trees, banana, cherimoya, pomegranate, guayabo, cherries, kaki, kumquats and chinotto, lime, sour orange, medlar, walnuts, avocado, grapefruit, tamarind, grapefruit and citron, pineapple, olive for fruits, and watermelon).

[26] Weight or price imputed in parenthesis: garlic (35 g per unit), guinea straw (7 kg per bundle), *mates* (1.5 kg per unit, pumpkin "*zapallo*" price), olive tree for oils and fruits (single price), sugar beet (beet price), pumpkin "*calabaza*" (2 kg per unit, pumpkin "*zapallo*" price), sweetcorn (200 g per unit), asparagus (100 g per unit), lupine (soya price), cucumber (300 g per unit), almond (nut price), guayabo (pomegranate price), sour orange (orange price), medlar (kumquats price), tamarind (nut price), grapefruit and citron (orange price), and watermelon (5 kg per unit). Although the assigned price may be debatable in some cases, given the minimal importance of these crops, differences in these prices will not significantly impact the results.

[27] Dirección General del Servicio Estadístico Nacional (DGSEN) (nd) - *Síntesis Estadística Mensual de la República Argentina.* Volumes of January/December 1949 and July/September 1951.

[28] Although BCRA (1976b) provides national prices for most agricultural products as a unified source since 1949/50 (a period relatively close to 1946), there is evidence of significant changes in relative prices between crop groups with respect to 1945/46. This led to discarding it as the main price source. Regarding the relative price changes, BCRA (1962a) price indexes for "cereals and flax" and "industrial crops" recorded variations of 11% and 60%, respectively, between 1946 and 1950.

[29] Dirección Nacional del Servicio Estadístico (DNSE) (nd) - *IV Censo General de la Nación. Tomo II. Censo Agropecuario.*

where more than one type of data is available for the same crop, the priority order listed is followed[30].

3.3.2- Livestock

The estimation of the national GDP by SAE (1955) includes the production of pork; beef; sheep and wool; milk; and poultry and eggs. The allocation indicator used to distribute these figures is the value of livestock calculated based on live cattle, sheep, pork, goats, and poultry[31]. A potential issue associated with this allocation indicator arises from the assumption of a similar relationship between value added and stock values for each type of livestock and across provinces.

The value of livestock used as an allocation indicator was constructed simply by multiplying the quantities of live animals per province by their respective prices. The provincial livestock quantities come from the agricultural censuses of 1937[32] and 1947[33], which disaggregate cattle, sheep, and pork data by sex and age[34], and poultry data by species.

Cattle prices are shown in **Tables A3.9 and A3.10** in the appendix. Prices for live cattle in 1946, at the places of production, are sourced from the Monthly Statistical Synthesis of the Argentine Republic (multiple issues). This source provides national average cattle prices, national averages categorized by age and sex[35], and average prices for 11 provinces (though not categorized by age and sex)[36]. Then, prices for each province and type of cattle were estimated using a formula like the following: $P_{Cows\ Córdoba} = P_{Cows\ Argentina} \times P_{Cattle\ Córdoba} / P_{Cattle\ Argentina}$. These prices were extrapolated to 1937 using per head prices from the "Liniers Market" (the country's main cattle spot market)[37] for each cattle type, obtained from

[30] For pyrethrum, garlic, and asparagus, cultivated hectares from the 1952 Agricultural Census (Ministerio de Asuntos Técnicos, nd - *Censo Nacional Agropecuario de 1952*) were used.
[31] Horses (omitted): horses are usually included in livestock estimates after SAE (1955), but only those destined for slaughter and live export and not those raised in herds (INDEC, 2014). Using slaughter data obtained from industrial censuses and exports, it can be estimated that this represents less than 0.5% of horses for 1937 and 1946. On the other hand, horses' data presents serious difficulties in pricing and provincial allocation of slaughter and export origin. Also, it was possible to approximate that the inclusion of horses generates differences in the provincial livestock GDP less than 0.05%. Given this, it was decided to omit horses in constructing the allocation indicators.
[32] Ministerio de Agricultura (1939b) - *Censo Nacional Agropecuario 1937. Ganadería.*
[33] DNSE (nd) - *IV Censo General de la Nación. Tomo II. Censo Agropecuario.*
[34] Cattle numbers for 1937 are reported without age and sex classification in provincial urban centers. In these cases, the composition of the rest of the corresponding province was used.
[35] DGSEN (nd) - *Síntesis Estadística Mensual de la República Argentina. Julio/Septiembre de 1951.*
[36] Dirección Nacional de Investigaciones, Estadísticas y Censos (DNIEC) (nd) - *Síntesis Estadística Mensual de la República Argentina. Octubre de 1947.*
[37] Liniers has played this role in setting reference prices for cattle from the beginning of the twentieth century until today.

the National Meat Board statistics[38]. For the remaining 13 provinces, prices were assigned from a geographically close province with data (or an average of two in case of significant climatic differences)[39].

For sheep prices (**Tables A3.11 and A3.12** in the appendix), the same methods and sources as those used for cattle were employed, with minor differences. Prices for 1946 are available for seven provinces. To extrapolate to 1937, the prices from the "Avellaneda market" were used, since it is the country's main sheep spot market. For Chubut, Santa Cruz and Tierra del Fuego, both 1937 and 1946 prices of Patagonia were used[40]. Prices for the remaining 14 provinces were determined using similar criteria to those applied for cattle[41].

For pork, national prices by sex and age for 1946 were obtained from the Statistical Synthesis, and extrapolated to 1937 using the average price of pigs in the "Liners Market" from the National Meat Board statistics.

Poultry prices for chickens, roosters[42], ducks, and turkeys[43] in 1946 and 1940 are available from the Market Municipal Concentration of Birds Eggs and Affines of Capital Federal[44]. The 1940 prices are extrapolated to 1937 using the wholesale price index of meat in Buenos Aires[45].

Goat livestock is omitted in national GDP calculations of SAE (1955), but not in the subsequent official estimates. Although it represents less than 0.75% of the value of livestock, it is included in the allocation indicator because of its importance in some regions. Bunge (1940) estimates

Universidad de SanAndrés

38 Ministerio de Economía - Junta Nacional de Carnes de la República Argentina *(nd) - Estadísticas Básicas 1973.*

39 For the 13 provinces listed below, the prices of the provinces indicated in parenthesis were used: Capital Federal (Buenos Aires); Catamarca (Santiago del Estero); Chubut, Neuquén, Río Negro, Santa Cruz and Tierra del Fuego (average of Mendoza and La Pampa); Formosa (Chaco); Jujuy, Salta and Tucumán (average of Chaco and Santiago del Estero); La Rioja (average of San Juan and Santiago del Estero); Misiones (Corrientes).

40 Patagonian sheep prices categorized by age and sex were sourced from Ministerio de Economía - Junta Nacional de Carnes de la República Argentina (nd) - *Estadísticas Básicas 1973.*

41 For the provinces listed below, the prices of the provinces indicated in parenthesis were used: Capital Federal (Buenos Aires); Catamarca, Jujuy, Salta, Santiago del Estero and Tucumán (Córdoba); Chaco and Formosa (Santa Fe); Corrientes and Misiones (Entre Ríos); La Rioja (average of San Juan and Córdoba); Mendoza (average of San Juan and San Luis); Neuquén and Río Negro (average of La Pampa and Patagonia).

42 Chickens and roosters were grouped in the 1937 census.

43 Published price data for turkeys are expressed in units of weight. Assumed weight for turkeys is 6 kg, based on information from National Agricultural Technology Institute (*Instituto Nacional de Tecnología Agropecuaria*) in Azcona *et al*. (2003) and Cantaro *et al*. (2010).

44 DNSE (1954) - *Anuario Estadístico de la República Argentina. 1949-1950. Tomo II: Comercio.*

45 BCRA (nd) - *Suplemento Estadístico de la Revista Económica del Banco Central de la República Argentina.* December 1942 and 1943 issues.

the national price for 1937, and that for 1946 is obtained by extrapolation using the wholesale price index for meat in Buenos Aires[46].

3.3.3- Fishing

The allocation indicator used is based on the value of marine and fluvial fishing, as well as marine hunting products, such as whale oil. This value is derived from data on tons caught (or the product of the hunt) and prices published in the official fishing statistics for 1937[47] and 1946[48]. The indicator incorporates national prices for marine fish, industrial tarpon, freshwater silverside, other freshwater fish, seabird guano, sea lion skins, sea lion oil, penguin oil, whale oil, and guano and whale meal. For hunting products, prices were not available for 1937, so those corresponding to 1943[49] are extrapolated using the price of whale oil produced in the Anthracic Zone[50].

In instances where the data on tons caught are available by the port of landing or by the river section of the catch, the values are assigned to the provinces corresponding to those locations. For cases not falling into this category, a distribution approach is applied, based on information from several fishing statistics numbers. Deep-sea fishing data are allocated to Capital Federal; whaling products to Tierra del Fuego; seabird guano to Santa Cruz; and lion and penguin hunting products are equally divided among Tierra del Fuego, Santa Cruz, and Chubut. For 1937, the fishery of “Patagones - Barra Río Negro” is evenly split between Buenos Aires and Río Negro[51]. For rivers where part of the fishing data is published by section of the catch and some minor part is not, the latter is distributed based on the proportions of the former[52]. Regarding silverside form reservoirs and Patagonian inland rivers in 1946, the distribution is determined using fishery statistics data from 1941 and 1942[53].

Universidad de San Andrés

---

[46] BCRA (nd) - *Suplemento Estadístico de la Revista Económica del Banco Central de la República Argentina - Diciembre de 1943*, and BCRA (nd) - *Boletín Estadístico del Banco Central de la República Argentina - Diciembre de 1947.* The prices used are 3.00 and 4.66 m$n per head for 1937 and 1946.
[47] Ministerio de Agricultura (1939) - *Estadística de la pesca 1937.*
[48] Ministerio de Agricultura (1955) - *Producción Pesquera de la República Argentina 1946-53.*
[49] Ministerio de Agricultura (1950) - *Producción Pesquera de la República Argentina Años 1943 - 44 - 45*.
[50] Prices sourced from Tønnesen & Johnsen (1982); peso / pound exchange rate obtained from Ferreres (2010).
[51] Patagones is located in Buenos Aires and Barra Río Negro in Río Negro.
[52] An example of this is the fishing activity in the Uruguay River in 1946, where a fishing value was reported for Entre Ríos, another for Corrientes, and an unassigned category labelled as “Estimated” was proportionally distributed between Corrientes and Entre Ríos based on to the first two reported values.
[53] Ministerio de Agricultura (1943) - *Estadística de la pesca Año 1941* and Ministerio de Agricultura (1944) - *Actividades pesqueras en el año 1942.*

Despite potential limitations regarding this allocation procedure, it is worth noting that, with the exception of Tierra del Fuego, the contribution of this sector to the provincial GDP is practically negligible.

3.3.4- Mining; Manufacturing; and Electricity, Gas, and Water

Separate allocation indicators were constructed for each of these three sectors. However, since the same methodology and sources are used in all three cases, they are presented collectively in a single section to avoid redundancy. Using data from the 1937[54] and 1946[55] industrial censuses, the allocation indicator is defined as the census value added, calculated by subtracting the value of raw materials used, fuels and lubricants consumed, and electricity purchased (separately for each sector) from the gross value of output.

Mining activity is categorized as "Deposits, quarries, and mines" in the 1937 census and as "Extractive Industries" in the 1946 census. For 1937, values for Capital Federal, Chaco, La Rioja, Los Andes, Misiones, and Santa Cruz are consolidated in the census into a single figure that represents less than 1% of the national value added in the sector. This aggregated figure was allocated among the provinces based on the gross value of mining production, derived from provincial extraction quantities by product[56] and national prices from 1937 mining statistics[57].

In **Section 3.3,** the challenge of allocating values related to the 1946 *Comodoro Rivadavia Military Zone* (ZMCR) between Chubut and Santa Cruz was discussed. In the case of the extractive industries, special care must be taken, given that the ZMCR represented approximately one third of the national value added in this sector, mainly due to its oil-related activity. To address this challenge, a distinction was made between oilfield activities and other mining activities. In 1946, Chubut and Santa Cruz (excluding their territories in ZMCR) had no oil production. As a result, the entire value added in their "Extractive Industries" was attributed to the rest of mining activities. For ZMCR, the census provides separate value-added figures for oilfield activities and the rest of mining activities. The value associated with oil activities was then allocated between Chubut and Santa Cruz based on oil extraction data published in the oil statistics[58] for 1946, considering the current provincial boundaries[59]. Regarding the rest of the mining activities

[54] Dirección General de Estadística de la Nación (DGEN) (1940) - *Estadística Industrial de 1937*
[55] DNSE (1952a) - *IV Censo General de la Nación - Censo Industrial de 1946* and DNSE (1952b) - *IV Censo General de la Nación - Tomo III.*
[56] Quantities of tin, silver, and lead in metal form (not mineral) were excluded because of their inclusion in manufacturing.
[57] Dirección de Minas y Geología (1938) - *Estadística Minera de la Nación 1937.*
[58] Dirección Nacional de Geología y Minería (1958) - *Estadística del petróleo de la República Argentina correspondiente al año 1957.*
[59] Chubut: 2,272,444 m^2; Santa Cruz: 21,271 m^2.

in the area, the census value added for ZMCR, Chubut, and Santa Cruz were combined and then distributed based on the gross value of non-oil mining production published for 1944[60]. In this distribution, ZMCR was included within Chubut and Santa Cruz. Finally, 98.93% of “Extractive Industries” value added for the three territories combined was allocated to Chubut and 1.07% to was assigned to Santa Cruz.

For the sector categorized as “Electricity, Gas and Water”, the censuses do not provide information on water services. Therefore, only data related to electricity and gas were used for this sector[61]. In the 1946 census, values are classified under the group “Electricity and Gas”, while in 1937 electricity is associated with the group “Electricity Factories” and gas is part of the subgroup “Gas for Lighting and Heating” within the group “Petroleum, Coal and their Derivatives”. Tierra del Fuego exhibits a census value added that is negative and close to zero in both years. As a solution, a decision was made to impute a value of zero for this region.

In manufacturing, discrepancies exist between the 1937 and 1946 censuses regarding the activities considered part of the sector. For example, construction was classified under manufacturing in 1937, but not in 1946. However, the 1946 industrial census includes retrospective data, including the year 1937, with a consistent definition of what constitutes manufacturing for all years. This means, for example, that in this publication construction is excluded from manufacturing in both years. To maintain methodological consistency, data for both 1946 and 1937 were sourced from the 1946 industrial census.

Universidad de SanAndrés

3.3.5- Construction

The allocation indicator is defined as the total wages paid by construction firms for their activities in each province. The data is sourced from the 1937 industrial census[62] and the 1947 construction companies' census[63], which includes data on wages paid in 1946.

The 1946 data for Tierra del Fuego and Zona Militar de Comodoro Rivadavia are grouped in the census. However, the census also provides additional data without the grouping limitation, enabling a proportional distribution of wages between the two territories. Specifically, besides the grouped data on wages paid to all workers in the sector, there is also additional data without the

[60] Dirección Nacional de Minería (1953) - *Estadística minera de la República Argentina - Años 1945 - 1949.*
[61] In BCRA (1966) constant 1960 price estimates, water and sanitation services represent 24% and 21% of the sector for 1937 and 1946, respectively.
[62] DGEN (1940) - *Estadística Industrial de 1937.*
[63] DNSE (1952b) - *IV Censo General de la Nación - Tomo III.*

grouping problem, which exclusively focuses on wages paid to construction laborers ("*obreros*"), excluding administrative and technical workers. Hence, the total wages of Tierra del Fuego and ZMCR, which were initially grouped, could then be proportionally distributed using the ungrouped wages paid to "*obreros*". It is worth noting that, when combining both territories, the wages paid to "*obreros*" represent approximately 90% of the total wages for the sector.

3.3.6- Transport

Initially, the sector was disaggregated into six branches based on CEPAL (1958) estimates of sectoral national GDP at 1950 prices for 1937 and 1946 (**Table A3.13**). Then, each branch was allocated among the provinces, employing the following criteria (results in **Table A3.14** and **Table A3.15** in appendix):

- Railways: Distribution is based on the revenues of railway companies for passengers' transport and excess baggage, and loads transportation from railway statistics for the 1936/37[64] and 1945/46[65] exercises. These revenues were proportionally assigned to provinces based on the total number of passengers and the total weight of loads received and dispatched at the stations, junctions, detours, and stops[66]. Due to a lack of station data in the 1945/46 statistics, each company's revenues from that exercise were assigned to the provinces using station data from the 1943/1944 exercise[67]. See **Table A3.16** in appendix for the distribution.

- Navigation: The distribution uses sea and river ports data on the weight of incoming and outgoing cargo as for domestic and foreign trade in 1938[68] and 1946[69]. The total weight (incoming plus outgoing) is assigned to provinces by ports allocation. In cases of ports used simultaneously by Capital Federal and Buenos Aires, the distribution methodology varied. For the port of

[64] Dirección General de Ferrocarriles (1942) - *Estadística de los Ferrocarriles en explotación - Ejercicio 1936-37*.
[65] Instituto de Estudios Económicos del Transporte (1947) - *Estadística de los Ferrocarriles Argentinos - Ejercicio 1945-1946*.
[66] The station manuals, specifically the Oficina de Ajustes de Ferrocarriles (1937) and Empresa Ferrocarriles del Estado Argentino (1958) played a crucial role in the identification of the corresponding provinces for each station.
[67] Dirección Nacional de Transportes (1950) - *Estadística de los ferrocarriles en explotación - Ejercicio 1943-44*.
[68] The construction of the allocation indicator based on the information provided in the 1937 yearbooks proved unfeasible. Consequently, the corresponding indicator for 1938 from Dirección General de Navegación y Puertos (1940) - *Anuario Estadístico del Movimiento de los Puertos en la República Argentina* was used. Values for Ramallo port in Buenos Aires were unavailable for 1938, prompting the use of data from 1939 as documented in Dirección General de Navegación y Puertos (1941).
[69] Dirección Nacional de Construcciones Portuarias y Vías Navegables (1952) - *Anuario Estadístico del Movimiento de los Puertos en la República Argentina correspondiente a 1946*.

Buenos Aires, the allocation was made based on zone-disaggregated data. However, for the fluvial zone values of "Riachuelo" and "Barracas" situated on the border of both territories, an equitable approach was taken, with values being evenly divided. See **Table A3.17** in the appendix for a detailed presentation of the distribution of this branch.

- Trucks: Distribution is based on the existing number of trucks in each province according to patenting statistics[70].

- "Transportes de Buenos Aires": This term refers to the organization that provided all subway, tram, omnibus, micro-omnibus and private bus services in Capital Federal during the second quarter of the 20th century. Therefore, the entire branch is assigned to this territory.

- Transportation of people in the interior, taxis, and *mateos*[71]*:* Using the same data sources as for trucks, the distribution is based on the provincial proportion of Omnibus and Micro-omnibus, excluding Capital Federal[72].

- Air Navigation: Unfortunately, provincial-level information for this branch was not available before 1953. To allocate this branch to the provinces, 1953 provincial data from CFI-ITDT (1965/1962) on total domestic passenger traffic for both 1937 and 1946[73] was used. It is worth noting that errors in this sector would likely have a minimal impact on provincial GDP estimates, given that this sector constitutes less than 0.25% of the national GDP in both 1937 and 1946.

Universidad de SanAndrés

3.3.7- Communications

Using BCRA (1966) estimates of sectoral national GDP at 1960 prices, the sector was divided into two branches: Telephone, and Post and Telegraph (see **Table A3.18** in the appendix). Each branch is then distributed separately.

---

[70] For the year 1946, quantities of provincial trucks and vans were sourced from DNEC (1959) - *Anuario Estadístico de la República Argentina 1957*. For 1937, provincial data from 1940 were used, based on truck numbers reported by Comité Nacional de Geografía (1941) - *Anuario Geográfico Argentino.* The 1940 data for Tucumán and Tierra del Fuego also include buses. For Tucumán, the two categories were separated based on the proportion between trucks and buses observed in the remaining provinces, excluding Los Andes, Mendoza, and Catamarca, as their bus data also includes cars. In the case of Tierra del Fuego, all data was imputed to trucks, based on information from 1942 as documented in Comité Nacional de Geografía (1943) - *Anuario Geográfico Argentino - Suplemento 1942*.

[71] Horse-drawn carriages.

[72] The data for 1940, used for 1937 calculation in Los Andes, Mendoza, and Catamarca also include cars. Separation was done based on the proportion between cars, omnibuses, and micro-buses in these provinces as per Comité Nacional de Geografía (1943) - *Anuario Geográfico Argentino - Suplemento 1942.*

[73] "*Gran Buenos Aires*" values were assigned to Buenos Aires province, since Jorge Newbery Airfield in Capital Federal was not inaugurated until 1947.

For Telephones, the allocation indicator is the provincial telephones quantity for 1937[74] and 1946. The 1946 values were derived through interpolation using the annual growth rate of provincial telephone quantities between 1939[75] and 1952[76].

The distribution of the Post and Telegraph branch relies on the revenues published in post and telegraph reports for 1937[77] and 1946[78]. Revenue data are categorized by district, posing no difficulty in identifying their corresponding province, except for the following:

- Capital Federal and Suburban Offices: To allocate between Capital Federal and Buenos Aires, the data on quantities of internal correspondence and parcels sent were used. In 1937, the following were assigned to Capital Federal: Central House, Branches, Main Agencies, Agencies (B), and Postal Cars. Buenos Aires received the suburban branches, agencies and couriers. In 1946, the distribution assigned to Capital Federal included Central House, branches and agencies of Capital Federal, as well as Postal Cars; whereas Buenos Aires received the suburban branches, agencies and couriers.

- In 1937, 0.16% of the collection was made by *Banco de la Nación Argentina*. In the context of this thesis, this value is assigned to Capital Federal.

- “District No. 23” was listed as Rawson (capital of Chubut) in 1937, and as Comodoro Rivadavia in 1946. In both cases, the entire district is assigned to Chubut.

- Formosa, Río Negro, and Tierra del Fuego have no assigned districts in the original source. The value for Resistencia (capital of Chaco) is distributed between Chaco and Formosa based on the provincial number of workers in the communication sector in the 1947 population census. The same principle is applied for Río Negro, using data from Neuquén, and Tierra del Fuego, using data from Río Gallegos (capital of Santa Cruz).

3.3.8- Finance

The central bank of the country published quarterly provincial data on aggregate bank deposits and loans for all banks in the country from the last quarter of 1941 to the last quarter of 1960 (BCRA, 1962b). The allocation indicator for 1946 is determined as the sum of deposit and loan balances for each province in the last quarter of that year. To obtain the allocator for 1937, the

[74] Ministerio del Interior (nd) - *Estadística Telefónica Año 1937.*
[75] Comité Nacional de Geografía (1941) - *Anuario Geográfico Argentino.*
[76] Gamiz (1958) - *La telefonía argentina en cifras.*
[77] Ministerio del Interior (1938) - *Memoria de correos y telégrafos - Año 1937.*
[78] Ministerio del Interior (1948) - *Administración General de Correos y Telecomunicaciones - Memoria - Año 1946.*

1941 values from BCRA (1962b) were extrapolated using annual data on deposits and loans by province from *Banco de la Nación Argentina*[79], the country's main bank[80].

3.3.9- Housing

This sector includes services provided by buildings intended for housing (SAE, 1955). Traditionally calculated at the national level, it considers rent paid by tenants and an imputed rental value for owner-occupied houses, reflecting what the latter would have paid if they had rented. The allocation indicator for 1946 was constructed by extending this methodology to the provincial level. For 1937, extrapolation techniques based on the values obtained for 1946 were applied.

The 1947 housing census[81] provides provincial data on the quantity of homes classified by the number of rooms. Additionally, it provides information on the quantities of rented homes, classified by the number of rooms and the corresponding rent amounts. This information is used to calculate the average rental value for houses by province and rooms number[82]. By applying these values to both owned and rented homes, the provincial housing services gross-value is determined, which serves as the 1946 allocation indicator.

To determine the allocation indicator for 1937, the 1946 indicator was extrapolated by multiplying it by $(1 + h_i) \times (1 + r_i)$. Here, h_i aims to capture the rate of change in the housing stock of province "i" between 1946 and 1937, while r_i represents the rate of change in rents. In the absence of 1937 housing stock data (or an alternative, such as constructed area), the provincial population change rate between 1946 and 1937 is used for h_i. For r_i, data on average monthly rent of a 4 x 4.5 meters room was employed, corresponding to an unskilled industrial worker in the provincial capitals and Capital Federal for August 1945 and 1939[83].

[79] From DNSE (nd) - *Anuario Estadístico de la República Argentina 1949-1950 - Tomo I: Compendio.*
[80] Based on national data on deposits and loans from Ferreres (2005), Banco Nación's share of deposits and loans among all banks in the country was 42.5% in 1937 and 44.7% in 1941.
[81] DNSE (nd) - *IV Censo General de la Nación. Censo de Vivienda.*
[82] The census presents rent values in the form of intervals. To assign a representative value for each interval, the midpoint was used. For the last interval, "more than 1000 m$n", an imputation of 1100 m$n as the upper limit was made, since the width of the previous intervals is 100 m$n. For the first interval, "up to 75 m$n", an imputation of 0 m$n as the lower limit was applied. This decision aligns with data from Dirección de Estadística Social (1945), which shows that there are urban dwellings with average rental values of 10 m$n per month in 1945, which means that there are cases with rents less than this value.
[83] Dirección de Estadística Social (1945).

3.3.10- Commerce

The allocation indicator for the year 1946 is derived from sales data obtained from the commerce census[84], excluding establishments in the Services sector. Given the unavailability of comparable information for 1937, the construction of the allocation indicator for that year involved choosing to extrapolate 1946 values based on the provincial population change, among various options considered (see equation 3.6 in **Section 3.3**).

It is worth noting that the evolution of the "sales tax" collection by province (the predecessor of the current and well-known value-added tax) was also considered as a potentially more appropriate extrapolation alternative. However, this option was ultimately dismissed due to data issues. Notably, there were extremely unusual values, such as higher collection in Santa Fe than in Buenos Aires until 1940, and the doubling of the latter in the following year. This anomaly was likely the result of the recent implementation of the tax during the period, effective since 1935. Additionally, there were differentiated (and time-varying) tax rates by product, including exemptions and destination (local market or export). Lastly, in the case of selling companies located in multiple provinces, the data source assigned the collection from these companies to the province where their headquarters were located, potentially leading to a significant overestimation for Capital Federal.

QUAERERE VERUM
Universidad de
SanAndrés

3.3.11- Personal Services

The 1946 allocation indicator is the sum of three concepts, calculated for each province: (a) total wages paid in service provider establishments (e.g., hotels, shoe repair shops, or automobile repair shops), (b) total income of workers in liberal professions, and (c) total wages of domestic service workers.

The provincial values for component (a) are derived from the total wages paid by service establishments in each province in 1946, as reported in the commerce census[85]. As for components (b) and (c), they were obtained indirectly through a two-step procedure: first, a national total for each case was computed, and then those totals were distributed among the provinces.

For the first step, CONADE-CEPAL (1965) provides national estimates for 1950 of the average annual earning of professionals and the average annual wages of domestic workers[86]. These two

[84] DNSE (1952b) - *IV Censo General de la Nación. Tomo III.*
[85] DNSE (1952b) - *IV Censo General de la Nación. Tomo III.*
[86] 16,896 m$n annually for professionals and 2,357 m$n annually for domestic service.

values are extrapolated to 1946 using the evolution of the average annual remuneration of employees in "Communal, social and personal services" from Llach & Sánchez (1984)[87]. The national total for (b) is obtained by multiplying these extrapolated average earnings of professionals by the number of workers in liberal professions in the 1947 census[88]. Similarly, for (c) the extrapolated annual average wage of domestic workers is multiplied by the number of workers domestic services according the 1947 census.

For the second stage, the distribution of the national values obtained in the first stage to the provinces is necessary. Although provincial data on the numbers of workers in liberal professions and domestic services are available from the 1947 census, specific earnings, or wages, for these activities at the provincial level are not. Therefore, to capture the relative provincial differences in the earnings of liberal profession workers or wages of domestic services workers, an alternative provincial income value was imputed in each case. Subsequently, the national totals of (b) and (c) are distributed proportionally from their provincial analogues, constructed with the imputed incomes. Specifically, the provincial analogues of (b) are constructed from the provincial number of liberal profession workers in the 1947 population census, multiplied by the provincial average annual wage paid to workers in commercial and service establishments in 1946, obtained from the commerce census[89]. Similarly, for (c), the provincial minimum wage for unskilled female workers[90] is imputed for domestic services workers.

Finally, as previously mentioned in this section, having the provincial values for (a), (b), and (c) in hand, the allocation indicator is obtained simply, by adding the three concepts for each province. The provincial allocation indicators in 1937 were extrapolated from those of 1946, using the population evolution for each province, similar to equation 3.6 in **Section 3.3**.

QUAERERE VERUM
Universidad de
San Andrés

3.3.12- Government Services

The SAE (1955) national GDP measures this sector based on the remuneration amount paid to employees and workers involved in providing services in the National Administration, Provinces, and Municipalities. Unfortunately, applying a similar methodology at the provincial level proved challenging, due to the lack of necessary data for allocating personnel expenditures of

---

[87] 18.56 Pesos Ley for 1946, and 52.00 Pesos Ley for 1950.
[88] DNSE (nd) - *IV Censo General de la Nación. Tomo I.*
[89] These wages were obtained by dividing the total wage mass of 1946 by the number of employees as of the last day of the year.
[90] The 8-hour day wage for non-qualified female personnel aged 21 or over in each province's main cities was sourced from a 1945 Resolution of the national executive power (*Vicepresidencia de la Nación - Resolución Nº 24 del 24 de mayo de 1945*).

national government employees to the provinces. However, the 1947 census does offer provincial information on the number of individuals who reported working in "national, provincial, and local government activities". Therefore, the 1946 allocation indicator is constructed by imputing to these employees the wages paid that year by commercial and service establishments in each province, as reported in the commercial census[91].

For 1937, in the absence of available data on the number of government employees or their wages, a method of extrapolating the 1946 allocation indicators was employed, similar to equation 3.6 in **Section 3.3**. However, a more indirect procedure had to be adopted because the chosen variable for extrapolation (the change in expenditures budgeted by provincial governments) is not available for all jurisdictions. Specifically, the "National Territories" administered by the national government at the time did not have budget laws. A two-step procedure was then implemented; firstly, the 1937 national government GDP was allocated between two groups (jurisdictions with a budget and those without); secondly, the totals of each group were distributed among the jurisdictions within them.

In the first step, the procedure begins with the use of provincial GDP estimates from the government sector for 1914[92] and 1946. Each provincial value is then interpolated to 1937 using the average annual growth rate between those years. This process yields the 1937 government GDP shares of the grouped National Territories (2.91%) and the group of Provinces and Capital Federal (97.09%). Subsequently, in the next step, the total of the two groups is distributed among their respective components.

For each of the National Territories without budget data, as a second step, the 1946 government GDP was extrapolated to 1937 based on provincial population changes. This was used to estimate each territory's share of the 2.91% allocated to the total of National Territories in the previous step.

For Capital Federal and each of the Provinces, as a second step, the 1946 government GDP was extrapolated to 1937 using the evolution of provincial government expenditure budgets. These extrapolated values were then employed to distribute 97.09% of the national GDP of the sector corresponding to this group for 1937. It's worth noting that, due to variations in the concepts included in the original budget laws, the extrapolation was based on homologated budgets available for 1939 and 1947 (see **Table A3.19** in appendix for details and sources).

Universidad de San Andrés

[91] Obtained by dividing the wage mass of 1946 by the number of employees as of the last day of the year.
[92] Material provided by the authors of Aráoz & Nicolini (2020).

3.4- The Old and New Data: Long Term Patterns of Regional Inequality

By combining official provincial GDP data post-1950 with the 1895 and 1914 data from Aráoz & Nicolini (2016, 2020), and incorporating new data for 1937 and 1946, it is possible to conduct a long-term study of regional inequality in Argentina[93]. The selected years for this study include 1895[94], 1914, 1937, 1946, 1953, 1965, 1975, 1986, 1993, and 2004[95]. The distribution of each province's share in the total national GDP for these years is outlined in **Table 3.4**. A parallel representation of population shares, using census data for 1895 and 1914, along with official interpolations and projections for the other years[96] is provided in **Table 3.5**. **Figure 3.1** summarizes the values for provinces that ranked in the top 5 for either variable in at least one of the years. From the previous two tables, it is possible to determine the GDP per capita of each province in relation to the national total, as presented in **Table 3.6**.

All of these data will be analyzed in **Sections 3.4.2** and **3.4.3**. Before presenting this analysis, however, it is necessary to discuss two concerns: the effect of possible price differentials among provinces, and the reliability of the new provincial estimates for 1937 and 1946.

Regarding the first concern, unfortunately, measures of price differentials across Argentine provinces are rather scarce, so it was not possible to include this aspect in the analysis. The limited evidence that is available suggests that while there are differences in price levels across provinces, there is no geographic pattern to these differences that persists over time. For example, in a study of 14 Argentine cities between 1903 and 1912, Correa Deza & Nicolini (2014) find that the average price level of the largest cities, located in Pampean region, is lower than that of cities in the interior, further away from Buenos Aires. In particular, they associate this with the comparative advantages that Pampean region has in the production of wheat and livestock, the basis of the two most consumed products (bread and meat), as well as advantages in

Universidad de San Andrés

93 Parts of this and the next sections draw from Aráoz, *et al.* (2020), in collaboration with the author of this thesis. **Chapter IV** of this thesis provides a deeper analysis of the evolution of regional inequality in Argentina, offering detailed insights into the sectoral composition of economies with a focus on the easy or light ISI period spanning from 1914 to 1959.

94 There is a non-trivial challenge regarding the quality and precision of the measurement of economic activity, and even population, in the censuses of the beginning of the period for the national territories, particularly in 1895. The relator of República Argentina (1898) - *Segundo Censo Nacional* notes (vol. 2, p. cxxv): "the national territories, except Misiones, can be considered depopulated, since, on average, they do not reach one inhabitant for every 10 km2 of surface". As a result, the records for these distant territories are probably not very reliable. However, given that these territories' main economic characteristics emerging from the first set of estimations are confirmed by the more recent and reliable censuses, the information of the census is probably a reasonable approximation of the real numbers.

95 Estimates are presented at current prices for all years, except for 1895, for which the only available estimate is based on national GDP at 1914 constant prices. The values for 1895 are derived from Aráoz *et al*. (2020), which follows the methodology described in Aráoz & Nicolini (2016) but incorporates updates in the data.

96 For 1937 and 1946, the data is sourced from DNEC (1956); for 1953, from CFI-ITDT (1965/1962), and for 1965, 1975, 1986, 1993 and 2004 from INDEC (1975b, 1989, 1993, 1996, 2008).

access to transportation. On the other hand, they mention that cities of Cuyo region (San Juan and Mendoza) are among the most expensive, along with those of the eastern part of the North-east (the capitals of Corrientes and Misiones).

Table 3.4: Share of Provincial GDP on Total GDP (%)

Provinces	**Year**									
	1895	**1914**	**1937**	**1946**	**1953**	**1965**	**1975**	**1986**	**1993**	**2004**
Bs. Aires	24.63	29.04	27.18	28.02	31.47	37.57	32.21	39.14	34.39	32.95
Cap. Federal	22.27	25.87	31.71	33.77	30.02	24.97	27.61	23.56	23.94	20.65
Catamarca	0.91	0.58	0.29	0.35	0.32	0.27	0.40	0.39	0.53	0.85
Chaco	0.29	0.46	1.22	1.44	1.78	1.62	1.14	0.89	1.26	1.30
Chubut	0.07	0.29	1.15	1.04	0.95	0.88	1.46	1.61	1.30	2.23
Córdoba	6.95	8.61	8.89	6.56	6.57	7.77	6.56	7.11	7.92	7.84
Corrientes	3.68	2.67	1.78	1.69	1.40	1.26	1.32	1.09	1.35	1.18
Entre Ríos	6.72	4.25	3.14	2.79	2.88	2.21	2.33	1.66	2.17	2.43
Formosa	0.15	0.22	0.46	0.44	0.47	0.35	0.54	0.30	0.59	0.51
Jujuy	0.77	0.87	0.63	0.69	0.83	0.64	1.04	0.69	0.87	0.84
La Pampa	0.63	1.50	1.25	1.02	0.95	0.97	0.60	1.03	0.85	0.88
La Rioja	0.80	0.74	0.27	0.30	0.28	0.21	0.38	0.51	0.53	0.58
Mendoza	3.49	2.93	2.44	3.65	3.88	3.83	4.44	2.64	3.90	3.92
Misiones	0.64	0.30	0.61	0.91	0.82	0.80	1.50	1.34	1.35	1.25
Neuquén	0.14	0.26	0.36	0.39	0.35	0.37	1.06	0.98	1.70	3.11
Río Negro	0.18	0.50	0.58	0.74	0.93	0.94	1.29	1.48	1.42	1.34
Salta	1.79	1.15	1.12	1.07	1.14	1.25	1.36	1.50	1.47	1.75
San Juan	2.55	0.97	0.74	1.31	1.14	1.17	0.98	0.94	1.09	1.10
San Luis	0.96	1.35	0.56	0.48	0.51	0.53	0.45	1.08	1.02	1.07
Santa Cruz	0.05	0.26	0.37	0.43	0.47	0.89	0.65	0.74	0.95	1.71
Santa Fe	14.03	12.70	11.82	9.60	9.13	9.20	8.53	8.21	7.86	8.82
S. del Estero	1.72	1.43	1.02	1.07	1.09	0.69	1.02	0.60	0.91	1.17
T. del Fuego	0.02	0.06	0.08	0.08	0.10	0.12	0.21	0.75	0.66	0.80
Tucumán	6.59	2.99	2.34	2.17	2.49	1.46	2.92	1.76	1.99	1.74
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: see text in **Section 3.3**.

Table 3.5: Share of Provincial Population on Total Population (%)

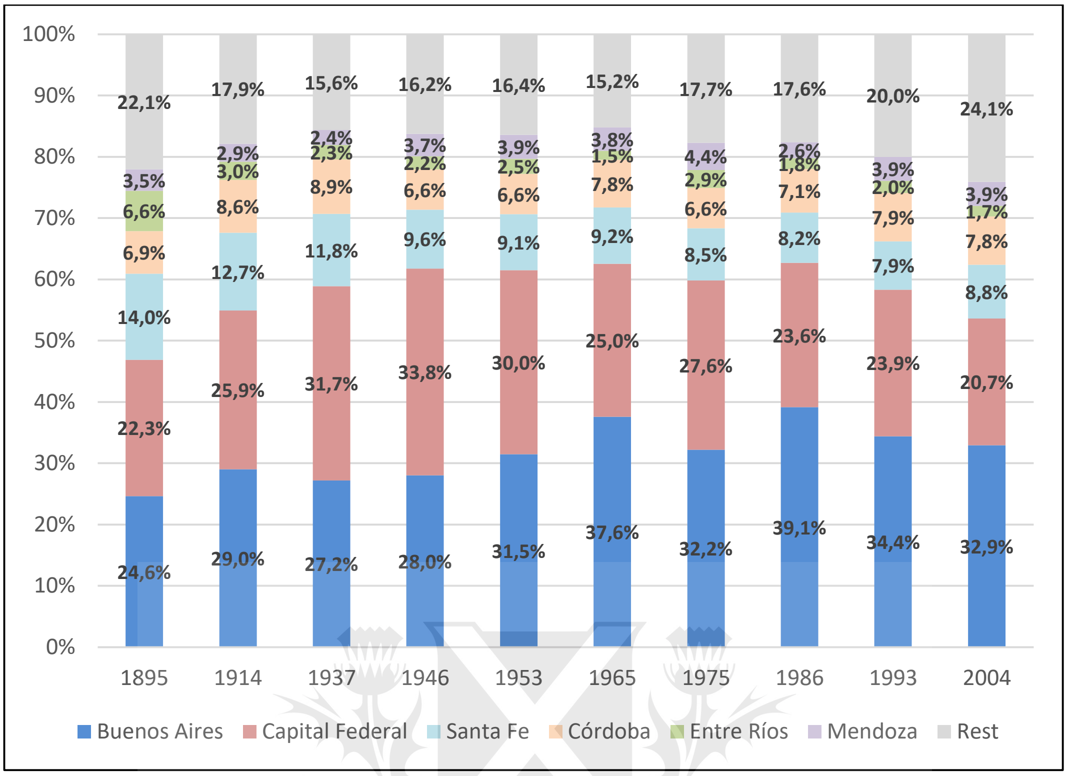
Provinces	Year									
	1895	**1914**	**1937**	**1946**	**1953**	**1965**	**1975**	**1986**	**1993**	**2004**
Bs. Aires	23.29	26.21	26.99	26.92	29.71	35.98	38.26	39.39	38.55	38.01
Cap. Federal	16.79	19.98	18.98	18.80	16.95	13.39	11.31	9.43	8.92	7.88
Catamarca	2.28	1.28	1.01	0.93	0.91	0.78	0.74	0.73	0.82	0.94
Chaco	0.26	0.60	2.25	2.70	2.73	2.55	2.46	2.56	2.57	2.66
Chubut	0.09	0.29	0.52	0.58	0.68	0.76	0.88	0.99	1.12	1.15
Córdoba	8.88	9.33	9.47	9.43	9.25	8.87	8.80	8.62	8.46	8.44
Corrientes	6.06	4.40	3.41	3.30	3.06	2.55	2.42	2.35	2.45	2.54
Entre Ríos	7.38	5.39	4.95	4.95	4.55	3.75	3.40	3.17	3.10	3.16
Formosa	0.12	0.24	0.62	0.71	0.80	0.95	1.03	1.10	1.25	1.34
Jujuy	1.26	0.98	1.01	1.05	1.13	1.26	1.39	1.53	1.58	1.68
La Pampa	0.66	1.28	1.36	1.07	0.94	0.76	0.74	0.75	0.80	0.83
La Rioja	1.76	1.01	0.76	0.70	0.68	0.60	0.58	0.60	0.69	0.82
Mendoza	2.94	3.52	3.63	3.70	3.93	4.15	4.25	4.33	4.34	4.34
Misiones	0.84	0.68	1.28	1.54	1.75	1.87	2.01	2.22	2.48	2.65
Neuquén	0.37	0.37	0.51	0.54	0.56	0.62	0.76	0.97	1.26	1.34
Río Negro	0.23	0.54	0.81	0.84	0.68	1.05	1.24	1.43	1.58	1.53
Salta	2.98	1.80	1.75	1.83	1.96	2.12	2.28	2.51	2.70	2.99
San Juan	2.13	1.51	1.54	1.64	1.72	1.71	1.67	1.66	1.61	1.72
San Luis	2.06	1.47	1.18	1.04	0.97	0.82	0.77	0.77	0.90	1.05
Santa Cruz	0.03	0.13	0.28	0.27	0.24	0.32	0.39	0.45	0.50	0.55
Santa Fe	10.04	11.41	11.12	10.74	10.16	9.23	8.98	8.72	8.54	8.26
S. del Estero	4.08	3.32	2.90	2.97	2.74	2.27	2.15	2.05	2.04	2.18
T. del Fuego	0.01	0.03	0.04	0.03	0.04	0.05	0.07	0.18	0.23	0.29
Tucumán	5.46	4.22	3.65	3.72	3.84	3.58	3.42	3.50	3.50	3.67
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: see text.

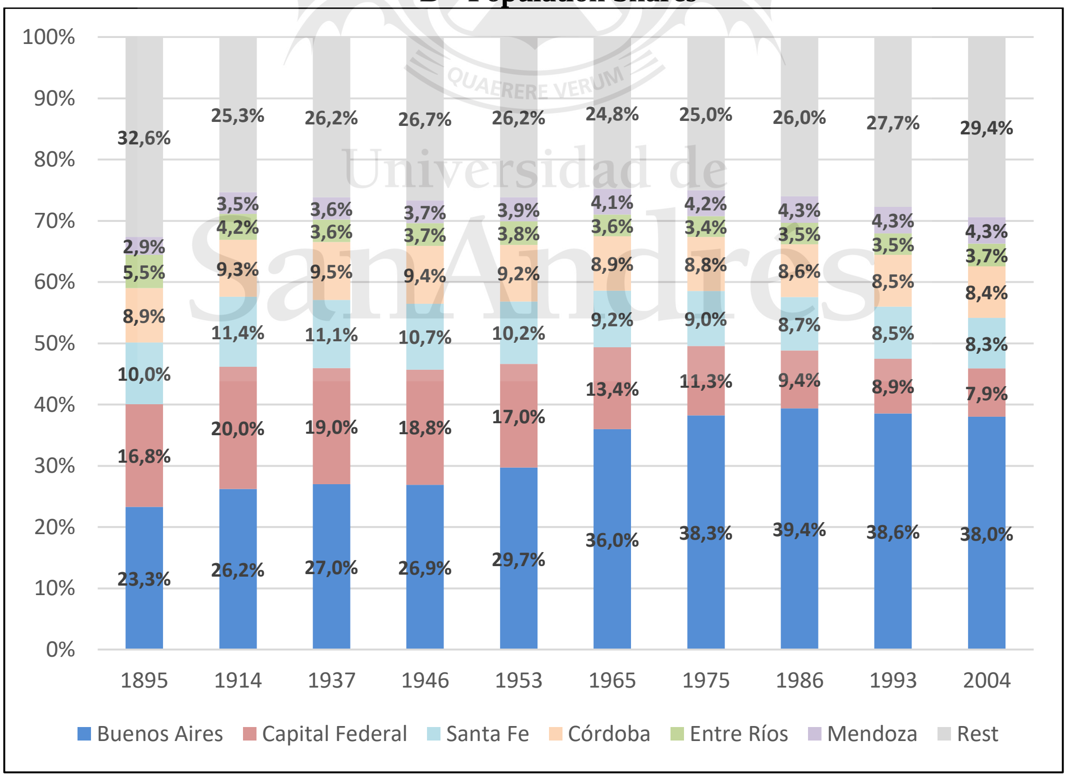
Universidad de San Andrés

Figure 3.1: Evolution of Provincial GDP and Population Shares

A- GDP Shares



B- Population Shares



Note: The provinces presented individually are those that ranked among the top 5 in terms of GDP or population in at least one of the years shown. Buenos Aires, Capital Federal, Santa Fe and Córdoba were consistently in the top 4 for both variables in all years considered.
Source: Own elaboration based on **Tables 3.4** and **3.5**.

Table 3.6: Per Capita GDP (country current year GDP pc = 1)

Provinces	Year									
	1895	**1914**	**1937**	**1946**	**1953**	**1965**	**1975**	**1986**	**1993**	**2004**
Buenos Aires	1.06	1.11	1.01	1.04	1.06	1.04	0.84	0.99	0.89	0.87
Cap. Federal	1.33	1.29	1.67	1.80	1.77	1.87	2.44	2.50	2.68	2.62
Catamarca	0.40	0.45	0.29	0.38	0.35	0.34	0.54	0.53	0.64	0.91
Chaco	1.08	0.77	0.54	0.53	0.65	0.64	0.46	0.35	0.49	0.49
Chubut	0.73	0.98	2.19	1.80	1.39	1.16	1.67	1.62	1.17	1.94
Córdoba	0.78	0.92	0.94	0.70	0.71	0.88	0.75	0.82	0.94	0.93
Corrientes	0.61	0.61	0.52	0.51	0.46	0.49	0.54	0.46	0.55	0.46
Entre Ríos	0.91	0.79	0.63	0.56	0.63	0.59	0.69	0.52	0.70	0.77
Formosa	1.22	0.92	0.74	0.62	0.59	0.37	0.52	0.28	0.47	0.38
Jujuy	0.61	0.88	0.62	0.66	0.74	0.51	0.75	0.45	0.55	0.50
La Pampa	0.96	1.17	0.92	0.95	1.01	1.28	0.80	1.37	1.06	1.06
La Rioja	0.45	0.73	0.35	0.43	0.41	0.35	0.66	0.85	0.77	0.71
Mendoza	1.19	0.83	0.67	0.99	0.99	0.92	1.05	0.61	0.90	0.90
Misiones	0.76	0.45	0.48	0.59	0.47	0.43	0.75	0.60	0.55	0.47
Neuquén	0.39	0.72	0.71	0.72	0.63	0.60	1.39	1.01	1.35	2.32
Río Negro	0.75	0.93	0.72	0.87	1.36	0.90	1.04	1.04	0.90	0.88
Salta	0.60	0.64	0.64	0.58	0.58	0.59	0.60	0.60	0.54	0.58
San Juan	1.20	0.64	0.48	0.80	0.66	0.69	0.59	0.57	0.68	0.64
San Luis	0.46	0.91	0.47	0.46	0.52	0.65	0.59	1.41	1.14	1.02
Santa Cruz	1.89	2.09	1.33	1.59	2.00	2.75	1.69	1.65	1.87	3.11
Santa Fe	1.40	1.11	1.06	0.89	0.90	1.00	0.95	0.94	0.92	1.07
Sgo. del Estero	0.42	0.43	0.35	0.36	0.40	0.31	0.48	0.29	0.44	0.54
T. del Fuego	1.66	1.91	2.18	2.55	2.48	2.45	2.89	4.20	2.82	2.72
Tucumán	1.21	0.71	0.64	0.58	0.65	0.41	0.85	0.50	0.57	0.47
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Source: Own elaboration based on **Tables 3.4** and **3.5**.

However, the patterns found by Correa Deza & Nicolini (2014) for the beginning of the 20th century contrast markedly with the current patterns of basic basket values for the main urban agglomerations of each region. According to these basket values, which are used as poverty lines by INDEC (2016b) for the end of the 2010s, the Northeast region is the one with the second lowest value, 16 % below that of Greater Buenos Aires (the second largest in the country)[97]. In the rest of Pampean region, the value of the basic basket is similar to that of Greater Buenos

[97] For the months of the second quarter of 2016, taking Greater Buenos Aires as a reference, the relative values of the total basic basket for the main urban agglomerations of each region were on average: 1.00 for Greater Buenos Aires; 1.00 for Pampean; 1.17 for Patagonia; 0.95 for Cuyo; 0.84 for the Northeast; and 0.82 for the Northwest.

QUAERERE VERUM Universidad de SanAndres

Aires. In turn, the cities of southern Patagonia (not included in Correa Deza & Nicolini, 2014) have the highest relative cost of living.

On the other hand, estimates of Dirección de Estadística Social (1945) on working-class family budget between the years 1939 and part of 1945, show that at that time the City of Buenos Aires and La Plata (capital of Buenos Aires province) were by far the most expensive in the country, followed by cities in southern Patagonia and Santa Fe (in the Pampean region). The rest of the country's provinces do not show a clear or stable geographic pattern over the period. For example, the cost of living in Córdoba went from 72% of that in City of Buenos Aires in 1939 to 98% in 1944.

To the best of my knowledge, there are no cases in the literature other than those mentioned above that allow the magnitude of provincial price level differences to be determined. The instability of the results between these studies and between the years considered in each of these studies raises reservations about using extrapolations based on them to obtain provincial measures of (GDP) at purchasing power parity for the years included in the analysis in this chapter. Therefore, it was decided to leave the provincial GDP measures unchanged, despite the potential biases this may introduce into the results. However, it must be made clear that the relative differences in provincial GDP per capita levels are much greater than the relative differences in price levels. For example, the ratio between the richest and poorest provinces in 1946 was more than 7, while the ratio between the provinces with the highest and lowest price levels in 1944 (Dirección de Estadística Social, 1945) was 1.65. Therefore, the possible failure to correct GDPs for differences in price levels does not significantly affect the conclusions drawn.

The other concern mentioned, about the reliability of the new provincial GDP estimates for 1937 and 1946, will be addressed in the next section.

3.4.1- Reliability of the New Estimates

Before delving into the analysis, it is important to address whether provincial GDP data, estimated using different methodologies between benchmarks, are strictly comparable. In other words, it is necessary to determine to some extent whether observed differences in the data are due to real differences or to methodological discrepancies. This problem is widespread in studies for many countries involving the reconstruction of historical regional GDP (Díez-Minguela & Sanchis Llopis, 2020) and even in cross-country comparisons using well-known databases, such as the Maddison Project (Felice, 2019). As highlighted in this chapter, data availability poses a challenge in the construction of regional GDP estimates, as the substantial information required for this task is not always easily obtainable, especially in historical contexts. Therefore, despite the potential comparability issues discussed earlier, the use of newly emerging data for subsequent research represents a great advancement in understanding regional history.

In the case of Argentina, GDPs for all the presented benchmarks were estimated using a consistent methodology across all provinces, except for 1965, where this cannot be guaranteed due to the unavailability of methodological documentation. The challenge of differing methodologies arises when making intra-provincial comparisons over time. This issue is partially mitigated here by avoiding the analysis of provincial growth rates and focusing on figures relative to national totals. Furthermore, there are data available that allows an assessment of the sensitivity of the estimates to different methodologies. Specifically, for some sectors, it was possible to replicate the methodology used for 1937-1946 in 1953, enabling a comparison with the results obtained by CFI-ITDT (1965/1962) for that year. In the absence of errors due to methodological differences, if the two alternative provincial shares for 1953 were plotted on a Cartesian axis, the observations should be perfectly aligned on a 45º straight line (slope = 1, constant = 0, and $R^2 = 1$). For sectors where this comparison was possible, **Table 3.7** shows results close to this line, suggesting the robustness of the provincial estimates to methodological changes. Moreover, given that Capital Federal and Buenos Aires consistently have higher shares than the rest of the provinces in almost all economic sectors, a straight line close to the desired one could be obtained by correctly estimating only these two territories. To address this concern, the exercise was repeated excluding these two areas, yielding results that remain robust to methodological changes.

Universidad de SanAndrés

Table 3.7: Comparison with Replicated Methodology for 1953 Data

Sector	All provinces			Capital Federal and Buenos Aires excluded		
	R^2	Slope (ideal = 1)	Constant (ideal = 0)	R^2	Slope (ideal = 1)	Constant (ideal = 0)
Agriculture	0.98	0.94	0.00	0.93	0.95	0.00
Manufacturing	1.00	0.99	0.00	1.00	1.04	0.00
Mining	0.90	0.91	0.00	0.90	0.89	0.00
Electricity, gas and water	0.95	0.92	0.00	0.99	1.02	0.00
Communications	0.99	0.93	0.00	0.96	0.99	0.00
Finance	1.00	0.99	0.00	0.99	1.13	0.00
Commerce (methodology 1946)	0.97	0.87	0.01	0.99	1.04	0.00
Commerce (methodology 1937)	0.96	0.84	0.01	0.98	0.96	0.00

Source: see text.

It is also possible to compare the results obtained for 1937 and 1946 with existing estimates for specific provinces but following different methodologies, such as Salta (Antonelli, 2013), Mendoza (Coria López, 2014), and Buenos Aires (Ministerio de Hacienda, Economía y Previsión - Provincia de Buenos Aires, 1957) (see **Section 3.2**).

For Salta, Antonelli's GDP per capita values for 1937 and 1946, relative to the national total, are reported as 0.24 and 0.19, respectively. In comparison, the GDP per capita estimates presented in **Table 3.6** indicate values of 0.64 and 0.58 for the same years. Both sets of estimates show a decline of about 0.05 points between 1937 and 1946. However, there is a notable discrepancy in the observed levels, with the results presented in this thesis being more than twice as large. This inconsistency is in line with the difference between Antonelli (2013) and CFI-ITDT (1965/1962) for 1953, as mentioned in **Section 3.2**. Among various methodological discrepancies, Antonelli's lower values can be attributed to the omission of some economic sectors from the calculations. Furthermore, as highlighted in **Section 3.2**, the use of an input-output ratio from a very distant year (1997) in Antonelli's estimates could also contribute to the observed discrepancy, although the exact impact is not entirely clear a priori.

In the case of Mendoza, Coria López (2014) reported GDP shares for 1937 and 1946 are 2.02% and 2.89%, respectively. In comparison, the estimates presented in **Table 3.4** are approximately 20% higher, with 2.44% for 1937 and 3.65% for 1946. Disparities in levels between Coria López (2014) and CFI-ITDT (1965/1962) for 1953 follow a similar trend, but with larger magnitudes (i.e., the share for this year is 50% higher in CFI-ITDT). Identifying the source of such differences is challenging, as Coria López's method significantly differs from that used in the estimates presented in this thesis and those of CFI-ITDT. Despite these differences, the growth rate of the shares between 1937 and 1946 exceeds 40% in both sets of estimates.

Regarding the province of Buenos Aires, the GDP share values reported by Ministerio de Hacienda, Economía y Previsión - Provincia de Buenos Aires (1957) are 27.56% for 1937 and 30.32% for 1946. The estimates in **Table 3.4** are comparable for 1937 (27.18%), but lower for 1946 (28.02%). Although there is an increase in the share between the two years in both cases, the magnitudes differ. However, given the province's important contribution to the country (more than 25%), the observed differences in magnitude may be considered irrelevant.

Overall, for some provinces, differences in GDP share estimates are relatively large, but the estimates presented in this thesis align with other estimates, such as CFI-ITDT (1965/1962). It is important to note that these cases of independent estimates for isolated provinces involve using very different methodologies, which makes them incomparable. Despite variations in shares, the changes between years do not exhibit notable differences. In provinces of significant size, such

QUAERERE VERUM Universidad de SanAndrés

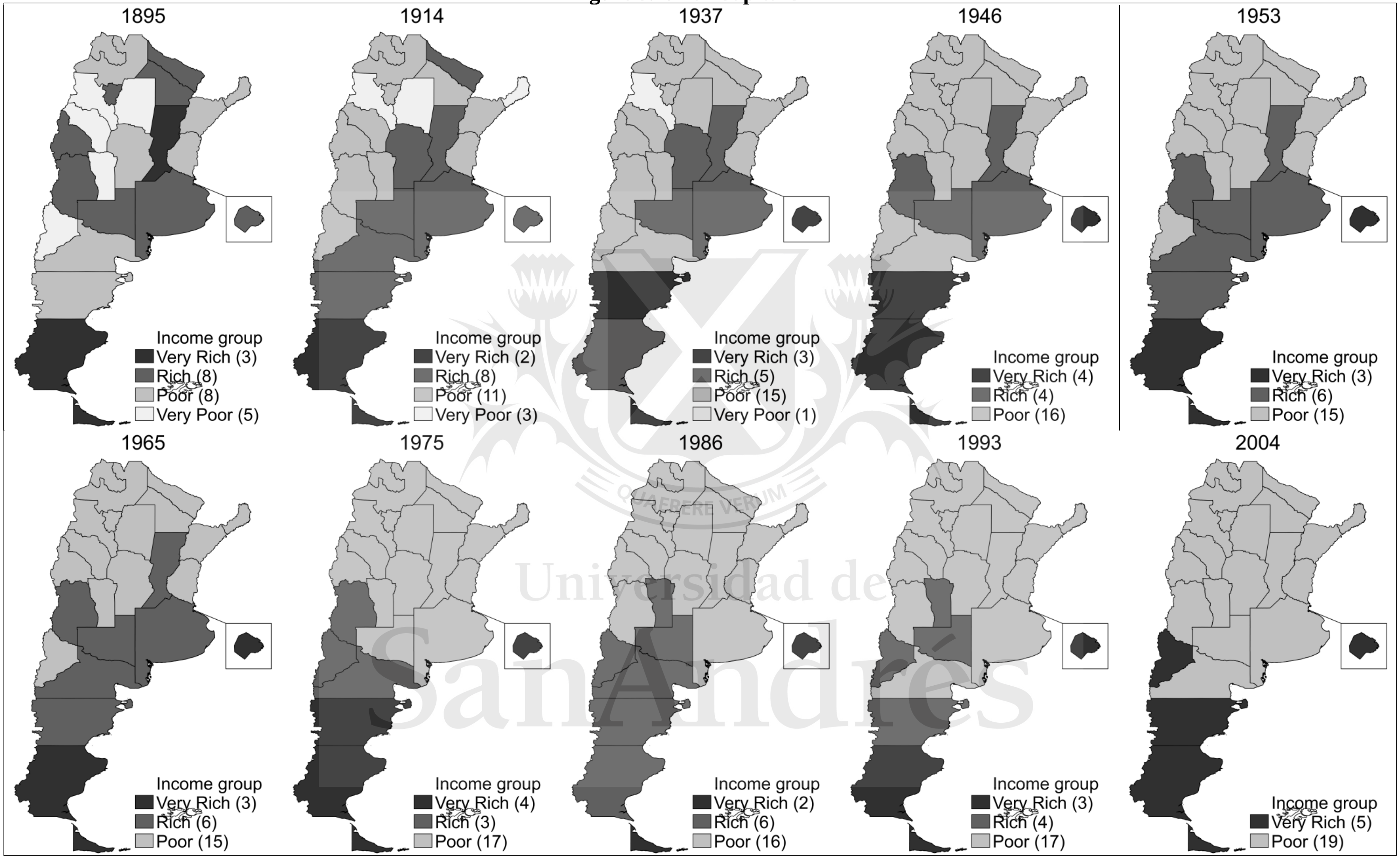
as Buenos Aires, the observed differences in shares compared to previous estimates are not particularly large.

3.4.2- Long-term Regional Inequality in Argentina: A Description

The analysis of regional patterns in Argentine economic activity reveals several key trends. Firstly, there is a substantial and growing importance of the province of Buenos Aires and the Capital Federal district in the first half of the twentieth century, contrasting with a reverse trend after the 1990s. **Figure 3.1** illustrates that only these two areas consistently accounted for more than 40% of the population and an even higher share of the GDP throughout this period. In fact, the GDP of either one of these two districts alone surpasses the combined GDP of the other four districts that follow in size. Secondly, there is a persistent pattern in the relative positions of provinces and regions in terms of per capita GDP. Thirdly, this persistence occurs in the context of a gradual and evident reinforcement of the division between a poorer North and a wealthier South and Capital Federal, located in the center of the country. Lastly, there is a clear and consistent increase in the regional dispersion of per capita income.

The evolution of the spatial configuration of the regional distribution of income per capita is summarized in the maps of **Figure 3.2**. As with the maps in **Chapter I**, income groups were defined based on standard deviations from the simple mean of GDP per capita for each district in each year. Thus, the "Rich" group includes provinces with GDP per capita between the mean and the mean plus one standard deviation, and the "Very Rich" group includes those above the mean plus one standard deviation. **Figure A3.3** also presents the same information, but uses an alternative grouping method, leading to conclusions similar to those presented next. Notably, the maps highlight some provinces in Patagonia (Tierra del Fuego, Santa Cruz and eventually Chubut) and Capital Federal as consistently exhibiting the highest per capita income throughout most of the period. This phenomenon is tied to complementary processes, including extensive land exploitation and oil production in Patagonia, as well as the concentration of manufacturing and services in Capital Federal. The new estimates reveal that by 1937, this pattern was much more pronounced than in 1914, with Capital Federal and Chubut clearly distancing themselves from the rest of the provinces. Additionally, in 1937, the differences between the northern and the southern regions of the country mentioned in the previous paragraph were less diffuse than in previous years.

Figure 3.2: Per Capita GDP



Note: The income groups are constructed using standard deviations from the simple average of the GDP per capita of the districts. For example, the category "Very Rich" includes districts with GDP per capita higher than the average GDP per capita plus one standard deviation.
Source: Own elaboration based on **Table 3.6**

Universidad de San Andrés

Since colonial times, especially since the late 18th and early 19th centuries, the city of Buenos Aires and its agrarian hinterland in the province of Buenos Aires have played a dominant role in the economic process and political events of the country (Hora, 2010, and Oszlak, 1997). The estimation of regional GDPs for 1895 confirms the concentration of economic activity in Buenos Aires and Capital Federal at the end of the nineteenth century. **Table 3.3** and **Figure 3.1** show that the participation of these two districts in the national value-added is more than 45% by the end of the nineteenth century, increasing to over 60% in the 1980s. During this period, Buenos Aires experienced simultaneous growth in its GDP share and population shares, resulting in relatively little variation in its GDP per capita (**Table 3.5**). This suggests that its GDP growth was essentially extensive. In contrast, Capital Federal experienced intensive GDP growth until the 1940s, with its GDP share growing at a faster rate than its population share, which even declined slightly at one point. Since the 1950s, although this district's share of GDP began to decline, the decrease in its population share was even more pronounced, resulting in a subsequent increase in its relative GDP per capita.

In 1895, most of the provinces with relevant contributions to the national GDP were located in the Pampean region, situated in the center of the country and naturally suited for the production of cereals and meat - the two primary items in Argentine exports (see **Chapter II**). The only other province closely aligned with this group is Tucumán, which accounted for more than 6% of the total national income. Tucumán's specialization in sugar cane cultivation and industrial sugar production led to a substantial expansion of economic activity since the 1870s. However, the province suffered a severe crisis of overproduction in 1895, which marked the beginning of a slowdown (Juarez-Dappe, 2010). Other high-income areas include the far south of the country, such as the provinces of Santa Cruz and Tierra del Fuego, where extensive sheep production and very low population density allowed for exceptionally high labor productivity. Capital Federal, housing most of the industrial and services sectors, also stands out as a high-income region. Conversely, provinces in the North, such as La Rioja, Catamarca, Misiones, and Santiago del Estero, exhibit the lowest levels of income per capita. Districts in the Northeast, like Formosa and Chaco, only recently incorporated to the national economy, demonstrated relatively high income per capita, due to their low population density in a frontier-economy context [98]. However, this relatively affluent position for these northeastern districts vanished by 1937.

In summary, between 1895 and 1914 it is observed (i) a confirmation of the leading positions by Santa Cruz, Tierra del Fuego and Capital Federal (ii) an expansion of the relative affluence to

[98] In Chaco and Formosa, agriculture, together with a relatively rudimentary sugar production process, stood as the predominant economic activities. The remarkably low population density documented by census officials in 1895, with less than one inhabitant per square kilometer, accounts for the relatively high income per capita in these regions.

other provinces in Patagonia, and (iii) a conformation of a cluster of high-income provinces in the Pampean region.

In the following decades, the Argentine economy underwent significant transformations, witnessing the industrial sector surpassing the agricultural sector, which had historically been the main driver of the economy in the late 19th and early 20th centuries (for more details, see **Chapter II**). The disruptions in trade flows caused by the two world wars and the 1930 international crisis stimulated the industrialization of the economy. Furthermore, the country's political economy shifted towards a highly interventionist scheme, especially since the second postwar period. The inclusion of new provincial GDP data for 1937 and 1946 enable an extension of the regional analysis for these decades following 1914.

The new values exhibit characteristics that align with the available estimates for the nearest previous and subsequent years (i.e., 1914 and 1953), thereby enhancing their reliability. For instance, the observed GDP concentration in Capital Federal and Buenos Aires constitutes over 50% of the national GDP exclusively in these two jurisdictions. The two provinces following them in GDP share, namely Santa Fe and Córdoba, also coincide across the years. Moreover, the combined GDP share of these two provinces between 1914 and 1953 remains below 22%, supporting the continuity of their relative positions with respect to Capital Federal and Buenos Aires. Similar to other years, the 1937 and 1946 estimates display the characteristic pattern of "rich south vs. poor north" in GDP per capita, with high values in Capital Federal and Patagonian provinces and low values in the northern provinces, particularly in Santiago del Estero and Catamarca.

With the inclusion of new data from 1937 and 1946, it becomes possible to assess whether the trends previously identified, based solely on data from 1914 and 1953, exhibited smooth patterns or underwent changes within the period. For instance, the data for 1914 and 1953 indicate an increase in the relative GDP per capita of Capital Federal. However, the new datasets reveal that this increase occurred mainly between 1914 and 1946, with a slight reversal observed in 1946-1953. Similar examples can be found in the changes in provincial GDP shares between 1914 and 1953, as detailed in **Table 3.4** and **Figure 3.1**. These include: (i) an increase in Buenos Aires; (ii) a decrease in other "big provinces" of the Pampean region, such as Santa Fe and Córdoba; and (iii) an increase in *Cuyo* provinces, particularly Mendoza and San Juan. Each of these changes can be linked to specific factors. For instance, Buenos Aires' GDP share witnessed a significant increase mainly in 1946-1953, a period marked by high state intervention in the economy. Conversely, Santa Fe and Córdoba experienced decreases mainly during 1937-1946, possibly due to challenges in exporting their agricultural products caused by World War II. In the same period, Mendoza and San Juan exhibited an opposite trend, increasing their shares. In particular, Mendoza saw high relative growth in GDP per capita, entering the group of "rich" districts, as categorized in the maps in **Figure 3.2**. This prosperity endured until 1975. The consolidation of wine production in the industrial sector up until the 1940s, followed by an expansion of oil production in the 1950s, were integral components of this province's growth[99].

As far as subsequent periods are concerned, the maps in **Figure 3.2** reveal stability between 1953 and 1965, while, by 1975, the most important characteristics of the regional income distribution in the second half of the twentieth century were already established[100]. Since then, the differences in GDP per capita between the wealthiest jurisdictions and the rest of the country have become increasingly pronounced. In 2004, Capital Federal's GDP per capita reached 2.62 times the national average. In the "rich's club", together with Capital Federal, Tierra del Fuego and Santa Cruz stand out, with incomes in 2004 at 2.72, and 3.11 times the national average, respectively. Conversely, all provinces in the North belong to the poor group, with Formosa registering only 38% of the national average income per capita in 2004. Neuquén's case is noteworthy, transitioning from the lowest position in the per capita GDP ranking to joining the rich's club in 2004. The province's growth, particularly since the 1970s, has been fueled by irrigated agricultural production, the exploitation of hydrocarbons, and the construction of large hydroelectric plants (Bandieri & Dabús, 2019).

QUAERERE VERUM
Universidad de
SanAndrés

3.4.3- Argentine Regional Convergence

Having outlined the general patterns of evolution in regional economies from 1895 to 2004, a compelling question arises, as to whether there has been a closing of the gap between their per capita GDPs. Moreover, if such a trend exists, it becomes intriguing to determine whether it has persisted in light of the diverse changes in the international economic landscape (marked by openings and closings) and the national context (characterized by variations in the intensity of government intervention) during this extensive timeframe.

The evolution of the ratio between the average GDPs per capita of the three wealthiest provinces and that of the three least affluent ones is noteworthy. In 1895, the unweighted average of the three richest provinces (i.e., Tierra del Fuego, Santa Cruz and Santa Fe) stood at 1.65 relative to the national average of 1. In contrast, the three poorest provinces (i.e., Catamarca,

[99] The subsequent relative lag of Mendoza is partially explained by a significant drop in the demand for wine and the stop on oil investment (Coria López, 2008, 2014).
[100] To verify that the conclusions do not depend on the classification criterion used to categorize the provinces on the maps in **Figure A3.3**, an alternative criterion is used. This approach uses equal-width intervals (except for the last one) based on relative GDP per capita. The conclusions drawn from examining these maps are quite similar to those presented in this section.

Neuquén and Santiago del Estero) had an unweighted average of 0.40. By 2004, the unweighted average of the three richest districts (i.e., Capital Federal, Tierra del Fuego and Santa Cruz) had risen to 2.82, while the three poorest ones (i.e., Formosa, Corrientes and Misiones) registered an unweighted average of 0.44. This translated to an increase in the ratio between the averages from 4.12 to 6.41, indicating a substantial widening of the gap between the richest and poorest provinces over the long term.

Similar conclusions can be drawn by examining the evolution of the dispersion of provincial GDP per capita. This is closely related to the concept of σ-convergence. In particular, a group of economies is said to converge in the sense of σ if the dispersion of their GDP per capita levels tends to decrease over time (Sala-i-Martin, 1996). Two widely used measures capturing such dispersion are the Coefficient of Variation (CV) and the Standard Deviation of Logarithms (SDLOG) (Ram, 2018)[101]. One of the main differences between these metrics is the weight given to different parts of the distribution of the variable being analyzed. Specifically, the CV gives more weight to the top of the distribution (the "rich" provinces), while the SDLOG does the same for the bottom (the "poor" provinces) (Trapeznikova, 2019). **Figure 3.3** shows that, despite their distinct properties, both dispersion measures of provincial GDP per capita evolve in a similar way in the Argentine case. In 2004, both indicators surpass their 1895 counterparts, suggesting a long-term divergence among provinces. The pronounced increase in the CV *vis-à-vis* the SDLOG can be attributed to the richer provinces exhibiting greater deviations from the rest, as evident in **Table 3.6** and **Figure 3.2**. Moreover, although both indicators show divergence between the two extremes of the graph, they display non-trivial oscillations. For example, there is convergence between 1895 and 1914, which is the last part of the period of integration into world markets before World War I (see **Chapter II**). Conversely, during World War II and the post-war period, the behavior is less clearly defined.

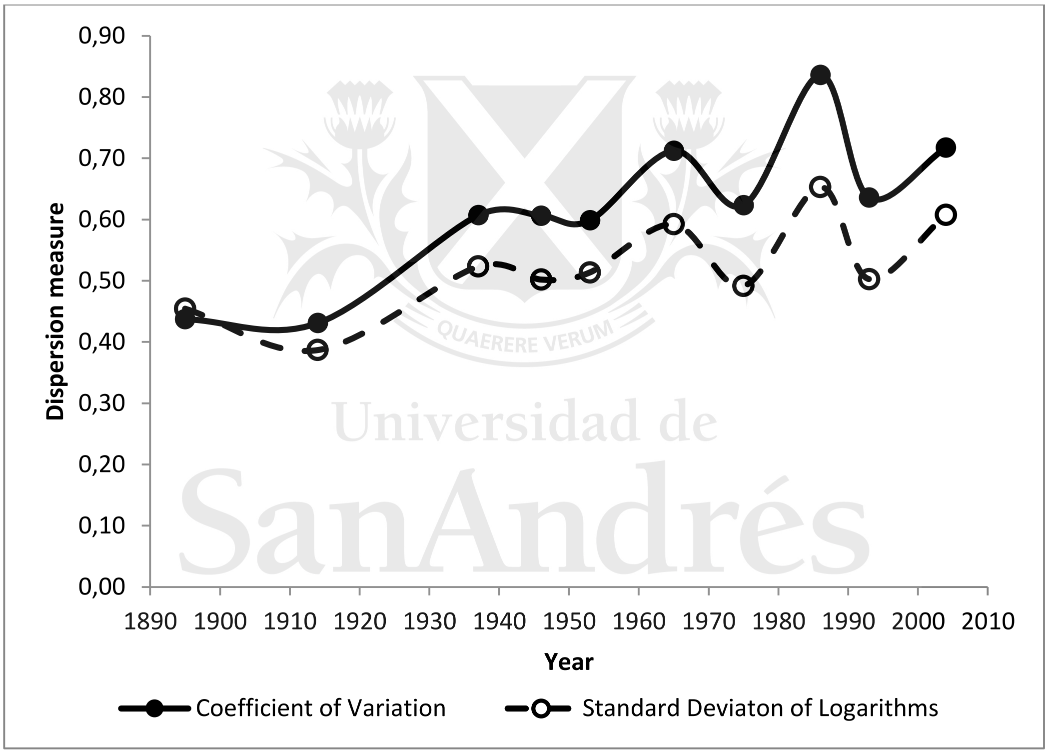
Williamson (1965) suggests that regional inequality should exhibit an inverted-U-shaped pattern throughout the course of economic development. According to this hypothesis, regional inequality initially increases during the early stages of national industrialization development, but eventually starts to decrease as the economy progresses further. The initial surge results from the concentration of economic activities in specific areas, leading to a divergence between prosperous and lagging regions. Subsequently, as the benefits of economic growth spread to initially lagging regions and the development convergence occurs, inequality is expected to decline. However, as noted above, the Argentine case depicted in **Figure 3.3** contradicts this expected

[101] $CV_t = \sqrt{\frac{\sum_{i=1}^{N}(y_{it}-\bar{y}_t)^2}{N}}/\bar{y}_t$, $SDLOG_t = \sqrt{\frac{\sum_{i=1}^{N}(\ln(y_{it})-\overline{\ln(y_t)})^2}{N}}$, where y_{it} represents the per capita GDP of province i in year t, $\bar{y}_t$ is the simple mean of provincial per capita GDP in year t, and $\overline{\ln(y_t)}$ is the simple mean of the natural logarithms of provincial per capita GDP in the year t.

Universidad de San Andrés

pattern by showing the opposite behavior. Initially, regional inequality decreased between 1895 and 1914, but it then began to rise. One could argue that this deviation could be related to the presence of two distinct waves of development with very different characteristics. The first one, starting around the 1870s and concluding in the early twentieth century, relied on an open economy based on the export of raw materials (see **Chapter II**). The second wave, characterized by industrial production focused on the domestic market (Import Substitution Industrialization), began thereafter. Therefore, the decline in inequality from 1895 to 1914 may correspond to the final years of the first wave, while the subsequent increase aligns with the onset of the second wave.

Figure 3.3: Provincial Per Capita GDP Dispersion



Source: own elaboration.

In the context of the second wave marked by industrialization, Williamson's hypothesis suggests that regional inequality should eventually decline after the observed increase since 1914. However, this expected decline does not manifest, presenting a noteworthy deviation from Williamson's hypothesis, which mainly addresses industrial-type developments, like this wave. One possible explanation for this discrepancy may lie in a complex system of government stimulus for the industrial sector implemented during the ISI period. Throughout most of the 1940s, the government focused on supporting light industries primarily located in urban areas, which were already relatively more developed. This was evident through mechanisms such as protection systems and credits at subsidized rates. Moreover, especially from the 1950s onwards, the focus of economic stimulus shifted toward branches deemed strategic for national development, such as the fundamental production of metals and oil, rather than considering their potential impact on regional income distribution. To a large extent, these targeted industries tended to emerge and expand in geographical regions with already high per capita incomes, such as some Patagonian areas with large oil reserves. As a result, rather than contributing to regional cohesion, these economic interventions reinforced the ongoing process of increasing inequalities[102].

In addition to the σ-convergence discussed in the previous paragraphs, another related form of convergence is derived from the neoclassical growth theory, known as β-convergence[103]. According to this theory, assuming diminishing returns to capital, less developed economies (with less capital) should achieve higher returns than more developed ones, eventually leading to a catching-up process (Solow, 1956, and Swan, 1956). The usual empirical strategy to analyze this phenomenon involves regressing the GDP per capita growth of different economies on their initial GDP per capital levels, based on cross sectional data (Baumol, 1986). If the poorer economies grow at a higher rate than the rich ones, a negative slope should be observed, confirming this type of convergence. Applying this approach to the Argentine case, **Figure 3.4** plots the GDP per capita of the provinces relative to the country as a whole (in logs) for 1895, along with the growth rate between that year and 2004[104]. The graph reveals a negative and significant slope, supporting the β-convergence hypothesis among the provinces during this period. Hence, on average, the provinces with the lowest GDPs per capita in 1895 experienced higher growth rates than those that started from higher levels.

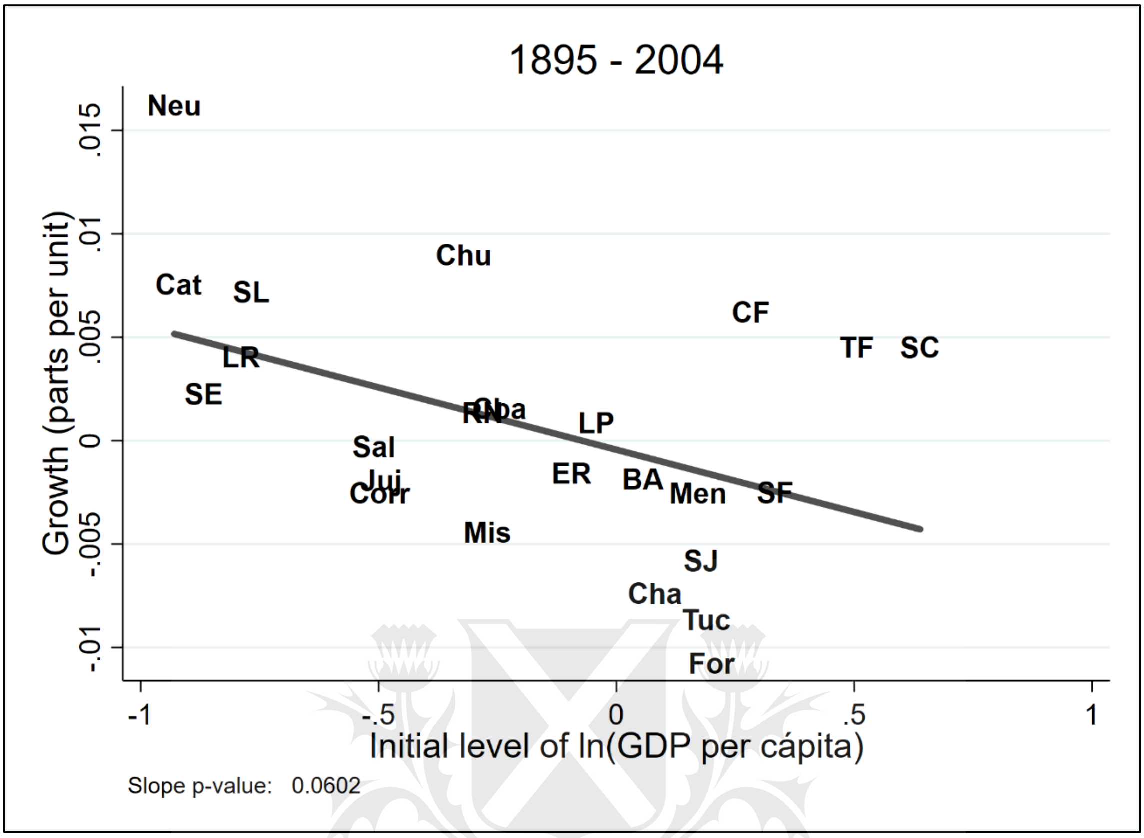
Universidad de
SanAndrés

[102] In addition to linking stages of economic development to the evolution of regional inequality, Williamson conducted a series of studies analyzing the relationship between globalization and convergence (Williamson, 1996, 1997, 1999, and O'Rourke & Williamson, 1999). Broadly, his findings suggest that during periods of globalization, such as between the 1870s and World War I, convergence among countries is expected. Conversely, during periods of deglobalization, spanning from the beginning of World War I to the end of World War II, the opposite trend is expected. It is crucial to note that this relationship cannot be directly extrapolated to the regional level within a country, since economic interdependence among regional units within nations is presumed to be much stronger than between countries themselves. Williamson also examines the relationship between globalization and income distribution within a country. Employing the wage-rent ratio as a metric to gauge how the typical unskilled worker at the bottom of the distribution has fared relative to the typical landowner or capitalist at the top, his research suggests that in the first globalization, unskilled labor suffered losses while landowners gained in labor-scarce countries such as Argentina, Australia, Canada, and the United States, with the opposite observed in Europe. However, these findings cannot be extrapolated to a comparison of regions within a country due to the wage-rent ratio construction, which does not incorporate any regional factor.

[103] **Section 5.2** of **Chapter IV** expands on this concept of convergence.

[104] By expressing the GDP per capita of each province relative to the country as a whole, the use of monetary units is avoided. It also means that the zero values of the scatterplots in **Figures 3.4** and **3.5** correspond to cases whose values, including both initial levels (in logs) and growth rates, coincide with those of the entire country. While this transformation alters the constant term in regression, it does not affect the slope.

Figure 3.4: Initial GDP Per Capita Levels and Growth Rates across Argentine Provinces, 1895-2004 Period



Note: The abbreviations represent Argentine provinces: BA: Buenos Aires; Cat: Catamarca; Cba: Córdoba; CF: Capital Federal; Cha: Chaco; Chu: Chubut; Corr: Corrientes; ER: Entre Ríos; For: Formosa; Juj: Jujuy; LP: La Pampa; LR: La Rioja; Men: Mendoza; Mis: Misiones; RN: Río Negro; Sal: Salta; SC: Santa Cruz; SE: Santiago del Estero; SJ: San Juan; SL: San Luis; TF: Tierra del Fuego; Tuc: Tucumán
Source: own elaboration.

Universidad de SanAndrés

It is interesting to note the presence of β-convergence (**Figure 3.4**), but not σ-convergence (**Figure 3.3**). Sala-i-Martin (1996) clearly explains that the former is a necessary but not sufficient condition for the latter. Therefore, it is possible to find β-convergence without σ-convergence, as seen in this case. This non-coincidence can be attributed to the existence of reversals, where certain provinces start the period as relatively poor and end up relatively rich, and vice versa. Such situations can result in equal or greater dispersion at the end of the period. In Argentina, these cases can be identified by examining **Figure 3.4** alongside the 1985 and 2004 maps in **Figure 3.2**. Notably, the already mentioned case of Neuquén stands out, starting at the bottom of the GDP per capita distribution and ending among the highest in 2004. A similar, albeit less extreme, situation is observed in Chubut, where the expansion of oil and gas production play an important role in both cases. Conversely, the northeastern provinces of Formosa and Chaco represent instances of initially high-income provinces (though not the highest) that ended up in the lowest positions.

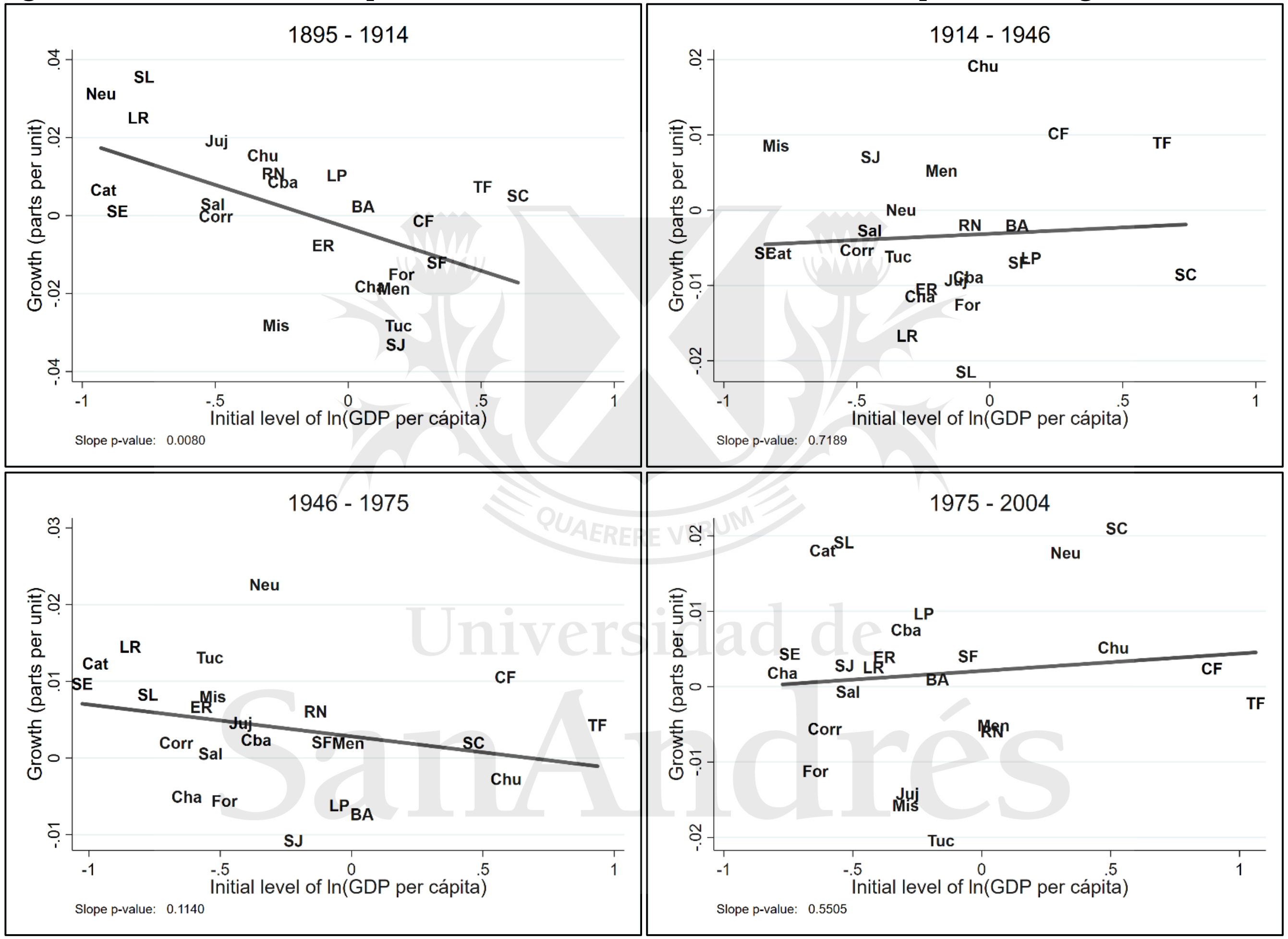
Previous studies relying solely on data post 1950, such as Marina (2001), Elías (1995), and Grotz & Llach (2013), do not report β-convergence for Argentina. In line with these studies, the data used here, but restricted to cover similar time periods, do not unveil β-convergence either. Therefore, the observed β-convergence during the 1895-2004 period appears to be the result of diverse patterns in different sub-periods. This observation is confirmed by **Figure 3.5**, which replicates the β-convergence analysis conducted earlier but divides the entire 1895-2004 period into four shorter intervals, revealing variations in the results across them.

The first sub-period, spanning from 1895 to 1914, corresponds to the second part of the period of consolidation of national markets and integration into international markets initiated around 1870, characterized by β-convergence (and also σ-convergence). This indicates that the poorest provinces tend to experience faster growth than the richest ones. Notable examples include Tucumán and Mendoza, two archetypal cases of regional economies integrated into the national market with products for domestic consumption, which had a relatively high per capita income in 1895 but experienced a subsequent relative decline (see **Table 3.6** and **Figure 3.5**). Similarly, Santa Fe, a province with high per capita income, lost relative positions due to its strong specialization in agro-pastoral activities, abstaining from the growing diversification of the national economy.

The central decades of the century show the opposite situation. During the ISI period from 1914 and 1975, there was no β-convergence and a notorious increase in the dispersion of GDP per capita (see **Figures 3.3** and **3.5**)[105]. Between 1914 and 1946, a period marked by the deglobalization of the international economy, the absence of convergence can be attributed to the fact that provinces experiencing the highest relative growth were also among those with the highest initial levels. This pattern was particularly evident in Capital Federal, where most of the expansion of industrial production took place, as well as in Chubut, linked to oil production, and Tierra del Fuego, at the time linked to fishing activities. Moreover, measures of income dispersion during this period experienced a substantial increase, as illustrated in **Figure 3.3**.

[105] In the next chapter of this thesis, a more extensive analysis of regional convergence is undertaken, considering shorter periods.

Figure 3.5: Initial GDP Per Capita Levels and Growth Rates across Selected periods in Argentine Provinces



Note: The abbreviations represent Argentine provinces: BA: Buenos Aires; Cat: Catamarca; Cba: Córdoba; CF: Capital Federal; Cha: Chaco; Chu: Chubut; Corr: Corrientes; ER: Entre Ríos; For: Formosa; Juj: Jujuy; LP: La Pampa; LR: La Rioja; Men: Mendoza; Mis: Misiones; RN: Río Negro; Sal: Salta; SC: Santa Cruz; SE: Santiago del Estero; SJ: San Juan; SL: San Luis; TF: Tierra del Fuego; Tuc: Tucumán

Source: own elaboration.

Universidad de San Andrés

The second part of the ISI period, spanning from 1946 to 1975, was marked by increased state involvement in the economy, and the GDP per capita dispersion seemed to stabilize, though at higher levels than those observed at the end of the agro-export period. Furthermore, although β-convergence is observed, it is not significant. This phenomenon can be attributed, in part, to the diverse growth patterns observed in the lagging provinces. While some of them experienced growth rates comparable, or even higher, than those of the high-level provinces, such as the case of La Rioja, Catamarca, and Santiago del Estero in the northwest of the country, other lagging provinces, such as Chaco and Formosa in the northeast, exhibited the lowest growth rates in the country. At the same time, high growth rates were also observed in initially rich areas like Capital Federal and in an oil-producing district of Patagonia[106], specifically Neuquén.

Lastly, for the period from 1975 to 2004, there is no β-convergence (see **Figure 3.5**), and **Figure 3.3** suggests a weak σ-divergence. The growth patterns among the poorest provinces are diverse. While Catamarca and San Luis experience notable growth, Formosa and Corrientes witness almost negligible expansion. Furthermore, certain rich districts, notably Santa Cruz and Neuquén, contribute substantially to the widening of regional dispersion.

3.5- Final Comments on the Argentine Spatial Inequality

The contemporary regional income distribution in Argentina can be summarized as featuring a wealthy capital city, a poor North, and a rich South, with a widening gap between the two tails of the distribution. To understand this pattern, it is essential to consider Argentina's historical and political trajectory, together with the geographic and demographic characteristics of its regions, as outlined in **Chapter II**.

Argentina's economic and political narrative has been profoundly shaped by the remarkable influence of the urban conglomerate of Buenos Aires, one of the largest in Latin America, which covers Capital Federal and some districts in the province of Buenos Aires. Its historical significance as the administrative center and primary port, dating back to colonial times, has only intensified over the years. The city's affluence during the globalization period stemmed largely from the exceptional economic expansion of the *Pampa Húmeda* in the Center-East of the country, covering the provinces of Buenos Aires, Santa Fe, La Pampa and some areas of Córdoba. This expansion was closely tied to comparative advantages in agro-pastoral production, primarily intended for export. In 1914, the geographical block composed of these provinces and Capital Federal contributed over 77% of the national GDP, with most of the provinces within this

[106] Oil extraction started in 1907 in Chubut, in 1918 in Neuquén, in 1946 in Santa Cruz and in 1949 in Tierra del Fuego.

QUAERERE VERUM Universidad de SanAndrés

block boasting per capita incomes higher than the national average. In subsequent years, and particularly after the 1930 crisis when inward-looking development gained prominence, Buenos Aires city reinforced its traditional role as the primary center for commerce, financial services, and light manufacturing. Industrial activity expanded primarily in Capital Federal, but data from 1953 indicate that significant industrial development also extended to the *Conurbano*, the areas of province of Buenos Aires surrounding Capital Federal (CFI-ITDT, 1965/1962).

Apart from the Pampean territories, other regions of high relative income in 1895 followed very different paths, with some rising to the top of the GDP per capita distribution and others ending up at the bottom. This was the case of the "National Territories" that, in contrast to the "traditional" provinces based on cities founded by Spanish conquerors in the sixteenth century, were recently integrated into the national markets and brought under administrative control in 1895. Despite the diversity of their paths, all these territories shared the initial characteristic of being frontier economies with very low population density, leading to high labor productivity in extensive agriculture or cattle farming. In the North, two national territories (i.e., Formosa and Chaco) initially experienced high incomes per capita because of the nature of a frontier economy. However, they quite rapidly converged with other poor provinces in the region as the advantages of low population density faded. In contrast, some districts in Patagonia, such as Santa Cruz and Tierra del Fuego, started with high income per capita because of a substantial land-labor ratio at the end of the nineteenth century, but they maintained their privileged economic positions in the second half of the twentieth century, as a result of the continuous inflow of income generated by oil and gas deposits.

Lastly, neither different development models nor public policies prevented the poorest provinces, all located in the North of the country, from falling behind and stagnating in relative terms for most of the twentieth century, with some exceptional periods of catch-up and convergence (1895-1914).

Universidad de San Andrés

3.6- Appendix Chapter III

Table A3.1: Distribution of *Territorio Nacional de Los Andes* in 1937

Sector		Methodology of distribution
Agriculture		Departmental data of quantities allocated to the provinces according to current limits.
Livestock		
Mining		Proportion of the population of the territory corresponding to each province.
Manufacturing		
Electricity, gas and water		
Fishing		Zero production.
Constructions		
Finance		The data allows us to assume a null or already distributed amount.
Housing		The extrapolation methodology used to estimate this sector in 1937 generates the values of Los Andes already distributed.
Commerce		
Personal services		
Government services		
Transport	Aircraft	Data originally distributed.
	Navigation	Zero production.
	Railways	Station data assigned according to current provincial limits.
	Trucks	Proportion of the population of the territory corresponding to each province.
	Transportation of people in the interior, taxis and *mateos*	
Communications	Post and wire businesses	The data allows us to assume a null or already distributed amount.
	Telephones	Zero production.

Note: Territory that existed between 1900 and 1943, constituted by the departments Antofagasta de la Sierra (now in Catamarca), Susques (now in Jujuy), Pastos Grandes and San Antonio de los Cobres (now in Salta). Based on the interpolation of the departmental population at constant growth rate between census data from 1914 and 1947; the shares in 1937 are: Catamarca (11.91%), Jujuy (26.17%) and Salta (61.92%).
Source: Own elaboration.

Universidad de San Andrés

Table A3.2: Distribution of *Zona Militar de Comodoro Rivadavia* in 1946

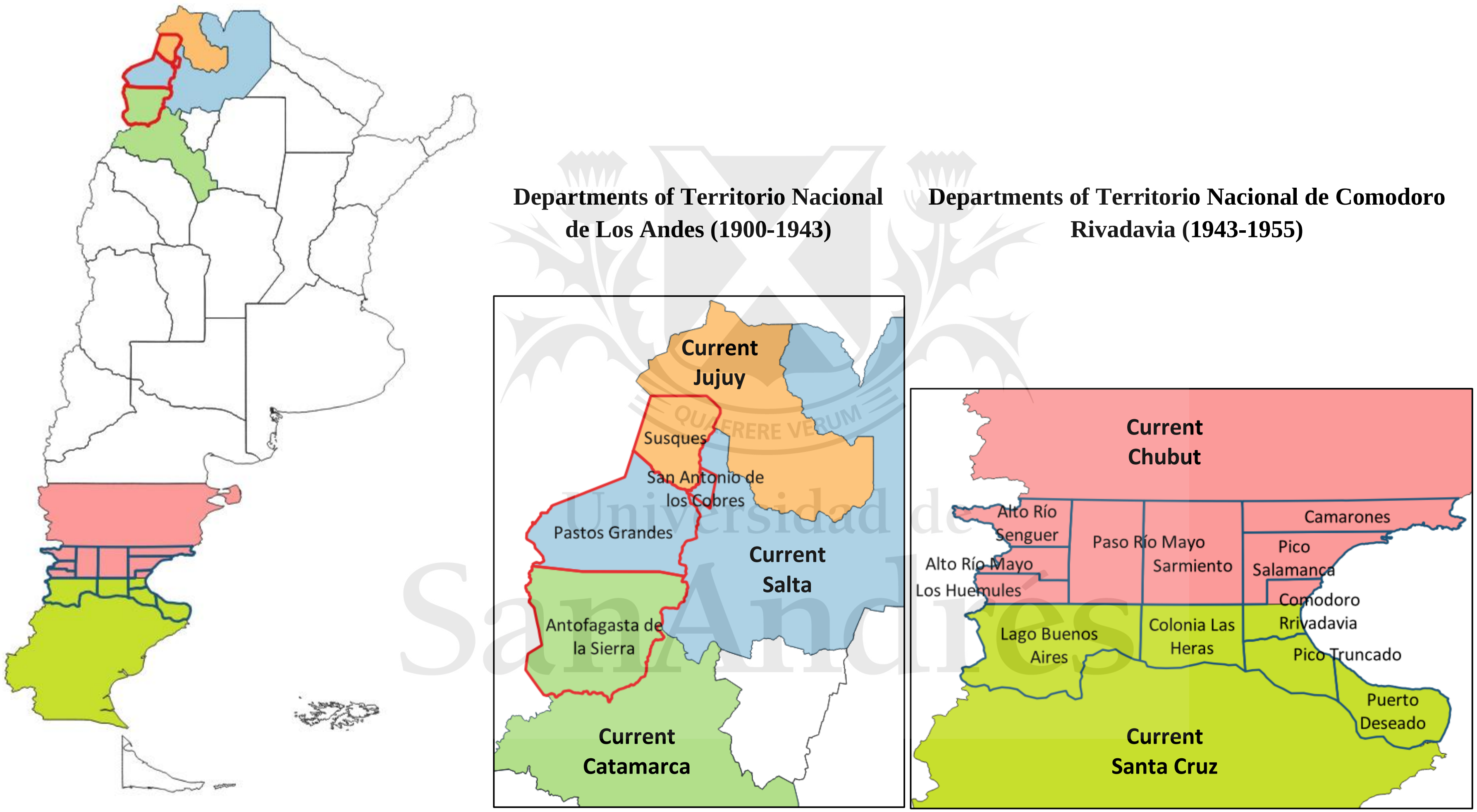
Sector		Methodology of distribution
Agriculture		Quantities of each crop distributed according to departmental data of the agricultural census of 1947. If not available, using the portion of the sown surface of the total of the crops. The quantities of the head department were assigned according to population in 1947.
Livestock		The departmental quantities of livestock were assigned to the provinces according to the current limits. The quantities of the head department were assigned according to population in 1947.
Housing		Departmental quantities and rentals of the total territory. The values obtained for the head were distributed by population in 1947.
Fishing		Port of Comodoro Rivadavia correspond to Chubut.
Mining		See text in section of the sector.
Manufacturing		Proportion of number of workers of the sector of the territory that in 1947 population census corresponded to each province. For Commerce, it was used the number of workers of "Commerce, banks, offices and insurance".
Electricity, gas and water		
Constructions		
Government services		
Commerce		
Personal services		Each of the three branches of the sector (see text in section of the sector) was distributed separately by their number of workers in 1947. To personnel in the establishments corresponds: Public spectacles; Hostelry; Hygiene and cleaning services; and Miscellaneous.
Finance		The data allows us to assume a null or already distributed amount.
Transport	Aircraft	Data originally distributed.
	Navigation	Port of Comodoro Rivadavia correspond to Chubut.
	Railways	Station data assigned according to current provincial limits.
	Trucks	Proportion of the land transport workers of 1947 population census corresponding to each province.
	Transportation of people in the interior, taxis and *mateos*	
Communications	Post and wire businesses	In the postal statistics, in some years "District Nº 23" corresponds to Rawson (current capital of Chubut) and in others to Comodoro Rivadavia; it was assigned to Chubut.
	Telephones	Population proportion of the head department in 1947 population census corresponding to each province.

Notes:
- *Zona Militar de Comodoro Rivadavia* (ZMCR) existed between 1943 and 1955, currently distributed between Chubut and Santa Cruz. To Chubut correspond the departments of Alto Río Mayo, Alto Río Senguers, Los Huemules, Paso Río Mayo, Sarmiento, Pico Salamanca, and Camarones. To Santa Cruz correspond Colonia Las Heras, Lago Buenos Aires, Pico Truncado, and Puerto Deseado. The head department, Comodoro Rivadavia, had territories that currently belong to both provinces.
- Population data for April 1947 published under the different departamental divisions in DNSE (nd) - *IV Censo General de la Nación - Tomo I* and INDEC (1982) - *Censo Nacional de Población y Vivienda 1980*, allows to deduce that 21,475 inhabitants from the head department correspond to Chubut and 9,379 to Santa Cruz.
- The 1947 census has data by provinces of the employed population aged 14 years and over, classified into 28 branches. INDEC (nd) - *Cuadros inéditos […]* have the same data, but with updated limits. Combining those sources was possible to determine the amount of that population in ZMCR corresponding to Chubut and Santa Cruz.

Source: Own elaboration.

QUAERERE VERUM Universidad de San Andrés

Figure A3.1: Administrative Division of *Territorio Nacional de Los Andes* and *Territorio Nacional de Comodoro Rivadavia*



Source: Own elaboration based on digital cartography of Rodríguez (2022).

Table A3.3: Provincial Population Estimated in 1937 and 1946

Provinces	Number of inhabitants		Share(%)	
	1937	1946	1937	1946
Capital Federal	2,582,451	2,967,876	18.98	18.80
Buenos Aires	3,672,476	4,250,614	26.99	26.92
Catamarca (a)	137,500	146,178	1.01	0.93
Chaco	306,078	425,826	2.25	2.70
Chubut (b)	71,360	91,556	0.52	0.58
Córdoba	1,288,150	1,488,311	9.47	9.43
Corrientes	464,540	521,702	3.41	3.30
Entre Ríos	673,142	781,884	4.95	4.95
Formosa	84,146	112,187	0.62	0.71
Jujuy (a)	137,782	165,349	1.01	1.05
La Pampa	184,445	168,314	1.36	1.07
La Rioja	103,339	109,776	0.76	0.70
Mendoza	494,251	583,603	3.63	3.70
Misiones	174,299	243,650	1.28	1.54
Neuquén	68,983	85,958	0.51	0.54
Río Negro	110,327	133,164	0.81	0.84
Salta (a)	238,411	288,205	1.75	1.83
San Juan	209,519	258,778	1.54	1.64
San Luis	160,222	164,379	1.18	1.04
Santa Cruz (b)	37,811	42,499	0.28	0.27
Santa Fe	1,512,990	1,695,383	11.12	10.74
Santiago del Estero	394,475	469,377	2.90	2.97
Tierra del Fuego	5,106	5,001	0.04	0.03
Tucumán	496,625	587,604	3.65	3.72
TOTAL	**13,608,428**	**15,787,174**	**100.00**	**100.00**

Notes:

(a) In the original estimates of DNEC (1956), the 1937 values of the Territorio Nacional de Los Andes was distributed between Catamarca, Jujuy and Salta, provinces that absorbed the territory in 1943.

(b) In the original table of DNEC (1956) in the year 1946 corresponded 58,254 inhabitants to Chubut, 24,363 to Santa Cruz and 51,438 to Zona Militar de Comodoro Rivadavia (ZMCR). With data from the 1947 population census and retrospective publications of the 1980 population census, it was possible to determine the number of inhabitants of ZMCR that corresponded to Chubut and Santa Cruz in 1947 according to the current political division. That proportion was used to distribute the values of the year 1946 (64.74% to Chubut and 35.26% to Santa Cruz).

Source: Own elaboration based on DNEC (1956), DNSE (nd) - *IV Censo General de la Nación* and INDEC (1982) - *Quinto Censo Nacional de Población y Vivienda de 1980*.

QUAERERE VERUM
Universidad de
SanAndrés

Table A3.4: Participation of Each Province Within the Sector GDP of the Year 1937 (%)

Provinces	Agric.	Livestock	Fishing	Mining	Manuf.	EGW	Constr.	Transp.	Comms.	Finance	Housing	Commerce	Per. svcs.	Gov. svcs.
Cap. Fed.	0.0000	0.0000	23.8936	0.0000	47.4315	47.4350	44.6794	28.8244	56.1077	49.8462	28.4138	57.1172	50.6972	48.7466
Buenos Aires	37.3283	39.1748	32.8032	5.1965	27.5959	29.6650	28.4159	32.1260	17.2543	21.2565	23.1762	15.3045	19.1851	21.5310
Catamarca	0.2026	0.6595	0.0000	0.2221	0.0713	0.0954	0.4274	0.2099	0.2903	0.1433	0.6353	0.1882	0.3406	0.2378
Chaco	1.0806	2.4085	0.4322	0.0740	1.2041	0.6291	0.6895	1.5840	0.9465	0.5113	2.0034	0.8456	0.7382	0.4416
Chubut	0.1454	1.3942	0.7982	48.6431	0.4179	0.1708	0.7172	1.4590	0.4610	0.4364	0.3498	0.2369	0.3117	0.3679
Córdoba	22.4043	11.3161	0.4684	6.2544	3.1749	5.4125	3.3365	6.4106	5.0140	5.2911	5.4056	5.4071	6.9561	6.0783
Corrientes	1.3812	7.9615	0.3334	0.1047	0.3287	0.6865	0.2575	0.9740	0.7934	0.8206	1.8153	0.7603	1.3289	1.1205
Entre Ríos	4.5679	6.9059	2.7628	2.3930	1.2538	1.3152	3.0689	3.5779	2.5391	2.6372	3.2448	1.5993	2.1500	2.1859
Formosa	0.2360	2.2379	0.0066	0.0000	0.0993	0.0776	0.0845	0.4785	0.0914	0.0848	0.4814	0.1967	0.1989	0.1922
Jujuy	0.5987	0.5011	0.0000	7.4046	0.7371	0.1767	0.7522	0.5326	0.3225	0.2222	0.8766	0.3165	0.3719	0.3450
La Pampa	1.5725	4.5783	0.0000	0.5904	0.2138	0.3332	0.2444	0.7560	0.6825	0.5580	1.4062	0.8249	0.6218	0.3867
La Rioja	0.2697	0.5119	0.0000	0.4297	0.0585	0.0575	0.4750	0.1742	0.2523	0.0846	0.6099	0.1282	0.2650	0.2343
Mendoza	2.5388	0.5816	0.0000	1.9781	1.8182	2.1430	2.1621	2.4918	1.5012	2.3085	6.6151	1.7198	2.1393	2.9439
Misiones	1.2695	0.4415	0.0635	0.0081	0.1226	0.2677	0.1157	0.7389	0.5814	0.3481	1.2795	0.4256	0.4121	0.3328
Neuquén	0.0790	0.6883	0.0000	8.3658	0.0611	0.1303	1.3393	0.2447	0.3540	0.1241	0.3086	0.1484	0.1881	0.3210
Río Negro	0.6193	1.0546	0.2736	0.2332	0.3355	0.2122	1.2180	0.8294	0.3045	0.2619	0.7412	0.3363	0.5161	0.3907
Salta	0.5976	1.4873	0.0000	15.9494	0.7350	0.4542	1.5721	0.9478	0.6293	0.5266	1.8394	0.6048	0.8981	0.7058
San Juan	1.1301	0.2751	0.0000	0.1091	0.4725	0.5858	0.1424	0.8133	0.4667	0.9914	1.2291	0.6216	0.6869	0.9164
San Luis	0.2186	2.0515	0.0627	1.4289	0.1178	0.2125	0.3130	0.4382	0.3842	0.1911	0.8843	0.2967	0.4989	0.3691
Santa Cruz	0.0406	1.5790	1.2805	0.1003	0.1417	0.1326	0.2131	0.4000	0.2990	0.3661	0.2910	0.2275	0.2735	0.3591
Santa Fe	20.8242	11.3749	7.6333	0.3025	8.7612	8.5225	7.3543	13.0567	8.8847	10.8702	10.6910	10.4959	8.3020	9.3875
Sgo. del Est.	0.3560	1.8162	0.0789	0.1799	1.0565	0.2640	1.0431	0.6724	0.6296	0.4315	3.0263	0.4857	0.9948	0.6066
T. del Fuego	0.0023	0.1555	29.1073	0.0000	0.0859	0.0000	0.0717	0.0512	0.0212	0.0100	0.0235	0.0205	0.0102	0.1209
Tucumán	2.5366	0.8448	0.0017	0.0322	3.7053	1.0206	1.3069	2.2085	1.1889	1.6784	4.6527	1.6918	1.9144	1.6782
ARGENTINA	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: See text

QUAERERE VERUM Universidad de San Andrés

Table A3.5: Participation of Each Province Within the Sector GDP of the Year 1946 (%)

Provinces	Agric.	Livestock	Fishing	Mining	Manuf.	EGW	Constr.	Transp.	Comms.	Finance	Housing	Commerce	Per. svcs.	Gov. svcs.
Cap. Fed.	0.0000	0.0003	19.6538	0.0000	45.7439	45.8691	34.0098	27.4581	53.8988	61.1130	26.6089	56.9994	50.5235	41.4082
Buenos Aires	38.4757	39.2922	40.7091	5.1343	31.0341	39.1517	27.4361	32.9336	18.7210	16.3963	26.4115	15.3816	19.2554	23.3370
Catamarca	0.3509	0.3649	0.0000	0.3632	0.1535	0.1540	1.1571	0.3208	0.3102	0.1326	0.7586	0.1738	0.3140	0.6606
Chaco	2.3197	2.5422	0.3132	0.0471	1.0803	0.4569	0.7302	1.5754	1.0303	0.5091	2.3930	1.0215	0.8906	0.9334
Chubut	0.3027	1.7378	5.1447	46.7800	0.2450	0.1021	0.7635	1.5526	0.6162	0.4165	0.4692	0.2639	0.3468	0.7172
Córdoba	10.2323	11.8122	0.3907	6.0336	3.2103	3.2246	7.1920	6.4119	5.0075	4.3420	7.8529	5.4248	6.9693	5.6986
Corrientes	2.2506	6.9615	0.3208	0.0898	0.4156	0.3990	1.2945	1.0929	0.8239	0.5808	2.7908	0.7414	1.2942	1.3181
Entre Ríos	4.6794	7.0218	1.2929	1.5158	1.0525	0.7901	3.0266	2.7899	2.5249	1.6891	3.6689	1.6131	2.1656	2.6418
Formosa	0.2107	2.2262	0.0377	0.0293	0.1631	0.0770	0.4649	0.3660	0.0959	0.0890	0.6247	0.2278	0.2300	0.3894
Jujuy	0.8873	0.3707	0.0666	5.9015	0.4441	0.1540	2.2692	0.7521	0.3317	0.2145	1.0240	0.3299	0.3870	0.8511
La Pampa	1.3952	4.3575	0.0000	0.4119	0.2456	0.2208	0.7177	1.2383	0.6278	0.4194	0.8900	0.6536	0.4921	0.5361
La Rioja	0.3491	0.4883	0.0000	0.1428	0.1501	0.0921	0.9984	0.2156	0.2403	0.0878	0.5765	0.1183	0.2441	0.4641
Mendoza	9.3097	0.6402	0.0000	13.4557	3.1207	1.8947	3.9765	3.5567	1.7817	2.5931	3.3544	1.7633	2.1905	3.2703
Misiones	2.8348	0.3930	0.0234	0.0431	0.2675	0.1103	1.0600	0.8869	0.6986	0.3800	1.6540	0.5167	0.4996	0.7069
Neuquén	0.1070	0.4745	0.1753	9.8737	0.1173	0.0581	1.4502	0.4324	0.4559	0.1577	0.3860	0.1606	0.2032	0.6077
Río Negro	1.6632	0.9018	1.6984	0.2580	0.3754	0.2660	1.1192	1.0262	0.3667	0.3131	0.7414	0.3525	0.5402	0.7164
Salta	1.0322	1.2893	0.0000	7.3362	0.7757	0.3554	1.6433	1.3328	0.7657	0.4792	1.5510	0.6348	0.9414	1.2849
San Juan	4.0282	0.2478	0.0000	0.9298	0.7187	0.3751	1.2039	1.1330	0.4865	0.8275	1.6033	0.6666	0.7357	1.6066
San Luis	0.1791	1.6557	0.0496	0.5761	0.2075	0.1622	0.6082	0.5580	0.3781	0.2193	0.8832	0.2643	0.4439	0.6017
Santa Cruz	0.0372	2.0212	0.4220	0.5067	0.2676	0.0718	0.3123	0.5831	0.2996	0.2420	0.2547	0.2220	0.2666	0.6132
Santa Fe	14.7040	13.2182	5.3722	0.3719	7.2350	5.4125	5.6381	9.2330	8.5001	7.1442	9.6382	10.2127	8.0670	8.0021
Sgo. del Est.	0.9948	1.2874	0.0000	0.1112	0.9030	0.2727	1.8079	1.3291	0.6930	0.3424	2.6289	0.5019	1.0264	1.0546
T. del Fuego	0.0006	0.1282	24.3295	0.0012	0.0280	0.0000	0.1636	0.0897	0.0216	0.0179	0.0207	0.0175	0.0086	0.1800
Tucumán	3.6556	0.5669	0.0000	0.0870	2.0455	0.3299	0.9570	3.1318	1.3242	1.2936	3.2153	1.7382	1.9642	2.4001
ARGENTINA	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: See text

Table A3.6: Gross Domestic Product at Factor Cost of 1937 (Millions of current m$n)

Provinces	Agric.	Livestock	Fishing	Mining	Manuf.	EGW	Constr.	Transp.	Comms.	Finance	Housing	Commerce	Per. svcs.	Gov. svcs.	GDP
Cap. Fed.	0.00	0.00	2.39	0.00	707.68	89.18	114.38	230.78	64.17	90.22	275.33	804.21	408.11	381.69	3,168.13
Buenos Aires	646.90	439.93	3.28	6.70	411.73	55.77	72.74	257.21	19.73	38.47	224.58	215.49	154.44	168.59	2,715.57
Catamarca	3.51	7.41	0.00	0.29	1.06	0.18	1.09	1.68	0.33	0.26	6.16	2.65	2.74	1.86	29.22
Chaco	18.73	27.05	0.04	0.10	17.96	1.18	1.76	12.68	1.08	0.93	19.41	11.91	5.94	3.46	122.23
Chubut	2.52	15.66	0.08	62.75	6.24	0.32	1.84	11.68	0.53	0.79	3.39	3.34	2.51	2.88	114.51
Córdoba	388.27	127.08	0.05	8.07	47.37	10.18	8.54	51.33	5.73	9.58	52.38	76.13	56.00	47.59	888.29
Corrientes	23.94	89.41	0.03	0.14	4.90	1.29	0.66	7.80	0.91	1.49	17.59	10.70	10.70	8.77	178.32
Entre Ríos	79.16	77.55	0.28	3.09	18.71	2.47	7.86	28.65	2.90	4.77	31.44	22.52	17.31	17.12	313.82
Formosa	4.09	25.13	0.00	0.00	1.48	0.15	0.22	3.83	0.10	0.15	4.66	2.77	1.60	1.51	45.70
Jujuy	10.37	5.63	0.00	9.55	11.00	0.33	1.93	4.26	0.37	0.40	8.49	4.46	2.99	2.70	62.49
La Pampa	27.25	51.41	0.00	0.76	3.19	0.63	0.63	6.05	0.78	1.01	13.63	11.61	5.01	3.03	124.99
La Rioja	4.67	5.75	0.00	0.55	0.87	0.11	1.22	1.39	0.29	0.15	5.91	1.81	2.13	1.83	26.69
Mendoza	44.00	6.53	0.00	2.55	27.13	4.03	5.54	19.95	1.72	4.18	64.10	24.21	17.22	23.05	244.21
Misiones	22.00	4.96	0.01	0.01	1.83	0.50	0.30	5.92	0.67	0.63	12.40	5.99	3.32	2.61	61.13
Neuquén	1.37	7.73	0.00	10.79	0.91	0.24	3.43	1.96	0.40	0.22	2.99	2.09	1.51	2.51	36.17
Río Negro	10.73	11.84	0.03	0.30	5.01	0.40	3.12	6.64	0.35	0.47	7.18	4.73	4.15	3.06	58.02
Salta	10.36	16.70	0.00	20.57	10.97	0.85	4.02	7.59	0.72	0.95	17.82	8.52	7.23	5.53	111.83
San Juan	19.58	3.09	0.00	0.14	7.05	1.10	0.36	6.51	0.53	1.79	11.91	8.75	5.53	7.18	73.54
San Luis	3.79	23.04	0.01	1.84	1.76	0.40	0.80	3.51	0.44	0.35	8.57	4.18	4.02	2.89	55.58
Santa Cruz	0.70	17.73	0.13	0.13	2.11	0.25	0.55	3.20	0.34	0.66	2.82	3.20	2.20	2.81	36.84
Santa Fe	360.88	127.74	0.76	0.39	130.72	16.02	18.83	104.54	10.16	19.68	103.60	147.78	66.83	73.50	1,181.43
Sgo. del Est.	6.17	20.40	0.01	0.23	15.76	0.50	2.67	5.38	0.72	0.78	29.32	6.84	8.01	4.75	101.54
T. del Fuego	0.04	1.75	2.91	0.00	1.28	0.00	0.18	0.41	0.02	0.02	0.23	0.29	0.08	0.95	8.16
Tucumán	43.96	9.49	0.00	0.04	55.28	1.92	3.35	17.68	1.36	3.04	45.08	23.82	15.41	13.14	233.57
ARGENTINA	**1,733.00**	**1,123.00**	**10.00**	**129.00**	**1,492.00**	**188.00**	**256.00**	**800.63**	**114.38**	**181.00**	**969.00**	**1,408.00**	**805.00**	**783.00**	**9,992.00**

Source: Own elaboration based on data from **Table 3.2** and **Table A3.4**.

Universidad de San Andrés

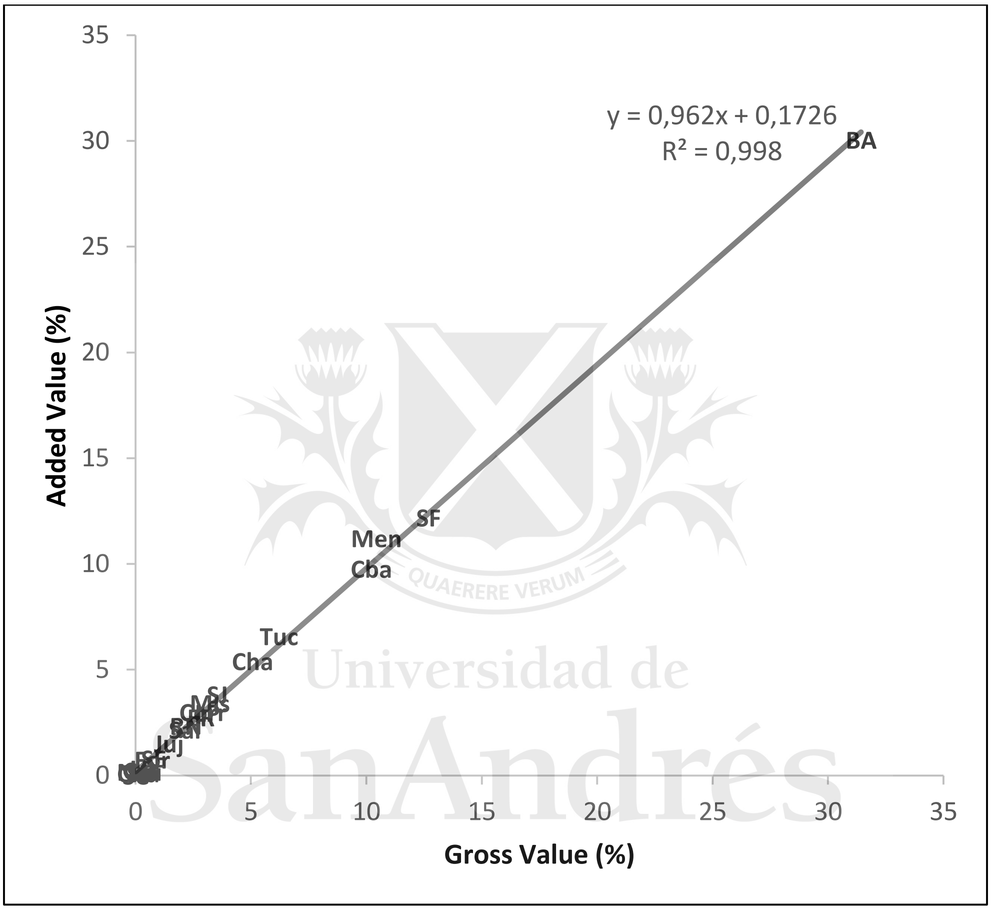
Table A3.7: Gross Domestic Product at Factor Cost of 1946 (Millions of current m$n)

Provinces	Agric.	Livestock	Fishing	Mining	Manuf.	EGW	Constr.	Transp.	Comms.	Finance	Housing	Commerce	Per. svcs.	Gov. svcs.	GDP
Cap. Fed.	0.00	0.01	6.29	0.00	2,547.93	149.53	309.15	449.23	131.49	235.90	475.23	2,236.09	887.70	717.19	8,145.74
Buenos Aires	1,326.26	835.75	13.03	12.73	1,728.60	127.63	249.39	538.81	45.67	63.29	471.71	603.42	338.32	404.20	6,758.80
Catamarca	12.10	7.76	0.00	0.90	8.55	0.50	10.52	5.25	0.76	0.51	13.55	6.82	5.52	11.44	84.17
Chaco	79.96	54.07	0.10	0.12	60.17	1.49	6.64	25.77	2.51	1.96	42.74	40.07	15.65	16.17	347.43
Chubut	10.43	36.96	1.65	116.01	13.65	0.33	6.94	25.40	1.50	1.61	8.38	10.35	6.09	12.42	251.74
Córdoba	352.71	251.24	0.13	14.96	178.82	10.51	65.37	104.90	12.22	16.76	140.25	212.81	122.45	98.70	1,581.84
Corrientes	77.58	148.07	0.10	0.22	23.15	1.30	11.77	17.88	2.01	2.24	49.84	29.09	22.74	22.83	408.82
Entre Ríos	161.30	149.35	0.41	3.76	58.63	2.58	27.51	45.64	6.16	6.52	65.53	63.28	38.05	45.76	674.47
Formosa	7.26	47.35	0.01	0.07	9.09	0.25	4.23	5.99	0.23	0.34	11.16	8.93	4.04	6.74	105.70
Jujuy	30.59	7.89	0.02	14.64	24.74	0.50	20.63	12.30	0.81	0.83	18.29	12.94	6.80	14.74	165.71
La Pampa	48.09	92.68	0.00	1.02	13.68	0.72	6.52	20.26	1.53	1.62	15.90	25.64	8.65	9.29	245.60
La Rioja	12.04	10.39	0.00	0.35	8.36	0.30	9.08	3.53	0.59	0.34	10.30	4.64	4.29	8.04	72.23
Mendoza	320.91	13.62	0.00	33.37	173.82	6.18	36.15	58.19	4.35	10.01	59.91	69.18	38.49	56.64	880.80
Misiones	97.72	8.36	0.01	0.11	14.90	0.36	9.64	14.51	1.70	1.47	29.54	20.27	8.78	12.24	219.59
Neuquén	3.69	10.09	0.06	24.49	6.53	0.19	13.18	7.07	1.11	0.61	6.89	6.30	3.57	10.53	94.31
Río Negro	57.33	19.18	0.54	0.64	20.91	0.87	10.17	16.79	0.89	1.21	13.24	13.83	9.49	12.41	177.50
Salta	35.58	27.42	0.00	18.19	43.21	1.16	14.94	21.81	1.87	1.85	27.70	24.90	16.54	22.25	257.42
San Juan	138.85	5.27	0.00	2.31	40.03	1.22	10.94	18.54	1.19	3.19	28.63	26.15	12.93	27.83	317.08
San Luis	6.17	35.22	0.02	1.43	11.56	0.53	5.53	9.13	0.92	0.85	15.77	10.37	7.80	10.42	115.71
Santa Cruz	1.28	42.99	0.14	1.26	14.90	0.23	2.84	9.54	0.73	0.93	4.55	8.71	4.68	10.62	103.41
Santa Fe	506.85	281.15	1.72	0.92	402.99	17.64	51.25	151.05	20.74	27.58	172.14	400.65	141.74	138.60	2,315.01
Sgo. del Est.	34.29	27.38	0.00	0.28	50.30	0.89	16.43	21.74	1.69	1.32	46.95	19.69	18.03	18.27	257.27
T. del Fuego	0.02	2.73	7.79	0.00	1.56	0.00	1.49	1.47	0.05	0.07	0.37	0.69	0.15	3.12	19.50
Tucumán	126.01	12.06	0.00	0.22	113.93	1.08	8.70	51.24	3.23	4.99	57.42	68.19	34.51	41.57	523.15
ARGENTINA	**3,447.00**	**2,127.00**	**32.00**	**248.00**	**5,570.00**	**326.00**	**909.00**	**1,636.04**	**243.96**	**386.00**	**1,786.00**	**3,923.00**	**17,57.00**	**1,732.00**	**24,123.00**

Source: Own elaboration based on data from **Table 3.2** and **Table A3.5**.

Universidad de San Andrés

Figure A3.2: Provincial Added Value and Gross Value Shares of Agricultural Sector for 1953



Note: BA: Buenos Aires; Cat: Catamarca; Cba: Córdoba; CF: Capital Federal; Cha: Chaco; Chu: Chubut; Corr: Corrientes; ER: Entre Ríos; For: Formosa; Juj: Jujuy; LP: La Pampa; LR: La Rioja; Men: Mendoza; Mis: Misiones; RN: Río Negro; Sal: Salta; SC: Santa Cruz; SE: Santiago del Estero; SJ: San Juan; SL: San Luis; TF: Tierra del Fuego; Tuc: Tucumán

Sources: own elaboration based on CFI-ITDT (1962/1962)

Table A3.8 (Part 1): Sources of Crop Prices Used in the 1946 Provincial Agricultural GDP Estimate

Crop	Price (m$n per 100 Kg)	Remarks	Source
		CEREALS AND FLAX	
Barley (beer)	21.40	1945/46 cropping season price	BdC 1971
Barley (fodder)	20.42	1946 year price	BdC 1948
Birseed	28.76	1945/46 cropping season price	BdC 1971
Corn	20.20	1945/46 cropping season price	BdC 1971
Flax	25.28	1945/46 cropping season price	BdC 1971
Millet	18.98	1945/46 cropping season price	BdC 1948
Oats	20.82	1945/46 cropping season price	BdC 1971
Rice	31.94	1945/46 cropping season price	BdC 1971
Rye	28.31	1945/46 cropping season price	BdC 1971
Wheat	16.09	1945/46 cropping season price	BdC 1971
		INDUSTRIAL CROPS	
Grapes for wine	29.50	1946 year price	PN
Guinea corn (seed)	16.79	1946 year price	BdC 1948
Guinea corn (straw)	3.07	1946 year price; price per bunch	BdC 1948
Olive	119.60	1946 year price; *Aceitunas* and *Olivos* used in the production of Fruits and legumes and Oils	CI 1946
Peanut	38.00	1946 year price	BdC 1979
Raw cotton	50.38	1946 year price; used in ginned cotton production	CI 1946
Sugar cane	1.60	1946 year price; used in sugar production	CI 1946
Sunflower	25.78	1945/46 cropping season price	BdC 1971
Tartar	36.00	1946 price from january to may (inclusive)	PN
Tobacco	116.04	1946 year price; domestic raw tobacco used in the production of Cigarettes and Cigars	CI 1946
Turnip (seed)	26.80	1946 year price	BdC 1948
Yerba mate	41.00	1946 year price	AE
Anise	557.37		
Cassava	3.93		
Cumin	508.74		
Formio	4.05	1949/50 cropping season prices from BCRA (1976b) extrapolated to 1945/46 using the Industrial Price Index of Industrial Crops of Capital Federal published in BCRA (1962a). Index Values of 217.4 for 1946 and 348.7 for 1950. That is, 1949/50 prices were divided into 1.60.	
Hemp (fiber)	4.11		
Hemp (seed)	89.15		
Pyrethrum	215.78		
Soy	17.46		
Tea	62.35		
Tung	17.15		

Universidad de San Andrés

Table A3.8 (Part 2): Sources of Crop Prices Used in the 1946 Provincial Agricultural GDP Estimate

Crop	Price (m$n per 100 Kg)	Remarks	Source
		FRUITS AND VEGETABLES	
Bean	42.00	1946 price from january to may (inclusive); used for green, dry and black beans	PN
Broad bean	38.00	1946 year price	BdC 1948
Chickpea	112.20	1946 year price	BdC 1948
Garlic	148.80	1946 price from january to may (inclusive)	PN
Lentil	44.40	1946 year price	BdC 1948
Onion	28.56	1946 price from january to may (inclusive)	PN
Pea	68.00	1946 price from january to may (inclusive); used for dried and green peas	PN
Pope	16.40	1946 year price	AE
Sweet potato	17.89	1946 price from january to may (inclusive)	PN
Tomato	26.95	1946 price from january to may (inclusive)	PN
Apple	27.31	1949/50 cropping season prices from BCRA (1976b) extrapolated to 1945/46 using the simple average of the prices evolution of Grapes for wine and Tomato. That is, the 1949/50 prices was divided to: 0.5x29.50/27.90 + 0.5x26.95/43.60 = 1.28. 1 dozen = 3 kg was assumed for Artichoke. 1 kg = 1 bunch was assumed for Asparagus.	
Artichoke	90.11		
Asparagus	66.5		
Cerize and Cherry	97.52		
Chili and Pepper	91.36		
Damascus	20.28		
Grapefruit	17.16		
Lemon	18.72		
Orange	23.40		
Peach	28.87		
Pear	18.72		
Plum	24.97		
Pumpkin (*Zapallo*)	22.16		
Quince	7.80		
Strawberry	117.02		
Table grape	42.13		
Tangerine	26.53		

Sources:

BdC 1948: Bolsa de Cereales (nd) - *Número Estadístico 1948*

BdC 1971: Bolsa de Cereales (nd) - *Número Estadístico 1971*

BdC 1979: Bolsa de Cereales (nd) - *Número Estadístico 1979*

CI 1946: DNSE (1952) - *IV Censo General de la Nación. Censo Industrial de 1946*

PN: Presidencia de la Nación (1946) - *Índices Básicos de la Economía Nacional*

AE: DNSE (1954) - *Anuario Estadístico de la República Argentina. 1949 - 1950. Tomo II: Comercio*

BCRA (1962a) - *Boletín estadístico. Septiembre de 1962*

BCRA (1976b) - *Cuentas Nacionales de la República Argentina. Volumen V: Estadísticas Agrícolas*

Universidad de San Andrés

Table A3.9: Cattle Head Prices (m$n) for 1937

Provinces	Calfs	Young steers	Young bulls	Heifers	Steers	Bulls	*Torunos* and oxen	Caws
Capital Federal	44.75	99.53	110.97	97.48	110.83	144.74	133.23	120.77
Buenos Aires	44.75	99.53	110.97	97.48	110.83	144.74	133.23	120.77
Catamarca	37.70	83.85	93.49	82.12	93.37	121.94	112.25	101.74
Chaco	35.40	78.73	87.79	77.11	87.67	114.50	105.39	95.53
Chubut	42.38	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Córdoba	48.62	108.13	120.57	105.91	120.41	157.26	144.75	131.21
Corrientes	38.77	86.22	96.14	84.45	96.01	125.39	115.42	104.62
Entre Ríos	38.58	85.80	95.67	84.04	95.55	124.78	114.86	104.11
Formosa	35.40	78.73	87.79	77.11	87.67	114.50	105.39	95.53
Jujuy	36.55	81.29	90.64	79.62	90.52	118.22	108.82	98.64
La Pampa	47.78	106.27	118.49	104.08	118.33	154.54	142.26	128.94
La Rioja	51.83	65.77	68.89	64.60	75.84	85.95	79.11	75.68
Mendoza	36.99	82.26	91.72	80.57	91.60	119.63	110.12	99.82
Misiones	38.77	86.22	96.14	84.45	96.01	125.39	115.42	104.62
Neuquén	42.38	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Río Negro	42.38	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Salta	36.55	81.29	90.64	79.62	90.52	118.22	108.82	98.64
San Juan	65.97	146.73	163.60	143.71	163.39	213.39	196.42	178.04
San Luis	44.26	98.44	109.76	96.41	109.62	143.16	131.78	119.45
Santa Cruz	42.38	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Santa Fe	47.35	105.32	117.43	103.15	117.28	153.16	140.98	127.79
Sgo. del Estero	37.70	83.85	93.49	82.12	93.37	121.94	112.25	101.74
T. del Fuego	42.38	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Tucumán	36.55	81.29	90.64	79.62	90.52	118.22	108.82	98.64

Sources: own elaboration based on DNIEC (nd) and DGSEN (nd) *Síntesis Estadística Mensual de la República Argentina*, volumes 1947 October and 1951 July-September, and Ministerio de Economía - Junta Nacional de Carnes de la República Argentina (nd) - *Estadísticas Básicas 1973*.

QUAERERE VERUM Universidad de San Andrés

Table A3.10: Cattle Head Prices (m$n) for 1946

Provinces	Calfs	Young steers	Young bulls	Heifers	Steers	Bulls	*Torunos* and oxen	Caws
Capital Federal	77.21	99.53	110.97	97.48	110.83	144.74	133.23	120.77
Buenos Aires	77.21	99.53	110.97	97.48	110.83	144.74	133.23	120.77
Catamarca	65.04	83.85	93.49	82.12	93.37	121.94	112.25	101.74
Chaco	61.07	78.73	87.79	77.11	87.67	114.50	105.39	95.53
Chubut	73.12	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Córdoba	83.88	108.13	120.57	105.91	120.41	157.26	144.75	131.21
Corrientes	66.88	86.22	96.14	84.45	96.01	125.39	115.42	104.62
Entre Ríos	66.56	85.80	95.67	84.04	95.55	124.78	114.86	104.11
Formosa	61.07	78.73	87.79	77.11	87.67	114.50	105.39	95.53
Jujuy	63.06	81.29	90.64	79.62	90.52	118.22	108.82	98.64
La Pampa	82.43	106.27	118.49	104.08	118.33	154.54	142.26	128.94
La Rioja	89.43	114.29	128.55	112.91	128.38	167.66	154.33	139.89
Mendoza	63.81	82.26	91.72	80.57	91.60	119.63	110.12	99.82
Misiones	66.88	86.22	96.14	84.45	96.01	125.39	115.42	104.62
Neuquén	73.12	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Río Negro	73.12	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Salta	63.06	81.29	90.64	79.62	90.52	118.22	108.82	98.64
San Juan	113.82	146.73	163.60	143.71	163.39	213.39	196.42	178.04
San Luis	76.36	98.44	109.76	96.41	109.62	143.16	131.78	119.45
Santa Cruz	73.12	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Santa Fe	81.70	105.32	117.43	103.15	117.28	153.16	140.98	127.79
Sgo. del Estero	65.04	83.85	93.49	82.12	93.37	121.94	112.25	101.74
T. del Fuego	73.12	94.26	105.11	92.32	104.97	137.09	126.19	114.38
Tucumán	63.06	81.29	90.64	79.62	90.52	118.22	108.82	98.64

Sources: own elaboration based on DNIEC (nd) and DGSEN (nd) *Síntesis Estadística Mensual de la República Argentina*, volumes 1947 October and 1951 July-September.

QUAERERE VERUM Universidad de San Andrés

Table A3.11: Sheep Head Prices (m$n) for 1937

Provinces	Lambs (*Corderos*) and Weaners (*Borregos*)	Wethers	Ewes	Rams
Capital Federal	6.07	8.31	8.20	15.63
Buenos Aires	6.07	8.31	8.20	15.63
Catamarca	5.76	7.89	7.78	14.82
Chaco	5.47	7.49	7.39	14.08
Chubut	6.90	6.05	3.46	3.89
Córdoba	5.76	7.89	7.78	14.82
Corrientes	5.30	7.25	7.15	13.63
Entre Ríos	5.30	7.25	7.15	13.63
Formosa	5.47	7.49	7.39	14.08
Jujuy	5.76	7.89	7.78	14.82
La Pampa	5.88	8.05	7.94	15.13
La Rioja	8.11	11.10	10.95	20.86
Mendoza	8.16	11.18	11.02	21.00
Misiones	5.30	7.25	7.15	13.63
Neuquén	6.39	7.05	5.70	9.51
Río Negro	6.39	7.05	5.70	9.51
Salta	5.76	7.89	7.78	14.82
San Juan	10.45	14.31	14.11	26.89
San Luis	5.87	8.04	7.93	15.12
Santa Cruz	6.90	6.05	3.46	3.89
Santa Fe	5.47	7.49	7.39	14.08
Santiago del Estero	5.76	7.89	7.78	14.82
Tierra del Fuego	6.90	6.05	3.46	3.89
Tucumán	5.76	7.89	7.78	14.82

Sources: own elaboration based on DNIEC (nd) and DGSEN (nd) *Síntesis Estadística Mensual de la República Argentina*, volumes 1947 October and 1951 July-September, and Ministerio de Economía - Junta Nacional de Carnes de la República Argentina (nd) - *Estadísticas Básicas 1973*.

QUAERERE VERUM
Universidad de
SanAndrés

Table A3.12: Sheep Head Prices (m$n) for 1946

Provinces	Lambs (*Corderos*)	Weaners (*Borregos*)	Wethers	Ewes	Rams
Capital Federal	9.20	9.44	12.98	10.86	21.27
Buenos Aires	9.20	9.44	12.98	10.86	21.27
Catamarca	8.72	8.95	12.31	10.30	20.17
Chaco	8.28	8.50	11.70	9.78	19.16
Chubut	10.54	10.82	9.36	3.88	5.91
Córdoba	8.72	8.95	12.31	10.30	20.17
Corrientes	8.02	8.23	11.33	9.47	18.55
Entre Ríos	8.02	8.23	11.33	9.47	18.55
Formosa	8.28	8.50	11.70	9.78	19.16
Jujuy	8.72	8.95	12.31	10.30	20.17
La Pampa	8.90	9.14	12.57	10.51	20.59
La Rioja	12.27	12.60	17.33	14.49	28.39
Mendoza	12.36	12.69	17.45	14.59	28.59
Misiones	8.02	8.23	11.33	9.47	18.55
Neuquén	9.72	9.98	10.96	7.19	13.25
Río Negro	9.72	9.98	10.96	7.19	13.25
Salta	8.72	8.95	12.31	10.30	20.17
San Juan	15.83	16.24	22.34	18.68	36.61
San Luis	8.89	9.13	12.56	10.50	20.57
Santa Cruz	10.54	10.82	9.36	3.88	5.91
Santa Fe	8.28	8.50	11.70	9.78	19.16
Santiago del Estero	8.72	8.95	12.31	10.30	20.17
Tierra del Fuego	10.54	10.82	9.36	3.88	5.91
Tucumán	8.72	8.95	12.31	10.30	20.17

Sources: own elaboration based on DNIEC (nd) and DGSEN (nd) *Síntesis Estadística Mensual de la República Argentina*, volumes 1947 October and 1951 July-September, and Ministerio de Economía - Junta Nacional de Carnes de la República Argentina (nd) - *Estadísticas Básicas 1973*.

Table A3.13: Branches of Transport GDP

Branches	Millions of 1950 m$n		%	
	1937	**1946**	**1937**	**1946**
Aircraft	46	110	1.69	2.77
Navigation	444	514	16.27	12.94
Railways	1,048	1,498	38.40	37.70
Trucks	661	1,002	24.22	25.22
Transportation of Buenos Aires	328	431	12.02	10.85
Transportation of people in the interior, taxis and *mateos*	202	418	7.40	10.52
Total Transports GDP (a)	**2,729**	**3,973**	**100.00**	**100.00**

(a) In the original publication the totals do not match the sum of the branches due to rounding problems. Here the sum of branches is computed.
Source: CEPAL (1958)

Universidad de San Andrés

Table A3.14: Construction of Allocator for the Transportation Sector for 1937

Branches	**TOTAL**	**Air Navi-gation**	**Navigation**	**Railways**	**Trucks**	**"Transportes de Buenos Aires"**	**Transportation of people in the interior, taxis and *mateos***
Transport GDP (millions of 1950 m$n)	2,729	46	444	1,048	661	328	202
Share (%)	100.00	1.69	16.27	38.40	24.22	12.02	7.40
Distribution (%):							
Cap. Fed.	28.82	0.00	28.47	18.61	20.75	100.00	-
Buenos Aires	32.13	38.80	36.07	32.83	35.62	-	59.01
Catamarca	0.21	1.10	0.00	0.15	0.29	-	0.84
Chaco	1.58	3.50	0.80	1.97	2.03	-	1.98
Chubut	1.48	5.20	6.06	0.13	0.78	-	2.27
Córdoba	6.41	9.40	0.00	10.26	8.13	-	4.61
Corrientes	0.97	4.00	0.76	1.05	0.77	-	2.65
Entre Ríos	3.56	2.80	7.52	2.40	4.52	-	3.60
Formosa	0.48	1.00	0.84	0.64	0.25	-	0.25
Jujuy	0.53	0.90	0.00	0.82	0.50	-	1.09
La Pampa	0.76	0.30	0.00	0.98	1.42	-	0.38
La Rioja	0.17	0.70	0.00	0.26	0.22	-	0.11
Mendoza	2.49	5.50	0.00	2.11	4.56	-	6.55
Misiones	0.74	3.90	0.72	0.17	1.42	-	1.98
Neuquén	0.24	1.00	0.00	0.19	0.49	-	0.48
Río Negro	0.83	3.80	0.06	0.71	1.69	-	0.99
Salta	0.95	4.70	0.00	1.36	1.01	-	1.39
San Juan	0.81	0.40	0.00	0.93	0.91	-	3.09
San Luis	0.44	0.60	0.00	0.66	0.31	-	1.37
Santa Cruz	0.40	4.80	0.31	0.06	0.97	-	0.13
Santa Fe	13.06	0.50	18.34	17.41	12.26	-	5.51
Sgo. del Est.	0.67	0.40	0.00	1.41	0.38	-	0.42
T. del Fuego	0.05	1.70	0.06	0.00	0.05	-	0.00
Tucumán	2.21	5.00	0.00	4.86	0.67	-	1.30
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Sources: See text.

Universidad de San Andrés

Table A3.15: Construction of Allocator for the Transportation Sector for 1946

Branches	TOTAL	Air Navi-gation	Navigation	Railways	Trucks	"Transportes de Buenos Aires"	Transportation of people in the interior, taxis and *mateos*
Transport GDP (millions of 1950 m$n)	2,729	46	444	1,048	661	328	202
Share (%)	100.00	2.77	12.94	37.70	25.22	10.85	10.52
Distribution (%):							
Cap. Fed.	27.46	0.00	28.28	20.50	20.71	100.00	0.00
Buenos Aires	32.93	38.80	41.90	30.65	31.79	-	65.23
Catamarca	0.32	1.10	0.00	0.24	0.34	-	1.09
Chaco	1.58	3.50	1.28	1.81	1.64	-	2.06
Chubut	1.57	5.20	6.54	0.17	1.63	-	1.00
Córdoba	6.41	9.40	0.00	9.09	9.22	-	3.78
Corrientes	1.09	4.00	1.28	1.23	0.95	-	1.07
Entre Ríos	2.77	2.80	4.49	3.43	2.41	-	1.98
Formosa	0.37	1.00	0.70	0.47	0.18	-	0.22
Jujuy	0.75	0.90	0.00	1.25	0.61	-	0.96
La Pampa	1.24	0.30	0.00	1.74	2.06	-	0.52
La Rioja	0.22	0.70	0.00	0.29	0.29	-	0.15
Mendoza	3.56	5.50	0.00	4.03	5.71	-	4.22
Misiones	0.89	3.90	0.93	0.18	1.52	-	1.98
Neuquén	0.43	1.00	0.00	0.43	0.65	-	0.74
Río Negro	1.03	3.80	0.00	0.87	1.98	-	0.89
Salta	1.33	4.70	0.00	2.05	1.09	-	1.50
San Juan	1.13	0.40	0.00	1.01	1.28	-	3.98
San Luis	0.56	0.60	0.00	0.97	0.54	-	0.37
Santa Cruz	0.58	4.80	0.36	0.07	1.23	-	0.63
Santa Fe	9.23	0.50	14.15	10.83	11.56	-	3.68
Sgo. del Est.	1.33	0.40	0.00	2.83	0.59	-	0.98
T. del Fuego	0.09	1.70	0.09	0.00	0.09	-	0.07
Tucumán	3.13	5.00	0.00	5.85	1.92	-	2.89
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: See text.

Universidad de San Andrés

Table A3.16: Railway Companies Revenues for Passengers Transport and Baggage Excess, and Loads Transportation

Year assigned:	1937			1946		
Provincess	**Passengers transport and baggage excess (%)**	**Loads transportation (%)**	**Total revenues (%)**	**Passengers transport and baggage excess (%)**	**Loads transportation (%)**	**Total revenues (%)**
Cap. Fed.	41.33	12.87	18.61	42.64	13.08	20.50
Buenos Aires	40.04	31.01	32.83	40.31	27.42	30.65
Catamarca	0.13	0.16	0.15	0.12	0.28	0.24
Chaco	0.72	2.29	1.97	0.55	2.23	1.81
Chubut	0.11	0.14	0.13	0.20	0.16	0.17
Córdoba	1.59	12.45	10.26	1.20	11.74	9.09
Corrientes	1.13	1.02	1.05	0.89	1.35	1.23
Entre Ríos	2.38	2.41	2.40	3.79	3.31	3.43
Formosa	0.17	0.76	0.64	0.11	0.60	0.47
Jujuy	0.62	0.87	0.82	0.46	1.52	1.25
La Pampa	0.05	1.22	0.98	0.04	2.31	1.74
La Rioja	0.10	0.30	0.26	0.06	0.36	0.29
Mendoza	0.42	2.53	2.11	0.32	5.27	4.03
Misiones	0.08	0.19	0.17	0.10	0.20	0.18
Neuquén	0.02	0.24	0.19	0.02	0.57	0.43
Río Negro	0.83	0.68	0.71	0.74	0.91	0.87
Salta	1.19	1.40	1.36	0.73	2.49	2.05
San Juan	0.18	1.12	0.93	0.16	1.29	1.01
San Luis	0.06	0.81	0.66	0.08	1.27	0.97
Santa Cruz	0.04	0.07	0.06	0.02	0.09	0.07
Santa Fe	3.86	20.84	17.41	2.98	13.46	10.83
Sgo. del Est.	0.67	1.60	1.41	0.51	3.60	2.83
T. del Fuego	0.00	0.00	0.00	0.00	0.00	0.00
Tucumán	4.26	5.01	4.86	3.99	6.47	5.85
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00
Revenue soruce share	**20.17**	**79.83**	**100.00**	**25.08**	**74.92**	**100.00**

Sources: Own elaboration based on:

Dirección General de Ferrocarriles (1942) - *Estadística de los Ferrocarriles en explotación - Ejercicio 1936-37.*
Instituto de Estudios Económicos del Transporte (1947) - *Estadística de los Ferrocarriles Argentinos - Ejercicio 1945-1946.*
Dirección Nacional de Transportes (1950) - *Estadística de los ferrocarriles en explotación - Ejercicio 1943-44.*
Oficina de Ajustes de Ferrocarriles (1937) - *Manual de estaciones, empalmes e intercambios de las empresas asociadas.*
Empresa Ferrocarriles del Estado Argentino (1958) - *Manual de Estaciones.*

Table A3.17: Merchandise Movement in Ports by Province
(Incoming and outcoming of domestic and foreign trade)

Provinces	Tons		Share (%)	
	1938	1946	1938	1946
Capital Federal	10,521,820	9,675,857	28.4671	28.2819
Buenos Aires	13,331,875	14,333,610	36.0697	41.8962
Chaco	295,990	437,080	0.8008	1.2776
Chubut	2,241,676	2,237,908	6.0649	6.5413
Corrientes	279,259	436,993	0.7555	1.2773
Entre Ríos	2,778,634	1,536,027	7.5177	4.4897
Formosa	309,581	240,330	0.8376	0.7025
Misiones	266,819	318,960	0.7219	0.9323
Río Negro	22,178	494	0.0600	0.0014
Santa Cruz	113,962	123,554	0.3083	0.3611
Santa Fe	6,778,058	4,841,767	18.3382	14.1522
Tierra del Fuego	21,538	29,586	0.0583	0.0865
TOTAL	36,961,390	34,212,166	100.0000	100.0000

Notes:
1938 values for Ramallo (Buenos Aires) were not available, so it were used those of 1939 (50,863 tn)

Ports Riachuelo (36,1634 tn in 1938 and 2,336,016 tn in 1946) and Barracas (7,756 tn in 1938 and 564 tn in 1946) values half divied between Capital Federal y Buenos Aires.
Sources: Own elaboration based on:

Dirección General de Navegación y Puertos (1940) - *Anuario Estadístico del Movimiento en los Puertos de la República Argentina correspondiente a 1938*
Dirección General de Navegación y Puertos (1941) - *Anuario Estadístico del Movimiento en los Puertos de la República Argentina correspondiente a 1939*
Dirección Nacional de Construcciones portuarias y vías navegables (1952) - *Anuario Estadístico del Movimiento en los Puertos de la República Argentina correspondiente a 1946*

Universidad de SanAndrés

Table A3.18: Branches of Communications GDP

Branches	Millions of 1960 m$n		%	
	1937	1946	1937	1946
Post and Telegraph	3,117	3,817	68.40	62.58
Telephones	1,440	2,282	31.60	37.42
Total Communications	4,557	6,099	100.00	100.00

Source: BCRA (1966)

Table A3.19: Expenses in Provincial Budgets

Provinces	**1939 year** (a) **millions of current m$n**	**1947 year** (b) **millions of current m$n**
Capital Federal (c)	153.0	255.0
Buenos Aires	170.8	363.3
Catamarca	1.8 (d)	9.8
Corrientes	11.1 (e)	25.6
Córdoba	41.9	77.1
Entre Ríos	23.2	55.0
Jujuy	3.8	18.4
La Rioja	2.2	8.6
Mendoza	32.6	71.1
Salta	8.51 (f)	30.4
San Juan	12.8	44.0
San Luis	4.0	12.8
Santa Fe	62.1	103.9
Santiago del Estero	8.0	27.3
Tucumán	16.9	47.4

Notes and Sources:

(a) Values from Comité Nacional de Geografía (1941) - *Anuario Geográfico de la República Argentina*.

(b) Values from Revista de Economía Argentina (1948).

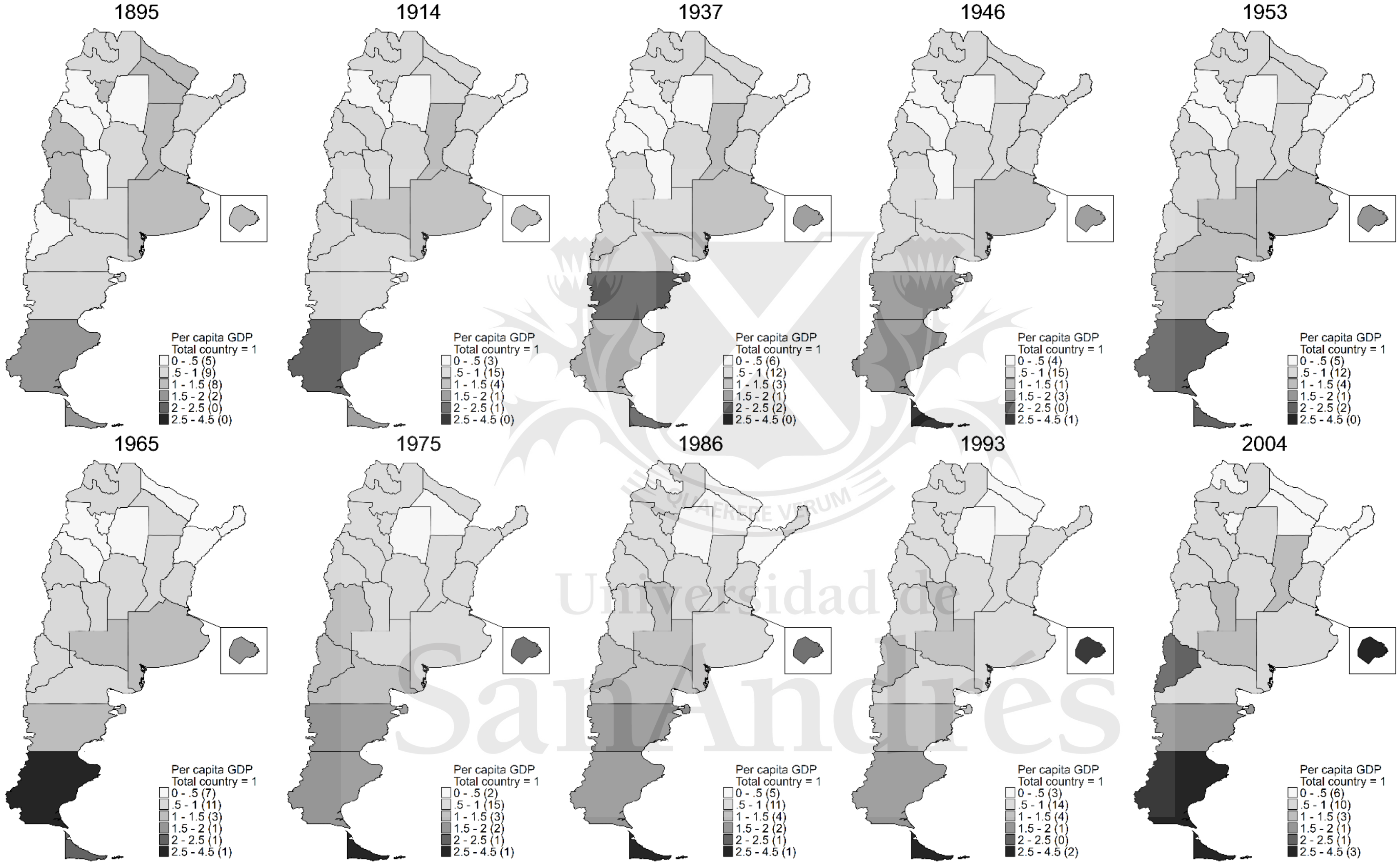
(c) Values obtained from budgeted expenses in Budget of Capital Federal, 1939 - *Ordenanza Nº 10.092* for 1939 and Budget of Capital Federal, 1947 - *Decreto Nacional 14258/947* for 1947.

(d) Originally published the value of 1.7 million m$n of 1938. This value was extrapolated from the variation between the provincial budgets of 1938 (1369386.79 m$n) and 1939 (1446397.20 m$n) obtained from Alvero & Ibañez (2004).

(e) Originally published the value of 10.6 million m$n of 1937. The value of 1939 was obtained from expenses (including autarkic distributions) according to the budget law Budget of province of Corrientes, 1939 - *Ley de Presupuesto (Ley Nº 827)*.

(f) Originally published the value of 8.2 million m$n of 1937. This value was extrapolated from the variaton between the provincial budgets of 1937 (Budget of province of Salta, 1937 - *Ley Nº 1683, Original 405*) and 1939 (Budget of province of Salta, 1937 - *Ley Nº 1808, Original 530*) (6,983,054.05 m$n and 7,247,784.20 m$n respectively).

Figure A3.3: Per Capita GDP (Alternative Grouping Criterion of Equal-Width Intervals)



Source: Own elaboration based on **Table 3.6**

Universidad de San Andrés

3.7- References

AGUILAR-RETURETA, J. (2015): "The GDP per capita of the Mexican regions (1895-1930): new estimates". *Revista de Historia Económica - Journal of Iberian and Latin American Economic History* 33(3), pp. 387-423.

ALVERO, L. A. & IBAÑEZ C. (2004): "La Economía de Catamarca a partir de los ingresos y gastos según los presupuestos provinciales (1936 - 1942)". Presented at *XIX Jornadas de Historia Económica*, AAHE, Neuquén 2004.

ANTONELLI, E. (2010): "Estimación del Producto Interno Bruto regional: el caso de la provincia de Salta (Argentina) 1880-1930". *Ensayos de Economía* 37, pp. 201-231.

ANTONELLI, E. (2013): "Producto bruto geográfico de Salta 1930-1970*". Documento de Trabajo Año 2013 Nº8*. Instituto de Investigaciones Económicas, Facultad de Ciencias Económicas, Jurídicas y Sociales, Universidad Nacional de Salta. Salta, Argentina.

ARÁOZ, M. F. & NICOLINI, E. (2016): "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". *Anales LI Reunión Anual de Asociación Argentina de Economía Política*.

ARÁOZ, M. F. & NICOLINI, E. (2020): "Regional growth and the persistence of regional income inequality in Argentina in the first half of the twentieth century*". Journal Of Latin American Studies*. 52(2), 293-316.

ARÁOZ, M. F., NICOLINI, E. A., & TALASSINO, M. (2020): "Growth and convergence among Argentine provinces since 1895". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 65-95). Palgrave Macmillan, Cham.

ARAUJO, M., GARCÍA, M., MARTÍNEZ-GALARRAGA, J. & WILLEBALD, H. (2013): "Desempeño regional en Uruguay durante la primera mitad del siglo XX: metodología y primeras aproximaciones". In Primer encuentro sobre la Reconstrucción de los PIBs regionales en América Latina, 1890 - 2010. Montevideo, Uruguay.

ARKLEMS, Proyecto ARKLEMS + LAND. https://arklems.org/pbi/

Asociación de Dirigentes de Ventas (1955): *Informe Económico Nº 1*.

AZCONA, J.O., TERZAGHI, A.L., y CARNET, Z. (2003): "Pavos blancos de pechuga ancha". *Idia XXI: revista de información sobre investigación y desarrollo agropecuario*, 2003, v. 3, no. 5, p. 42-44.

Universidad de San Andrés

BADIA-MIRÓ, M. (2015): "La evolución de la localización de la actividad económica en Chile en el largo plazo: la paradoja de un caso de extrema concentración en ausencia de fuerzas de aglomeración". *Estudios de economía* 42(2), pp. 143-167.

BADIA-MIRÓ, M. (2020): "Spatial Inequality in Chile in the Long Run: A Paradox of Extreme Concentration in the Absence of Agglomeration Forces (1890–2017)". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 157-182). Palgrave Macmillan, Cham.

BADÍA-MIRÓ, M., GUILERA, J. & LAINS, P. (2012): "Regional incomes in Portugal: industrialisation, integration and inequality, 1890-1980". *Revista de Historia Económica - Journal of Iberian and Latin American Economic History* 30(2), pp. 225-244.

Banco Central de la República Argentina (BCRA) (1946): Cálculo de la renta nacional. Informaciones sobre las actividades económicas en nuestro país. Informe Nº 3.

Banco Central de la República Argentina (BCRA) (1962a): Boletín Estadístico. Apéndice I - Índices de Precios Mayoristas en la Capital Federal. Año V. Septiembre de 1962. Nº9.

Banco Central de la República Argentina (BCRA) (1962b): Estadísticas monetarias y bancarias - Años 1940 - 1960. Suplemento del Boletín Estadístico Año V - Nº 6 - Junio de 1962.

Banco Central de la República Argentina (BCRA) (1966): Origen del Producto y composición del Gasto Nacional. *Suplemento del Boletín Estadístico* Año IX - Nº 6 - Junio de 1966.

Banco Central de la República Argentina (BCRA) (1976a): Sistema de Cuentas del Producto e Ingreso de la Argentina. Vol III: Series Históricas.

Banco Central de la República Argentina (BCRA) (1976b). Sistema de Cuentas del Producto e Ingreso de la Argentina. Vol V: Estadísticas Agrícolas.

Banco Central de la República Argentina (BCRA) (nd): Boletín Estadístico del Banco Central de la República Argentina. Diciembre de 1947. Buenos Aires.

Banco Central de la República Argentina (BCRA) (nd): Suplemento Estadístico de la Revista Económica del Banco Central de la República Argentina. Issues: Diciembre de 1942 and Diciembre de 1943.. Buenos Aires.

Banco Central de la República Argentina (BCRA) (nd): Suplemento Estadístico de la Revista Económica del Banco Central de la República Argentina. Diciembre de 1943. Buenos Aires.

QUAERERE VERUM
Universidad de
SanAndrés

BANDIERI, S. O., & DABÚS, C. D. (2019): "La Patagonia: una historia de economías y sociedades contrastantes". In BANDIERI, S., CORIA LÓPEZ, L. & DABÚS, C. (comp.): *Historia económica de las regiones argentinas, 1810-2001* (Chapter 6). Ed. Biblos.

BAUMOL W. (1986): "Productivity growth, convergence and welfare: what the long run data show". *American Economic Review*, 76, pp. 1072-85.

BÉRTOLA, L. & WILLEBALD H. (2013): "Regional development in Brazil, 1870-1920." In Primer encuentro sobre la Reconstrucción de los PIBs regionales en América Latina, 1890 - 2010. Montevideo, Uruguay.

Bolsa de Cereales (nd): Número Estadístico 1948.

Bolsa de Cereales (nd): Número Estadístico 1971.

Bolsa de Cereales (nd): Número Estadístico 1979.

BOLT, J., INKLAAR, R., DE JONG, H., & VAN ZANDEN, J. L. (2018): "Rebasing 'Maddison': new income comparisons and the shape of long-run economic development". *GGDC Research Memorandum*, 174.

Budget of Capital Federal, 1939: Ordenanza Nº 10.092

Budget of Capital Federal, 1947: Decreto Nacional 14258/947

Budget of province of Corrientes, 1939: Ley de Presupuesto (Ley Nº 827).

Budget of province of Salta, 1937: Ley Nº 1683, Original 405.

Budget of province of Salta, 1939: Ley Nº 1808, Original 530.

BUNGE, A. (1940): *Una nueva Argentina*. Buenos Aires.

BUNGE, A. E. (1917): *Riqueza y Renta de La Argentina, Su Distribución y Su Capacidad Contributiva*. Buenos Aires: Agencia General de Librería y Publicaciones.

BUYST, E. (2011): "Continuity and change in regional disparities in Belgium during the twentieth century". *Journal of Historical Geography* 37(3), pp. 329-337.

CANTARO, H., SÁNCHEZ, J. & SEPÚLVEDA, P. (2010): Cría y engorde de pavos. *Instituto Nacional de tecnología Agropecuaria*, INTA. Argentina.

CAO, H., & VACA, J. (2006): "Desarrollo regional en la Argentina: la centenaria vigencia de un patrón de asimetría territorial". *EURE* (Santiago), 32(95), 95-111.

QUAERERE VERUM
Universidad de
San Andrés

Comisión Económica para América Latina y el Caribe (CEPAL) (1958): El Desarrollo Económico de la Argentina: Anexo. E/CN.12/429/Add.4. Santiago de Chile.

Comité Nacional de Geografía (1941): Anuario Geográfico Argentino. Buenos Aires.

Comité Nacional de Geografía (1943): Anuario Geográfico Argentino. Suplemento 1942. Buenos Aires.

Consejo Federal de Inversiones y Centro de Investigaciones Económicas Instituto Torcuato Di Tella (CFI-ITDT) (1965): *Relevamiento de la estructura regional de la economía argentina*. Buenos Aires: Ediciones CFI. (Reprinted from Universidad Torutato Di Tella, 1962).

Consejo Nacional de Desarrollo y Comisión Económica para América Latina y el Caribe (CONADE-CEPAL) (1965): Distribución del ingreso y cuentas nacionales en la Argentina. Tomo V: Población, Ocupación y Remuneraciones. Buenos Aires. (Reprinted from Universidad Torutato Di Tella, 1962).

CORIA LÓPEZ, L. A. (2008): "El PBG de Mendoza Para 1914. Algunos Aspectos Metodológicos". *XXI Jornadas de Historia Económica de La Asociación Argentina de Historia Económica*. Caseros.

CORIA LÓPEZ, L. A. (2014): "El Producto Bruto Geográfico de Mendoza de los últimos 100 años (1914-2013)". *Anales XLIX Reunión Anual de la Asociación Argentina de Economía Política*.

CORREA DEZA, M. F., & NICOLINI, E. A. (2014): "Diferencias regionales en el costo de vida en Argentina a comienzos del siglo XX". *Investigaciones de Historia Económica-Economic History Research*, 10(3), 202-212.

CORREA, A. & LAHITTE, E. (1898): *Investigación Parlamentaria Sobre Agricultura, Ganadería, Industrias Derivadas y Colonización. Anexo G: Tucumán y Santiago Del Estero*. Buenos Aires: Taller Tipográfico de la Penitenciaría Nacional.

CORTÉS CONDE, R. (1994): "Estimaciones Del Producto Bruto Interno de Argentina 1875-1935". Unpublished.

CRAFTS, N. (2005): "Regional GDP in Britain, 1871-1911: Some Estimates". *Scottish Journal of Political Economy* 52, pp. 54-64.

DE CORSO, G. & TIRADO-FABREGAT, D. A. (2020): "Was the Oil Sown Evenly? Long-Term Patterns of Regional Inequality in Venezuela (1881–2011)". In *Time and Space:*

QUAERERE VERUM
Universidad de
SanAndrés

Latin American Regional Development in Historical Perspective (pp. 309-341). Palgrave Macmillan, Cham.

DELLA PAOLERA, G. & TAYLOR, A. M. (Eds.) (2003): *A new economic history of Argentina*. Cambridge University Press.

Departamento Nacional del Trabajo (DNT) (1907): Boletín del Departamento Nacional del Trabajo N° 3. Buenos Aires.

Departamento Nacional del Trabajo (DNT) (1913): Boletín del Departamento Nacional del Trabajo N° 25. Buenos Aires.

DÍEZ-MINGUELA, A., & SANCHIS LLOPIS, M. T. (2020): Comparing different estimation methodologies of regional GDPs in Latin American countries. In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 17-40). Palgrave Macmillan, Cham.

Dirección de Estadística e Investigaciones de la Provincia de Buenos Aires (DEIBA) (1960): Producto Bruto Interno de la Provincia de Buenos Aires - Período 1948/1958.

Dirección de Estadística Social (1945): Nivel de vida de la familia obrera. Evolución durante la Segunda Guerra Mundial 1939 - 1945. Buenos Aires.

Dirección de Minas y Geología (1938): Estadística Minera de la Nación 1937. Buenos Aires.

Dirección General de Estadística de la Nación (1940): Estadística Industrial de 1937. Buenos Aires.

Dirección General de Ferrocarriles (1942): Estadística de los Ferrocarriles en explotación - Ejercicio 1936-37. Buenos Aires.

Dirección General de Navegación y Puertos (1940): Anuario Estadístico del Movimiento de los Puertos en la República Argentina correspondiente a 1938. Buenos Aires.

Dirección General de Navegación y Puertos (1941): Anuario Estadístico del Movimiento de los Puertos en la República Argentina correspondiente a 1939. Buenos Aires.

Dirección General del Servicio Estadístico Nacional (DGSEN) (nd): Síntesis Estadística Mensual de la República Argentina. Enero/Diciembre de 1949. Buenos Aires.

Dirección General del Servicio Estadístico Nacional (DGSEN) (nd): Síntesis Estadística Mensual de la República Argentina. Julio-Septiembre de 1951. Buenos Aires.

Dirección Nacional de Construcciones Portuarias y Vías Navegables (1952): Anuario Estadístico del Movimiento de los Puertos en la República Argentina correspondiente a 1946.

Dirección Nacional de Estadística y Censos (DNEC) (1956): Informe demográfico de la República Argentina 1944 - 1954. Buenos Aires.

Dirección Nacional de Estadísticas y Censos (DNEC) (1959): Anuario Estadístico de la República Argentina 1957. Buenos Aires.

Dirección Nacional de Geología y Minería (1958): Estadística del petróleo de la República Argentina correspondiente al año 1957. Buenos Aires.

Dirección Nacional de Investigaciones, Estadísticas y Censos (DNIEC) (nd): Síntesis Estadística Mensual de la República Argentina. Octubre de 1947.

Dirección Nacional de Minería (1953): Estadística minera de la República Argentina - Años 1945 - 1949. Buenos Aires.

Dirección Nacional de Transportes (1950): Estadística de los Ferrocarriles en explotación - Ejercicio 1943-44. Buenos Aires.

Dirección Nacional del Servicio Estadístico (DNSE) (1952a): IV Censo General de la Nación. Censo Industrial de 1946. Buenos Aires.

Dirección Nacional del Servicio Estadístico (DNSE) (1952b): IV Censo General de la Nación. Tomo III. Censos: Industrial, de Comercio, de Empresas de Construcción, Bancario, de Seguros y de Empresas de Capitalización y Ahorro (Crédito Recíproco). Buenos Aires.

Dirección Nacional del Servicio Estadístico (DNSE) (1954): Anuario Estadístico de la República Argentina. 1949 - 1950. Tomo II: Comercio. Buenos Aires.

Dirección Nacional del Servicio Estadístico (DNSE) (nd): Anuario Estadístico de la República Argentina. 1949 - 1950. Tomo I: Compendio. Buenos Aires.

Dirección Nacional del Servicio Estadístico (DNSE) (nd): IV Censo General de la Nación. Censo de Vivienda. República Argentina.

Dirección Nacional del Servicio Estadístico (DNSE) (nd): IV Censo General de la Nación. Tomo I. Censo de Población. Buenos Aires.

Dirección Nacional del Servicio Estadístico (DNSE) (nd): IV Censo General de la Nación. Tomo II. Censo Agropecuario. Buenos Aires.

QUAERERE VERUM Universidad de SanAndres

ELÍAS, V. (1995): "Regional economic convergence: The case of Latin American economies". *Estudios de Economía*, 22(2), pp. 159-176.

Empresa Ferrocarriles del Estado Argentino (1958): *Manual de Estaciones*.

ENFLO, K., HENNING, M. & SCHÖN, L. (2014): "Swedish regional GDP 1855–2000: Estimations and general trends in the Swedish regional system". *Research in Economic History* (pp. 47-89). Emerald Group Publishing Limited.

European Statistical Office (Eurostat) (1995): *Regional accounts methods - Gross value-added and gross fixed capital formation by activity*. Theme 1: General statistics (midnight blue), Series E: Methods. Luxembourg: Office for Official Publications of the European Communities.

FELICE, E. (2011): "Regional value added in Italy, 1891–2001, and the foundation of a long-term picture". *The Economic History Review* 64(3), pp. 929-950.

FELICE, E. (2019): "GDP and Convergence in Modern Times". In *Handbook of Cliometrics* (pp. 263-93). Berlin Heidelberg: Springer-Verlag.

FERRER, A. (2008): *La economía argentina: desde sus orígenes hasta principios del siglo XXI*. Fondo de Cultura económica: Buenos Aires.

FERRERES, O. J. (2005). *Dos siglos de economía argentina (1810-2004): historia argentina en cifras*. Fundación Norte y Sur.

FERRERES, O. J. (2010): *Dos siglos de economía argentina. Historia argentina en cifras.* Fundación Norte y Sur.

GAMIZ, J. M. (1958). La telefonía argentina en cifras. *Facultad de Ciencias Económicas, Instituto de la Producción, Series Estadísticas* nº 5. Buenos Aires.

GEARY, F. & STARK, T (2002): "Examining Ireland's Post-Famine Economic Growth Performance". *The Economic Journal* 112 (482), pp. 919-935.

GOODWIN, N., HARRIS, J. M., NELSON, J. A., ROACH, B., & TORRAS, M. (2019): *Principles of economics in context*. Routledge.

GROTZ, M. & LLACH, J. J. (2013): "Coparticipación casi sin convergencia, 1950-2010". In *Consecuencias económicas y políticas del federalismo fiscal argentino* (No. 338 (82) (091)). Universidad Nacional de La Plata, La Plata.

QUAERERE VERUM
Universidad de
SanAndrés

GRUPE H., J. C. (nd): Estimación PRELIMINAR Producto Interno Bruto por provincia y por sector de Actividad Económica. Documento de Trabajo, Relevamiento de Estructura Económica, Centro de Investigaciones Económicas Instituto Torcuato Di Tella.

HORA, R. (2010): *Historia económica de la Argentina*. Argentina: Siglo Veintiuno Editores.

Instituto de Estudio Económicos sobre la Realidad Argentina y Latinoamericana (IEERAL) (1986): "Estadísticas de la evolución económica de Argentina 1913-1984". *Estudios*, Año IX, nº 39, Julio/Septiembre 1986.

Instituto de Estudios Económicos del Transporte (1947): Estadística de los Ferrocarriles Argentinos - Ejercicio 1945-1946. Buenos Aires.

Instituto Nacional de Estadística y Censos (INDEC) (1974): Anuario Estadístico de La República Argentina 1973. Buenos Aires: Instituto Nacional de Estadística y Censos.

Instituto Nacional de Estadística y Censos (INDEC) (1975a): Producto Bruto Geográfico.

Instituto Nacional de Estadística y Censos (INDEC) (1975b): Serie anual de la población de la Capital Federal y las provincias por sexo y grupo de edades, 1960-1975. Buenos Aires: Instituto Nacional de Estadística y Censos.

Instituto Nacional de Estadística y Censos (INDEC) (1982): Censo Nacional de Población y Vivienda 1980. República Argentina.

Instituto Nacional de Estadística y Censos (INDEC) (1989): Proyecciones provinciales por sexo y edad. Período 1970/1990.

Instituto Nacional de Estadística y Censos (INDEC) (1993): Proyecciones provinciales por grupos de edad. Período 1985 - 1990.

Instituto Nacional de Estadística y Censos (INDEC) (1996): Estimaciones de la población Por departamento. Período 1990 – 2005. Buenos Aires.

Instituto Nacional de Estadística y Censos (INDEC) (2014). Cuentas Nacionales de la República Argentina. Año base 2004. Versión revisada y ampliada. Serie Documentos de trabajo Nº 23.

Instituto Nacional de Estadística y Censos (INDEC) (2016a): "Cuentas Nacionales: Metodología de Estimación: Base 2004 y Serie a Precios Constantes y Corrientes". Ciudad Autónoma de Buenos Aires: Instituto Nacional de Estadística y Censos.

QUAERERE VERUM
Universidad de
SanAndres

Instituto Nacional de Estadística y Censos (INDEC) (2016b): "Incidencia de la pobreza y de la indigencia en 31 aglomerados urbanos. Resultados segundo trimestre de 2016". Ciudad Autónoma de Buenos Aires: Instituto Nacional de Estadística y Censos.

Instituto Nacional de Estadística y Censos (INDEC) (nd): Cuadros inéditos IV Censo General de la Nación año 1947 características económicas de la población. Serie Información Demográfica 2.

JUAREZ-DAPPE, P, (2010): *When Sugar Ruled: Economy and Society in Northwestern Argentina, Tucuman, 1876-1916*. Ohio University Press.

LLACH, J. J. & SÁNCHEZ, C. E. (1984): "Los determinantes del salario en la Argentina. Un diagnóstico de largo plazo y propuestas de políticas". *IEERAL, Estudios*, Año VII, nº 29, IEERAL, Enero/Marzo de 1984.

LLACH, L. (2007): *The wealth of the provinces: The rise and fall of the Interior in the political economy of Argentina, 1880–1910*. Harvard University.

MARINA, A. (2001): "Convergencia económica en Argentina: ¿qué nos dice la evidencia empírica?". In *Convergencia económica e integración: La experiencia en Europa y América Latina* (pp. 147-162). Ediciones Pirámide.

MARTÍNEZ-GALARRAGA, J., ROSÉS, J. R. & TIRADO, D. A. (2015): "The long-term patterns of regional income inequality in Spain, 1860–2000". *Regional Studies* 49(4), pp-502-517.

Ministerio de Agricultura (1916): Estadística Agrícola 1914-1915. Buenos Aires: Talleres Gráficos del Ministerio de Agricultura de la Nación.

Ministerio de Agricultura (1939a): Censo Nacional Agropecuario 1937. Agricultura. Buenos Aires.

Ministerio de Agricultura (1939b): Censo Nacional Agropecuario 1937. Ganadería. Buenos Aires.

Ministerio de Agricultura (1939c): Estadística de la pesca 1937. Publicación Miscelánea Nº 56. Buenos Aires.

Ministerio de Agricultura (1940): Censo Nacional Agropecuario 1937. Economía Rural. Buenos Aires.

QUAERERE VERUM
Universidad de
SanAndrés

Ministerio de Agricultura (1943): Estadística de la pesca Año 1941. Publicación Miscelánea Nº 143. Buenos Aires.

Ministerio de Agricultura (1944): Actividades pesqueras en el año 1942. Publicación Miscelánea Nº 162. Buenos Aires.

Ministerio de Agricultura (1950): Producción Pesquera de la República Argentina Años 1943 - 44 - 45. Publicación Miscelánea Nº 333. Buenos Aires.

Ministerio de Agricultura (1955): Producción Pesquera de la República Argentina 1946-53. Buenos Aires.

Ministerio de Asuntos Técnicos (nd): Censo Nacional Agropecuario de 1952.

Ministerio de Economía - Junta Nacional de Carnes de la República Argentina (nd): Estadísticas Básicas 1973.

Ministerio de Economía de Buenos Aires (nd): PRODUCTO BRUTO INTERNO de la Provincia de Buenos Aires 1935 - 1981.

Ministerio de Hacienda, Economía y Previsión - Provincia de Buenos Aires (MHPPBA) (1957): Producto Bruto Interno - Años 1935 - 1954. La Plata, Buenos Aires.

Ministerio del Interior (1938): Memoria de correos y telégrafos - Año 1937. Buenos Aires.

Ministerio del Interior (1948): Administración General de Correos y Telecomunicaciones - Memoria - Año 1946. Buenos Aires.

Ministerio del Interior (nd): Estadística Telefónica Año 1937.

Oficina de Ajustes de Ferrocarriles (1937): *Manual de estaciones, empalmes e intercambios de las empresas asociadas*. Casa Jacobo Peuser Ltda., Buenos Aires.

O'ROURKE, K. H., & WILLIAMSON, J. G. (1999): *Globalization and history: the evolution of a nineteenth-century Atlantic economy*. MIT press.

OSZLAK, O. (1997): *La formación del Estado argentino*. Buenos Aires: Editorial Planeta.

PÉREZ MORA, M. (2008): *Estimación del PBG Mendoza en el período 1884-1935 sobre la base de ponderadores de valor agregado de 1914*. FCE: UN Cuyo.

Presidencia de la Nación (1946): Índices Básicos de la Economía Nacional. Buenos Aires.

QUAERERE VERUM
Universidad de
SanAndrés

RAM, R. (2018): “Comparison of cross-country measures of sigma-convergence in per-capita income, 1960–2010”. *Applied Economics Letter*s, 25(14), 1010-1014.

República Argentina (1898): Segundo Censo de la República Argentina. Mayo 10 de 1895. Buenos Aires: Taller Tipográfico de la Penitenciaría Nacional.

República Argentina (1916a): Tercer Censo Nacional de la República Argentina. Levantado el 1º de Junio de 1914. Buenos Aires: Talleres gráficos de L.J. Rosso y Cia.

República Argentina (1916b): Anuario Estadístico del Trabajo. Buenos Aires: Talleres Gráficos A. de Martino.

Revista de Economía Argentina (1948): “Los gastos sanitarios en los presupuestos provinciales”. *Revista de Economía Argentina*, Año XXX, Nº 359, Mayo - Junio 1948.

RODRÍGUEZ, G. M. (2022). “Nuevas bases cartográficas de los censos de Argentina. Radios censales de 1991 a 2010, y departamentos de 1869 a 1980”. *Datos de Investigación Centro de Estudios Urbanos y Regionales* (CEUR-CONICET). Buenos Aires

ROSÉS, J. R. & WOLF, N. (Eds.) (2019): *The Economic Development of Europe's Regions A Quantitative History since 1900*. London: Routledge.

ROSÉS, J. R., MARTÍNEZ-GALARRAGA, J. & TIRADO, D. A. (2010): “The upswing of regional income inequality in Spain (1860–1930)”. *Explorations in Economic History* 47(2), pp. 244-257.

SACHS, J., & LARRAIN, F. (1993): *Macroeconomics in the global economy*. Prentice Hall.

SALA-I-MARTIN, X. X. (1996): “The classical approach to convergence analysis”. *The economic journal*, 1019-1036.

SÁNCHEZ, G. (2017). “Evolución económica de las provincias argentinas durante la Belle Époque (1880-1913). Un análisis a través de los recursos fiscales”. *Tiempo y Economía*, 4(2), 89-112.

SCHULZE, M.S. (2007): “Regional income dispersion and market potential in the late nineteenth century Hapsburg Empire”. *London School of Economics Working Papers*, 106/07.

Secretaría de Asuntos Económicos (SAE) (1955): Producto e Ingreso de la República Argentina en el período 1935 - 54. Buenos Aires.

QUAERERE VERUM
Universidad de
SanAndrés

SEGUÍ, D. F. (1898): *Investigación Parlamentaria Sobre Agricultura, Ganadería, Industrias Derivadas y Colonización. Anexo B. Provincia de Buenos Aires*. Taller Tipográfico de la Peninteciaría Nacional.

SOLOW, R. M. (1956): “A contribution to the theory of economic growth”. *The Quarterly Journal of Economics*, 70(1), 65-94.

SWAN, T. W. (1956): “Economic growth and capital accumulation”. *Economic record*, 32(2), 334-361.

TIRADO-FABREGAT, D. A., BADIA-MIRÓ, M., & WILLEBALD, H. (Eds.) (2020): *Time and Space: Latin American Regional Development in Historical Perspective*. Springer International Publishing: Imprint: Palgrave Macmillan.

TØNNESSEN, J. N. & JOHNSEN, A. O. (1982): *The history of modern whaling*. Univesity of California Press.

TRAPEZNIKOVA, I. (2019): “Measuring income inequality”. IZA World of Labor.

United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-Operation and Development, & World Bank. (2009): *System of national accounts 2008*. New York, United Nations.

Vicepresidencia de la Nación: Resolución Nº 24 del 24 de mayo de 1945.

WILLIAMSON, J. G. (1965). “Regional inequality and the process of national develop-ment: a description of the patterns”. *Economic development and cultural change*, 13(4, Part 2), 1-84.

WILLIAMSON, J. G. (1996): “Globalization, convergence, and history”. *The Journal of Economic History*, 56(2), 277-306.

WILLIAMSON, J. G. (1997): “Globalization and inequality, past and present”. *The World Bank Research Observer*, 12(2), 117-135.

WILLIAMSON, J. G. (1999): “Real wages, inequality and globalization in Latin America before 1940”. *Revista de Historia Economica-Journal of Iberian and Latin American Economic History*, 17(S1), 101-142.

ZALDUENDO, E. A. (1975): “Las desigualdades económicas entre las regiones de Argentina”. *CEPAL Documento* B/14.

Universidad de San Andrés

CHAPTER IV

ARGENTINE REGIONAL DYNAMICS DURING THE "EASY" ISI PERIOD AND PERONISM

4.1- The Argentine Import Substitution Industrialization (ISI)

The late 19th and early 20th centuries witnessed an international landscape marked by openness and a growing demand for primary goods, leading to substantial growth in many developing countries. Notably, at the turn of the 20th century, Argentina thrived by exporting agricultural produce and raw materials, while importing manufactured goods from Europe and the United States. However, the onset of international crises, including the Great Depression and the two world wars, precipitated a collapse in international trade, disrupting the foundations of the established growth patterns of many developing economies (O'Rourke & Williamson, 1999; Bértola & Ocampo, 2013).

Whether triggered by foreign exchange shortages (due to plummeting agricultural prices during the crisis and increased protectionism in developed countries), or trade impediments caused by wars, this context of deglobalization posed challenges in importing manufactured goods. This, in turn, acted as a stimulus for the development of local industries in developing countries, driven by the aim to meet their domestic markets demands. This phenomenon is widely recognized as Import Substitution Industrialization (ISI), which became particularly prominent in Latin America. The ISI period lasted until the second half of the 20th century, where deliberate development policies spurred industrialization in these and many other nations (Hirschman, 1968).

As might be expected, industrialization patterns vary across countries due to several factors. These include the scales of economies and endowments, the timing of industrial adoption, the levels of government intervention, the applied policies, the degree of diversification and vertical integration, the intensity of labor and capital employed, and the predominant industrial orientation (mostly inward-looking in Latin America and outward-looking in Asia). For example, great disparities become apparent when considering the scales of economies. In 1930, Argentina's population exceeded that of Bolivia and Uruguay by more than five times, while Brazil's population was three times that of Argentina (Sánchez-Albornoz, 1986). This demographic disparity is reflected in the countries' industrialization patterns, with smaller economies in Latin America generally adopting industrialization later and to a lesser extent than their larger counterparts (Haber, 2006). Estimates from Bulmer-Thomas (2003) underscore this trend, indicating that in 1928, manufacturing accounted for approximately 20% of Argentina's GDP and over 12% in

Brazil - both relatively large and early industrialized countries within Latin America. In contrast, manufacturing accounted for less than 6% in Colombia, a smaller country which industrialized later[1].

In this historical context, Argentina stands out. During its agro-export stage in the early 20th century, Argentina's GDP per capita was comparable to that of developed countries. In fact, according to the Maddison Project Database (Bolt *et al.*, 2018), Argentina's GDP per capita at the time even exceeded that of Germany and France. However, after experiencing robust growth during that stage and even converging with the central countries, progress toward convergence halted with the onset of the ISI period.

Throughout the ISI stage, extending until the mid-1970s, Argentina sustained economic growth, though at a slower pace than the global average, leaving its GDP per capita at around 60% of that of developed countries (Glaeser *et al.*, 2018; Bértola & Porcile, 2006). The relative stagnation became even more pronounced in subsequent periods, as Argentina found itself surpassed by other countries that also underwent ISI, such as South Korea, Taiwan, Singapore, and Hong Kong.

In analyzing this, one could argue that there are significant differences between the characteristics of countries and the ISI itself in each case. For example, in Asian countries, industrialization began later, within the context of a growing global economy and open trade. Moreover, these countries had more authoritarian governments and pursued an export-oriented strategy. Nevertheless, Argentina's performance was also weaker compared to other Latin American countries that also pursued inward-looking strategies, such as Brazil, Mexico, or Colombia. This is noteworthy, considering that Argentina initiated industrialization relatively earlier and possessed better initial conditions, including human capital, urbanization, and transportation infrastructure (Duran *et al.*, 2017). Even Brazil, which also experienced subpar growth relative to Asia, surpassed Argentina in growth. These two countries are often compared due to their shared characteristics of being the two largest (in population and area) in South America. Unlike its neighbor, Argentina's ISI planning was less organized and less vertically integrated (Baer, 1972; Bértola & Porcile, 2006).

While there is an extensive literature examining Argentina's overall economic performance throughout this period (e.g., Eshag & Thorp, 1965; Díaz Alejandro, 1970; Di Tella & Dornbusch, 1989; Ferrer, 2008; Gerchunoff & Llach, 2007; Rapoport, 2008; Cortés Conde, 2009; Belini & Korol, 2020), relatively little is known about the relative performance of the country's

[1] Uruguay stands out as an exception among the smaller countries, notably ranking second in the region in terms of manufacturing's share of GDP in 1928.

Universidad de San Andrés

regions during the first half of the 20th century, when the events that triggered the ISI occurred. This is not a minor subject, since Latin American countries, including Argentina, exhibit notable differences in the degree of economic and social development among their regions (CEPAL, 2014). Industrialization, in particular, has played a central role in shaping regional inequality within countries (Badia-Miró *et al.*, 2020a). In the case of Argentina, significant levels of regional inequality were evident even before the ISI. This can be seen in Aráoz & Nicolini's (2020) 1914 estimates of provincial GDP per capita, revealing a ratio of more than 4 to 1 between the richest and poorest provinces.

Regional disparities within a country, coupled with a multiplicity of factors influencing their evolution, have given rise to the development of an expanding body of literature on regional performance in Latin America. Tirado-Fabregat *et al.* (2020) provide a comprehensive compilation of this research. Regarding the ISI period, the variability of its impact on different regions of a country and their distinct economic trajectories depends on many factors, such as inherited population distribution, urbanization level, location of natural resources, commodity price cycles, unequal integration of the domestic market, integration of the regions into international markets, the focus of public policies, and increasing state intervention in the economy.

As discussed in **Chapter III**, various theoretical frameworks present different alternative trajectories for the evolution of regional disparities. These include the concept of convergence, in line with Neoclassical growth theory, or the inverted U-shaped pattern proposed by Williamson (1965)[2]. Empirically, the patterns in the evolution of regional inequality exhibit variations across countries. Wolf & Rosés (2009) provide evidence supporting Williamson's pattern for regions in many European countries. However, this paradigm does not universally hold for Latin American countries, as demonstrated by Badia-Miró *et al.* (2020b), who illustrate that each country appears to follow a unique path. For instance, considering the three largest Latin American economies, Brazil displays the inverted U-shaped pattern, while regional inequality in Mexico follows more of a W-shaped pattern. In the case of Argentina, there was a reduction in inequality in the first decades of the 20th century, a marked increase until 1960, and then a stabilization at relative high levels (see **Chapter III** of this thesis).

[2] The Neoclassical growth theory, derived from Solow (1956) and Swan (1956), suggests that under constant returns to scale in production and diminishing returns to both capital and labor, the poorer regions are better positioned to exploit the benefits of increased capital, because they have relatively low capital-labor ratios. Thus, within this framework, poorer regions are expected to experience faster growth than richer regions, eventually leading to a process known as convergence. Building on this concept, Williamson (1965) introduces the idea of a non-linear convergence path. According to his proposition, during the process of economic development, disparities in regional incomes exhibit an inverted U-shaped pattern, which reflects increasing inequality in the early stages of industrialization due to spatial concentration of economic growth and decreasing inequality thereafter due to rapid growth in lagging regions in the long run.

Furthermore, theoretical arguments suggest that regional development exhibits a high degree of path dependence. Temporary conditions, unexpected shocks, and historical "accidents" can have enduring effects, leading to the establishment of specialization patterns, economic success, or economic backwardness. These become "locked in" through external and self-reinforcing influences (Martin & Sunley, 1998).

The endogenous growth theory, pioneered by Romer (1986) and Lucas (1988), builds upon the assumption of increasing returns to physical or human capital and positive externalities. According to this theory, countries or regions endowed with higher levels of physical or human capital can maintain a faster pace of growth. This is because growth triggers positive spillovers, fostering additional growth in a self-reinforcing manner.

The New Economic Geography, introduced by Krugman (1991) and further developed by Krugman & Venables (1995), proposes the existence of agglomeration mechanisms which enable firms to leverage economies of scale by concentrating production in proximity to markets with larger customer and supplier bases. This tends to exacerbate income disparities between rich and poor economies. Evidence suggests that this agglomeration mechanism operates unevenly across Latin American countries. For instance, cases like São Paulo in Brazil (Bucciferro & Ferreira de Souza, 2020) and Capital Federal in Argentina (Aráoz *et al.*, 2020; and **Chapter III** of this thesis) underscore the influence of agglomeration on city growth. In contrast, in other cities such as Santiago de Chile (Chile) its relevance appears to be less pronounced (Badia-Miró, 2020).

The role of resource endowments is also relevant to understanding diverse regional trajectories. Resources can act as catalysts, accelerating growth. Yet, they can also hinder development by fostering an unhealthy economic dependence (Gunton, 2003; Badia-Miró *et al.*, 2015). In the Argentine context, the significance of land resources has played a crucial role in the development of the Pampean region during globalization, while the oil resource has been significant for the country's southern region since the ISI stage (see **Chapter II**). Additionally, the exploitation of oil has contributed to regional divergence, as the southern territories that benefited from it were already relatively rich before ISI began.

The existence of varying productivity levels among regions of a country can also be attributed to variations in the sectoral structure of their respective economies. When productivity varies across sectors, regions specializing in high-productivity sectors are likely to exhibit higher aggregate productivity levels. Moreover, productivity disparities can also emerge across regions within a given sector, for example, due to differences in natural resources and factor endowments. In this context, Esteban (2000) highlights that a significant portion of the interregional variance in aggregate productivity per worker among the five largest European Union countries in 1986 can be attributed to productivity differentials within sectors. Similarly, Badia-Miró (2014) reveals that both productivity differentials within sectors and sectoral composition play a role in determining aggregate productivity levels across different regions in Chile.

A fundamental input to assess the coherence of these narratives is regional GDP data. In the case of Argentina, the lack of available information on this indicator for periods preceding 1950 has resulted in a scarcity of literature discussing regional dynamics during much of the country's ISI period from a comparative standpoint (see **Section 2.2** of **Chapter II**). Specifically, the phase of Argentina's ISI corresponding to these years is often referred to as its "easy" or "light" phase, since it was characterized by a predominant reliance on light and intensive labor industries.

While there have been notable attempts to conduct comparative regional analyses for the easy ISI period (Belini & Korol, 2020; Ferrer, 2008; Rapoport, 2008; Díaz Alejandro, 1970), these efforts have had certain limitations, since they primarily focus on examining the performance of specific economic sectors and internal migration flows, rather than providing a comprehensive overview of the overall economy. For example, their assessment of a region's success often relies on the performance of a key economic sector (such as sugar cane in the North), offering an incomplete picture. Alternatively, it may rely on whether a region has experienced population influx or outflow. However, even if regions receiving population growth have seen an increase in terms of gross product, it remains unclear how this translates into their per capita income, which is essential for making more accurate comparisons between regions.

A recent breakthrough in this regard is evident in the work of Aráoz & Nicolini (2020), who have generated regional GDP estimates for the year 1914. Their findings reveal that the country's capital, Capital Federal, together with certain southern territories exhibited the highest GDP per capita, a characteristic that persists to this day. The study also highlights significant growth in these districts between 1914 and 1953, attributed to agglomeration economies in Capital Federal and surrounding areas, along with abundant land and natural resources in the South. In contrast, the authors note that the northern regions of the country, which had a relatively low per capita GDP in 1914, lagged even further behind during the 20th century.

It would be reasonable to anticipate that the regional trends identified for 1914-1953 did not remain static over the entire period, given the significant contextual changes that took place. These changes encompassed both external factors (such as the two world wars and a major international crisis) and internal factors (including shifts in the degree of state intervention and the relevance of industrialization in policies). As an example, the policies implemented by the government in response to the international crisis during the 1930s stimulated local industry. However, this was an indirect effect, since industrialization was not the primary goal of such policies

(Belini & Korol, 2020; Terranova, 2020). This stands in contrast with the postwar policies of Perón's administration (1946-1955), characterized by state-led industrialization. Moreover, Belini (2021) shows that the evolution of industrial branches was far more heterogeneous in the 1930s than in the 1940s. Given the uneven distribution of these branches across the country, one might also expect a regionally heterogeneous evolution. This complexity suggests that it is worthwhile to decompose the analysis of Argentina's regional dynamics into shorter time spans than the entire 1914-1953 period. The new regional GDP data provided in **Chapter III** for the years 1937 and 1946 facilitates this decomposition.

Using the newly available regional GDP data for Argentina during the easy ISI period (years 1914, 1937, 1946, 1953, and 1959), this chapter aims to conduct a descriptive comparison of regions concerning the evolution of GDP, population, and GDP per capita and per worker. Through this analysis, it seeks to spot regional patterns that exhibit variations over time and space. In order to distinguish general patterns from regional ones, alternative approaches are employed to measure convergence. This allows for the determination of whether regional disparities have widened or contracted over different time spans. One approach is the sigma convergence analysis, involving an examination of the evolution of various measures of regional dispersion of GDP per capita and per worker. Another approach is the beta convergence analysis, which uses growth regression to assess whether regions with lower GDP per capita and per worker have higher growth rates.

Furthermore, given the potential importance that differences in sectoral structure across regions may have in explaining the previously mentioned aggregate productivity variations, the analysis includes a sectoral component. Initially, differences in sectoral structures across regions are identified by using regional GDP data by sector and constructing location indicators based on them. Subsequently, the contribution of sectoral differences across regions, along with variations in productivity across and within sectors is quantified, to explain regional disparities in GDP per worker. To this end, two alternative approaches are employed: one based on the shift-share analysis proposed by Esteban (2000), and another based on the decomposition of the Theil index.

The first approach involves decomposing, for each Argentine province, the differences between provincial and national GDP per worker into three components: differences in sectoral composition, differences in productivity, and differences in allocation (specialization in activities in which the region is more productive). If the first component exhibits a larger magnitude compared to the others in a province, it suggests that the sectoral structure may play a significant role in explaining the productivity difference between the province and the nation as a whole.

QUAERERE VERUM Universidad de SanAndrés

The second approach involves decomposing the inequality between provincial and sectoral GDP per worker, as measured by the Theil index. This decomposition segregates the inequality into two components: one stemming from provincial productivity differences and another from sectoral productivity differences. This method offers an aggregate measure of the importance of structural differences in observed provincial productivity variations for each year. Finally, by applying beta convergence analysis to sectoral data, an examination is conducted to determine whether the convergence patterns found for GDP per worker persist at the sectoral level.

4.2- Data for Argentine Regions

The proposed analyses require specific inputs, namely regional data on population, the number of workers, and GDP (the latter two at sectoral level when necessary) during the easy or light stage of Argentine ISI. This stage roughly corresponds to the years between World War I and the late 1950s. Within this timeframe, available data for each of Argentina's 24 first-level administrative divisions, referred to as provinces hereafter, was used. The dataset covers the years 1914, 1937, 1946, 1953, and 1959. It is important to note that the number of workers is only available for years close to 1914, 1946, and 1959 (details will be provided later). With these figures, it is also feasible to calculate the provincial GDP per capita and per worker, the latter even at sectoral level.

QUAERERE VERUM
Universidad de
SanAndrés

All GDP estimates used were generated under a consistent methodology for all provinces within each year (**Chapter III** provides more methodological details than those presented here). The 1953 and 1959 figures are sourced from semi-official estimates by CFI-ITDT (1965/1962), calculated at current values and disaggregated into 14 economic sectors[3]. The approach employed varied based on data availability. For certain sectors, such as agriculture, livestock, and manufacturing, CFI-ITDT used a direct approach to calculate provincial aggregate values. In contrast, for sectors like commerce, finance, transport, and communications, an indirect approach was used, involving the distribution of sectoral national totals among provinces according to sector-specific criteria.

For 1946 and 1937, the estimates are derived from this study as detailed in **Chapter III** of this thesis. The methodology used relies on an indirect approach, which uses the distribution of national sectoral GDP figures at current values from Banco Central de la República Argentina (1976)[4]. These national figures share the same sectoral disaggregation as CFI-ITDT

[3] Agriculture; Livestock; Fishing; Mining; Manufacturing; Electricity, Gas, and Water; Constructions; Transport; Communications; Finance; Housing; Commerce; Personal Services; and Government.
[4] Central Bank of the Argentine Republic

(1965/1962) for 1953 and 1959. To allocate them among the provinces, data from population and economic censuses, along with other sources such as provincial public sector budgets and sector-specific statistical yearbooks were employed.

Estimates for 1914 are sourced from Aráoz & Nicolini (2020), obtained by direct approach from the sum of returns to each productive factor (labor, capital, and land) [5]. The data used primarily originate from the Third National Census of the Argentine Republic, a population and economic census carried out in 1914 (República Argentina, 1916). Additional sources, such as yearbooks of labor statistics, were also consulted.

It should be noted that the existence of possible price level differences between provinces can potentially bias the results based on the provincial GDP data mentioned above. However, there are significant limitations in the data that prevent the generation of provincial GDP at purchasing power parity measures, which are discussed in **Section 3.4** of **Chapter III** of this thesis. Given these limitations, it was decided to use the provincial GDP data without modification.

Provincial population data for 1914, 1937, and 1946 are sourced from official census interpolations by Dirección Nacional de Estadísticas y Censos (1956). Data for 1953 and 1959 are derived from CFI-ITDT (1965/1962) interpolations. It is worth noting that the corresponding national population censuses for the period are those of 1914, 1947, and 1960. Additionally, by combining the GDP data with employment figures from 1914, 1947, and 1960 censuses[6], it is possible to approximate the provincial GDP per worker for the years 1914, 1946, and 1959.

Universidad de
SanAndrés

It is also necessary to make some clarifications regarding the generation of sectoral-level data. Aráoz & Nicolni (2020) disaggregate their 1914 regional sectoral GDP estimates into three broad sectors: primary, secondary, and tertiary. As mentioned earlier, data for the other years considered originally have a higher level of sectoral disaggregation (14 sectors). Therefore, these sectors have been grouped into three to achieve a homogeneous (and simpler) classification[7].

To calculate the share of each economic sector (primary, secondary, and tertiary) in the 1914 GDPs, Aráoz & Nicolini (2020) define the economic sector of each factor of production. This is straightforward for land and livestock, which are, by definition, in the primary sector. For the

[5] Aráoz & Nicolini (2020) provide GDP values for 1914 for the National Territory of Los Andes, which was disaggregated into the provinces of Catamarca, Jujuy, and Salta in 1943. In this context, Los Andes is distributed among the three provinces based on the population proportions from the 1914 Population Census.

[6] República Argentina (1916), Instituto Nacional de Estadística y Censos (nd), and Dirección Nacional de Estadísticas y Censos (nd), respectively.

[7] The primary sector includes Agriculture; Livestock; and Fishing. The secondary sector includes Mining; Manufacturing; Electricity, Gas and Water; and Constructions. The tertiary sector includes Transport; Communications; Finance; Housing; Commerce; Personal Services; and Government.

value of capital and most occupational categories, the authors point out that they encountered no major difficulties in assigning them to a specific economic sector. The notable exceptions were the occupation categories *jornaleros* (day laborers) and *peone*s (hand laborers), which could be assigned to more than one sector. To address this issue, the authors assumed that the total amount of wages in each sector was proportional to the relative value added generated by capital, land, and livestock in the sector. Since *jornaleros* and *peones* represented 26% of the Argentine labor force in the 1914 census, it is important to note that the comparisons of sectoral composition between that year and the others used in this chapter must be approached with reservations.

Applying the same criteria and considering the aforementioned limitations, the sectoral distribution of workers in each province in 1914[8] can be derived. This methodology can also be applied for 1946 and 1959, using the 1947 and 1960 census figures, with some adjustments. For 1947, the census provides figures for provincial workers by branch, which can be easily assigned among the three major sectors. The only exception is the number of workers whose branch is unknown (categorized as *Desconocida*), which represents 3.2% of the Argentine labor force. For each province, the proportion of workers on each branch is used to distribute the number of workers with an unknown branch.

Issues related to the information in the 1960 census encompass two main aspects. Firstly, while there are provincial figures for the employed and unemployed population, the data is not categorized by sector. Secondly, although provincial data on the economically active population (EAP) by branch is available, one of these branches is labeled "*Actividades no bien especificadas"* (Activities not well specified), constituting 10% of the national EAP. To estimate the provincial labor force by sector, a two-step approach is adopted. First, a similar procedure to that used for the "Unknown" category in 1947 is applied to address the "Activities not well specified" branch. Second, the Employees / EAP ratio for each province is employed to approximate the provincial number of workers per sector. This assumes an identical unemployment rate across sectors, but not across provinces.

Table A4.1 in the appendix provides the provincial values of GDP, population, and the number of workers finally used. **Tables A4.2** and **A4.3** present the provincial GDP values[9] and the number of workers, disaggregated by sector. For these tables, GDP figures are expressed in 1950

[8] These values, although not published in Aráoz & Nicolini (2020), were kindly provided by the authors for the purpose of this thesis.
[9] The total GDP deflator for the three sectors is used, not to alter the sectoral structure.

m$n using a national deflator obtained from Ferreres (2010)[10]. It is important to note that deflation is applied for illustrative purposes only and does not affect the results of the analysis in any of the subsequent sections. In the sectoral analyses of **Section 4.2.2**, calculations are based on sectoral GDP data expressed in monetary units. While these calculations may require relativization with respect to national totals, the regressions at the end of the section, where such relativizations are not performed, only affect the constant term, which is not used in the analysis.

4.3- Benchmarks

As mentioned above, the period under analysis in this chapter, 1914-1959, aligns well with the light stage of Argentine industrialization. However, the new data enables a subdivision of the period into shorter spans, each characterized by its own distinct features, such as deglobalization, World War II, state intervention during Perón's first government, and policy shifts leading to the transition from light to heavy industrialization.

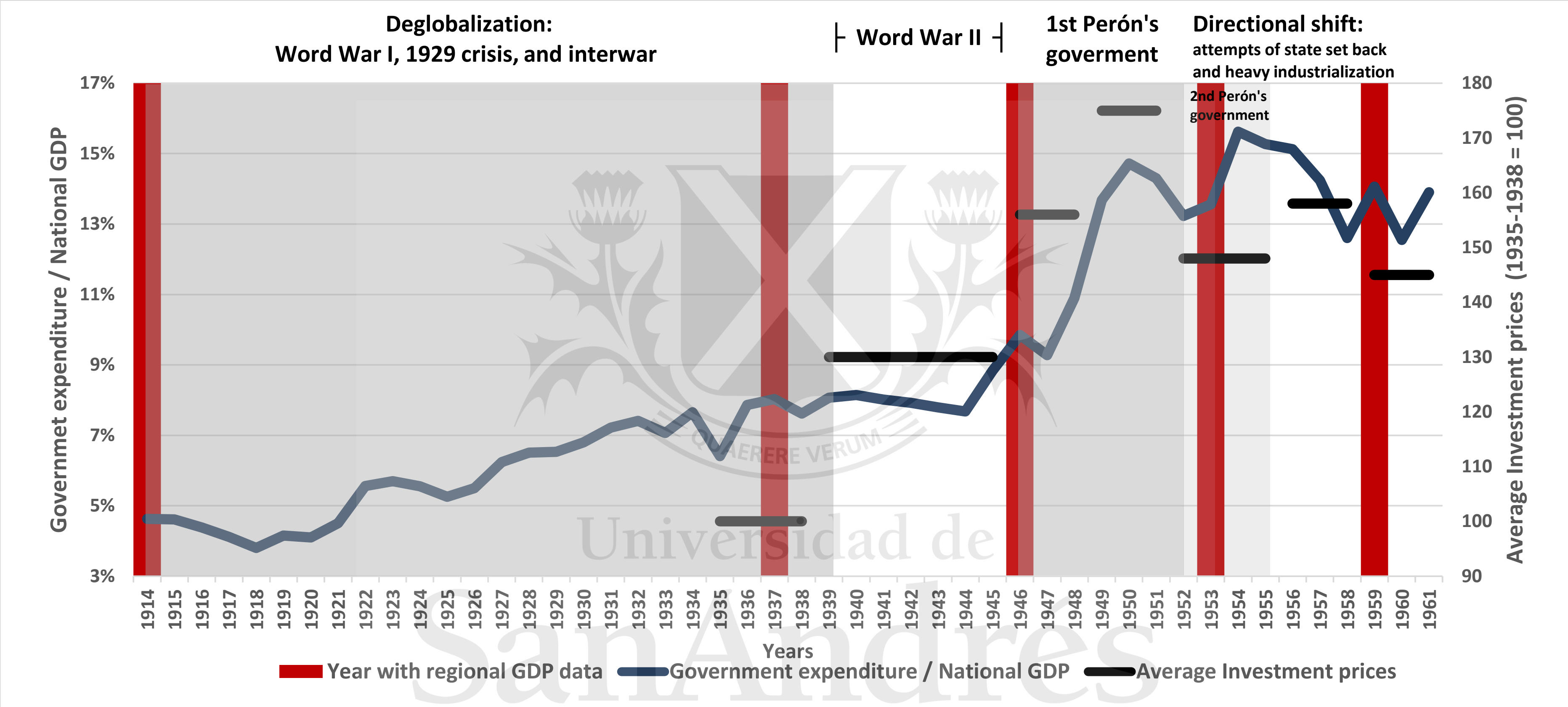
Figure 4.1 outlines these spans, providing details on the main events that occurred during each period and indicators related to state intervention and capital prices. Notably, the degree of state involvement in the economy differs markedly across spans, being much higher in the latter ones. This is illustrated in the figure by the rise in government expenditure relative to national GDP, serving as a proxy for state intervention. It is also linked to the evolution of capital goods prices, proxied by the Index of Implicit Prices of Gross Domestic Investment of Argentina, relative to Implicit Prices for Gross National Product (referred to as Average Investment prices in **Figure 4.1**, based on calculations by Díaz Alejandro, 1970).

In this regard, unlike other cases of state-led industrialization, such as those in East Asia, government intervention in Latin American countries has been highly price-distorting (De Long & Summers, 1991; Taylor, 1998). Specifically, Taylor (1994) and Díaz Alejandro (1970) highlight Argentina as the quintessential example where these distortions led to an increase in capital prices, subsequently reducing investment in the long term. Consequently, the authors claim that the path of Argentine economy has been shaped by constraints on capital accumulation. In line with this perspective, **Figure 4.1** illustrates that during periods of heightened state influence (serving as a proxy for intervention), capital prices also experience an increase.

[10] During the 20th century, Argentina experienced currency denomination changes, with 1$ equating to 10,000,000,000,000 m$n in the current currency.

Universidad de San Andrés

Figure 4.1: Argentine Light ISI Benchmarks



Notes: For Government expenditure / National GDP: Data for government expenditure and GDP, both at current values, were obtained from della Paolera & Taylor (2003). For Average Investment prices: Yearly averages of the Index of Implicit Prices of Gross Domestic Investment divided by Implicit Prices for Gross National Product were derived from Table 6.1 of Díaz Alejandro (1970).

Sources: Own elaboration based on sources indicated above.

Universidad de San Andrés

A potential concern with the graph is that external events, such as wars, can lead to increases in the international prices of capital goods. Therefore, it is essential to compare Argentine prices with those in the rest of the world. However, Taylor (1994) argues that the trends in price over time in Argentina also are reflective of international price levels compared to Argentina. In a similar vein, Díaz Alejandro (1970) estimates that the relative price of new machinery and equipment in Buenos Aires was 176 in 1935-1938 and 254 in 1962, using the price in Houston and Los Angeles as a reference, which was 100 in 1962.

The first span (1914-1937) started with World War I and is characterized by a context of de-globalization. Before this period, from the late 19th century, Argentina's economic growth was primarily driven by the export of agricultural products, particularly from the Pampean region. This growth was supported by land incorporation, immigration, and the influx of foreign capital. In exchange for food and raw material exports, the country imported manufactured goods (Cortés Conde, 1979).

World War I created a global environment of trade restrictions and deglobalization, a situation further intensified by the international crisis of 1929, signifying the end of Argentina's agro-export stage (Taylor, 1994). Concurrently, by the mid-1910s, the expansion of the agricultural frontier was reaching its limits. Argentina's economy, highly dependent on international labor and capital flows, revealed its vulnerability when these flows were disrupted during World War I. In the 1920s, the Argentine economy resumed its growth path from 1914, although at a noticeably slower pace (Belini & Korol, 2012; Gerchunoff & Llach, 2018). Despite the postwar recovery, external flows were smaller than before. Faced with unfavorable import conditions, Argentina, along with other Latin American countries, initiated an industrialization process.

Especially after the 1929 crisis, the state assumed an increasingly active role in the economy, as depicted in **Figure 4.1**, indicating a nearly doubling of the state's size during this span. However, it cannot be characterized as a coherent nor organized policy aimed explicitly at industrialization. Instead, the primary focus was on addressing fiscal and debt challenges associated with the fall in income derived from exports (Belini & Korol, 2020; Terranova, 2020). Nonetheless, the protectionist measures implemented played a pivotal role in stimulating the growth of the industrial sector.

The second span (1937-1946) corresponds to the new shock to international commerce caused by World War II. During this period, the industrial sector started to play a more significant role in the Argentine economy, even surpassing the agricultural sector's GDP in participation

Universidad de San Andrés

(BCRA, 1976)[11]. In addition, Argentina successfully managed to place industrial exports in other South American countries and South Africa to replace those of the belligerent countries, which declined once the war ended (Belini, 2012). Moreover, as can be seen in **Figure 4.1**, the state's influence in the economy increased during this span, although it remained below the levels that would be reached in subsequent periods.

The third span (1946-1953) includes almost all of the first two terms of General Perón's presidency (1946-1952 and 1952-1955). During this period, interventionism reached its zenith (Glaeser *et al.*, 2018). The state engaged extensively in factor and product markets, implementing exchange and price controls, trade restrictions, monopolizing foreign trade, and regulating interest rates and credit (Cortés Conde, 2009). State involvement extended even into the production of goods and services. This is reflected in the surge of government expenditure as a share of GDP compared to the previous span, as well as in higher capital prices, surpassing even wartime levels, both illustrated in **Figure 4.1**.

The consequences of these policies and how they continue to affect the present day are the subject of extensive debate in Argentine literature (examples include Belini, 2012; Taylor, 2018; Spurk, 2019). For instance, Gansley-Ortiz (2018) and Cortés Conde (2009) explore the belief that Argentina's current relative backwardness can be traced back to the economic policy decisions made during that period. In this regard, Cortés Conde (2002) remarks: "*Although much had changed since the 1930 crisis, nothing influenced Argentine life in the second half of the century as much as Peronism. It could be said that in 1946 a stage was inaugurated in which a different conception of the state and the economy prevailed*". Even a recent publication by Cortés Conde *et al.* (2020) that features contributions from renowned experts on Argentina exclusively focuses on the economic analysis of this period.

The fourth and final span under consideration (1953-1959) marks a transitional phase from light industrialization to a heavier one (consolidated in the 1960s and lasting until the mid-1970s) and a gradual reversal of state intervention in the economy. **Figure 4.1** reflects this decline in intervention through slightly lower levels of state size and capital prices compared to the previous span. However, the recorded values are still distant from returning to those observed in the pre-Peronist periods.

This span was marked by a series of economic cycles triggered by foreign exchange shortages as a consequence of the growth of local demand and industry, especially in the preceding period. Specifically, the growing industrial sector, dependent on imported inputs and capital

[11] The contribution of agriculture and livestock to the GDP, which accounted for 29% in 1937, decreased to 22% by 1944. In contrast, the manufacturing sector experienced a notable increase in its contribution, which rose from 15% to 23% in the same period.

Universidad de San Andrés

goods, in parallel with a relatively stagnant exportable sector (agricultural), generated the currency shortage. To address these challenges, since the final years of Perón's administration, the government attempted to develop a heavy industry and bolster the agricultural export sector, alongside dealing with macroeconomic imbalances such as budget deficits, inflation, and structural problems in transportation and energy. Although some of the most interventionist measures were removed by successive administrations following Perón's overthrow in 1955, the general protectionist stance remained (Glaeser *et al.*, 2018), and the inward-looking nature of industrialization did not change either.

Lastly, it should be noted that the absence of data on the number of workers for the years 1937 and 1953 poses a challenge for subsequent analysis requiring this variable, particularly for sector-specific productivity calculations. Consequently, only two benchmark periods can be considered for these analyses: 1914-1946 and 1946-1959. The preceding characterization highlights significant differences between these two periods in terms of the global context, industrial policy, and state intervention. The first period is defined by major external shocks, including two world wars and the Great Depression. During this time, industrial stimulus provided by economic policy was indirect, as it was formulated primarily in response to the prevailing circumstances. In contrast, the second period witnessed a strategic shift, with industrialization becoming a primary objective of national policy. Notably, this period also saw a heightened degree of state intervention in the economy.

QUAERERE VERUM
Universidad de
SanAndrés

4.4- Regional Patterns in Argentina during the ISI: New Contributions

<u>4.4.1- The Regional Evolution of Population and GDP</u>

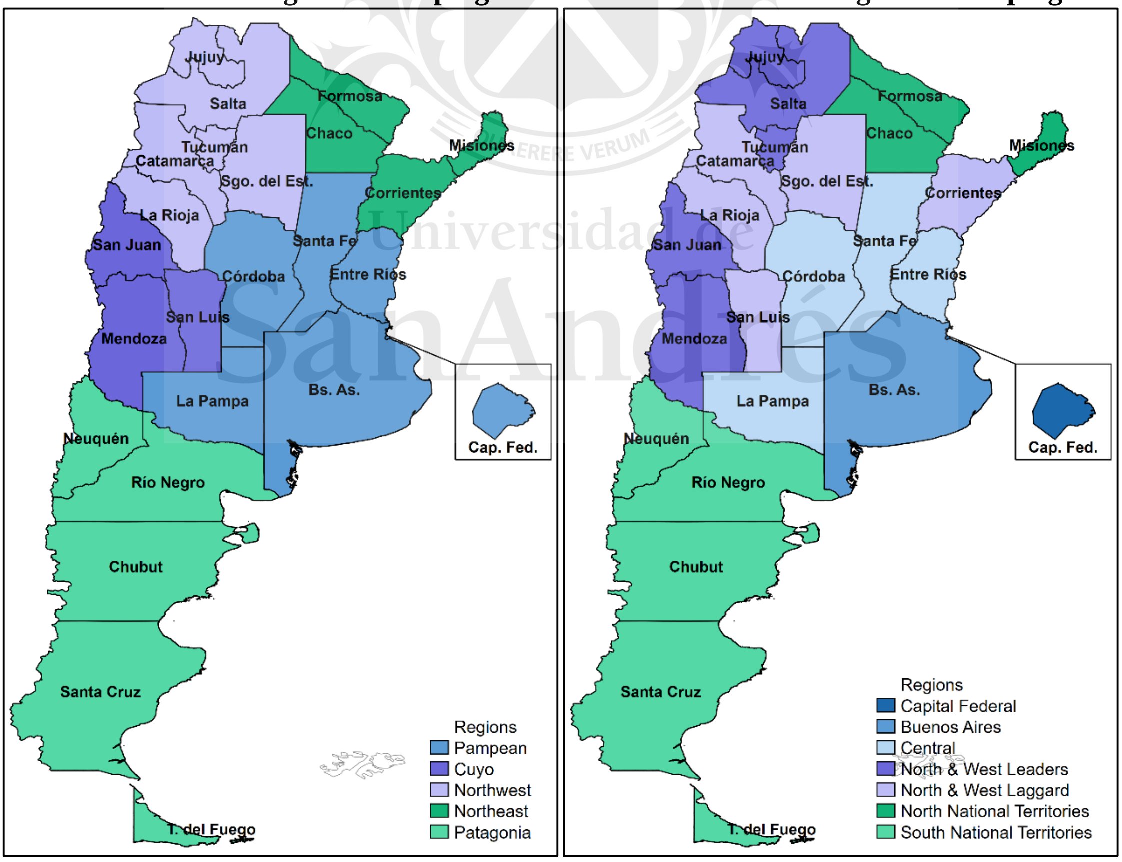
The first section of this chapter outlines various factors contributing to an uneven distribution of economic activity and population across regions, as well as differentiated patterns in their regional development. These factors include varying natural resource endowments, agglomeration economies, specific historical events, and even differences in the initial levels of per capita income or productivity. Within this framework, little is known about the relative performance of regions in the Argentine case, particularly during the "light" phase of industrialization.

To fill this information gap, the analysis presented here aims to explore variations in regional patterns of population, GDP, GDP per capita, and GDP per worker across different benchmarks, using regional GDP data generated in **Chapter III**, along with other existing data, covering the years 1914, 1937, 1946, 1953, and 1959. Until 1946, external shocks, including world wars and the 1930 crisis, impacted the Argentine economy, resulting in a closure of international trade that stimulated local industry. During this period, industrialization can be seen as a consequence of the prevailing context, rather than a deliberate state policy. In contrast, the post-1946 period is characterized by industrialization driven by a highly interventionist state.

As mentioned in the previous section, the analysis relies on data for each of the 24 Argentine provinces. However, for clarity, some results are presented by grouping the provinces into regions[12]. As explained in **Chapter II**, the heterogeneities among provinces in multiple aspects imply that there is no single criterion for grouping them. One of the most widely used regionalization criteria in the literature is illustrated in **Figure 4.2a**, where regions are formed based on elements such as geographic proximity and similarity, historical development similarity, or type of agricultural specialization (Cao *et al.*, 2003). **Chapter II** provides a summary of each region's characteristics. However, to better align with the specificities of the period under investigation, in this chapter a modified regionalization approach is employed, as depicted in **Figure 4.2b**.

Figure 4.2: Argentine Provinces and Regions

A -Traditional Regional Grouping **B - Alternative Regional Grouping**



Source: Own elaboration.

Universidad de San Andrés

[12] The results for each particular province can be found in the appendix.

The first modification over the traditional regionalization involves dividing the Pampean region into three distinct units: Capital Federal, Buenos Aires, and the rest of the region (hereafter referred to as “Central”). This division is justified by the fact that the first two jurisdictions are, by far, the largest economies in the country, together representing over 45% of the population and more than 54% of the Argentine GDP during the first half of the 20th century. Therefore, it is worthwhile to analyze them separately.

The second modification pertains to the provinces that were formerly known as “National Territories” until the mid-20th century. These territories, then administered by the national government, were sparsely populated, and located in the extreme corners of the country. For classification, these were divided into “South National Territories”, which coincide with Patagonian region[13] in **Figure 4.2a**, and “North National Territories”, which almost coincide with the traditional Northeast, except that the latter includes the province of Corrientes. Besides being located at opposite ends of the country, thus implying completely different geographical and climatic characteristics as well as different natural resource availability, these two groups also exhibit significant disparities in terms of relative performance, as will be demonstrated later.

Finally, the major modification consists of regrouping the remaining provinces, located in the north and west of the country (*Cuyo* and Northwest regions, plus the province of Corrientes). In general, these provinces exhibit greater heterogeneity among themselves in terms of geography, climate, soil suitability, and developed economic activities than those in the above groups. However, it is possible to distinguish cases that have achieved relative success in expanding activities related to industrial crops intended for the domestic market. Such cases include wine production in Mendoza and San Juan (originally part of the *Cuyo* region) and sugar production in Tucumán, Salta, and Jujuy (originally part of the Northwest region). These cases, which tend to have GDP per capita levels around the national median during the period, contrast with the remaining provinces in the group, ranking among the lowest. In fact, two subgroups can be clearly identified by examining the average GDP per capita of each province from 1914 to 1959: four “North & West Leaders” provinces that are richer than four “North & West Laggard” provinces which are poorer.

Having addressed the issue of regionalization, **Figure 4.3** illustrates the evolution of population and the relative participation of the population in different regions (provincial values in **Table A4.4** of the appendix). As noted in previous sections, in the absence of aggregate indicators of provincial economic activity, population growth has been used in the literature as an indicator of

[13] Despite being a National Territory, La Pampa is categorized within its original classification into the Pampean region (in this case, Central region) due to the closer resemblance of its observed variables to those of the Pampean region.

relative success of a region, based on the allure that the most prosperous areas can exert. Related to this, industrialization further intensified an ongoing urbanization process in the country, evident in internal migration flows, especially to Greater Buenos Aires during the period 1947-1960. This, along with the settlement of border regions (the National Territories), contributed to non-uniform population dynamics across regions from 1914 to 1959. Recchini de Lattes & Lattes (1974) present a more comprehensive analysis of regional population dynamics than that presented here.

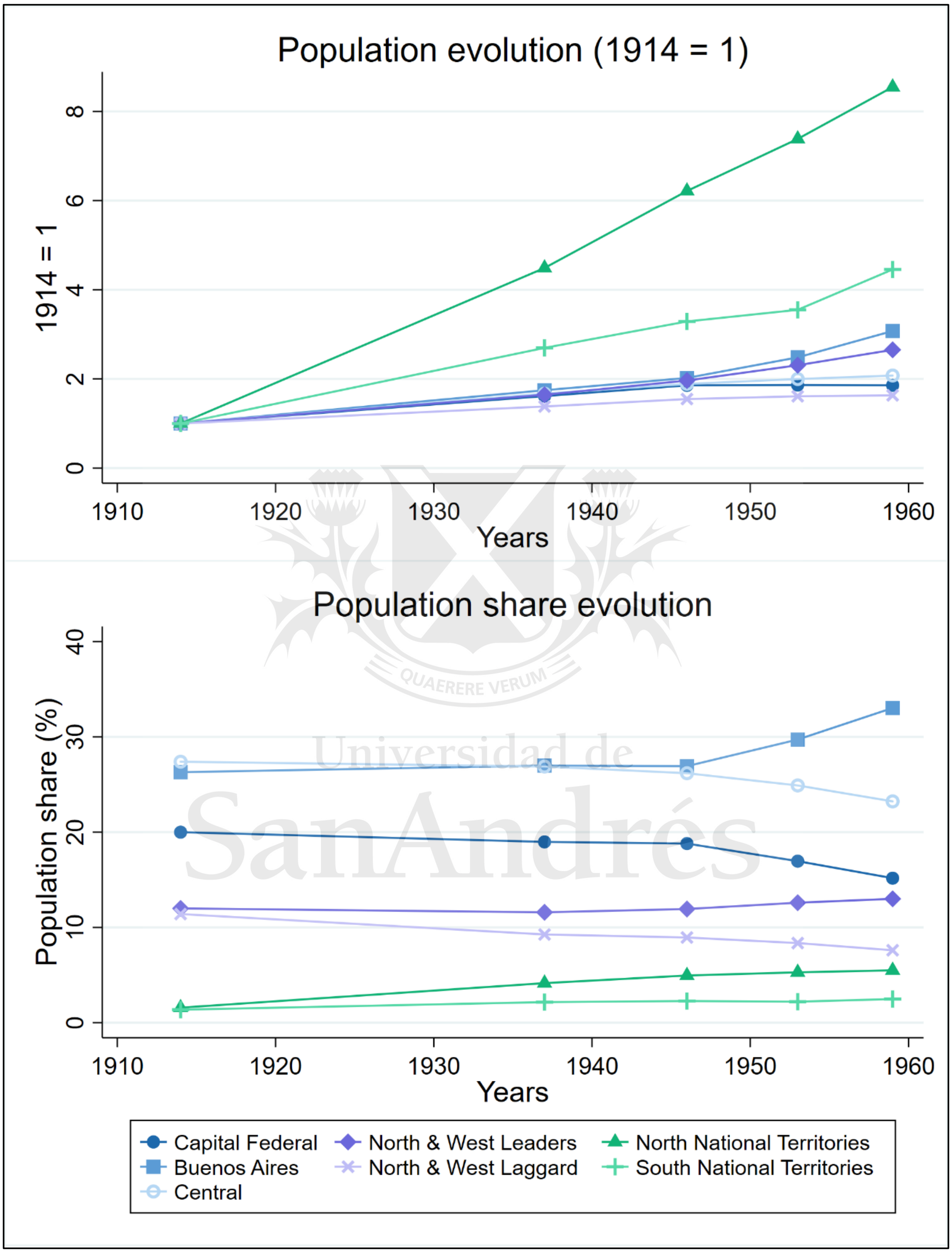
Furthermore, even within a given region, the behavior is not uniform when considering shorter periods, especially before and after 1946. The only consistent trend observed over the entire period is a decline in population participation in the North & West Laggard territories. In the literature, these provinces are often highlighted as unsuccessful cases that failed to develop economic activities with potential demand in the Pampean provinces (Ferrer, 2008; Cao & Vaca, 2006). On the other hand, the first half of the period (1914-1937) stands out mainly for a strong increase in population participation of the National Territories, which were the least populated in the country at the beginning of the period. In subsequent years, the participation of these territories in the country's total population continued to increase, although at a slower pace.

Moreover, in the first half of the period, there was a varied pattern in the evolution of population share within the North & West Leaders provinces. Mendoza witnessed an increase in its population share, while Tucumán experienced a decrease (see **Table A4.4** in the appendix). In the second half, the population participation in the North & West Leaders provinces increased, though to a lesser extent than in Buenos Aires and some National Territories.

Additionally, during the second half of the period under analysis, there was a sharp increase in the population of Buenos Aires. This surge can be attributed to the growth of the manufacturing sector in the provincial zone surrounding Capital Federal (*Conurbano Bonaerense*) during state-led industrialization. Meanwhile, the population of Capital Federal, which has remained stagnant in absolute terms since the 1947 census, has experienced a decline in relative terms due to the overall population growth in the country. This stagnation is likely a result of congestion caused by the small size of the territory, with approximately three million people living in an area of merely around 200 km^2.

With the availability of new regional GDP data, an accurate assessment of the progress of regional economies can be made, going beyond a mere observation of changes in population distribution. **Figure 4.4** illustrates the evolution of regional GDP shares, and the corresponding provincial values can be found in **Table A4.4** of the appendix. While there are instances where regional patterns appear to exhibit similar movements when compared to population changes, this is not always the case.

Figure 4.3: Population Evolution and Regional Population Shares

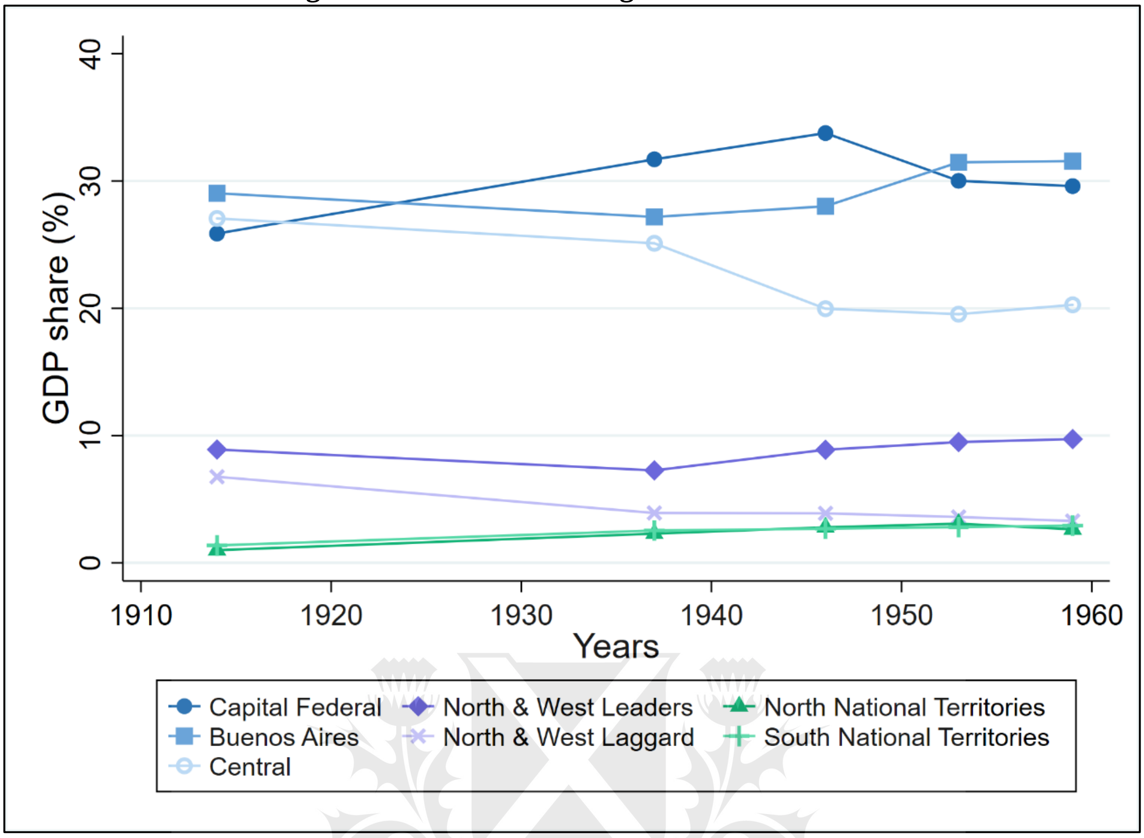


Note: The population of Argentina, measured in thousands of inhabitants, stood at 7,996 in 1914, 13,608 in 1937, 15,787 in 1946, 17,572 in 1953, and 19,570 in 1959.

Source: own calculation based on data from **Table A4.4**.

Universidad de SanAndrés

Figure 4.4: Evolution of Regional GDP Shares



Source: own calculation based on data from **Table A4.4**.

QUAERERE VERUM
Universidad de
SanAndrés

One example of such alignment is observed in the North & West Laggard region, where both population and GDP shares declined over the entire period. Indeed, their character as population expellers is usually associated with their economic backwardness. The National Territories also show coincident trends in the first half of the period, but in the opposite direction to the North & West Laggard region; they experience growth in both population and GDP shares. Central and North & West Leaders regions are also cases where the movements of GDP shares seem to align with those of the population.

However, as mentioned earlier, there are also cases where the evolution of GDP and population shares do not coincide. In some National territories, for instance, the GDP share falls in the second half of the period, contrasting with the population share. Another non-coincidence occurs in the North National Territories, where the population participation rate seems to grow at a faster pace than that of GDP. This dynamic results in a decrease in their relative level of GDP per capita, as will be demonstrated later. In Capital Federal, the GDP share initially increases but then reverses since 1946, consistently accompanied by a decline in population participation. In Buenos Aires, unlike its population participation, the GDP share decreased during 1914-1937, and then, from 1937, both shares increased. Therefore, as expected, relying solely on the analysis of regional economic performance based on population evolution can lead to misleading conclusions.

Additionally, aside from the observed differences in the evolution of population and regional GDP shares, variations in their levels are also noteworthy. Comparing **Figures 4.3** and **4.4**, Capital Federal (the second most populous province after Buenos Aires) serves as the most notable example. While its population share during the period remained less than 20%, its GDP share exceeded 25% and even reached 30% in some years, making it the primary contributor to national GDP when this occurs. This disparity can potentially be attributed to the presence of agglomeration economies, as Capital Federal serves as the country’s main urban area.

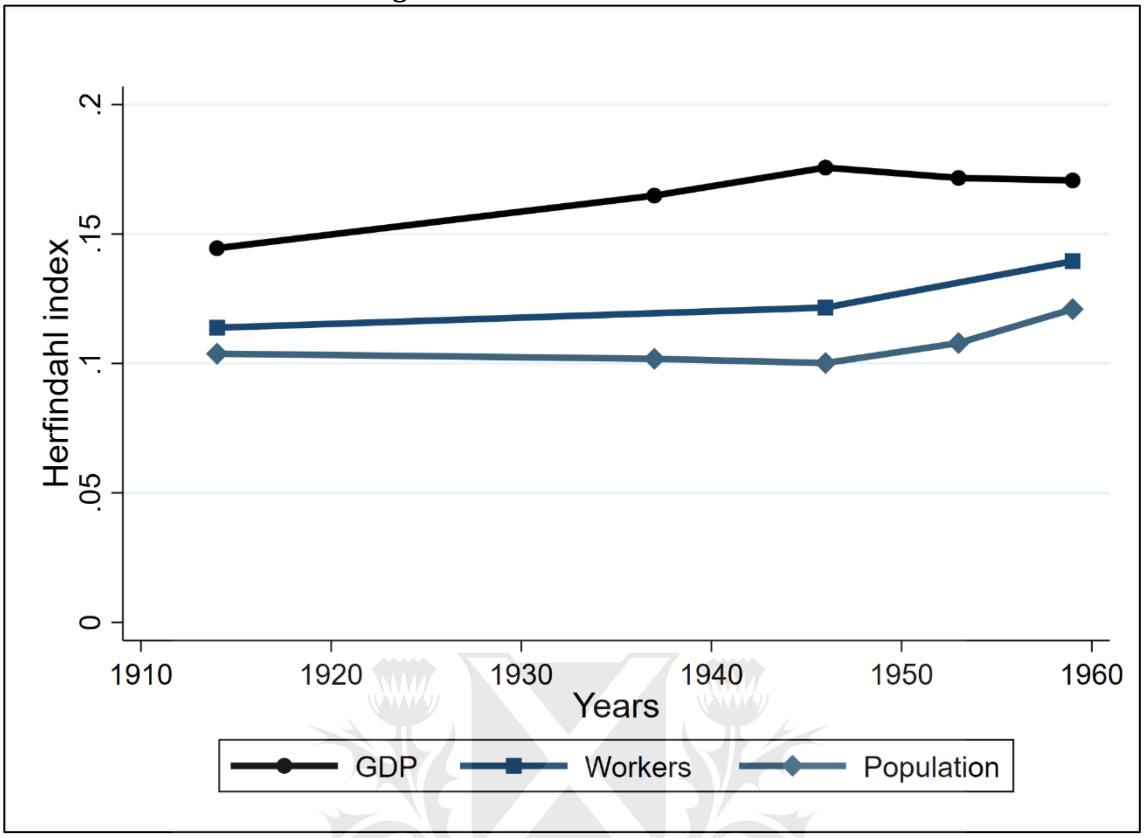
The differences in the magnitude of GDP and population participation in Capital Federal can be correlated with differences in concentration. Concentration is evident when a few locations hold the majority of the participation. One way to quantify concentration is by using the Herfindahl index[14]. Its normalized version takes a value of 1 when all the participation (in this case, population, or GDP) is concentrated in a single location, and 0 when all locations have equal participation. **Figure 4.5** illustrates the evolution of this index, calculated from provincial shares for GDP, population, and the number of workers.

Considering the significance of Capital Federal within the country, a greater territorial concentration in GDP than in population is expected. **Figure 4.5** confirms this hypothesis and illustrates that concentration differences vary over time. Until 1946, during the ISI stage with less state intervention, GDP concentration increased, later decreasing but without returning to the original values. This “reversal” is attributed to the decrease in participation of the district with highest contribution (Capital Federal) since 1946, while its neighbor and second in participation (Buenos Aires) experienced an increase, surpassing the former. Simultaneously, in this second period after 1946, population concentration increased. These shifts are linked to the fact that the population of Buenos Aires (the most populous district in the country) increased in participation, especially due to internal migrations associated with the location of the industry (mainly in *Conurbano Bonaerense*), while the absolute population of the second most populous district (Capital Federal) stagnated.

Universidad de San Andrés

[14] Being s_i the participation of the value of a variable of a jurisdiction over the total. The Herfindahl concentration index is calculated as $H = \sum s_i^2$. I use its normalized version ranged from 0 to 1: $H^* = (H - 1/N)/(1 - 1/N)$.

Figure 4.5: Concentration Index



Source: own calculation based on data from **Table A4.4**.

In summary, it can be concluded that during Argentine ISI period, there was an upsurge in the territorial concentration of both GDP and population in Greater Buenos Aires (Capital Federal plus *Conurbano Bonaerense*). The concentration of economic activity in this region acted as a magnet for working-age populations. This phenomenon is reflected in an even more geographically concentrated distribution of workers compared to the general population, as evidenced by higher concentration index values for workers.

4.4.2- The Regional Evolution of Per Capita GDP

The previous section highlighted a greater geographic concentration of GDP compared to population, resulting in regions with higher GDP than others relative to their population. This discrepancy leads to variations in GDP between provinces and regions in the country. Indeed, the preliminary exploration of the geographical patterns of GDP per capita in the final sections of **Chapter III** underscored the existence of such differences. Moreover, as demonstrated there and further elaborated here, the magnitude of these disparities is far from constant over time. To delve deeper into the analysis of these disparities and their changes from 1914 to 1959, this and the next section use data on the ratio of each province's GDP per capita to the national average, and the corresponding ratio using GDP per worker, both detailed in **Table A4.5** in the Appendix.

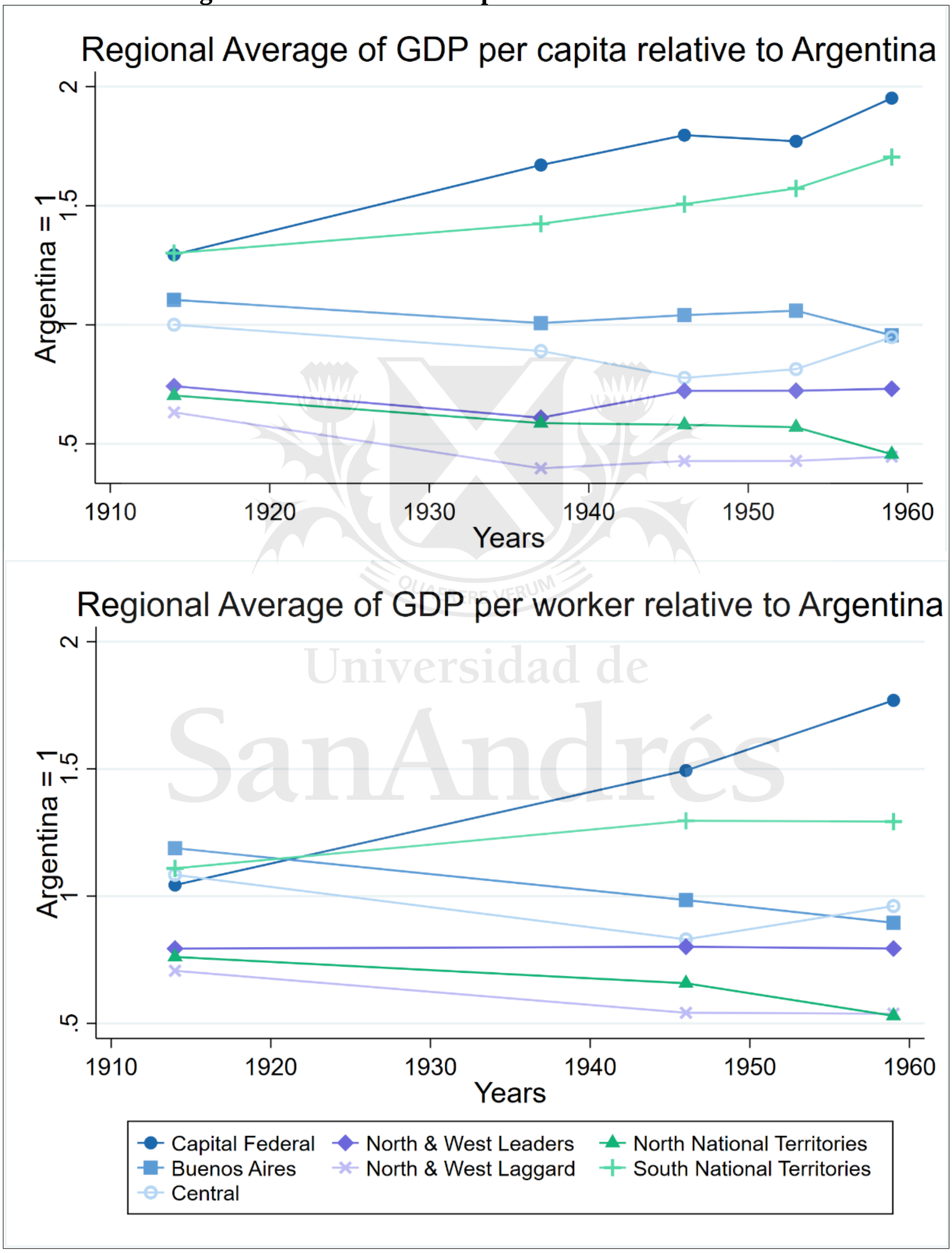
To summarize the data mentioned above, **Figure 4.6** shows the simple averages of the provincial ratios for each region and year. This gives an idea of the magnitude of the disparities in GDP per capita, showing, for example, that in 1959 some regions had an average GDP per capita of less than half the national figure, while others had almost twice as much. These disparities are even more pronounced at the provincial level, as there are cases in Southern Patagonia where both GDP per capita and GDP per worker exceed those of Capital Federal (see **Table A4.5**), the highest in **Figure 4.6**.

These relatively rich territories exhibit contrasting population characteristics: Capital Federal serves as the main urban center and the capital of the country, while the South National Territories are characterized by a sparse population. The latter are also known for their abundant oil resources, which began to be exploited during the ISI period (previously, they were primarily focused on sheep farming). Therefore, both agglomeration effects and natural resource endowments seem to work in favor of these territories. It should be noted that these regions, especially Capital Federal, exhibit relatively higher employment rates compared to the rest of the country (Appendix **Table A4.4** demonstrates a workers' share greater than the population share). Despite this, as can be seen in **Figure 4.6**, these territories maintained a substantially higher GDP per worker than the rest of the country for most of the period. Although the difference was not as pronounced in 1914, they still belonged to the group of regions with relatively high values for this indicator. Thus, the conclusions drawn remain largely consistent whether using per capita or per worker GDP.

In contrast to the South National Territories, the North National Territories, also sparsely populated, rank among those with the lowest per capita and per worker GDP in the country (**Figure 4.6**). Similarly, though with slightly less disadvantage, the North & West Laggard provinces have struggled to participate in activities that could integrate them into the national market, as discussed earlier.

Regarding the remaining regions, Buenos Aires and the Central region (both located in the traditional Pampean region) hold intermediate positions in terms of GDP per capita and per worker. These regions possess fertile lands and temperate climates, making them suitable for export-oriented agricultural and livestock activities, the produce of which is also in demand in the national market. Moreover, these regions host important urban and industrial centers, particularly the *Conurbano bonaerense*, and Rosario in Santa Fe. The North & West Leaders provinces rank slightly below Buenos Aires and Central provinces in terms of the distribution of GDP per capita, with their economies primarily reliant on agriculture-based manufacturing to supply the domestic market.

Figure 4.6: Relative Per Capita and Per Worker GDP



Source: own elaboration based on data from **Table A4.5**.

Universidad de SanAndrés

Despite the regional positions in GDP per capita remaining relatively stable throughout 1914-1959 (see **Figure 4.6**), the pace of change was not uniform across regions during this period, nor within regions when considering shorter periods. This discrepancy arises because changes in regional GDP and population shares, while generally consistent in direction (as shown in **Figure 4.3** and **4.4**), were not uniform in magnitude. Consequently, an apparent "success" in a region, characterized by an increase in both GDP and population, may be less favorable when population growth surpasses GDP growth (in shares), leading to a decline in relative GDP per capita.

This phenomenon becomes particularly evident when comparing the trajectories of the North and South National Territories. While both groups witnessed growth in population and GDP shares, their outcomes in terms of relative GDP per capita diverged, with a decrease observed in the North and an increase observed in the South (see **Figure 4.6**).

Furthermore, the shifts in relative GDP per capita are driven by exceptional cases where there is no coincidence between the evolution of GDP and population shares. Notably, Buenos Aires experienced an increase in its population share during 1914-1937, while its GDP share declined; conversely, the opposite pattern was observed in Capital Federal. While these instances are exceptions, it must be stressed that they involve regions with the highest population and GDP shares.

Referring to the evolution of regional differences, **Figure 4.6** shows that they seem to widen over time. Particularly noteworthy is the case of Capital Federal, which not only starts with high levels of GDP per capita at the beginning of the period but also experiences one of the fastest growth rates. This combination contributes to the widening of the initial regional disparities. In 1914, Capital Federal's GDP was 29% higher than the national average, but by 1959 it had increased to 91% higher. This means that the GDP per capita of Argentina's main city grew about 51% faster than the country's overall growth rate[15].

In comparison to other "big" Latin American countries over similar periods, the growth gap in GDP per capita between the main city and the national total in Argentina is notably larger. For example, as calculated above for Argentina, the growth gap was less than 35% in Sao Paulo and Rio de Janeiro compared to the Brazilian total between 1905 and 1960[16]. Similarly, for Mexico City, the gap was around 7% between 1910 and 1950[17]. Both of these examples are lower than the 37% observed in Capital Federal compared to the Argentine total between 1914 and 1953.

[15] Comparing Capital Federal's relative GDP per capita in 1959 with that in 1914, the ratio is 1.95/1.29, resulting in 1.51.
[16] Calculations based on regional GDP per capita data from Bucciferro & Ferreira de Souza (2020).
[17] Calculations based on regional GDP per capita data from Aguilar Retureta *et al.* (2020) for Mexico.

Universidad de San Andrés QUAERERE VERUM

Similar to Capital Federal, the South National Territories played a role in widening the disparities in regional Argentine GDP per capita, combining initially high GDP per capita with high growth. Surpassing Buenos Aires in terms of GDP per capita, some of its territories even exhibited the highest GDP per capita in the country (see **Table A4.5** in the appendix). On the other hand, the North & West Laggard region and the North National Territories also contributed to widening the gap, though for opposite reasons. These northern regions, initially among the poorest in the country, witnessed a decline in their relative GDP per capita, particularly during the 1914-1937 period.

At the same time that the gap in GDP per capita between the extremes of the distribution was widening, the gap between the territories in the middle of the distribution, specifically the Central and North & West Leaders regions, narrowed. Provinces in the Central region exhibited a higher initial level of GDP per capita, while North & West provinces experienced higher relative growth. This convergence was particularly notable during the period corresponding to World War II (1937-1946). Both regions are located in the internal part of the country and have been historically more relevant than the laggards in the north (see **Chapter II**). Additionally, neither region appears to have the distinctive characteristics linked to the growth observed in other regions during the ISI period, such as agglomeration economies in Capital Federal or proximity to coastal oil resources in the South National Territories.

The case of the Pampean region territories deserves special attention, since they are often considered central players in the Argentine ISI period, as discussed in **Chapter II**. The successive industrial censuses conducted since the mid-1930s[18] consistently reveal that over 88% of the value added in manufacturing is concentrated in this region. In addition, the urban centers within the Pampean region, closely linked to industrial activities, acted as attractive hubs for internal migration. In light of the newly aggregated data on economic activity presented earlier, it can be confirmed that Capital Federal experienced relative success during the ISI period compared to much of the country.

However, this relative success did not necessarily extend to the rest of Pampean region. Particularly, although Buenos Aires' GDP share grew, it can be considered extensive (at least in relative terms), since it was primarily supported by growth in its population share. Moreover, its population share grew at a faster rate, resulting in a decline in Buenos Aires' relative GDP per capita. In contrast, almost all other Pampean territories (i.e., Santa Fe, Córdoba, and Entre Ríos, all belonging to the Central region), witnessed a simultaneous decrease in both GDP share and

[18] Some of these were used as the main source to estimate provincial manufacturing GDP for the years 1937, 1946, and 1953.

relative GDP per capita. In other words, they cannot be considered successful cases compared to the rest of the country in terms of either variable.

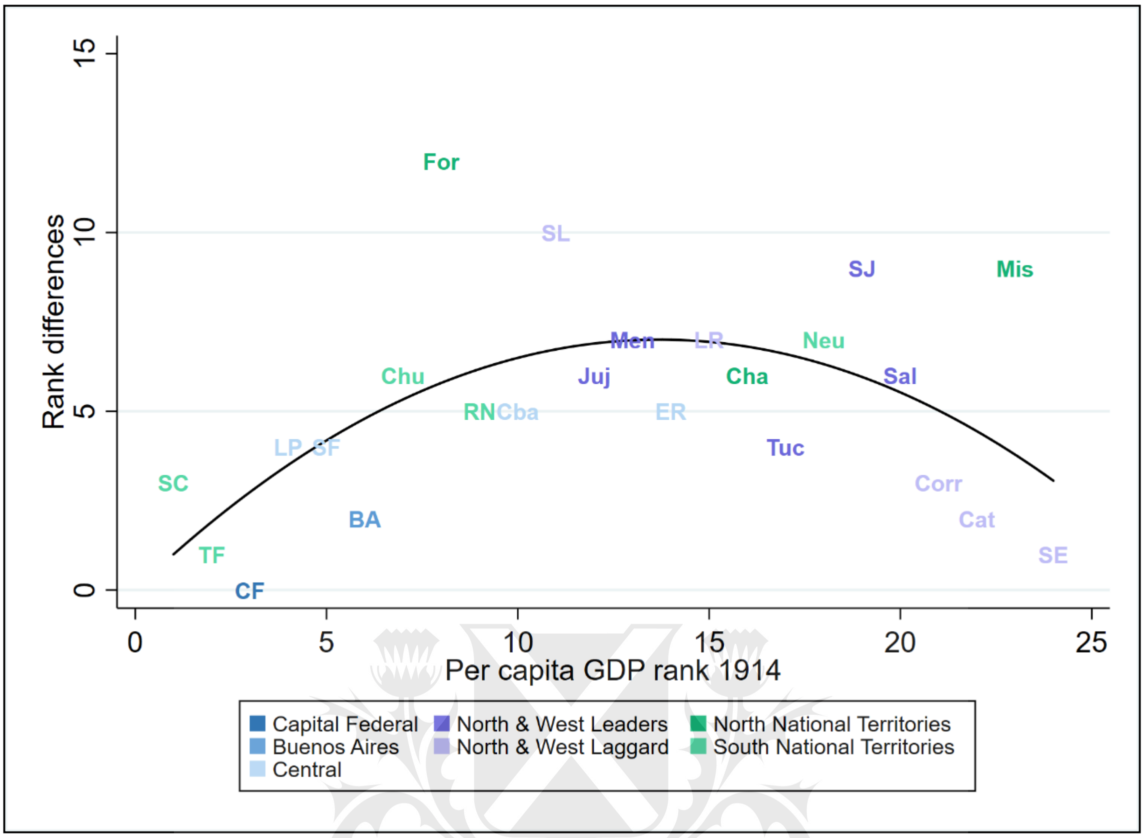
According to the literature, there are also other provinces considered relatively successful during the ISI period, though to a lesser extent than the Pampean region. Such is the case for Tucumán, Salta, Chaco, and Misiones in the north, and Neuquén in the south (Ferrer, 2008; Cao & Vaca, 2006). However, despite observed increases in GDP shares in some of these provinces, there has not been a corresponding rise in relative GDP per capita.

In the previous section, the use of regions served well in summarizing the dynamics of GDP and population among provinces. However, limitations arise when considering GDP per capita. An examination of the evolution of both population and GDP shares (**Figures 4.3** and **4.4**) reveals that provinces within the same region generally exhibit similar trends. However, a comparison between regional outcomes in **Figure 4.6** and provincial results in **Table A4.5** reveal a divergence in relative GDP per capita. For example, within the North & West Leaders group, wine-producing provinces (Mendoza and San Juan) saw relative growth from 1937 to 1946, while the opposite occurred in sugar-producing provinces of the northwest, especially in Tucumán and Salta. Therefore, a more in-depth analysis is necessary, incorporating approaches that are less dependent on the regional grouping used.

One way of descriptively analyzing patterns in provincial GDP per capita involves examining changes in their relative positions along the distribution (other approaches are discussed in the following sections). In the case of Argentina, spanning the period 1914-1959, distinct patterns emerge at the extremes of the distribution (the poorest and richest provinces) compared to the middle. **Figure 4.7** illustrates this, with the horizontal axis representing the initial position of provinces in the GDP distribution and the vertical axis measuring the instability of their relative positions.

Specifically, the horizontal axis of **Figure 4.7** represents provincial GDP per capita rankings in 1914 (lower values signaling a better position), while the vertical axis shows the maximum absolute difference between the highest and lowest positions in the ranking for each province across the years 1914, 1937, 1946, 1953, and 1959. Thus, a low vertical value suggests minimal changes in a province's relative position in the distribution of GDP per capita over time. Conversely, high values indicate substantial shifts, irrespective of the direction of change. For instance, Capital Federal consistently held a stable third place, with a rank difference of zero. In contrast, Mendoza, with an unstable rank, went from 13th in 1914 (its lowest rank) and 6th in 1946 (its highest rank), resulting in a rank difference of 7.

Figure 4.7: Changes in Provincial GDP Per Capita Rankings (1914-1959)



Notes:
-The vertical axis represents the difference between the maximum and minimum per capita GDP rankings for each province in the years 1914, 1937, 1946, 1953, and 1959.
-The abbreviations represent Argentine provinces: BA: Buenos Aires; Cat: Catamarca; Cba: Córdoba; CF: Capital Federal; Cha: Chaco; Chu: Chubut; Corr: Corrientes; ER: Entre Ríos; For: Formosa; Juj: Jujuy; LP: La Pampa; LR: La Rioja; Men: Mendoza; Mis: Misiones; RN: Río Negro; Sal: Salta; SC: Santa Cruz; SE: Santiago del Estero; SJ: San Juan; SL: San Luis; TF: Tierra del Fuego; Tuc: Tucumán
Source: own elaboration based on data from **Table A4.5**.

The inverted U-shape in **Figure 4.7** reveals a different stability pattern between the extremes and the middle of the 1914 GDP per capita distribution, with the most stable jurisdictions located at the two extremes. For instance, Capital Federal consistently held top positions in the ranking. At the opposite extreme, Catamarca and Santiago del Estero in the northwest of the country, consistently ranked among the bottom three throughout the period. The provinces in the middle of the initial distribution generally exhibited larger shifts in their rankings. Notably, Formosa was the least stable case, dropping from 8th in 1914 to 20th in 1959. However, not all unstable cases showed a "unidirectional" trend, as was the case with Formosa. For instance, Misiones gained positions until 1946 and then returned to approximately its initial position.

QUAERERE VERUM
Universidad de San Andrés

In summary, the dynamics of the overall provincial distribution of GDP per capita from 1914 to 1959 reveals two main patterns. Firstly, the provinces at each end of the distribution (the richest and the poorest) remained consistent throughout the period, with an apparent widening of differences. Secondly, provinces in the middle of the distribution experienced numerous changes in their relative positions, often in different directions depending on the period, suggesting a tendency for narrowing differences in GDP per capita.

Given these contrasting dynamics between the extremes and the middle of the distribution, a natural question arises as to whether the GDP per capita of the provinces generally converged over the period. The answer hinges partly on the dominant dynamic. Another pertinent question is the stability of the convergence pattern within this period. To address these inquiries, the next section delves into convergence analysis, a tool that unveils generalized patterns in regional behavior by summarizing them in a few figures.

4.4.3- The Convergence Analysis

The previous section illustrates the existence of regional disparities in Argentina in terms of GDP per capita and per worker during the ISI period. Notably, there was no uniform trend across regions, with trends even changing within regions, potentially affecting the regional distribution of both GDP per capita and per worker. In essence, the magnitude of the disparities changed over time.

Section 4.1 discusses different theoretical approaches leading to distinct dynamics of regional disparities. For instance, neoclassical growth models suggest a reduction in disparities over time, while the New Economic Geography emphasizes the presence of agglomeration economies that may amplify disparities. Additionally, Williamson (1965) proposes a non-linear behavior in which inequality initially increases during the early stages of development and subsequently declines, forming an inverted-U shape in dispersion measures. Empirically, the literature has yielded mixed results, depending on the specific location. For example, Badia-Miró *et al.* (2020b) find Williamson's inverted U-shaped pattern in Brazil, but a W-shaped pattern in Mexico (see **Section 4.1**).

In general, a decrease in income or product per capita disparities is termed σ-convergence (Barro *et al.*, 1991). **Table 4.1** aims to assess whether these patterns exist among Argentine regions, by illustrating the evolution of various dispersion and inequality measures calculated based on the provincial GDP per capita and per worker for each year during the "easy" ISI period. An increase in a measure indicates greater disparities.

Table 4.1: Measures of Dispersion and Inequality in GDP Per Capita and GDP per worker

Year	**1914**	**1937**	**1946**	**1953**	**1959**
Measures based on GDP per capita - All provinces					
Max/Min	4.54	7.55 ↑	7.11 ↓	6.98	10.26 ↑
p90/p10	2.84	4.75 ↑	4.17 ↓	4.34 ↑	4.87 ↑
CV	0.44	0.63 ↑	0.63	0.62	0.76 ↑
CV of logs	0.40	0.55 ↑	0.52	0.54	0.61 ↑
Gini	0.22	0.30 ↑	0.30	0.30	0.35 ↑
Theil	0.08	0.16 ↑	0.15	0.15	0.21 ↑
Average* (1914 = 1)	**1.00**	**1.59 ↑**	**1.52 ↓**	**1.53**	**1.92 ↑**
Measures based on GDP per capita - Capital Federal and South Patagonia provinces excluded					
Max/Min	2.72	3.67 ↑	2.90 ↓	3.83 ↑	4.25 ↑
p90/p10	2.48	2.77	2.41 ↓	2.57 ↑	2.62
CV	0.28	0.35 ↑	0.32 ↓	0.38 ↑	0.40 ↑
CV of logs	0.31	0.37 ↑	0.32 ↓	0.37 ↑	0.40 ↑
Gini	0.15	0.19 ↑	0.17 ↓	0.20 ↑	0.21 ↑
Theil	0.04	0.06 ↑	0.04 ↓	0.06 ↑	0.07 ↑
Average* (1914 = 1)	**1.00**	**1.26 ↑**	**1.08 ↓**	**1.32 ↑**	**1.42 ↑**
Measures based on GDP per worker - All provinces					
Max/Min	3.90	-	4.01	-	5.78 ↑
p90/p10	2.16	-	2.71 ↑	-	3.15 ↑
CV	0.31	-	0.43 ↑	-	0.50 ↑
CV of logs	0.33	-	0.38	-	0.45 ↑
Gini	0.17	-	0.21 ↑	-	0.25 ↑
Theil	0.04	-	0.08 ↑	-	0.10 ↑
Average* (1914 = 1)	**1.00**	**-**	**1.31 ↑**	**-**	**1.63 ↑**
Measures based on GDP per worker - Capital Federal and South Patagonia provinces excluded					
Max/Min	3.38	-	2.37 ↓	-	3.52 ↑
p90/p10	2.22	-	1.88 ↓	-	2.10 ↑
CV	0.30	-	0.25 ↓	-	0.31 ↑
CV of logs	0.33	-	0.25 ↓	-	0.31 ↑
Gini	0.16	-	0.13 ↓	-	0.17 ↑
Theil	0.04	-	0.03 ↓	-	0.04 ↑
Average* (1914 = 1)	**1.00**	**-**	**0.77 ↓**	**-**	**1.01 ↑**

* Each measure was standardized relative to 1914 and then a simple average was calculated.

Note: Ascending arrows indicate an increase in the indicator of more than 0.5% per year ~~over~~ compared to the previous benchmark, while descending arrows indicate a decrease of more than 0.5% per year. An annual growth rate of 0.5% implies a growth of 5.11% over a decade.

Source: own elaboration based on data from **Table A4.5**.

QUAERERE VERUM Universidad de San Andrés

Differences in construction make each measure susceptible to potentially drawing different conclusions. For example, the first measure, derived from the ratio between the maximum and minimum provincial GDP per capita, is influenced solely by the patterns of the most extreme cases. Although this influence is tempered by using the ratio between the 90th and 10th percentiles, it is important to note that this inequality measure is determined by only two provinces in the distribution, overlooking the rest (similar to any other measure based on percentile ratios).

The other measures considered in **Table 4.1** incorporate the entire distribution, but in practice, they exhibit varying sensitivity to its different parts of it (Trapeznikova, 2019; Monfort, 2008). For instance, the Coefficient of Variation (CV) is particularly sensitive to the right tail of the distribution (the rich), while the Coefficient of Variation of Logarithms (CV of logs) and the Theil index are more sensitive to the bottom part of the distribution (the poor). In contrast, the Gini coefficient assigns more weight to the middle of the distribution.

Despite the potential differences mentioned earlier, the first section of **Table 4.1** shows that all indicators suggest that the most significant changes predominantly occurred in the first and last spans (1914-1937 and 1953-1959). In both cases, GDP per capita dispersion increases, regardless of the indicator used. As discussed in **Section 4.2**, the first span aligns with the major shocks associated with deglobalization, particularly the 1930 crisis, which stimulated Argentine industrialization, mainly its light stage. The last span corresponds to the transition towards heavier industrialization.

Regarding the two spans in the middle (1937-1946 and 1946-1953), the observed changes were either small or close to zero. In the 1937-1946 span, associated with World War II, dispersion slightly decreases or remains almost unchanged, depending on the indicator used. In the subsequent span (1946-1953), associated with the state interventions of Perón's government, the changes are also minimal, but the direction is less clear.

Given the focus on GDP per capita, and the potential significance of provincial differences and changes in employment rates, calculations were also made for GDP per worker (as shown in the third section of **Table 4.1**). As detailed in **Sections 4.2** and **4.3**, the lack of provincial GDP per worker data for 1937 and 1953 limits the construction of only two spans (1914-1946 and 1946-1959). Despite this difference in the constructed spans, the findings based on GDP per capita align consistently with those based on GDP per worker: both spans show an increase in inequality. However, this increase in inequality is smaller in the results derived from GDP per worker.

Therefore, based on the inequality indicators derived from either GDP per capita or GDP per worker, it can be concluded that the Argentine case does not exhibit the inverted U-shaped inequality pattern proposed by Williamson (1965). In fact, although there is an initial increase in

Universidad de San Andrés

inequality as suggested by Williamson, the subsequent decline is not observed. While one might argue that the examined period is relatively short and that a decline could occur over a longer span, **Chapter III** (**Figure 3.3** in **Section 3.4.3**) demonstrates that provincial inequality persists even when extending the analysis to the beginning of the 21st century.

The previous section showed that the territories with the highest initial GDP per capita or per worker also experienced the fastest growth rates, potentially contributing to the observed trend of increasing inequality. As indicated in **Figure 4.6** and **Table A4.5**, these territories include Capital Federal and the Southern Patagonian region (Tierra del Fuego, Santa Cruz, and Chubut)[19]. Given their distinctive GDP per capita and growth dynamics compared to the rest of the country, a crucial question arises regarding the evolution of inequality among the remaining territories. To address this, inequality indicators for both GDP per capita and GDP per worker were computed, excluding these four relatively rich and rapidly growing territories, as detailed in the second and fourth sections of **Table 4.1**.

As in the full distribution, in the first and last spans (1914-1937 and 1953-1959), there was an increase in inequality, though of a more moderate nature. However, in the 1937-1946 span, there was a noticeable pattern of inequality reversal, which was not as evident in the full distribution. This decline can be attributed to the decrease in the relative GDP per capita of the Central region, consisting of provinces with relatively high initial levels. In the next span (1946-1953), dispersion increased again, reclaiming (or even surpassing) previous levels, depending on the indicator used.

In terms of GDP per worker, as illustrated in the last section of **Table 4.1**, regional inequality decreased until 1946, followed by a subsequent increase. However, in contrast to the calculations based on GDP per capita, the final levels of inequality are comparable to those of 1914. This contradicts the pattern suggested by Williamson. Thus, even when the most divergent provinces are excluded from the analysis, the results indicate neither long-term σ convergence nor an inverted U-shaped pattern.

In addition to σ-convergence analysis, another widely used approach in the literature to assess economic convergence is β-convergence analysis. β-convergence occurs when poor countries or regions tend to experience faster growth rates in terms of per capita income and product than rich ones (Barro & Sala-i-Martin, 1992). Both types of convergence are interrelated, as β-convergence is a necessary but not sufficient condition to achieve σ-convergence (Sala-i-Martin,

[19] These four territories are the only ones with an average level of GDP per capita of more than 50% of the national level, and they are also the ones with the highest growth rates between 1914 and 1959.

Universidad de SanAndrés

1996a, and Young *et al.*, 2008). The narrowing of the gap between poor and rich regions implies a negative association between the initial level of GDP per capita and growth under β-convergence. By expressing that concept in regression terms, Baumol (1986) developed a basic tool for testing the presence of convergence, known as growth regression:

$$\frac{\ln(y_{iT}) - \ln(y_{i0})}{T} = \alpha + \beta \ln(y_{i0}) + \varepsilon_i \qquad (4.1)$$

where y_{i0} and y_{iT} represent the GDP per capita of province i at the beginning and end of a period of T years, respectively, and ε_i a stochastic error term.

The left side of equation (4.1) represents the average per capita GDP annual growth rate. In this context, the β coefficient captures the rescaled correlation between the growth rate of per capita output and its initial level. A negative value of β implies β-convergence. Barro & Sala-i-Martin (1992) show that equation (4.1) can be derived from neoclassical growth models, such as Solow (1956) and Swan (1956). These models predict that poorer economies will experience faster growth (convergence), assuming diminishing returns to capital. This assumption implies a higher marginal productivity of capital in capital-poor economies.

Regarding the potential outcomes of equation (4.1), Sala-i-Martin (1996b), based on regional data for United States, Canada, Japan, and Europe, proposes the rule that "economies converge at a speed of about two percent per year". It is important to clarify that this value does not correspond to the estimate of β, but to the value of v contained in the expression: $\beta = -(1 - e^{-vT})/T$. This is the form of β in the Barro & Sala-i-Martin (1992) derivation of the empirical equation (4.1) based on neoclassical growth models. The convergence speed v represents the pace at which an economy's GDP per capita reaches its steady state.

Barro & Sala-i-Martin (2004) clarify that for a given positive v, β declines in absolute terms with the length of the interval T (approaching 0 as T approaches infinity[20]). The underlying rationale is that the growth rate decreases as income increases. Hence, when computing the growth rate over a longer time span, it combines more of the smaller future growth rates with the initially larger growth rates. Consequently, as the interval increases, the effect of the initial position on the average growth rate decreases.

Therefore, since this chapter uses data with different amplitude intervals, in addition to calculating the β estimator, the expression $v = -\ln(1 + T\beta)/T$ will be computed for comparisons. To offer a more intuitive interpretation, another related measure known as half-life: $HL = -\ln(2)/\ln(1 + \beta)$ will be calculated. This represents the timespan necessary for per capita

[20] And v tends to β as T approaches 0.

GDP disparities to be halved. Therefore, considering the reference speed of convergence value $v = 0.02$ from Sala-i-Martin (1996b), a half-life of 35 years is expected.

While Sala-i-Martin's (1996b) research indicates a convergence trend, this phenomenon does not consistently manifest at the regional level within the "big" Latin American countries. For instance, considering periods similar to those studied in this chapter, the convergence rate among Mexican regions' GDPs per capita for 1921-1950 was less than 1%[21], being only half of the rule mentioned above. Moreover, in the case of Brazil, the data from 1920-1960 revealed that there is not even significant convergence[22].

For Argentina in particular, the literature generally does not observe beta convergence during the second half of the 20th century (Elías, 1995; Marina, 2001; Grotz & Llach, 2013). However, there is evidence of convergence for specific periods, such as between the end of the 19th century and the beginning of the 20th century (Aráoz & Nicolini, 2016), and between the end of the 20th century and the beginning of the 21st century (Figueras *et al.*, 2014).

In the context of the ISI period, the preliminary results from **Section 3.4.3** of **Chapter III** indicate a lack of convergence among the Argentine provinces during the central decades of the 20th century. However, a more detailed analysis, based on newly available data, reveals certain nuances that become apparent when decomposing the first half of the twentieth century into subperiods. These nuances include non-constant convergence speeds and even signs of convergence, albeit weak. Notably, these results are in line with those obtained by the σ-convergence approach.

QUAERERE VERUM
Universidad de
SanAndrés

Table 4.2 presents the estimated results derived from the growth regression equation (4.1) through Ordinary Least Squares (OLS) for the Argentine provinces, considering the different spans allowed by the data. In the first section of the table, the relative GDP per capita of the entire set of provinces is used as y_i. At the same time, **Figure 4.8** visually represents the results from this section of the table, with zero values on the axes indicating instances where either GDP per capita level or growth rate equals the national total. The second section of **Table 4.2** repeats the estimates, though excluding the clearly divergent jurisdictions recognized in the σ-convergence analysis (Capital Federal and those of Southern Patagonia). This exclusion allows for a focused assessment of convergence among the remaining provinces.

[21] Own calculations based on data from Aguilar Retureta *et al.* (2020).
[22] Own calculations based on data from Bucciferro & Ferreira de Souza, 2020.

Table 4.2: Unconditional Growth Regressions (Relative GDP Per Capita)

Period	1914-1937	1937-1946	1946-1953	1953-1959	1914-1946	1946-1959	1914-1959
Dependent: GDP per capita growth							
lnGDPpc (β)	0.0052	-0.0116	-0.0030	0.0156	0.0019	0.0066	0.0084 ***
se(β)	0.0061	0.0075	0.0080	0.0116	0.0046	0.0061	0.0024
p-value (β)	0.4080	0.1336	0.7084	0.1925	0.6821	0.2879	0.0019
Speed	-0.0049	0.0123	0.0031	-0.0149	-0.0019	-0.0064	-0.0071
Half-life		59	227				
Dependent: GDP per capita growth. Capital Federal and South Patagonia provinces excluded							
lnGDPpc (β)	-0.0021	-0.0300 ***	0.0047	-0.0048	-0.0087	0.0022	0.0016
se(β)	0.0068	0.0099	0.0140	0.0242	0.0053	0.0084	0.0030
p-value (β)	0.7650	0.0072	0.7411	0.8464	0.1171	0.7939	0.6121
Speed	0.0021	0.0350	-0.0046	0.0048	0.0102	-0.0022	-0.0015
Half-life	333	23		145	79		

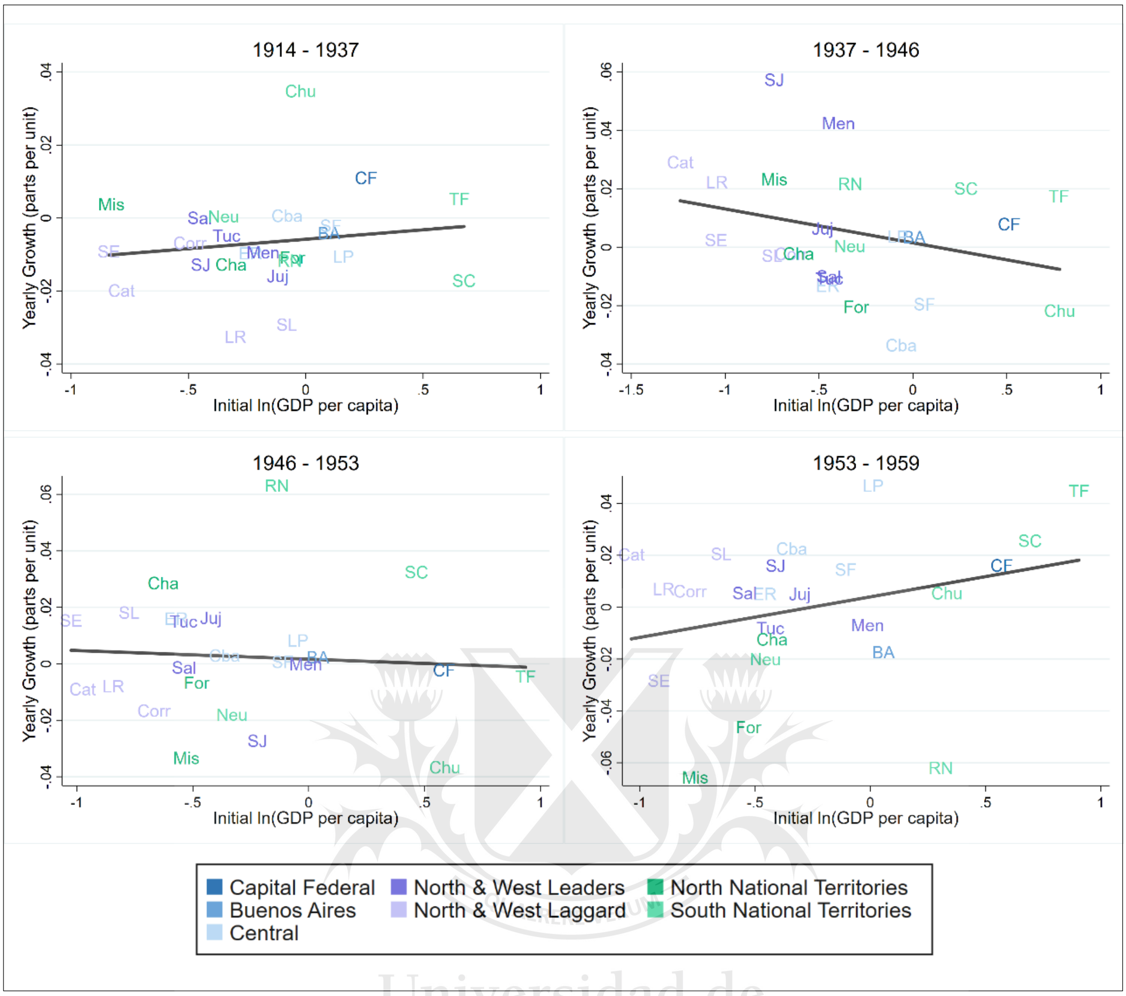
se: robust standard errors

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.01$

Constant term included in the regressions but not shown in the table.

Source: own elaboration.

Figure 4.8: Unconditional Growth Regressions



Notes:
- Provincial GDP per capita is expressed relative to Argentina. Therefore, a value of 0 in any of the axes implies that the corresponding variable (initial level or growth) equals the national total.
- The abbreviations represent Argentine provinces: BA: Buenos Aires; Cat: Catamarca; Cba: Córdoba; CF: Capital Federal; Cha: Chaco; Chu: Chubut; Corr: Corrientes; ER: Entre Ríos; For: Formosa; Juj: Jujuy; LP: La Pampa; LR: La Rioja; Men: Mendoza; Mis: Misiones; RN: Río Negro; Sal: Salta; SC: Santa Cruz; SE: Santiago del Estero; SJ: San Juan; SL: San Luis; TF: Tierra del Fuego; Tuc: Tucumán
Source: own elaboration.

Universidad de San Andrés

In **Table 4.3**, the analysis is repeated, replacing GDP per capita with GDP per worker. This adjustment is made to mitigate the possible effect of variations in employment rates among provinces, though it comes at the expense of data loss for years without worker count information.

For the full period (1914-1959), there is a positive and significant β-estimate using GDP per capita and including all provinces, indicating divergence. These results align with the findings of the σ-convergence analysis. However, alternative specifications, such as excluding Capital Federal and South Patagonia or using GDP per worker, show non-significant results, indicating neither convergence nor divergence. In summary, both β and σ approaches, explored through different alternatives, do not indicate convergence among Argentine provinces during the easy ISI period. This also coincides with the findings in the literature mentioned above for the subsequent decades. However, it contrasts with the convergence found in the previous period of agro-export-led growth.

Table 4.3: Unconditional Growth Regressions (Relative GDP Per Worker)

Period	**1914-1946**		**1946-1959**	**1914-1959**
Dependent: GDP per worker growth				
lnGDPpw (β)	-0.0080	**	0.0029	-0.0001
se(β)	0.0038		0.0100	0.0033
p-value (β)	0.0459		0.7772	0.9872
Speed	0.0093		-0.0028	0.0001
Half-life	86			13061
Dependent: GDP per worker growth. Capital Federal and South Patagonia provinces excluded				
lnGDPpw (β)	-0.0141	***	-0.0039	-0.0052
se(β)	0.0035		0.0106	0.0030
p-value (β)	0.0008		0.7149	0.1060
Speed	0.0187		0.0040	0.0059
Half-life	49		175	134

se: robust standard errors
*** p < 0.01 ; ** p < 0.05 ; * p < 0.01
Constant term is included in the regressions but not showed in the table.
Source: own elaboration.

Universidad de San Andrés

Before the data generated in **Chapter III** of this study became available, the work by Aráoz & Nicolini (2016, 2020) had recognized a convergence trend in Argentine provincial GDP per capita between 1895 and 1914. However, this trend came to a halt at some point during the subsequent four decades. The inclusion of new data for 1937 and 1946, along with existing data for 1914 and 1953, provides a basis for gaining insight into when this happened. Dividing the analysis into shorter time spans revealed that convergence stopped as early as the 1914-1937 period. While there is some evidence of a brief return to convergence in the subsequent period (1937-1946) corresponding to World War II, it once again disappears from 1946 onward.

The evidence supporting the lack of convergence during the deglobalization period from 1914 to 1937 is highlighted by the non-significant estimated β in **Table 4.2**. Moreover, regardless of statistical significance, the slope's direction indicates divergence (see **Figure 4.8**), coinciding with the results of the σ-convergence analysis. While this outcome contradicts the convergence hypothesis of neoclassical models, considering this period as a transition from an economic model based on agricultural exports to one centered on industrial production, the divergence result seems to be in line with the pattern proposed by Williamson (1965).

Furthermore, the apparent divergence is primarily driven by the growth of territories with relatively high GDP per capita, such as Capital Federal and some provinces in the South National Territories (including Tierra del Fuego and Chubut in South Patagonia). Given the urban nature of industrialization, agglomeration effects would justify the divergent movements observed in Capital Federal. As for the growth of Southern Patagonian Territories, previously mentioned as primarily driven by the exploitation of oil resources, even if these territories are excluded, the conclusions remain largely unaffected. This can be attributed to the decrease of relative GDP per capita in territories with initial low levels, particularly in the North & West Laggard region. In addition, **Figure 4.8** reveals no clear convergent behavior in the rest of the territories, except for Misiones.

Contrary to the first span, there are signs of convergence in 1937-1946, as observed in the σ-convergence analysis, though not statistically significant. However, the results become significant and exhibit a relevant magnitude when excluding Capital Federal and South Patagonia territories. In fact, excluding either Santa Cruz or Tierra del Fuego from the regression is sufficient to observe significant convergence. This suggests a pattern of a certain degree of initial divergence, followed by a subsequent period of convergence, aligning with Williamson's (1965) hypothesis. Nevertheless, as later sections will show, this pattern does not persist in subsequent periods.

The specific regional patterns underlying the observed convergence during this period associated with World War II can be identified by looking at **Figure 4.8**. On the one hand, the divergent effect generated by Capital Federal in 1937-1946 is less intense than in the previous span. On the other hand, some of the territories that were initially among the worst-positioned and contributed to divergence in the previous period are now driving convergence. These territories are mainly from the North & West Laggard region, along with others like San Juan and Misiones. Additionally, there is a relative decrease in territories with high initial GDP per capita levels in the Pampean region (especially Córdoba and Santa Fe), which contributes to convergence.

Regarding GDP per worker the results in **Table 4.3** show convergence during the 1914-1946 period, although at a relatively slow pace. This is in line with the σ-convergence analysis and is also consistent with the results for GDP per capita, considering the observed signs of convergence in the 1937-1946 subperiod.

The signs of convergence that weakly emerged during the World War II period disappeared in the subsequent years (1946-1953), aligning with the results obtained from the σ-convergence analysis. **Figure 4.8** illustrates a practically flat line for this period, a pattern that persists even when excluding Capital Federal and South Patagonia territories, as indicated by the results in

QUAERERE VERUM
Universidad de
SanAndrés

Table 4.2. Examining the individual patterns contributing to this outcome, it is noteworthy that the convergent effect driven by the relative decline of the Central region observed in the previous period is no longer present. Additionally, Misiones and some lagging territories in the North & West Laggard region, which contributed to convergence in the previous period, now have the opposite effect in 1946-1953. Although some lagging territories show relative growth and Capital Federal experiences declines (notably observed only during the 1946-1953 period), these factors alone are not enough to generate convergence.

In the subsequent period, from 1953 to 1959, the divergent effect of the high-income territories (Capital Federal and South Patagonia) regained strength, and there are no clear signs of convergence in the remaining provinces. Notably, low-income territories exhibit a mix of relatively high and low growth rates. For example, almost all the North & West Laggard territories experience high growth, while the North National Territories and Santiago del Estero exhibit lower rates. Similar patterns are observed when considering per worker GDP, for the period 1946-1959.

Building upon the preceding analysis, it is worth noting that, although the results for the first two spans (an initial increase in inequality followed by a slight decrease) somewhat align with the pattern proposed by Williamson (1965), this is not the case after World War II. The prevailing influence of agglomeration economies and the availability of natural resources seem to overshadow convergence effects. Therefore, it can be concluded that, with the exception of the period corresponding to World War II, there is no substantiating evidence supporting regional β-convergence among Argentine provinces during the easy ISI period.

Universidad de SanAndrés

4.4.4- Exploring Conditional Convergence

Beyond the aforementioned, the estimates presented in the previous section (i.e., β, v, and HL) can also be interpreted as indicators of an economy converging to its own steady state. However, it is essential to consider that several factors can cause regions to have different steady states. Empirically, this can result in an inability to detect beta convergence (Barro & Sala-i-Martin, 1992; Sala-i-Martin, 1996b). Notably, differences in human capital, as highlighted by Mankiw *et al.* (1992), along with other factors such as institutional arrangements, cultural distinctions, natural resources, and access to markets, can significantly contribute to this variation.

In the case of regions within a country, many of these factors may be mitigated (Barro & Sala-i-Martin, 1992). To account for such factors in the empirical analysis, if data are available, they can be easily incorporated as additional variables in the growth regression on the right side of equation (4.1). Conditional convergence is said to exist if the estimation of the modified equation yields a negative coefficient on the initial level of GDP (β). Conversely, if a negative coefficient results from estimating the original equation (4.1) without additional variables, it is termed absolute or unconditional convergence.

It is worth noting that, unlike absolute convergence, conditional convergence does not necessarily imply that economies with low levels of GDP per capita or per worker will experience faster growth, eventually catching up with the richest. Instead, it implies that the GDP per capita or GDP per worker of each economy will tend toward its own steady state, a value that may vary from one economy to another.

Starting with the observation that the estimates for Argentine provinces for 1914-1959 and smaller subperiods generally do not suggest absolute convergence (and when they do, it is weak), an exploration of the factors potentially associated with the existence of different steady states is undertaken. This serves a dual purpose: firstly, to examine the presence of conditional convergence (although, as noted above, its existence no longer necessarily implies the closure of regional gaps). Secondly, to determine the relevance of these factors for growth differentials between provinces.

Without claiming exhaustive coverage, this exploration introduces two variables into equation (4.1): the literacy rate of the adult population[23] and the distance to Capital Federal[24]. Literacy, serving as a proxy for human capital, is a commonly used factor in studies of conditional convergence. Higher levels of human capital facilitate the assimilation of growth-enhancing technologies (Barro, 1996). As for the second variable, considering Capital Federal's role as the country's primary urban center and main gateway to foreign markets, the distance to it can act as a proxy for access to both internal and external markets. In addition, territories in close proximity to Capital Federal are endowed with favorable conditions for the production of the country's exportable goods, such as grains and meat. Consequently, the distance can also serve as an indicator of the availability of natural resources for the production of export goods.

Therefore, with the incorporation of provincial literacy rates and distances to Capital Federal, the growth regression is now represented by equation (4.2):

$$\frac{\ln(y_{iT}) - \ln(y_{i0})}{T} = \alpha + \beta \ln(y_{i0}) + \lambda\, literacy_{i0} + \delta\, CFdistance_i + \varepsilon_i \quad (4.2)$$

The corresponding estimation results are outlined in **Table 4.4** and they broadly coincide with those of the unconditional case presented in **Table 4.2** for the periods 1914-1946 and 1946-

[23] Data from CFI (1966).

[24] Distance from the provincial capitals.

1959. Specifically, signs of convergence are evident in the former, notably significant in the case of per worker GDP, while a lack of convergence is observed in the latter. In addition, when the results suggest convergence, the inclusion of controls reveals higher convergence speeds.

Table 4.4: Conditional Growth Regressions

Period	**1914-1946**		**1946-1959**		**1914-1959**	
Dependent: GDP per capita growth						
lnGDPpc (β)	-0.0103		-0.0048		-0.0015	
se(β)	0.0072		0.0074		0.0048	
p-value (β)	0.1677		0.5267		0.7608	
literacy (λ)	0.0395	*	0.0883	*	0.0324	*
se(λ)	0.0224		0.0497		0.0159	
p-value(λ)	0.0928		0.0908		0.0550	
CFdistance (δ)	0.0037		0.0053		0.0029	*
se(δ)	0.0027		0.0031		0.0015	
p-value(δ)	0.1902		0.1066		0.0674	
Speed	0.0124		0.0049		0.0015	
Half-life	67		145		465	
Dependent: GDP per worker growth						
lnGDPpw (β)	-0.0197	**	-0.0120	*	-0.0119	**
se(β)	0.0072		0.0101		0.0051	
p-value (β)	0.0125		0.2490		0.0309	
literacy (λ)	0.0395	**	0.0961	*	0.0402	**
se(λ)	0.0199		0.0480		0.0157	
p-value(λ)	0.0608		0.0593		0.0182	
CFdistance (δ)	0.0040		0.0042		0.0037	**
se(δ)	0.0024		0.0031		0.0018	
p-value(δ)	0.1034		0.1925		0.0623	
Speed	0.0310		0.0130		0.0171	
Half-life	35		57		58	

se: robust standard errors
*** p < 0.01 ; ** p < 0.05 ; * p < 0.01
Constant term included in the regressions but not shown in the table.
Source: own elaboration.

QUAERERE VERUM
Universidad de
San Andrés

Regarding the controls, the expected positive sign of the literacy coefficient aligns with the observed patterns in convergence literature and holds statistical significance. Without implying causality, this suggests that in instances where two provinces share similar levels of GDP per capita or GDP per worker, greater growth is anticipated in those with higher levels of adult education (literacy). Since the richest regions often exhibit higher levels of education, this observation could contribute to explaining the absence (or weakness) of absolute convergence observed in the previous section.

As for the distance coefficient of Capital Federal, it exhibits a positive sign, contrary to what would be expected, and remains statistically significant over the entire period. This initially surprising observation can be attributed to the fact that Capital Federal's closest territories, including Buenos Aires and the Central region, did not experience exceptionally high relative growth during the period, while more distant territories in South Patagonia did.

Another factor that could potentially contribute to regional imbalances is the diverse sectoral composition of economic activity across provinces. This means that differences in sector-specific productivity could influence the overall productivity levels based on the relative weight of each sector within an economy. The following subsection examines the relevance of this factor in the Argentine case.

4.4.5- Sectoral Patterns of Production

As mentioned in the previous section, regional disparities regarding infrastructure and human capital stocks or endowments can contribute to variations in per capita income or productivity. Another factor that plays a role in regional imbalances is the diverse sectoral composition of economies. In this regard, Esteban (2000) and Ezcurra *et al.* (2005) suggest that differences in productivity across sectors can lead to differences in aggregate productivity (GDP per worker) when there are variations in the sectoral composition among regions. Even if a process of regional equalization of productivity exists, sector by sector, significant interregional differences in aggregate productivity per worker may endure. Additionally, in theory, the sectoral composition in each region might primarily stem from some kind of geographical advantage or simply result from historical accidents.

In the Argentine case, Capital Federal serves as an illustrative example. During the colonial period, for strategic reasons, the Spanish crown designated the current territory of Capital Federal as the capital of the Viceroyalty of the Río de la Plata in 1776. Since it became the commercial center of the viceroyalty, activities linked to the urban sector gained prominence in the city. Even long after independence, this area continued to serve as a crucial commercial link with Europe, and the urban character of the activities developed there was reinforced during the first globalization.

Other regions of the country provide examples where patterns of productive specialization have emerged from factors such as soil suitability, as seen with grapes and wine in *Cuyo*, or natural resource endowments, exemplified by oil in Patagonia (**Chapter II** elaborates on this issue). Despite the well-known nature of the sectoral production patterns mentioned above, the absence, until now, of sectoral GDP estimates for the country's regions during the light ISI period has hindered an accurate measurement of each sector's contribution to the overall economy of each region for this specific timeframe.

Since the provincial GDP estimates used in the preceding sections are also sectorally disaggregated, Location Quotient (LQ) indices can be calculated to measure sectoral differences. These indices compare the sectoral composition of a given region with that of the entire country. If a sector within a region has a higher share than the same sector's share in the country as a whole, the region is considered to be specialized in that sector. This is equivalent to saying that if a region's share within a sector is larger than the region's total GDP share in the country's GDP, the region is specialized in that sector. Therefore, considering an Argentine province i, a sector s, and a year t, the location index is given by:

$$LQ_{ist} = (GDP_{ist}/GDP_{it})/(GDP_{st}/GDP_t) = (GDP_{ist}/GDP_{st})/(GDP_{it}/GDP_t) \qquad (4.3)$$

Being GDP_{ist} the GDP of sector s in province i for year t, GDP_{it} denoting the total GDP of province i, GDP_{st} the national GDP of sector s, and GDP_t the entire national GDP. The analysis includes 24 provinces and three sectors, classified into the traditional division of primary, secondary, and tertiary[25]. An LQ_{ist} value exceeding one indicates that province i is relatively more specialized in sector s than the entire country in year t. The values of this index for each sector, province, and year can be found in **Table A4.6** in the appendix. As a summary, the simple averages based on the provincial values for each region and year can be found in **Figure 4.9**.

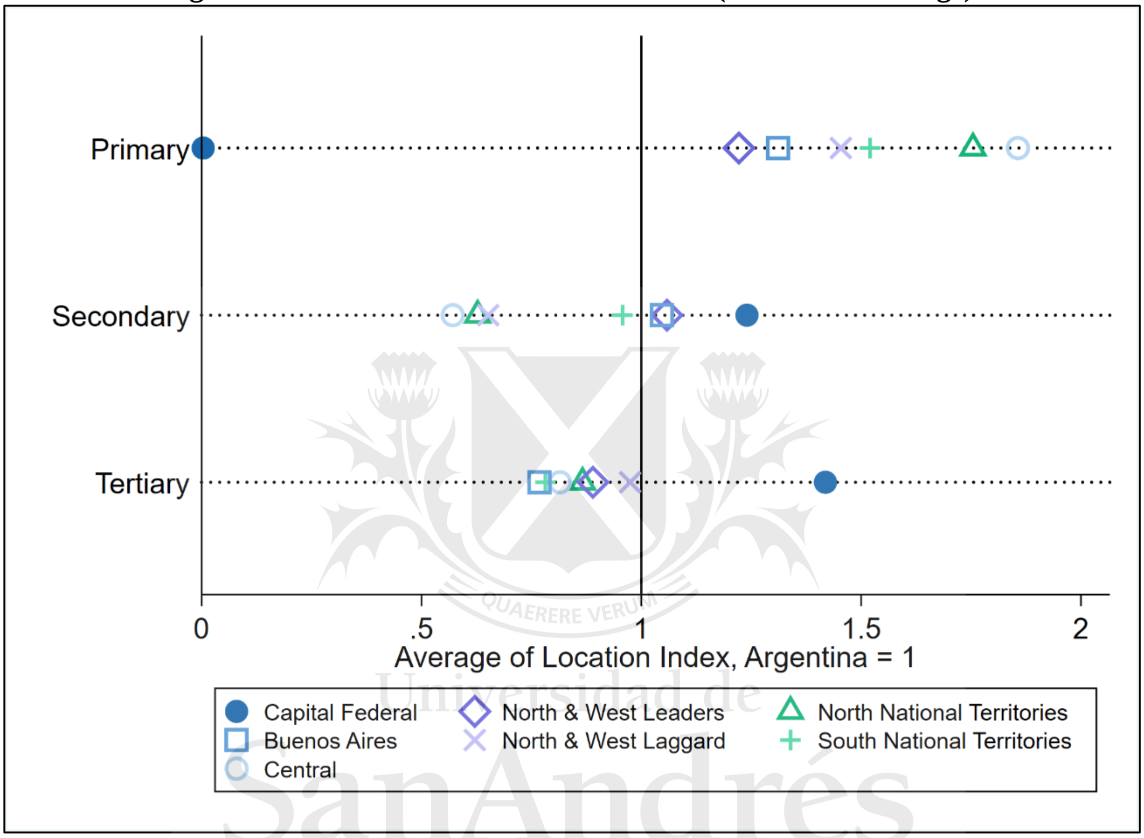
The results for Capital Federal are not surprising at all. Given its predominantly urban nature, activities related to the primary sector are practically negligible, while the location index for the other two sectors exhibits relatively high values. Notably, the tertiary sector is located in Capital Federal, marking a significant deviation from the rest of the country.

For the Central region, the results are somewhat unexpected. Together with Capital Federal and Buenos Aires, the territories in the Central region integrate the Pampean region according to the traditional classification (see **Figure 4.2**). In Argentine literature, this region is considered one of the country's most industrialized, and one of those that made the most progress in this regard during the ISI period (Gerchunoff & Llach, 2018; Belini & Korol, 2020; Ferrer, 2008; Rapoport, 2008). In Buenos Aires, this is reflected in a relatively high and growing value of the location index for the secondary sector, and relatively low values for the primary sector by the end of the period (see **Table A4.6**). This situation is intriguing, given the region's possession of

[25] Primary sectors include Agriculture; Livestock; and Fishing. Secondary sectors include Mining; Manufacturing; Electricity, Gas, and Water; and Constructions. Tertiary sectors include Transport; Communications; Finance; Housing; Commerce; Personal Services; and Government. See **Section 4.2** for details.

the country's best quality land, but it aligns with the observed stagnation of the exportable agricultural sector located there for much of the period. However, the scenario is quite different in the rest of the Pampean region, particularly in the Central region, where the location index for the secondary sector surprisingly ranks among the lowest in the country.

Figure 4.9: Location Index of Sectoral GDP (1914-1959 Average)



Note: Each data point represents the simple average of the Location Index for the years 1914, 1937, 1946, 1953, and 1959, calculated for all provinces of a region.
Sources: Own elaboration based on **Table A4.6**.

In contrast to the Central region, the North & West Leaders region exhibits relatively high values in the secondary sector location index. This can be attributed to industrial activities linked to local crops and, in some cases, to mining activities (as observed in Jujuy, Salta, and Mendoza). In the rest of the northern regions (the North National Territories and the North & West Laggard region), and especially towards the end of the period analyzed, the location index for the secondary sector takes relatively low values, contrasting with the prominence of the tertiary sector (see **Table A4.6** in appendix). For years with available data, further calculations of the location index with greater sectoral openness indicate that this relatively heightened presence of the tertiary sector is linked to the substantial influence of the government sector in these territories.

Besides the high relative industrialization localization in the primary urban center (Capital Federal), several provinces stand out for exhibiting notably higher secondary location indices, in some cases even with values above 2. This indicates a secondary sector share in their economy more than double that of the entire country. Notable examples include Chubut and Neuquén, particularly in 1937 and 1946 (see **Table A4.6** in the appendix), both part of the South National Territories (Patagonia). Chubut initially concentrated a large share of the country's mining value added due to its oil activity. However, over time, it lost its share, as the exploitation of other deposits across the country (notably oil in Santa Cruz and metal minerals in Jujuy) increased. In Neuquén, the period of high localization of the secondary sector was linked to the construction sector.

The evidence of regional disparities in the sectoral composition of GDP laid the groundwork to explore the extent to which these differences translate into disparities in GDP per worker, as highlighted in **Section 4.4.2**. As noted earlier, even if productivities within each economic sector are similar across the country, regional disparities in aggregate productivity can still arise, due to, for example, regional specialization in higher productivity sectors. To measure the extent of this phenomenon, a shift-share analysis methodology is employed, as proposed by Esteban (2000), and also used by Ezcurra *et al.* (2005) for Europe and Badia-Miró (2014) for the Chilean regions.

The methodology involves decomposing the differences between the GDP per worker of a province and the country's total into three factors: differences in sectoral composition (μ_i), differences in productivity (π_i), and an allocation component (α_i). The first factor measures the differences attributed to a distinct sectoral structure, assuming identical productivity across provinces within a given sector, while allowing for different productivities across sectors. The second factor measures the differences attributed to provincial characteristics, such as endowments of certain province-specific factors, which exert the same influence on productivity across all sectors. The third factor is a combination of the first two and can be interpreted as the contribution to regional differences derived from specialization in those activities where the region is most competitive. Formally, this implies that the relative difference between a province's GDP per worker (y_i) and that of the whole country (y) is given by[26]:

$$\frac{y_i - y}{y} = \mu_i + \pi_i + \alpha_i \tag{4.4}$$

[26] In the original publication, Esteban (2000) expressed each factor in terms of absolute differences with respect to the national GDP per worker. To ensure comparability across years and avoid dependence on monetary units, the decision has been made to express them in relative terms in the present analysis.

To carry out the decomposition, it is necessary to begin with the understanding that the GDP per worker (either for the country or a specific province) can be expressed as the average of sectoral GDP per worker, weighted by the share of workers in each sector (in this case, three sectors). Therefore, with y_{si} representing the GDP per worker of sector s in a province i, y_s representing the same for the whole country, p_{si} representing the proportion of workers in sector s within a province i ($\sum_{s=1}^{3} p_{si} = 1$), and p_s representing the proportion of workers in sector s in the country:

$$y_i = \sum_{s=1}^{3} p_{si} \times y_{si} \tag{4.5}$$

$$y = \sum_{s=1}^{3} p_s \times y_s \tag{4.6}$$

Using this, the μ_i factor is determined by calculating, for each province, what its GDP per worker would be, based on its employment sector composition (p_{si}) but with the national productivity of each sector (y_s). This result is then compared to the national GDP per worker (y), which makes it possible to capture the differences arising from the province-specific sectoral composition linked to productivity variations across sectors. Formally:

$$\mu_i = \frac{\left(\sum_{s=1}^{3} p_{si} \times y_s\right) - y}{y} \tag{4.7}$$

The second factor (π_i) is obtained by calculating a hypothetical GDP per worker for each province using its sectoral productivity (y_{si}), but assuming the same employment composition as the entire country (p_s). The comparison with the national GDP per worker captures the differences resulting from productivity variations within sectors between provinces:

$$\pi_i = \frac{\left(\sum_{s=1}^{3} p_s \times y_{si}\right) - y}{y} \tag{4.8}$$

Last, the allocation component (α_i) indicates the efficiency with which each province allocates its resources among the different economic sectors. Positive values will indicate that a province is specialized, in relative terms, in sectors with higher productivity than the national average. This is given by:

$$\alpha_i = \frac{\sum_{s=1}^{3} (p_{si} - p_s)(y_{si} - y_s)}{y} \tag{4.9}$$

QUAERERE VERUM
Universidad de
San Andrés

The values of the three components for the Argentine provinces for the years 1914, 1946, and 1959[27] are illustrated in **Figure 4.10**. The decomposition is based on GDP per worker and employment data for each sector and province, as described in **Section 4.2** and presented in **Tables A4.2** and **A4.3**. That section also addresses some issues related to the comparability of sectoral composition across years. Additionally, **Figure 4.10** clearly shows that most of the differences in GDP per worker between the provinces and the entire country can be primarily attributed to productivity differentials (π_i). In all cases, the component of sectoral composition differences (μ_i) plays a minor role. In other words, the variations in aggregate GDP per worker between provinces may be more closely associated with general productivity differentials than with variations in productivity between sectors and different compositions.

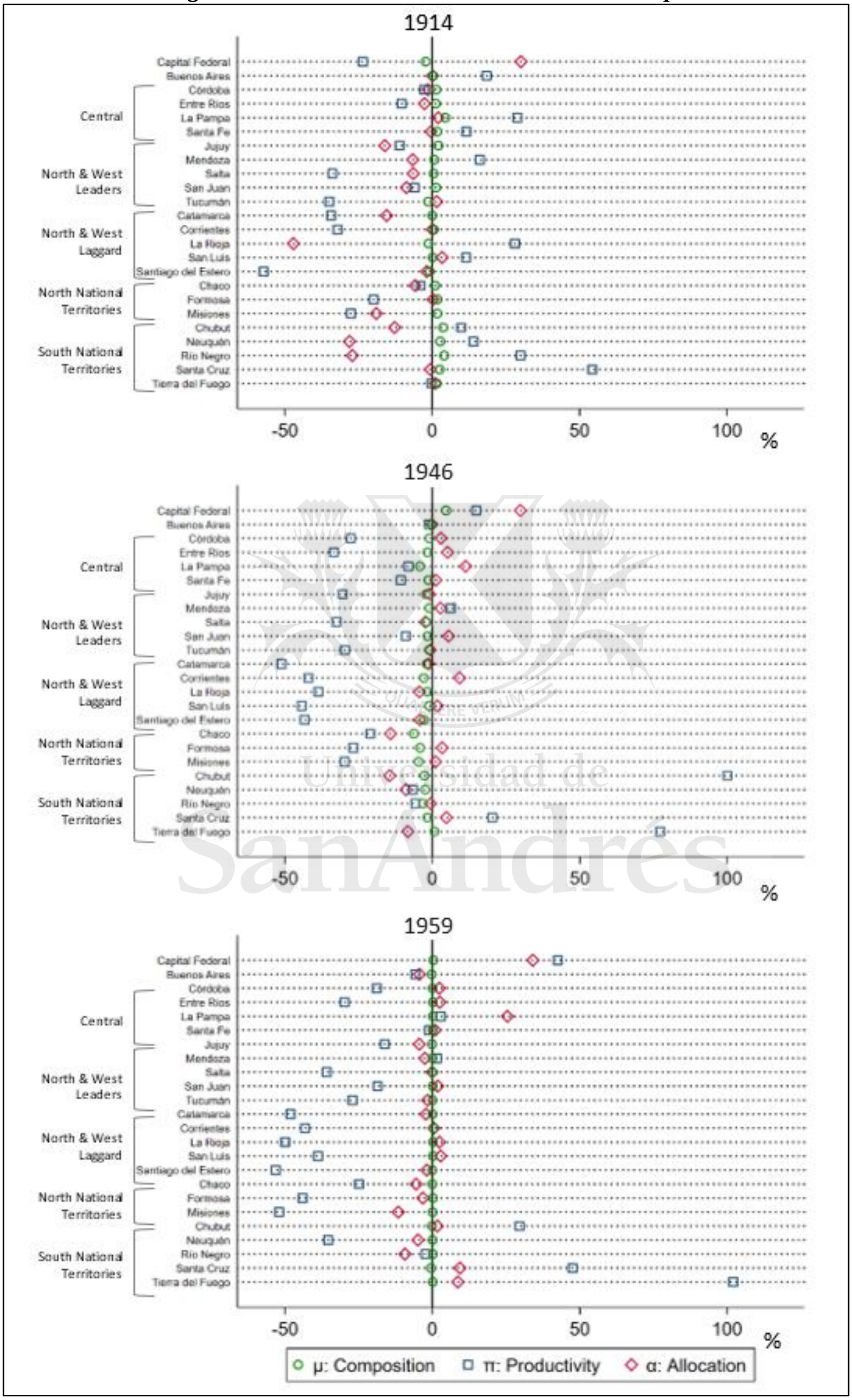
In this sense, the most notable cases include the positive productivity components observed in the provinces of South Patagonia (Chubut, Santa Cruz, and Tierra del Fuego), aligning with their consistently high GDP per worker levels throughout the period. Conversely, the lagging provinces of the North & West Laggard region and, to a lesser extent, those in the North National Territories, stand out for displaying negative values in this component. A distinctive case emerges with Capital Federal, the only one where the allocation component plays a relevant role in all the years considered. This is the result of a combination of high productivity and specialization in sectors with relatively higher productivity compared to the rest of the country.

The methodology used above is valuable for understanding how variations in the composition of economic sectors across provinces and variations in productivity within these sectors contribute to inter-provincial disparities in GDP per worker. However, these measures are province-specific, potentially limiting the identification of overarching patterns. Consequently, employing an aggregated indicator that consolidates provincial values into a single measure for each year would enhance the depth of analysis and broaden the perspective. The Theil index, widely used to obtain aggregate measures of regional inequalities, has a valuable property for this purpose. Specifically, the index can be decomposed into a component that measures inequality within groups and another that does so between groups.

QUAERERE VERUM
Universidad de
SanAndrés

[27] The lack of data on the number of workers by province and sector for 1937 and 1953 makes it impossible to include these years in the analysis.

Figure 4.10: GDP Per Worker Differences Decomposition



Source: own elaboration.

In the context of this study, each year contains three productivity measures for each of the 24 provinces: GDP per worker across the primary, secondary, and tertiary sectors (see **Table A4.5**). The data enable the differentiation of two sources of variation: the presence of sectors that exhibit higher productivity regardless of the province, and, conversely, the existence of provinces that demonstrate higher productivity within a given sector. The Theil index gauges the total inequality across the 72 observations[28] for each year. By categorizing observations based by sector, and through the decomposability property of the index, it is possible to distinguish the portion attributable to productivity differences among sectors from that arising from provincial differences within a sector.

Formally, to perform this decomposition, the first step is to compute the Theil index from the provincial GDP per worker for each sector s separately (T_s):

$$T_s = \sum_{i=1}^{N_s} \left(\frac{y_{si}}{\bar{y}_s}\right) \ln\left(\frac{y_{si}}{\bar{y}_s}\right) \tag{4.10}$$

Being N_s the number of sectors (in this case, 3) and $\bar{y}_s$ the simple averarge of the 24 provincial GDP per worker of sector s.

Having the Theil index T_s for each of the three sectors (primary, secondary, tertiary), the aggregated (and unweighted[29]) Theil index (T_A) can be obtained as follows:

Universidad de San Andrés

$$T_A = \underbrace{\sum_{s=1}^{3}\left(\frac{Y_s}{\sum_{s=1}^{3} Y_s}\right) T_s}_{T_W} + \underbrace{\sum_{s=1}^{3}\left(\frac{Y_s}{\sum_{s=1}^{3} Y_s}\right) \ln\left(\frac{Y_s / \sum_{s=1}^{3} Y_s}{N_s / \sum_{s=1}^{3} N_s}\right)}_{T_B} \tag{4.11}$$

$$T_A = T_W + T_B$$

where $Y_s = \sum_{i=1}^{N} y_{si}$.

On the one hand, the first term on the right side of the equation (T_W) groups the inequality within each sector. Thus, T_W represents the share of total inequality attributed to productivity differentials across provinces within a specific sector. On the other hand, the second term on the

[28] In the index calculated in this way, given a province i, there is a different observation of GDP per worker for each sector s of the province. That is, for example, for Buenos Aires there will be three observations: GDP per worker for the primary, secondary and tertiary sectors.

[29] It is unweighted in the sense that it does not consider the weight of each sector in the total economy of a province.

right side of the equation (T_B) represents the inequality arising from differences in productivity across sectors.

Table 4.5 presents the Theil inequality index applied to provincial productivity measures for each sector (provincial sectoral GDP per worker) for the years 1914, 1946, and 1959, along with its decomposition based on equation (4.11)[30]. The results indicate that the predominant source of inequality lies in productivity differences between provinces (T_W) rather than between sectors (T_B). Thus, according to the measures presented, the observed disparities in GDP per worker (**Figure 4.6** and **Table A4.5**) do not seem to be decisively explained by the provincial differences in the sectoral structure of their economies shown in **Figure 4.9** and **Table A4.6**. These results are consistent with those obtained through Esteban's (2000) methodology, where the component capturing the differences in GDP per capita generated by the province-specific sectoral composition (μ_i) was found to be of minor relevance in all cases.

Table 4.5: Decomposition of Theil Index of Sectoral GDP Per Worker

Year	T	T_W	T_B
	Theil index		
1914	0.1079	0.0939	0.0140
1946	0.1446	0.1421	0.0025
1959	0.1743	0.1673	0.0069
	Share (%)		
1914	100	87	13
1946	100	98	2
1959	100	96	4

Source: own elaboration.

Furthermore, upon comparing 1914 with subsequent years, a distinct pattern becomes evident: there is a simultaneous increase in total inequality (T_A), alongside a decrease in inequality between sectors (T_B). Two main conclusions can be drawn from these observations. First, the increase in total inequality is consistent with the patterns highlighted in the previous sections, offering no support for Williamson's (1965) hypothesis. Contrary to the hypothesis, there is no subsequent decrease in inequality after an initial increase. Second, the already low relevance of existing differences in sectoral structure in explaining productivity differences in 1914 (accounting for 13% of total inequality) weakens even further over time. Thus, it becomes necessary to

[30] The aggregated Theil indexes T_A in **Table 4.5** and **4.1** (third section) do not coincide because the former is constructed using three observations per province (one for each sector, see footnote 28) while the latter uses only one observation (the "global" or aggregated GDP per worker).

explore additional explanations for regional productivity differences. Factors such as economies of scale, exemplified by agglomeration effects in Capital Federal, and the quantity of natural resources endowment in South Patagonia, warrant further investigation. The next chapter examines the factors related to the interaction among regions that influence their convergence.

4.4.6- Within-sector Convergence Analysis

Throughout this chapter, there has been consistent reference to the existence of regional disparities in per capita productivity within the Argentine case. It has been observed that, in general, these disparities do not seem to have diminished during the ISI period. As mentioned earlier in this section, authors such as Esteban (2000) and Ezcurra *et al.* (2005) suggest that while regional disparities may persist, they are not incompatible with processes of regional convergence in value added per worker, particularly if this convergence occurs at the sectoral level without significant changes in the economic structure.

Related to that, Rodrik (2013) further explains that this convergence is likely to take place in specific sectors and may not be sufficient to translate into aggregate convergence. Particularly, regarding the first point, he argues that unconditional convergence tends to occur in the modern parts of the economy, especially in the manufacturing sector, rather than across the entire economy. He attributes convergence in this sector to its inherently more competitive nature compared to other sectors, such as traditional agriculture, and many non-tradable services. Regarding the second point, Rodrik proposes three key factors that account for the absence of aggregate convergence. First, nonmanufacturing sectors do not exhibit convergence. Secondly, the small size of the manufacturing sector in poorer economies limits its impact on aggregate convergence. Lastly, the shift of labor to more productive manufacturing is not sufficiently and systematically greater in those poorer economies.

To the best of my knowledge, no studies have yet explored sectoral convergence dynamics across Argentine regions during the easy ISI period. To address this gap, advantage is taken of the newly available data on sectoral GDP per worker in the provinces. Specifically, sectoral unconditional convergence is examined by estimating the growth regression using equation (4.1) separately for each sector.

The estimation results in **Table 4.6** reveal significant convergence within each of the three sectors of the economy during the 1914-1946 period. However, this sectoral convergence did not fully extend to the overall economy. While there is also statistically significant convergence across provinces in aggregate GDP per worker (first section of the table), the rate can be considered low, with a half-life of 86 years.

Table 4.6: Growth Regressions by Economic Sector

Period	**1914-1946**		**1946-1959**		**1914-1959**	
Dependent: GDP per worker growth						
lnGDPpw (β)	-0.0080	**	0.0029		-0.0001	***
se(β)	0.0038		0.0100		0.0033	
p-value (β)	0.0459		0.7772		0.9872	
Speed	0.0093		-0.0028		0.0001	
Half-life	86				13061	
Dependent: Primary sector GDP per worker growth						
lnGDPpw (β)	-0.0138	***	0.0008		0.0007	
se(β)	0.0034		0.0100		0.0036	
p-value (β)	0.0006		0.9369		0.8457	
Speed	0.0182		-0.0008		-0.0007	
Half-life	50					
Dependent: Secondary sector GDP per worker growth						
lnGDPpw (β)	-0.0218	***	-0.0287	**	-0.0064	**
se(β)	0.0038		0.0077		0.0026	
p-value (β)	0.0000		0.0012		0.0213	
Speed	0.0375		0.0359		0.0076	
Half-life	31		24		108	
Dependent: Tertiary sector GDP per worker growth						
lnGDPpw (β)	-0.0260	***	-0.0098	**	-0.0177	***
se(β)	0.0063		0.0090		0.0039	
p-value (β)	0.0004		0.2884		0.0002	
Speed	0.0559		0.0105		0.0354	
Half-life	26		70		39	

se: robust standard errors
*** p < 0.01 ; ** p < 0.05 ; * p < 0.01
Constant term included in the regressions but not shown in the table.
Source: own elaboration.

In the period that followed (1946-1959), the previously observed convergence in the aggregate vanished. Similar patterns emerged in both primary and tertiary sectors, where convergence ceased. The secondary sector, however, maintained the pattern of convergence observed in the previous period. This aligns with Rodrik's (2013) hypothesis, suggesting that unconditional convergence primarily unfolds in more modern sectors associated with the manufacturing industry and may not necessarily extend to the entire economy, as discussed earlier.

In summary, the initial results in the preceding section highlight remarkable differences in the sectoral structure of GDP across Argentine regions during the easy ISI period. However, the analyses based on shift-share methodology and Theil decomposition in the same section suggest that existing regional disparities in GDP per worker seem to be more closely associated with general productivity differences between provinces rather than differences arising from distinct

Universidad de San Andrés

sectoral compositions with varying productivity levels. The convergence analysis presented in this section further suggests that, within sectors, provincial productivity has only converged in the secondary sector throughout the entire period under study. Moreover, even in cases when convergence has been observed in other sectors, it has not been fully transmitted to the overall economy.

4.5- Final Comments on the New Results

The first half of the 20th century was marked by major global events, including two world wars and the international crisis of the 1930s. These events precipitated worldwide economic changes, such as the rise of protectionism and increased state involvement in economies. Notably, among these transformations, an import substitution industrialization process emerged in underdeveloped countries, particularly in Latin America. The responses to this process were heterogeneous in the evolution of regional economies, especially in the large countries of the region, such as Brazil, Mexico, and Argentina, given their internal territorial heterogeneity.

In the Argentine case, the absence of aggregate economic measures at the regional level, such as provincial GDP, has posed challenges for studying intra-country dynamics during the period, especially when attempting accurate comparisons. To address some of these statistical deficiencies, Aráoz & Nicolini (2020) and **Chapter III** of this study provide GDP estimates for all Argentine provinces for specific years during the first half of the 20th century (1914, 1937, and 1946). These provincial GDPs are also disaggregated into three economic sectors in 1914 and 14 sectors in 1937 and 1946.

With the inclusion of these new data, along with that already available for the 1950s (1953 and 1959), it became possible to analyze regional dynamics in terms of population, GDP, and inequality in GDP per capita and per worker during the “easy” or “light” stage of Argentine industrialization. Many of the quantitative results obtained support the prevailing view in Argentine literature for this period, including the concentration of economic activity and population in the Pampean region, particularly in Buenos Aires and Capital Federal, as well as the existence of significant income disparities measured by GDP per capita and per worker. Moreover, the analysis confirms the presence of high-income regions relative to the rest of the country, such as Capital Federal and territories located in South Patagonia (Santa Cruz, Chubut, and Tierra del Fuego), while also identifying lagging regions, mainly in the country’s north (such as Santiago del Estero, Catamarca, and Corrientes).

Additionally, this research also uncovered results that challenge the traditional literature’s perception of the Pampean region’s success during the ISI period. While the expected economic success was observed in Capital Federal concerning relative per capita and per worker GDP evolution, the same cannot be said for Buenos Aires. In the latter, GDP growth was extensive, thus not reflecting an increase in per capita or per worker terms relative to the entire country. Furthermore, there was also a decrease in GDP share for the rest of the Pampean region (Central region) during that period. Despite being generally perceived as one of the most industrialized regions (after Capital Federal and Buenos Aires), its secondary share in GDP was found to be among the lowest in the country at the time.

Regarding regional disparities, the research also revealed that, although the regions with the highest GDP per capita exhibited higher employment rates, disparities in GDP per worker remained significant. Concerning the dynamics of GDP per capita disparities, after a reduction in the gap during the agro-export period (as documented by Aráoz & Nicolini, 2016), regional disparities increased in the subsequent period, which covers World War I, the international crisis, and the years preceding World War II.

The evidence for Argentina does not entirely align with the stylized fact proposed by Williamson (1965), who argues that as an economy develops, particularly during an industrialization process, inequality is expected to initially increase and then reverse. In the Argentine context, after a period of rising regional inequality, it seemed to decrease slightly during World War II, but then increased again. The first phase of rising inequality coincides with a period of severe international shocks, while the second phase coincides with a period of high state intervention in the Argentine economy.

QUAERERE VERUM
Universidad de
SanAndrés

The increase in regional inequality can be attributed to the fact that the territories with the highest GDP per capita at the beginning of the period also experienced, by far, the highest relative growth (contrary to what is necessary for convergence). These territories include Capital Federal, the country's main urban center, where agglomeration economies appear to have played a central role, and certain territories of Patagonia, in the south of the country, which witnessed growth linked to the exploitation of its oil resources and gained momentum during the period.

Conversely, during the Second World War, agglomeration and endowment effects seemed to operate more evenly, and there was also convergence among the middle-income territories. In line with Mankiw *et al*. (1992), it was observed that factors such as differences in human capital seem to explain part of the variations in terms of regional growth patterns.

Finally, while significant heterogeneities exist in the economic structure of the different regions, they do not seem to play a fundamental role in explaining regional asymmetries in terms of productivity. The results suggest that this is because productivity exhibits more diversity across provinces than across sectors. Additionally, for the Argentine case, the study reveals that even when convergence is observed in the productivity of each sector individually, it does not necessarily lead to convergence in the aggregate. Regarding sectoral convergence, the results align with Rodrik's (2013) hypothesis, which suggests that a higher intensity of convergence is expected in industrial sectors compared to others.

In summary, the research sheds light on the intricate nature of regional productivity disparities, emphasizing the need to grasp both regional and sectoral dynamics for a comprehensive understanding of the overall economic performance of Argentine regions.

QUAERERE VERUM
Universidad de
SanAndrés

4.6- Appendix Chapter IV

Table A4.1: Gross Domestic Product, Population, and Workers in Argentine Provinces

	GDP (millions of 1950 m$n)					Population (thousands)					Workers (thousands)		
Provinces	**1914**	**1937**	**1946**	**1953**	**1959**	**1914**	**1937**	**1946**	**1953**	**1959**	**1914**	**1946**	**1959**
Capital Federal	5,289	11,355	16,556	19,357	19,917	1,599	2,582	2,968	2,979	2,968	757	1,417	1,226
Buenos Aires	5,936	9,733	13,737	20,296	21,241	2,102	3,672	4,251	5,222	64,64	746	1,783	2,584
Catamarca	118	105	171	207	234	101	138	146	159	170	35	48	51
Chaco	95	438	706	1,149	1,097	51	306	426	480	526	16	154	172
Chubut	58	410	512	614	686	23	71	92	120	138	9	36	57
Córdoba	1,759	3,184	3,215	4,240	4,865	745	1,288	1,488	1,625	1,736	270	554	635
Corrientes	546	639	831	902	883	350	465	522	538	541	119	165	167
Entre Ríos	869	1,125	1,371	1,856	1,800	430	673	782	800	802	147	250	269
Formosa	46	164	215	304	264	19	84	112	141	172	8	38	54
Jujuy	177	224	337	537	608	78	138	165	199	233	35	65	84
La Pampa	307	448	499	614	734	102	184	168	165	159	34	65	62
La Rioja	151	96	147	179	185	80	103	110	120	127	28	34	38
Mendoza	600	875	1,790	2,504	2,623	281	494	584	691	804	81	212	288
Misiones	62	219	446	529	410	56	174	244	308	377	17	86	122
Neuquén	54	130	192	227	210	30	69	86	98	109	9	30	38
Río Negro	102	208	361	600	579	43	110	133	120	180	14	51	71
Salta	234	401	523	735	827	144	238	288	345	401	58	106	141
San Juan	197	264	644	736	864	121	210	259	303	344	34	87	113
San Luis	276	199	235	328	353	117	160	164	171	173	36	53	60
Santa Cruz	54	132	210	306	410	11	38	42	42	51	5	22	29
Santa Fe	2,597	4,235	4,705	5,890	6,241	913	1,513	1,695	1,786	1,849	343	675	682
Santiago del Estero	291	364	523	706	553	264	394	469	481	477	109	135	134
Tierra del Fuego	12	29	40	63	82	3	5	5	7	7	2	3	4
Tucumán	611	837	1,063	1,606	1,620	335	497	588	675	763	140	198	247
ARGENTINA	20,441	35,814	49,030	64,486	67,288	7,996	13,608	15,787	17,572	19,570	3,052	6,267	7,329

Sources: see text on **Section 4.2**.

QUAERERE VERUM
Universidad de San Andrés

Table A4.2: Sectoral Gross Domestic Product in Argentine Provinces (Millions of 1950 m$n)

Year	**1914**			**1937**			**1946**			**1953**			**1959**		
Provinces	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**
Capital Federal	18	1,995	3,276	9	3,266	8,080	13	6,111	10,433	10	7,224	12,123	0	7,560	12,357
Buenos Aires	3,058	1,294	1,585	3,907	1,960	3,866	4,421	4,306	5,011	4,556	8,115	7,624	4,809	8,976	7,457
Catamarca	42	29	47	39	9	56	40	42	89	39	55	113	41	70	124
Chaco	30	40	25	164	75	199	273	139	294	473	261	415	404	255	437
Chubut	30	7	22	65	255	90	100	278	134	144	236	234	194	277	215
Córdoba	921	437	402	1,847	266	1,071	1,228	548	1,439	1,433	971	1,836	1,709	1,259	1,896
Corrientes	271	138	137	406	25	208	459	74	298	395	117	390	342	120	421
Entre Ríos	354	237	278	563	115	447	632	188	551	650	363	843	661	347	792
Formosa	26	11	9	105	7	52	111	28	76	153	42	109	114	39	111
Jujuy	65	74	38	57	82	85	78	123	136	126	210	201	170	239	200
La Pampa	219	25	62	282	19	147	286	45	168	369	44	201	451	64	219
La Rioja	45	29	78	37	10	48	46	37	64	46	39	94	57	28	100
Mendoza	111	271	218	181	141	554	680	507	603	754	720	1031	757	829	1,037
Misiones	11	22	29	97	9	113	216	51	180	241	64	224	102	75	233
Neuquén	24	13	17	33	55	42	28	90	73	39	80	108	35	69	106
Río Negro	53	12	36	81	32	95	157	66	138	229	136	235	177	161	241
Salta	81	76	77	97	131	173	128	158	238	225	201	309	263	247	317
San Juan	59	69	69	81	31	151	293	111	241	262	154	320	344	205	316
San Luis	150	66	59	96	17	86	84	39	112	85	80	163	126	65	163
Santa Cruz	27	9	18	67	11	55	90	39	81	142	69	94	161	150	99
Santa Fe	1,188	538	872	1,754	595	1,886	1,605	961	2,139	1,644	1,587	2,660	1,755	1,889	2,597
Santiago del Estero	151	81	60	95	69	200	125	138	260	268	148	290	139	134	280
Tierra del Fuego	6	2	4	17	5	7	21	6	12	25	13	25	44	16	23
Tucumán	106	303	202	192	217	428	281	252	531	474	451	682	462	422	736
ARGENTINA	7,046	5,777	7,619	10,272	7,401	18,140	11,394	14,335	23,301	12,781	21,381	30,324	13,316	23,495	30,476

Sources: see text on **Section 4.2**

Universidad de San Andrés

Table A4.3: Sectoral Workers in Argentine Provinces (Thousands)

Year	**1914**			**1946**			**1959**		
Provinces	**Primary**	**Secondary**	**Tertiary**	**Primary**	**Secondary**	**Tertiary**	**Primary**	**Secondary**	**Tertiary**
Capital Federal	42	285	429	9	588	819	7	470	749
Buenos Aires	244	214	287	456	608	719	335	1,139	1,110
Catamarca	16	13	6	19	11	18	15	16	21
Chaco	7	5	4	96	23	35	77	43	52
Chubut	5	1	2	15	9	12	16	20	21
Córdoba	137	76	58	195	125	234	156	205	273
Corrientes	52	38	29	78	26	61	71	30	66
Entre Ríos	65	39	43	101	46	103	90	70	110
Formosa	4	2	2	20	5	12	28	10	17
Jujuy	20	9	6	21	23	21	31	25	27
La Pampa	24	4	7	35	10	20	27	13	22
La Rioja	11	13	4	14	6	14	10	11	18
Mendoza	32	23	27	67	62	83	95	84	110
Misiones	9	4	4	45	18	23	64	23	35
Neuquén	6	2	1	12	7	11	12	11	15
Río Negro	10	2	3	25	9	18	30	16	25
Salta	26	19	13	41	26	39	45	41	55
San Juan	16	9	9	32	22	33	41	29	43
San Luis	15	12	8	20	10	23	15	18	27
Santa Cruz	3	1	2	8	6	8	8	12	9
Santa Fe	150	76	117	247	156	272	156	231	296
Santiago del Estero	44	47	18	60	27	48	43	41	50
Tierra del Fuego	1	0	1	1	0	2	1	1	2
Tucumán	43	60	38	61	63	75	81	72	95
ARGENTINA	981	954	1,118	1,677	1,887	2,703	1,451	2,631	3,246

Sources: see text on **Section 4.2**.

QUAERERE VERUM
Universidad de
SanAndrés

Table A4.4: Gross Domestic Product, Population, and Workers in Argentine Provinces - Shares

	GDP share (%)					Population share (%)					Workers share (%)		
Provinces	**1914**	**1937**	**1946**	**1953**	**1959**	**1914**	**1937**	**1946**	**1953**	**1959**	**1914**	**1946**	**1959**
Capital Federal	25.87	31.71	33.77	30.02	29.60	19.99	18.98	18.80	16.95	15.17	24.79	22.60	16.73
Buenos Aires	29.04	27.18	28.02	31.47	31.57	26.29	26.99	26.92	29.71	33.03	24.43	28.45	35.26
Catamarca	0.58	0.29	0.35	0.32	0.35	1.27	1.01	0.93	0.91	0.87	1.15	0.77	0.70
Chaco	0.46	1.22	1.44	1.78	1.63	0.64	2.25	2.70	2.73	2.69	0.51	2.46	2.35
Chubut	0.29	1.15	1.04	0.95	1.02	0.29	0.52	0.58	0.68	0.71	0.28	0.57	0.78
Córdoba	8.61	8.89	6.56	6.57	7.23	9.32	9.47	9.43	9.25	8.87	8.85	8.84	8.66
Corrientes	2.67	1.78	1.69	1.40	1.31	4.37	3.41	3.30	3.06	2.76	3.90	2.64	2.28
Entre Ríos	4.25	3.14	2.80	2.88	2.67	5.38	4.95	4.95	4.55	4.10	4.82	3.99	3.67
Formosa	0.22	0.46	0.44	0.47	0.39	0.24	0.62	0.71	0.80	0.88	0.27	0.61	0.74
Jujuy	0.87	0.63	0.69	0.83	0.90	0.98	1.01	1.05	1.13	1.19	1.15	1.03	1.14
La Pampa	1.50	1.25	1.02	0.95	1.09	1.28	1.36	1.07	0.94	0.81	1.11	1.03	0.85
La Rioja	0.74	0.27	0.30	0.28	0.28	1.00	0.76	0.70	0.68	0.65	0.93	0.54	0.52
Mendoza	2.93	2.44	3.65	3.88	3.90	3.52	3.63	3.70	3.93	4.11	2.66	3.39	3.93
Misiones	0.30	0.61	0.91	0.82	0.61	0.70	1.28	1.54	1.75	1.93	0.55	1.37	1.67
Neuquén	0.26	0.36	0.39	0.35	0.31	0.37	0.51	0.54	0.56	0.56	0.30	0.48	0.52
Río Negro	0.50	0.58	0.74	0.93	0.86	0.53	0.81	0.84	0.68	0.92	0.47	0.81	0.97
Salta	1.15	1.12	1.07	1.14	1.23	1.80	1.75	1.83	1.96	2.05	1.91	1.69	1.92
San Juan	0.97	0.74	1.31	1.14	1.28	1.51	1.54	1.64	1.72	1.76	1.12	1.39	1.54
San Luis	1.35	0.56	0.48	0.51	0.52	1.46	1.18	1.04	0.97	0.89	1.17	0.85	0.82
Santa Cruz	0.26	0.37	0.43	0.47	0.61	0.13	0.28	0.27	0.24	0.26	0.17	0.35	0.39
Santa Fe	12.70	11.82	9.60	9.13	9.27	11.41	11.12	10.74	10.16	9.45	11.25	10.77	9.30
Santiago del Estero	1.43	1.02	1.07	1.09	0.82	3.30	2.90	2.97	2.74	2.43	3.56	2.15	1.83
Tierra del Fuego	0.06	0.08	0.08	0.10	0.12	0.03	0.04	0.03	0.04	0.04	0.06	0.05	0.06
Tucumán	2.99	2.34	2.17	2.49	2.41	4.19	3.65	3.72	3.84	3.90	4.59	3.16	3.37
ARGENTINA	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Sources: own calculation based on **Table A4.1**.

Universidad de San Andrés

Table A4.5: Relative Per Capita and Per Worker GDP

	Relative GDP per capita					Relative GDP per worker		
Provinces	**1914**	**1937**	**1946**	**1953**	**1959**	**1914**	**1946**	**1959**
Capital Federal	1.29	1.67	1.80	1.77	1.95	1.04	1.49	1.77
Buenos Aires	1.10	1.01	1.04	1.06	0.96	1.19	0.98	0.90
Catamarca	0.46	0.29	0.38	0.35	0.40	0.50	0.46	0.50
Chaco	0.73	0.54	0.53	0.65	0.61	0.91	0.58	0.69
Chubut	0.98	2.19	1.80	1.39	1.44	1.01	1.83	1.31
Córdoba	0.92	0.94	0.70	0.71	0.82	0.97	0.74	0.84
Corrientes	0.61	0.52	0.51	0.46	0.47	0.69	0.64	0.58
Entre Ríos	0.79	0.63	0.56	0.63	0.65	0.88	0.70	0.73
Formosa	0.95	0.74	0.62	0.59	0.45	0.82	0.72	0.53
Jujuy	0.89	0.62	0.66	0.74	0.76	0.75	0.66	0.79
La Pampa	1.17	0.92	0.95	1.01	1.34	1.35	0.99	1.28
La Rioja	0.74	0.35	0.43	0.41	0.43	0.80	0.55	0.53
Mendoza	0.83	0.67	0.99	0.99	0.95	1.10	1.08	0.99
Misiones	0.44	0.48	0.59	0.47	0.32	0.55	0.67	0.36
Neuquén	0.70	0.71	0.72	0.63	0.56	0.89	0.82	0.60
Río Negro	0.93	0.72	0.87	1.36	0.94	1.07	0.90	0.88
Salta	0.64	0.64	0.58	0.58	0.60	0.60	0.63	0.64
San Juan	0.64	0.48	0.80	0.66	0.73	0.87	0.95	0.83
San Luis	0.92	0.47	0.46	0.52	0.59	1.15	0.56	0.64
Santa Cruz	1.96	1.33	1.59	2.00	2.34	1.56	1.23	1.57
Santa Fe	1.11	1.06	0.89	0.90	0.98	1.13	0.89	1.00
Santiago del Estero	0.43	0.35	0.36	0.40	0.34	0.40	0.50	0.45
Tierra del Fuego	1.92	2.18	2.55	2.48	3.24	1.02	1.70	2.11
Tucumán	0.71	0.64	0.58	0.65	0.62	0.65	0.69	0.71
ARGENTINA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Sources: own elaboration based on **Table A4.1**

QUAERERE VERUM Universidad de SanAndrés

Table A4.6: Sectoral GDP Localization Index

Year	**1914**			**1937**			**1946**			**1953**			**1959**		
Provinces	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**	**Prim.**	**Sec.**	**Ter.**
Capital Federal	0.01	1.33	1.66	0.00	1.39	1.40	0.00	1.26	1.33	0.00	1.13	1.33	0.00	1.09	1.37
Buenos Aires	1.49	0.77	0.72	1.40	0.97	0.78	1.38	1.07	0.77	1.13	1.21	0.80	1.14	1.21	0.78
Catamarca	1.04	0.88	1.06	1.30	0.43	1.06	1.02	0.83	1.10	0.95	0.81	1.16	0.88	0.85	1.17
Chaco	0.92	1.49	0.70	1.31	0.83	0.89	1.66	0.67	0.88	2.08	0.69	0.77	1.86	0.67	0.88
Chubut	1.47	0.40	1.02	0.56	3.01	0.43	0.84	1.86	0.55	1.19	1.16	0.81	1.43	1.16	0.69
Córdoba	1.52	0.88	0.61	2.02	0.40	0.66	1.64	0.58	0.94	1.71	0.69	0.92	1.78	0.74	0.86
Corrientes	1.44	0.89	0.68	2.22	0.19	0.64	2.38	0.30	0.75	2.21	0.39	0.92	1.96	0.39	1.05
Entre Ríos	1.18	0.96	0.86	1.74	0.50	0.78	1.98	0.47	0.85	1.77	0.59	0.97	1.85	0.55	0.97
Formosa	1.64	0.82	0.55	2.23	0.20	0.63	2.22	0.44	0.75	2.53	0.42	0.76	2.18	0.42	0.93
Jujuy	1.06	1.48	0.58	0.89	1.77	0.75	1.00	1.25	0.85	1.18	1.18	0.80	1.41	1.12	0.72
La Pampa	2.07	0.29	0.55	2.19	0.20	0.65	2.47	0.31	0.71	3.03	0.21	0.70	3.10	0.25	0.66
La Rioja	0.86	0.67	1.38	1.36	0.50	1.00	1.34	0.86	0.92	1.29	0.66	1.11	1.57	0.43	1.19
Mendoza	0.54	1.60	0.97	0.72	0.78	1.25	1.63	0.97	0.71	1.52	0.87	0.88	1.46	0.91	0.87
Misiones	0.52	1.28	1.23	1.54	0.21	1.02	2.08	0.39	0.85	2.30	0.36	0.90	1.25	0.53	1.26
Neuquén	1.28	0.86	0.84	0.88	2.06	0.64	0.63	1.61	0.81	0.86	1.06	1.01	0.85	0.94	1.12
Río Negro	1.51	0.43	0.96	1.36	0.74	0.90	1.87	0.63	0.80	1.93	0.68	0.83	1.55	0.79	0.92
Salta	1.01	1.14	0.89	0.84	1.58	0.85	1.05	1.03	0.96	1.55	0.82	0.89	1.61	0.86	0.85
San Juan	0.87	1.24	0.94	1.07	0.57	1.13	1.96	0.59	0.79	1.79	0.63	0.92	2.01	0.68	0.81
San Luis	1.58	0.85	0.58	1.68	0.42	0.85	1.54	0.56	1.00	1.31	0.73	1.06	1.80	0.52	1.02
Santa Cruz	1.47	0.56	0.90	1.76	0.40	0.82	1.85	0.64	0.81	2.35	0.68	0.66	1.99	1.05	0.53
Santa Fe	1.33	0.73	0.90	1.44	0.68	0.88	1.47	0.70	0.96	1.41	0.81	0.96	1.42	0.87	0.92
Santiago del Estero	1.51	0.98	0.55	0.91	0.91	1.09	1.03	0.90	1.04	1.92	0.63	0.87	1.27	0.69	1.12
Tierra del Fuego	1.36	0.68	0.91	2.01	0.87	0.48	2.32	0.54	0.64	2.03	0.60	0.84	2.68	0.54	0.62
Tucumán	0.50	1.75	0.89	0.80	1.26	1.01	1.14	0.81	1.05	1.49	0.85	0.90	1.44	0.75	1.00
ARGENTINA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Sources: own elaboration based on data from **Tables A4.2** and **A4.3**.

QUAERERE VERUM
Universidad de
San Andrés

4.7- References

AGUILAR RETURETA, J., BADIA-MIRÓ, M., & HERRANZ-LONCÁN, A. (2020): "Spatial inequality in Chile in the Long run: a paradox of extreme concentration in the absence of agglomeration forces (1890–2017)". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 211-239). Palgrave Macmillan, Cham.

ARÁOZ, M. F. & NICOLINI, E. (2016): "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". *Anales LI Reunión Anual de Asociación Argentina de Economía Política*.

ARÁOZ, M. F. & NICOLINI, E. (2020): "Regional growth and the persistence of regional income inequality in Argentina in the first half of the twentieth century". *Journal Of Latin American Studies*. 52(2), 293-316.

ARÁOZ, M. F., NICOLINI, E. A., & TALASSINO, M. (2020): "Growth and convergence among Argentine provinces since 1895". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 65-95). Palgrave Macmillan, Cham.

BADIA-MIRÓ, M. (2014): "The evolution of the localization of economic activity in Chile in the long run: a case of extreme concentration". In *4th Latin American Economic History Congress (CLADHE)*.

BADIA-MIRÓ, M. (2020): "Spatial inequality in Chile in the Long run: a paradox of extreme concentration in the absence of agglomeration forces (1890–2017)". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 157-182). Palgrave Macmillan, Cham.

BADIA-MIRÓ, M., NICOLNI, E. A., & WILLEBALD, H. (2020b): "Spatial Inequality in Latin America (1895–2010): Convergence and Clusters in a Long-Run Approach". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 343-374). Palgrave Macmillan, Cham.

BADIA-MIRÓ, M., PINILLA, V., & WILLEBALD, H. (2015). *Natural resources and economic growth*. Taylor & Francis.

BADIA-MIRÓ, M., TIRADO-FABREGAT, D. A., & WILLEBALD, H. (2020a): "Introduction: Time, Space and Economics in the History of Latin America". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 1-15). Palgrave Macmillan, Cham.

Universidad de San Andrés

BAER, W. (1972): “Import substitution and industrialization in Latin America: Experiences and interpretations”. *Latin American Research Review*, 7(1), 95-122.

Banco Central de la República Argentina (BCRA) (1976): Sistema de Cuentas del Producto e Ingreso de la Argentina. Vol III: Series Históricas.

BARRO, R. J. (1996): “Determinants of economic growth: A cross-country empirical study”. *NBER*.

BARRO, R. J., & SALA-I-MARTIN, X. (1992): “Convergence”. *Journal of political Economy*, 100(2), 223-251.

BARRO, R. J., & SALA-I-MARTIN, X. (2004): *Economic Growth*. The MIT Press.

BARRO, R. J., SALA-I-MARTIN, X., BLANCHARD, O. J., & HALL, R. E. (1991): “Convergence across states and regions”. *Brookings papers on economic activity*, 107-182.

BAUMOL W. (1986): “Productivity growth, convergence and welfare: what the long run data show”. *American Economic Review*, 76, pp. 1072-85.

BELINI, C. & KOROL, J. C. (2020): *Historia económica de la Argentina en los siglos XX y XXI*. Ed. Siglo XXI.

BELINI, C. (2012): “Industrial exports and Peronist economic policies in post-war Argentina”. *Journal of Latin American Studies*, 285-317.

BELINI, C. (2021): “La Gran Depresión, las políticas económicas y el crecimiento de la industria argentina durante la década de 1930”. In JÁUREGUI, A. & BELINI, C. (comp.): *Desafíos a la innovación. Intervención del Estado e industrialización en la Argentina (1930-2001).* Teseo.

BÉRTOLA, L., & OCAMPO, J. A. (2013): *El desarrollo económico de América Latina desde la Independencia*. Fondo de Cultura Económica.

BÉRTOLA, L., & PORCILE, G. (2006): “Convergence, trade and industrial policy: Argentina, Brazil and Uruguay in the international economy, 1900–1980”. *Revista de Historia Económica-Journal of Iberian and Latin American Economic History*, 24(1), 37-67.

BOLT, J., INKLAAR, R., DE JONG, H., & VAN ZANDEN, J. L. (2018): “Rebasing ‘Maddison’: new income comparisons and the shape of long-run economic development”. *GGDC Research Memorandum*, 174.

QUAERERE VERUM
Universidad de
SanAndrés

BUCCIFERRO, J. R., & FERREIRA DE SOUZA, P. H. (2020): "The evolution of regional income inequality in Brazil, 1872–2015". In *Time and Space: Latin American Regional Development in Historical Perspective* (pp. 131-156). Palgrave Macmillan, Cham.

BULMER-THOMAS, V. (2003). *The economic history of Latin America since independence*. Cambridge University Press.

CAO, H., & VACA, J. (2006): "Desarrollo regional en la Argentina: la centenaria vigencia de un patrón de asimetría territorial". *EURE* (Santiago), 32(95), 95-111.

CAO, H., RUBINS, R., & VACA, J. (2003): "Clasificaciones y agrupamientos de provincias y territorios de la República Argentina". *Asociacion de Administadores Gubermentales*.

CEPAL (2014). *Cambio estructural para la igualdad: una visión integrada del desarrollo*.

Consejo Federal de Inversiones (CFI) (1966): *Analfabetismo en la Argentina. Evolución y Tendencias Actuales*. Buenos Aires: Ediciones del CFI.

Consejo Federal de Inversiones y Centro de Investigaciones Económicas Instituto Torcuato Di Tella (CFI-ITDT) (1965): *Relevamiento de la estructura regional de la economía argentina*. Buenos Aires: Ediciones CFI. (Reprinted from Universidad Torutato Di Tella, 1962).

CORTÉS CONDE R., ORTIZ BATALLA J., D'AMATO L., & DELLA PAOLERA G. (2020): *La economía de Perón*. Edhasa.

CORTÉS CONDE, R. (1979): *El progreso argentino, 1880-1914*. Editorial Sudamericana.

CORTÉS CONDE, R. (2002): "La economía política del peronismo (1946-1955)". *Anuario del Centro de Estudios Históricos "Prof. Carlos SA Segreti"*, 2(2), 210-222.

CORTÉS CONDE, R. (2009): *The political economy of Argentina in the twentieth century*, Cambridge Books.

DE LONG, J. B., & SUMMERS, L. H. (1991): "Equipment investment and economic growth". *The Quarterly Journal of Economics*, 106(2), 445-502.

DELLA PAOLERA, G., & TAYLOR, A. M. (Eds.) (2003). *A new economic history of Argentina*. Cambridge University Press.

DI TELLA, G. & DORNBUSCH, R. (1989): *The Political Economy of Argentina, 1946–83*. Springer.

QUAERERE VERUM
Universidad de
SanAndrés

DÍAZ ALEJANDRO, C. (1970): *Essays on the economic history of the Argentine Republic*. Yale University Press.

Dirección Nacional de Estadística y Censos (DNEC) (1956): Informe demográfico de la República Argentina 1944 - 1954. Buenos Aires.

Dirección Nacional de Estadística y Censos (DNEC) (nd): Censo Nacional de Población 1960.

DURAN, X., MUSACCHIO, A., & DELLA PAOLERA, G. (2017): "Industrial Growth in South America". In O'ROURKE, K. H. & WILLIAMSON, J. G. (eds.): *The Spread of Modern Industry to the Periphery Since 187*. Oxford University Press.

ELÍAS, V. (1995): "Regional economic convergence: The case of Latin American economies". *Estudios de Economía*, 22(2), pp. 159-176.

ESHAG E. & THORP R. (1965): "Economic and social consequences of orthodox economic policies in Argentina in the post-war years". *Bulletin of the Oxford University Institute of Economics & Statistics*, 27(1), pp. 1-44.

ESTEBAN, J. (2000): "Regional convergence in Europe and the industry mix: a shift-share analysis". *Regional science and urban economics*, 30(3), 353-364.

EZCURRA, R., GIL, C., PASCUAL, P., & RAPÚN, M. (2005): "Regional inequality in the European Union: Does industry mix matter?". *Regional Studies*, 39(6), 679-697.

FERRER, A. (2008): *La economía argentina: desde sus orígenes hasta principios del siglo XXI*. Fondo de Cultura económica: Buenos Aires.

FERRERES, O. J. (2010): *Dos siglos de economía argentina. Historia argentina en cifras.* Fundación Norte y Sur.

FIGUERAS, A. J., CRISTINA, D., BLANCO, V., ITURRALDE, I. Y CAPELLO, M. L. (2014): "Un aporte al debate sobre la convergencia en Argentina: la importancia de los cambios estructurales". *Revista Finanzas y Política Económica*, 6(2).

GANSLEY-ORTIZ, A. L. (2018): "Perón and the Argentine Paradox: An Investigation into an Economic Mystery". *Senior Projects Spring*. Bard College.

GERCHUNOFF, P. & LLACH, L. (2018): *El ciclo de la ilusión y el desencanto: políticas económicas argentinas desde 1880 hasta nuestros días*. Crítica Argentina.

GLAESER, E. L., DI TELLA, R., & LLACH, L. (2018): "Introduction to Argentine exceptionalism". *Latin American Economic Review*, 27(1), 1-22.

Universidad de San Andrés

GROTZ, M. & LLACH, J. J. (2013): “Coparticipación casi sin convergencia, 1950-2010”. In *Consecuencias económicas y políticas del federalismo fiscal argentino* (No. 338 (82) (091)). Universidad Nacional de La Plata, La Plata.

GUNTON, T. (2003): “Natural resources and regional development: An assessment of dependency and comparative advantage paradigms”. *Economic geography*, 79(1), 67-94.

HABER, S. (2006): “The political economy of industrialization”. In *The Cambridge Economic History of Latin America, 2*(2006), (pp. 537-584). Cambridge University Press.

HIRSCHMAN, A. O. (1968): “The political economy of import-substituting industrialization in Latin America”. *The Quarterly Journal of Economics*, 82(1), 1-32.

Instituto Nacional de Estadística y Censos (INDEC) (nd): Cuadros inéditos IV Censo General de la Nación año 1947 características económicas de la población. Serie Información Demográfica 2.

KRUGMAN, P. (1991): *Geography and trade*. MIT press.

KRUGMAN, P., & VENABLES, A. J. (1995): “Globalization and the Inequality of Nations”. *The quarterly journal of economics*, 110(4), 857-880.

LUCAS, R. E. (1988): “On the mechanics of economic development”. *Journal of monetary economics*, 22(1), 3-42.

MANKIW, N. G., ROMER, D., & WEIL, D. N. (1992): “A contribution to the empirics of economic growth”. *The quarterly journal of economics*, 107(2), 407-437.

MARINA, A. (2001): “Convergencia económica en Argentina: ¿qué nos dice la evidencia empírica?”. In *Convergencia económica e integración: La experiencia en Europa y América Latina* (pp. 147-162). Ediciones Pirámide.

MARTIN, R., & SUNLEY, P. (1998): “Slow convergence? The new endogenous growth theory and regional development”. *Economic geography*, 74(3), 201-227.

MONFORT, P. (2008): “Convergence of EU regions: Measures and evolution”. *European Commission, Regional Policy*. Brussels.

O’ROURKE, K. H., & WILLIAMSON, J. G. (1999): *Globalization and history: the evolution of a nineteenth-century Atlantic economy*. MIT press.

RAPOPORT, M. (2008): *Historia económica, política y social de la Argentina (1880-2003).* Number 982. Editorial Emecé.

Universidad de San Andrés

RECCHINI DE LATTES, Z., & LATTES, A. (1974): *La Población de Argentina*. CICRED Series. Buenos Aires.

República Argentina (1916): Tercer Censo Nacional de La República Argentina. Buenos Aires: Talleres gráficos de L.J. Rosso y Cia.

RODRIK, D. (2013): "Unconditional convergence in manufacturing". *The Quarterly Journal of Economics*, 128(1), 165-204.

ROMER, P. M. (1986): "Increasing returns and long-run growth". *Journal of political economy*, 94(5), 1002-1037.

ROSÉS, J. R. & WOLF, N. (Eds.) (2019): *The Economic Development of Europe's Regions A Quantitative History since 1900*. London: Routledge.

SALA-I-MARTIN, X. (1996a): "The classical approach to convergence analysis". *The economic journal*, 106(437), 1019-1036.

SALA-I-MARTIN, X. (1996b): "Regional cohesion: evidence and theories of regional growth and convergence". *European economic review*, 40(6), 1325-1352.

SÁNCHEZ-ALBORNOZ, N. (1986): "The Population of Latin America, 1850-1930". In *The Cambridge History of Latin America*, 4, (pp. 121-151). Cambridge University Press.

SOLOW, R. M. (1956): "A contribution to the theory of economic growth". *The Quarterly Journal of Economics*, 70(1), 65-94.

SPRUK, R. (2019): "The rise and fall of Argentina". *Latin American Economic Review*, 28, 1-40.

SWAN, T. W. (1956): "Economic growth and capital accumulation". *Economic record*, 32(2), 334-361.

TAYLOR, A. M. (1994): "Tres fases del crecimiento económico argentino". *Revista de Historia Economica-Journal of Iberian and Latin American Economic History*, 12(3), 649-683.

TAYLOR, A. M. (1998): "On the costs of inward-looking development: price distortions, growth, and divergence in Latin America". *The Journal of Economic History*, 58(1), 1-28

TAYLOR, A. M. (2018): "The Argentina Paradox: microexplanations and macropuzzles". *Latin American Economic Review*, 27(1), 1-17.

QUAERERE VERUM Universidad de SanAndrés

TERRANOVA, L. (2020): “Industrialización por sustitución de importaciones “liviana” en Argentina: caracterización de los establecimientos industriales (1930–1955)”. *Revista de Economía Política de Buenos Aires*, (21), 49-94.

TIRADO-FABREGAT, D. A., BADIA-MIRÓ, M., & WILLEBALD, H. (Eds.) (2020): *Time and Space: Latin American Regional Development in Historical Perspective*. Springer International Publishing: Imprint: Palgrave Macmillan.

TRAPEZNIKOVA, I. (2019): “Measuring income inequality”. *IZA World of Labor*.

WILLIAMSON, J. G. (1965). “Regional inequality and the process of national development: a description of the patterns”. *Economic development and cultural change*, 13(4, Part 2), 1-84.

YOUNG, A. T., HIGGINS, M. J., & LEVY, D. (2008): “Sigma convergence versus beta convergence: Evidence from US county-level data”. *Journal of Money, Credit and Banking*, 40(5), 1083-1093.

QUAERERE VERUM
Universidad de
SanAndrés

CHAPTER V

IMPACT OF SPATIAL EFFECTS ON ARGENTINE REGIONAL CONVERGENCE DURING THE 1950S

5.1- The Spatial Problem[1]

Argentina's historical narrative has consistently been marked by regional imbalances, which persist even today. As early as 1940, Bunge (1940) observed a geographical pattern in the country. He described it as a "hand fan", illustrating the gradual decline in population density, economic capacity, cultural development and living standards as one moves farther away from the capital city. The GDP per capita of Argentine provinces (first-order administrative division) clearly exemplifies this imbalance, revealing an approximately 7 to 1 ratio between the provinces with the highest and lowest per capita GDP in the mid-20th century. Besides, rather than diminishing, these regional differences have increased over time.

In the previous chapters, various aspects concerning the evolution of these imbalances were discussed. It seems that, at least since the beginning of the 20th-century, a contrast has existed between a less developed north and a prosperous center and south. Specifically, in terms of regional dynamics, agglomeration effects seem to have contributed to the relative growth of the country's main urban center (Capital Federal, in the center-east), along with effects linked to the availability of natural resources in the country's south, particularly oil.

In connection with these regional imbalances, the uneven distribution of wealth and well-being across regions and cities has been a source of concern among authorities, policymakers, and researchers in many countries, especially over the last two decades (OECD, 2014; United Nations, 2020). This concern has ignited intense academic debates in fields such as economic geography, regional science, and economic growth theory. A central focus in regional economics has been the negative consequences of these disparities, which may result in undesirable social tensions among and within regions. Such tensions can manifest as discontent, political polarization, erosion of social trust, and threats to national cohesion (International Monetary Fund, 2019). Furthermore, regional divergences can even have detrimental effects on a country's growth (de Dominicis, 2014, and Che & Spilimbergo, 2012). Notably, Sawers (2018) attributes the backwardness of some regions to the relative lag in Argentine growth.

[1] A significant part of this chapter was co-authored with Marcos Herrera Gómez. A very preliminary version can be found in Talassino & Herrera Gómez (2021).

In the debate on economic asymmetries, a central element revolves around the hypothesis of absolute convergence, whereby poorer economies should experience higher growth rates than richer ones, thereby leading to a reduction in disparities over the long run. This hypothesis is theoretically supported by the standard neoclassical growth model. Assuming homogeneous technological progress across regions and diminishing returns to scale, the model anticipates a negative correlation between the initial level of per capita product and economic growth. In other words, regions with lower capital stocks can expect higher returns, allowing for higher relative growth.

The empirical analysis of economic convergence has become a common topic in mainstream economics since the pioneering work of Baumol (1986) and Romer (1986). However, a recent empirical review based on cross-country data (Johnson & Papageorgiou, 2020) finds weak support for this hypothesis over the past fifty years. Indeed, this could be expected from Lucas's (1990) observation that capital flows from rich to poor countries are lower than expected according to neoclassical models. Thus, the lack of capital mobility hinders the equalizing effect predicted by the law of diminishing returns.

Barro & Sala-i-Martin (1992a) also anticipate the possibility of non-convergence among countries when they exhibit high heterogeneity in terms of technology, preferences, natural resources, and government policies. Differences in these factors may lead countries to converge to different stationary states. In this sense, they find evidence in favor of the convergence hypothesis when analyzing similar groups of countries or regions of the same country, since these share a greater degree of homogeneity in their productive and social matrix. They also emphasize that restrictions on labor mobility, more pronounced among countries than within a country, can act against convergence.

In particular, Barro & Sala-i-Martin (2004) analyze within-country data for different countries around the globe, such as the United States, Japan, and some European nations, and their findings reveal a consistent trend of convergence in all cases. However, the evidence for Argentina presented in the previous two chapters of this thesis shows a sustained and at times even increasing regional inequality in GDP per capita, dating back to the late 19th century and persisting to the present day (a more thorough examination of this phenomenon can be found in **Section 5.3**). In other words, the performance of Argentina's provinces can be seen as an exception to the theory of regional convergence.

One possible explanation for this result is that certain heterogeneities influencing growth among countries, may also exist within the Argentine territory. Indeed, as discussed in the previous chapter and supported by studies such as Grotz & Llach (2013) and Marina (2001), when controlling for factors such as human capital (measured, for example, by literacy rate), convergence is found. However, it is crucial to note that this is conditional convergence, meaning that if heterogeneities persist, provinces might not necessarily converge to an identical level of GDP per capita.

Besides, there is an alternative explanation for the lack of convergence in the Argentine context that has not yet been explored. This explanation suggests that interregional interactions may influence growth patterns, consequently shaping the outcome of convergence. As outlined in the previous chapters, distinct geographical patterns characterize the distribution and evolution of GDP per capita across Argentina's diverse administrative units. Specifically, a noticeable economic divide persists between the relatively poor north of the country and a rich south, including the capital. Over the course of much of the 20th century, the southern territories experienced a growing detachment from the rest of the country. Beneath this observed pattern lies the potential existence of interdependence among administrative units, manifesting through various forms such as spillovers, trade, migration, and knowledge transfer, among others.

From a theoretical perspective, a notable shortcoming of neoclassical growth theory (which is the foundation of the convergence hypothesis) lies in its failure to account for spatial interactions. Spatial interdependence and externalities play central roles in alternative theories such as the endogenous growth theory (Aghion & Howitt, 1998) and the New Economic Geography (Puga, 1999; Ertur & Koch, 2007). From an empirical perspective, over the past two decades, the literature on regional economic growth has embraced these perspectives, which is evident in special issues published by Stimson *et al.* (2011) or in the Handbook edited by Capello & Nijkamp (2019), which builds upon and updates its first version (Capello & Nijkamp, 2009).

In line with the above, this chapter incorporates the spatial dimension into the study of Argentine regional convergence, aiming to explain the outcomes presented in the previous chapters that challenge the hypothesis of absolute convergence within the country. The findings reveal that, in Argentina, spatial interactions have a relevant and strong effect, preventing absolute convergence. This observation aligns with similar research conducted in Europe (Le Gallo *et al.*, 2003) and Brazil (Magalhães *et al*., 2005). However, the inclusion of spatial effects appears to result in a more pronounced change in the magnitude of convergence in Argentina.

In connection with the earlier discussion on the link between convergence and the omission of the spatial dimension, Abreu *et al.* (2005) point out that convergence can be affected by spatial effects in terms of both absolute and relative positions. On the one hand, the absolute position is associated with the specific location of an observation in space, such as within a certain climatic zone or a particular country or region. While such factors can contribute to convergence, they may lead to different steady states across regions, as demonstrated in the aforementioned work of Barro & Sala-i-Martin (1992a) for various countries. Moreover, these regional differences,

Universidad de SanAndrés

even if unobserved, are closely tied to the type of productive specialization adopted by each region, since each sector can exhibit different growth patterns depending on the context. All these spatial effects derived from absolute position are often captured in econometric specifications through the inclusion of dummy variables (fixed effects).

On the other hand, the relative position is related to the proximity of one observation to others, where the observed values depend on neighboring values. For example, economic growth in one region can benefit nearby regions through interactions by stimulating demand for goods and services produced in those areas. Incorporating this effect into the econometric specification typically involves modifying the assumption of independence among observations. Consequently, the usual estimation strategy of ordinary least squares (OLS) is not recommended.

The omission of relative spatial effect in OLS regression models results in biased and inefficient coefficients, and, in some instances, inconsistency. To overcome this challenge, since the end of the twentieth century, the empirical literature on convergence has introduced the use of econometric tools that facilitate the incorporation of these effects. This approach, commonly known as spatial econometrics, is detailed in the next section, with key insights provided by references such as Anselin (1988), and LeSage & Pace (2009).

In general, studies using sub-national level data suggest that spatial effects significantly influence regional growth patterns (Rey & Montouri, 1999; Sun *et al.*, 2017). As expected, the inclusion of spatial effects often alters convergence results. However, the change in convergence estimations does not consistently occur in the same direction, as convergence can be either stronger or weaker compared to non-spatial estimation, depending on the country and the temporal period. For example, Rey & Montouri (1999) show for the United States a lower convergence rate when the spatial effects are incorporated in their models. Le Gallo *et al.* (2003) find the opposite in their study of NUTS2 regions in Europe, where weak convergence under OLS becomes stronger with the incorporation of spatial effects. For China, Sun *et al.* (2017) find a comparable result to Le Gallo et al. (2003), although in this case, convergence was already present under OLS.

This heterogeneous impact can be observed in some Latin-American countries. Magalhães *et al.* (2005) show for Brazil that the inclusion of spatial effects increases the convergence rate for the period 1970-1995. However, for the subperiod 1970-1980 convergence is nonsignificant and is even reduced when spatial effects are added. In the case of Mexico, Asuad Sanén & Quintana Romero (2010) found for a null change in the rate. Regarding Colombian regions, Royuela & García (2015) identified a lower convergence rate when the spatial effects are included.

The observed variation in the strength and direction of convergence results due to the inclusion of regional interactions may stem from the intricate nature of these interactions. For example, depending on the nature of the prevailing spillovers, the growth of a geographic unit may benefit its neighbors in some cases, while in others it may come at their expense. In the first case, one channel could be growth coupled with a higher demand for goods and services provided by neighbors. In this scenario, if the growing region is also initially poorer than its neighbors, subtracting the positive effect of the spillover would lead to greater convergence, as this subtraction leaves the richest neighbors in a less favorable position. In the second case, if a geographic unit's growth is based on the extraction of productive factors from its neighbors, it may have a negative effect on them. In this scenario, if the growing region is also initially poorer than its neighbors, netting out the negative spillover effect would result in lower convergence, as the subtraction leaves richer neighbors in an even better position.

Empirical research using spatial econometrics to study these phenomena in Argentina at a subnational level is notably scarce. The primary challenge stems from the limitations in obtaining standardized and geographically disaggregated data for the country. For example, the most recent available estimates for provincial-level GDP using a comparable methodology date back to the year 2004, as discussed in **Chapter I**. Argentina's provincial level, comprising 24 subnational administrative units (23 provinces plus the Autonomous City of Buenos Aires), serves as the standard geographic disaggregation data. However, relying on cross-sectional data with this number of observations does not ensure sufficient reliability for spatial inference results.

In this particular context, the literature lacks quantitative assessments of spatial effects on regional convergence in Argentina throughout its history. A potential approach to address this gap involves using a historical database for the early and late 1950s of over 400 lower-level administrative units, referred to as departments (the subdivision of provinces). This database comprises the only standardized measure of GDP per capita for all departments in the country. With respect to the time period, the 1950s marked a transition in both the role of the state in the economy and the type of industrialization pursued by the country (Eshag & Thorp, 1965; Gerchunoff & Llach, 2018). Efforts were made to reverse the high level of intervention established during the Peronist government (1946-1955). Concurrently, there was a push to promote the development of heavy industry to complement the light industry that had characterized the development during the previous two decades.

Using these data, whose level of disaggregation is higher than that usually employed in regional studies for Argentina, the aim is to present the first quantitative analysis, to the best of current knowledge, of the effect of spatial dependence on regional convergence in Argentine depart-

Universidad de San Andrés

ments. Given that regression models used in the analysis account for the interaction among geographical units (departments), a change in a single department associated with any given explanatory variable will have a direct impact on the department itself and potentially affect all other departments indirectly. Following the methodology outlined by LeSage & Pace (2009), the estimates decompose the results between these two effects.

The preliminary findings, excluding spatial interactions and thereby omitting indirect effects, align with previous studies based on aggregated provincial data, indicating no absolute interdepartmental convergence. However, when incorporating spatial effects and decomposing them, the direct effect reveals absolute convergence, in line with the framework posed by Barro & Sala-i-Martin (1992a). Moreover, the absence of convergence in the total effect arises from spatial spillovers operating counter to the direct effects, thus neutralizing the net effect of convergence. This observation may be linked to the existence of clusters of departments in close proximity to each other, sharing similar GDP per capita levels. In this context, rich departments have a positive effect on the growth of their similarly rich neighbors, while poor departments have a negative effect on their similarly poor neighbors.

The observed spatial dependence among Argentine departments implies that if one department experiences a shock, other departments will also be affected. However, the capacity to transmit (or receive) such shocks may vary among departments. In order to examine spatial heterogeneity in the diffusion of random shocks across the country's departments, the chapter adopts a modified version of Gallo *et al.*'s (2003) approach. This involves the sequential simulation of shocks in each department and the measurement of their effects on the rest of the country. Consequently, the method enables the identification of departments that exert a relatively greater influence on the growth patterns of others while also identifying departments that are more susceptible to being influenced by shocks in other areas.

5.2- β-Convergence and Spatial Literature

5.2.1- Convergence and Spatial Interactions

A central concern within the field of economic growth revolves around the concept of economic convergence. The question of whether the income levels of poorer economies are converging with those of richer ones is crucial for human welfare. The bridging of the economic gap often results in a reduction of poverty levels in the poorer economies, together with improved access to basic necessities such as food, clean water, health care, and education. Additionally, convergence bears implications for the design of public policies. In the presence of convergence, small-scale policy interventions may prove effective in accelerating the transition of poor economies to prosperity. Conversely, in the absence of convergence, large-scale policy interventions may be necessary to push poor economies from one basin of attraction to another (Johnson & Papageorgiou, 2020).

The concept of economic convergence is closely linked to two alternative growth theories, both of which have been extensively researched in the field (Islam, 2003, provides an overview). In broad terms, neoclassical growth theory implies convergence, a concept not inherent in new growth theories. Consequently, assessing the validity of these alternative growth theories hinges on the study of convergence. A necessary condition for convergence is that poorer economies should experience faster growth than richer ones. Therefore, one way to assess convergence involves testing for the presence of a negative correlation between initial per capita GDP and growth, commonly known as β-convergence. Baumol (1986) expressed this relationship using the following model[2]:

$$\boldsymbol{g} = \alpha\mathbf{1} + \beta\ln(\boldsymbol{y_0}) + \boldsymbol{u}, \qquad (5.1)$$

where $\boldsymbol{g}$ is a $(n \times 1)$ vector representing the average annual growth rate for n geographic units (e.g., countries or, in this chapter, departments of Argentina) between periods 0 and T. That is, each element i of the vector is computed as $\ln(y_{Ti}\,/y_{0i})/T$; where y_{Ti} represents the per capita GDP value for the geographic unit i in period T, y_{0i} is the per capita GDP in period 0 for the same unit i, and T is the time gap between periods 0 and T; $\ln(\boldsymbol{y_0})$ is a $(n \times 1)$ vector containing the natural logarithm of per capita GDP observations for all geographic units in period 0; α and β are unknown parameters; $\mathbf{1}$ is a $(n \times 1)$ vector of ones, and $\boldsymbol{u}$ is a vector of errors that are independent and identically distributed, $\boldsymbol{u_i} \sim i.i.d.(0, \sigma^2)$. In this model, the β coefficient captures the re-scaled correlation between growth rates and initial per capita GDP levels, with a negative value implying β-convergence.

Barro & Sala-i-Martin (1992a) theoretically derived the expression (5.1) from neoclassical growth models, introducing $\beta = -(1 - e^{-vT})/T$, where v is defined as the convergence speed. The convergence speed is the pace at which an economy's GDP per capita reaches its steady state. Based on various empirical studies, Sala-i-Martin (1996b) suggests a reference value of 2% per year for this indicator. However, β has a limitation; given a positive v, its value fluctuates when considering different intervals T. Specifically, the value of β tends towards 0 as the time interval T becomes progressively larger. Barro & Sala-i-Martin (2004) explain that this arises from the fact that growth rates decrease as income increases. Consequently, the growth

[2] To enhance the clarity of the spatial models' explanation, the regressions are presented in matrix form rather than at the individual (departmental) level as usual.

QUAERERE VERUM
Universidad de
SanAndrés

rate calculated over an extended timespan includes a larger portion of the period characterized by lower growth rates compared to the initial phase with higher growth rates. As a result, as the interval T under consideration increases, the influence of the initial level of GDP per capita on the overall growth rate diminishes.

Given this perspective, **Section 5.4** will present the results along with each estimated β, accompanied by its corresponding convergence speed indicator, derived from the expression $v = -\ln(1 + T\beta)/T$. For the purposes of this chapter, as will be explained later, an interval of $T = 6$ will be adopted, a choice for which the differences between v and β are not so pronounced[3]. In addition, another related indicator, potentially offering a simpler interpretation, will be computed: the Half-Life, representing the time an economy takes to cover half the distance to its steady state. The expression for this indicator is $HL = -ln(2)/ln(1 + \beta)$. As a reference, at 2% convergence speed, the corresponding half-life is approximately 35 years.

Returning to equation (5.1), within the formal framework of the neoclassical Solow's growth model (Solow, 1956), incorporating exogenous technological growth and decreasing returns of capital, β-convergence can be interpreted as the tendency of an economy towards a common or single steady-state. The model assumes uniform productive structures across all geographic units, with variations only in initial conditions. However, it is crucial to note that Mankiw *et al*. (1992), Rodrik (2013), and, more recently, Johnson & Papageorgiou (2020) emphasize the limitations of this *absolute convergence* hypothesis. They point out that there can be multiple sources of heterogeneity, such as technological progress (both innovation and adoption), human capital accumulation, and differences in geography, institutions, and policy, which can result in the existence of different stationary states among economies, and these factors may either impede or accelerate the convergence process.

It is then possible to extend the Solow model to incorporate heterogeneities in productive structures among geographic units. This alternative provides the framework for the definition of *conditional convergence,* where each geographic unit converges to its own steady state. To capture this new concept, the equation (5.1) can be re-specified as:

$$\boldsymbol{g} = \alpha\mathbf{1} + \beta\ln(\boldsymbol{y_0}) + \boldsymbol{Z\Psi} + \boldsymbol{u}, \tag{5.2}$$

where $\boldsymbol{Z}$ is a $(n \times r)$ matrix representing the steady-state determinants of each geographic unit, and $\boldsymbol{\Psi}$ is a $(r \times 1)$ vector of unkown coefficients to be estimated. The matrix $\boldsymbol{Z}$ can also take the

[3] At T = 6, for values of v of 0.010, 0.020, and 0.030 correspond to β of 0.010, 0.019, and 0.027 respectively.

form of fixed effects for groups of geographic units that share common characteristics, such as departments belonging to the same province in the frame of this study.

In the context of cross-country studies, a strong presence of heterogeneities among countries is anticipated, preventing the identification of absolute convergence. However, across regions within a country, although differences in technology, preferences, and institutions exist, they are likely to be comparatively smaller than those observed across countries (Barro & Sala-i-Martin, 2004). Firms and households in different regions within a single country tend to have access to similar technologies and exhibit roughly similar tastes and cultures. Additionally, within a country, regions share a central government, resulting in similar institutional and legal systems.

This relative homogeneity observed among regions within a country implies a higher likelihood of these regions converging to similar steady states. Consequently, absolute convergence is more likely to apply across regions than across countries. Empirical evidence presented in the review by Barro & Sala-i-Martin (2004) supports the existence of absolute convergence at the sub-national level. Nevertheless, it is important to note that geographic units within a country tend to exhibit a higher degree of openness compared to national economies. Economic factors such as labor force mobility, capital mobility, technology diffusion, and knowledge can be particularly important since they directly affect regional interactions (Le Gallo *et al.*, 2003). Therefore, a greater interdependence among regions is expected, as highlighted by Rey & Le Gallo (2009).

This interdependence among regions implies that observations are spatially correlated, where the value of a variable for a specific observation at one location depends on the values of the same variable for observations at other locations. In the context of equations (5.1) and (5.2), this invalidates the assumption that the errors ($\boldsymbol{u}$) are independent among observations. Ignoring spatial dependence can lead to a specification error, introducing the potential for biased and/or inefficient estimates, in the least problematic instance, or even inconsistency of the estimates, depending on the structure of the omitted spatial dependence (Anselin, 1988).

Spatial econometrics provides a solution to these specification problems by developing specific methods to incorporate spatial effects into econometric models. A rich body of literature has addressed this issue, with notable references including Ord & Cliff (1973); Anselin (1988); LeSage & Pace (2009); Elhorst (2014), among others. In the context of economic growth, Abreu *et al.* (2005) provide an extensive review of the empirical literature incorporating spatial factors. More specifically, Arbia (2006) offers an introduction to the application of spatial econometrics techniques for analyzing economic convergence. In line with this approach, studies by Gallo *et al*. (2003), Magalhães *et al.* (2005), Ertur *et al.* (2006), Asuad Sanén & Quintana Romero (2010), Royuela & García (2015), and Sun *et al.* (2017) apply such techniques using within-country data, each for different cases. In all these studies, the incorporation of spatial effects into econometric models modifies convergence results. Depending on the case, this may result in a speed-up or a slowing down of convergence, with no obvious direction of the changes to be anticipated. Extensions of these studies, such as Dall'Erba & Le Gallo (2008), evaluate the impact of structural funds on the convergence process among European regions while accounting for spatial spillovers. All these studies strongly confirm the relevance of spatial considerations in the context of regional growth.

5.2.2- The Spatial Models

The natural question that arises from the discussion above is how spatial interdependence is incorporated into the models. Given the diverse ways in which geographic units interact, such as flows of goods, services and factors, technology transfers, or externalities of different signs, defining the operational mechanisms of such interdependence can be challenging. Indeed, many of these phenomena, and perhaps others not explicitly mentioned, may be unobservable. Still, their incorporation is essential to build the model (Herrera *et al.*, 2019). A straightforward example of a spatial model involves a variable $\boldsymbol{x}$ measured in 3 geographic units (x_1, x_2, and x_3), where each value depends on the values corresponding to the other units plus a zero-mean error term, as follows[4]:

$$x_1 = \varphi_{12}x_2 + \varphi_{13}x_3 + \mu_1$$

$$x_2 = \varphi_{21}x_1 + \varphi_{23}x_3 + \mu_2$$

$$x_3 = \varphi_{31}x_1 + \varphi_{32}x_2 + \mu_3 \quad (5.3)$$

This is known as an unrestricted spatial autoregressive process[5], and the parameters φ_{ij} represent the effect in $\boldsymbol{x}$ of observation j on observation i. That is, φ_{ij} captures the spatial interactions between i and j. One challenge with this model is that it has more parameters than observations, rendering it impossible to estimate. Specifically, a similar model with n observations would require estimating $n^2 - n$ parameters.

The solution to the over-parametrization problem that arises when assigning relation-specific parameters to each dependency is to structure the spatial dependency parameter (LeSage & Pace, 2009). Ord (1975) proposes a parsimonious parameterization for dependence relations,

[4] The example is a simplified version based on the explanation in LeSage & Pace (2009).
[5] There are alternative ways to model special dependence, such as incorporating it into the error term. In the context of growth regressions, these other alternatives are discussed later in equation (5.7).

QUAERERE VERUM
Universidad de San Andrés

building on earlier work by Whittle (1954). Formally, if the model expressed in equations (5.3) is presented in matrix form:

$$\boldsymbol{x} = \boldsymbol{\varphi x} + \boldsymbol{\mu} \tag{5.4}$$

where $\boldsymbol{x}$ and $\boldsymbol{\mu}$ are $(n \times 1)$ vectors and $\boldsymbol{\varphi}$ is an $(n \times n)$ matrix containing the parameters φ_{ij} (with $\varphi_{ii} = 0$), the introduction of structure in $\boldsymbol{\varphi}$ involves parameterizing the spatial interaction in the following way:

$$\boldsymbol{\varphi} = \rho \boldsymbol{W} \tag{5.5}$$

$\boldsymbol{W}$ is referred to as the weight matrix. It is a predefined $(n \times n)$ matrix where each element w_{ij} is a set of non-negative weights representing the "degree of possible interaction" of location j on location i (Ord 1975). Because the w_{ij} are predefined, rather than estimating $n^2 - n$ spatial parameters, the problem is simplified to estimating only one parameter: ρ. In other words, the role of $\boldsymbol{W}$ is to determine which units in the spatial system influence the particular unit under consideration, expressed in terms of neighborhood and nearest-neighbor relationships (Anselin, 1988). That is, each element defines the neighborhood relationship among geographic units. Specifically, element w_{ij} of $\boldsymbol{W}$ will be positive if geographic unit i is considered a neighbor of unit j, and zero otherwise. The elements of the main diagonal, w_{ii}, are all equal to zero since no unit can be its own neighbor. As an example, a straightforward criterion could assign to w_{ij} the value 1 if geographic unit i has contiguous boundaries with unit j. Another criterion to determine the w_{ij} value could be based on the inverse distance between i and j.

Despite their differences, the above examples used to define the neighborhood relation among Argentine departments in the context of this study are rooted in the idea that greater geographical proximity implies a greater interaction. This is in line with the so-called first law of geography, which establishes that "everything is related to everything else, but near things are more related than distant things" (Tobler, 1970). Economic interactions are often influenced by proximity, since businesses and individuals tend to engage more with nearby locations due to lower transportation costs, access to markets, and the clustering of related industries. For example, cities can source food from nearby rural areas. A similar pattern can be observed with labor, as seen in the typical Argentine example of Capital Federal, where many people who work there actually reside in other surrounding administrative units in *Conurbano Bonaerense*.

Of course, there are many other criteria for defining neighborhood relationships. The most commonly used criteria are geographical (such as the contiguity and inverse distance examples mentioned earlier), but there are also criteria based on economic or social interactions (such as trade flows), and even combinations of them (see Anselin & Rey, 2014, for an extensive exploration

QUAERERE VERUM Universidad de SanAndrés

of these options). Another concern regarding neighborhood criteria is the necessity for weights to be truly exogenous to the model to avoid identification problems and incorrect inferences in standard estimation and testing approaches (Anselin & Bera, 1998). In this regard, unlike socio-economic criteria, the exogeneity of geographic criteria is widely accepted in the literature (Anselin, 1999; Kelejian & Piras, 2014; Debrasi & Ertur, 2019). This arises from the recognition that geographically based weights are less susceptible to being influenced by the variables of interest under analysis (LeSage. & Pace, 2014). Moreover, socioeconomic criteria may fluctuate over time due to economic, social, or political factors, potentially raising endogeneity concerns. In contrast, under geographic criteria, the relationships among locations are often considered less prone to variations over time (Ahmad & Hall, 2017).

Based on the considerations outlined above, a geographic criterion has been selected. To understand the specifics of this geographic criterion, it is first necessary to understand certain characteristics of the spatial distribution of the data. A detailed exploration of these characteristics will be presented in **Section 5.4**, following the data description in **Section 5.3**. It is important to stress that, despite the advantages offered by geographical criteria in terms of exogeneity when compared to alternative approaches, these criteria are not necessarily based on immutable characteristics, and they can depend on the period under analysis. The exogeneity assumption holds true for periods in which geographical boundaries or the configuration of geographical units remain stable throughout, as is the case in this study. However, if the period extends to include stages preceding departmental formation, the process of territorial reorganization may become intertwined with the growth and economic expansion of certain areas. In such instances, the geographical neighborhood becomes an endogenous aspect of the process under analysis.

Having addressed the potential issues associated with $\boldsymbol{W}$, it is necessary to explain certain aspects. For ease of interpretation, the spatial weight matrix is usually row-standardized, ensuring that the sum of the weights for each row equals one. By doing this, considering a $(n \times 1)$ vector of a variable $\boldsymbol{x}$, the product $\boldsymbol{W} \times \boldsymbol{x}$ is referred to as the spatial lag of $\boldsymbol{x}$. In this context, each element i of the new vector represents the weighted average of the $\boldsymbol{x}$ values within the neighborhood of each geographic unit i. Formally:

$$\boldsymbol{W} \times \boldsymbol{x} = \begin{bmatrix} w_{11} & w_{12} & \cdots & w_{1n} \\ w_{21} & w_{22} & \cdots & w_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ w_{n1} & w_{n2} & \cdots & w_{nn} \end{bmatrix} \times \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} \sum_{j=1}^{n} w_{1j} x_j \\ \sum_{j=1}^{n} w_{2j} x_j \\ \vdots \\ \sum_{j=1}^{n} w_{nj} x_j \end{bmatrix} \tag{5.6}$$

where $w_{ij} = 0$ if $i = j$, $w_{ij} \geq 0$ if $i \neq j$, and $\sum_{j=1}^{n} w_{ij} = 1$.

Once the weighting matrix $\boldsymbol{W}$ is defined, following equation (5.6) enables the construction of vectors that contain, for example, the spatial lags of GDP per capita growth ($\boldsymbol{W} \times \boldsymbol{g}$), the spatial lags of the initial level of GDP per capita (in logs) ($\boldsymbol{W} \times \ln(\boldsymbol{y_0})$), or even the spatial lag of the error term ($\boldsymbol{W} \times \boldsymbol{u}$). Different spatial model specifications can be obtained by adding one or more of these spatial lags to the right-hand side of equations (5.1) or (5.2). Using all three spatial components leads to the most complex model, called the General Nesting Spatial model (GNS, or Cliff-Ord model). For example, the GNS applied to the model of equation (5.1), can be expressed as:

$$\boldsymbol{g} = \alpha\mathbf{1} + \rho\boldsymbol{W} \times \boldsymbol{g} + \beta \ln(\boldsymbol{y_0}) + \gamma\boldsymbol{W} \times \ln(\boldsymbol{y_0}) + \boldsymbol{u}, \qquad (5.7)$$

$$\boldsymbol{u} = \lambda\boldsymbol{W} \times \boldsymbol{u} + \boldsymbol{\varepsilon},$$

with $\boldsymbol{\varepsilon}$ as a vector of idiosyncratic errors $i.i.d.(\mathbf{0}, \sigma_e^2\boldsymbol{I_n})$. The parameter ρ captures the endogenous spatial lag effect, γ captures the spatial lag effect of the initial per capita product and λ captures the presence of the spatial lag effect in the error term. Thus, the long-run steady-state of a geographic unit depends on its own characteristics and those of neighboring units, including the spatial connectivity structure among geographic units and the strength of spatial dependence.

QUAERERE VERUM
Universidad de
San Andrés

Given the preceding considerations, the next step involves determining which of the components ($\rho\boldsymbol{W} \times \boldsymbol{g}$, $\gamma\boldsymbol{W} \times \ln(\boldsymbol{y_0})$, and $\lambda\boldsymbol{W} \times \boldsymbol{u}$) should be integrated into the model to capture spatial effects. There are two alternative approaches for determining the specification to use: the *data-driven specification*, where the spatial econometric model is driven by the data, and the *theory-driven specification*, where the spatial econometric model is a formal representation of an interaction economic model (Anselin, 2002). Under the data-driven specification, there are two approaches to finding the appropriate model: (a) the *specific-to-general modeling* (STGE), as proposed by Florax & Folmer (1992), which involves starting with a simple non-spatial model and testing each spatial component one by one to determine if it is appropriate to add them; and (b) the *general-to-specific modeling* (GETS), following Hendry (1979), which starts with the most complex spatial model and then tests if it is appropriate to remove any spatial component.

In the STGE model, the Moran's I test is commonly used as the initial statistic (Moran, 1950). Following this, a series of Lagrange Multiplier tests, as outlined by Anselin *et al*. (1996), can be conducted to determine which specific spatial effects should be included. On the other hand, the

GETS approach requires starting from a complex model such as the GNS. However, a limitation of this model is the identification problem, known as the *reflection problem*, which arises because the ρ and γ coefficients cannot be separated when the model also contains λ (Manski, 1993).

To address this problem, it is necessary to omit some of the spatial lags corresponding to the dependent variable ($\boldsymbol{W} \times \boldsymbol{g}$), the explanatory variable ($\boldsymbol{W} \times \ln(\boldsymbol{y_0})$), or the error term ($\boldsymbol{W} \times \boldsymbol{u}$) from the general model used as a starting point. That is, at least one restriction should be imposed to derive an initial model under GETS: (1) Spatial Autoregressive model with autoregressive disturbances (SARAR) if the restriction $\gamma = 0$ is imposed (Kelejian & Prucha, 1998; Kelejian & Prucha, 1999); (2) Spatial Error Durbin Model (SDEM) if the restriction $\rho = 0$ is imposed; and finally, (3) the Spatial Durbin Model (SDM) if we consider $\lambda = 0$ (Elhorst, 2014).

In the empirical literature, both GETS and STGE strategies are widely used, demonstrating minimal differences in the final outcomes. However, Hendry's GETS strategy is more robust against possible outliers and nonlinearities (Mur & Angulo, 2009). In the context of this study, a combination of both strategies is employed: first, the presence of omitted spatial effects over OLS regressions is tested (and confirmed) (STGE). Subsequently, spatial effects are included in the form of an SDM model, and their significance is assessed within the GETS framework.

QUAERERE VERUM
Universidad de
SanAndrés

The SDM model includes spatial lags of both the dependent and explanatory variables (GDP per capita growth and the initial level of GDP per capita in logs, respectively), while omitting the spatial lag of the error term ($\lambda = 0$). As explained in **Section 5.2.3**, spatial models that include spatial lags of the dependent variable ($\rho \neq 0$), such as SDM, assume that spillovers affect not only the neighbors of an observation (defined according to $\boldsymbol{W}$), but all observations. In this scenario, a change in the initial level of GDP per capita in a department affects the GDP per capita growth in that department and in all other departments, including feedback effects on the original department that changed. Additionally, if $\gamma \neq 0$, as allowed by the SDM specification, the initial GDP levels of neighbors can influence the growth of a department. Formally, imposing the restriction $\lambda = 0$ in equation (5.7), SDM can be expressed as:

$$\boldsymbol{g} = \alpha\boldsymbol{1} + \rho\boldsymbol{W} \times \boldsymbol{g} + \beta \ln(\boldsymbol{y_0}) + \gamma\boldsymbol{W} \times \ln(\boldsymbol{y_0}) + \boldsymbol{u}, \tag{5.8}$$

The model can be adapted to a conditional convergence version that includes control terms in the form of $\boldsymbol{Z\Psi}$:

$$\boldsymbol{g} = \alpha\boldsymbol{1} + \rho\boldsymbol{W} \times \boldsymbol{g} + \beta \ln(\boldsymbol{y_0}) + \gamma\boldsymbol{W} \times \ln(\boldsymbol{y_0}) + \boldsymbol{Z\Psi} + \boldsymbol{u}, \tag{5.9}$$

In the context of a growth regression using SDM, Fischer (2011) incorporates control terms such as human capital and regional fixed effects for Europe (NUTS2). Similarly, in the context of this study, province fixed effects are included in **Section 5.4**.

The choice of the SDM can be supported by both theory-driven and data-driven specifications. The theoretical foundation for the SDM is provided by Ertur & Koch (2007), who extend the Solow neoclassical model by incorporating Arrow-Romer type externalities as well as spatial externalities. These authors propose a Cobb-Douglas type aggregate production function, where the aggregate level of technology in the economy depends on the externalities of physical capital and the technological interdependence of neighboring economies. Similar to Barro & Sala-i-Martin (1992a) in the Sollow model, Ertur & Koch (2007) derive a regression equation from their augmented Sollow model, arriving at an SDM specification.

Another theoretical rationale comes from the work of LeSage & Pace (2009). In a context where the explanatory variable (in this case, GDP per capita) is correlated with an omitted variable following a spatial autoregressive process, the data generating process for the explanatory variable (in this case, GDP per capita growth) takes the form of an SDM.

In a data-driven approach to model selection, SDM holds an advantage over the other contenders, such as SDEM or SARAR models. This advantage lies in SDM's capability to nest most models used in the regional convergence literature. Therefore, by applying the GETS strategy of hypothesis testing over SDM parameters, it becomes possible to derive the other models. Specifically, imposing the restriction $\rho = 0$, results in the spatially lagged X model (SLX), as proposed by Rey & Montouri (1999). Imposing $\gamma = 0$ results in the Spatial Lag model (SLM), which includes a spatial lag of growth rates from the neighborhood. Additionally, if the restriction $\gamma = -\rho\beta$ holds, SDM leads to the Spatial Error Model (SEM), as proposed by Le Gallo *et al*. (2003). Finally, by imposing the restriction $\rho = \lambda = 0$, a non-spatial growth regression is obtained.

5.2.3- The Coefficient Interpretation

In non-spatial linear models, such as those presented in equations (5.1) or (5.2), regression parameters have a straightforward interpretation as the partial derivative of the dependent variable with respect to the explanatory variable. That is, β represents the average change in "Y" for a unit increase in "X" in cases like (5.1), and it is conditional on other variables "Z" in (5.2). However, the interpretation of the parameters becomes richer and more complicated in models with spatial lags of either the explanatory or the dependent variable (SDM has both), where a change in the explanatory variable for a single observation can potentially affect the dependent variable in all other observations.

LeSage & Pace (2009) provide a detailed explanation of these more complex interpretations from the matrix of partial derivatives of the expectation of “Y” with respect to “X”. In the context of the growth regressions of the previous sections, and denoting E as the expectation operator, the matrix of partial derivatives of $E\boldsymbol{g}$ with respect to a unique explanatory variable $\ln(\boldsymbol{y_0})$ in observations 1 up to n can be represented as:

$$\begin{bmatrix} \frac{\partial E\boldsymbol{g}}{\partial \ln(y_0)_1} & \cdots & \frac{\partial E\boldsymbol{g}}{\partial \ln(y_0)_n} \end{bmatrix} = \begin{bmatrix} \frac{\partial Eg_1}{\partial \ln(y_0)_1} & \cdots & \frac{\partial Eg_1}{\partial \ln(y_0)_n} \\ \vdots & \ddots & \vdots \\ \frac{\partial Eg_n}{\partial \ln(y_0)_1} & \cdots & \frac{\partial Eg_n}{\partial \ln(y_0)_n} \end{bmatrix}, \tag{5.10}$$

This matrix then contains the changes in each Eg_i for changes in the explanatory variable in all observations (including both the specific observation i and all remaining ones j). The elements of a row i can be interpreted as measures of the effect of the change in each department j on a particular observation i. For example, the row corresponding to Capital Federal measures how the growth of this department is affected by changes in the initial level of GDP per capita across all the country’s departments, including Capital Federal itself. The elements in a column j can be interpreted as the effects in each department j resulting from changes in a single observation i. For instance, the column corresponding to Capital Federal measures how the change in its initial level of GDP per capita affects the growth of each department, including Capital Federal itself. In summary, the entire matrix then represents the total expected effect on growth resulting from a unitary change in the initial GDP per capita (in logs) across all departments i.

In linear non-spatial models such as equation (5.1), since there is independence among observations, all non-diagonal elements of the partial derivatives matrix equal zero, and all diagonal elements equal β. This implies that the expected change in growth, in response to a change in the initial level of GDP per capita, remains the same for all departments. However, this uniformity does not hold true in models that include spatial lags in either the dependent variable ($\boldsymbol{W} \times \boldsymbol{g}$) or the explanatory variable ($\boldsymbol{W} \times \ln(\boldsymbol{y_0})$), designed to capture interactions among observations (departments). These interactions introduce scenarios where not all off-diagonal elements equal zero, and in certain cases, the diagonal elements may differ across departments. Consequently, this deviation from uniformity invalidates the typical “marginal” interpretation of regression coefficients.

To examine the characteristics of the partial derivatives matrix within the framework of SDM models, it is useful, as suggested by LeSage & Pace (2009), to express the expectation value of the reduced form of the model of equation (5.8) as:

$$Eg = (I_n - \rho W)^{-1} \, [\beta \ln(y_0) + \gamma W \times \ln(y_0)] + R, \tag{5.11}$$

With $R = (I_n - \rho W)^{-1}\alpha\mathbf{1}$. Then, using expression (5.11) in (5.10), the partial derivatives matrix takes the following form:

$$\begin{bmatrix} \frac{\partial Eg}{\partial \ln(y_0)_1} & \cdots & \frac{\partial Eg}{\partial \ln(y_0)_n} \end{bmatrix} = (I_n - \rho W)^{-1} \begin{bmatrix} \beta & \gamma w_{12} & \cdots & \gamma w_{1n} \\ \gamma w_{21} & \beta & \cdots & \gamma w_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \gamma w_{n1} & \gamma w_{n2} & \cdots & \beta \end{bmatrix}, \tag{5.12}$$

$$= (I_n - \rho W)^{-1} \, [\beta I_n + \gamma W], \tag{5.13}$$

where w_{ij} represents the (i, j)-th element of W.

The shape of the matrix becomes clearer when considering that $(I_n - \rho W)^{-1}$ can be expressed as a geometric progression: $(I_n - \rho W)^{-1} = I_n + \rho W + \rho^2 W^2 + \rho^3 W^3 + \cdots$ (known as Leontief multiplier). Under regular conditions, where $-1 < \rho < 1$, the progression will converge. Notably, even though the diagonal elements of W are all zero, this is not necessarily the case for W^2 (and W^3, and so on). Then, in spatial models with $\rho \neq 0$ or $\gamma \neq 0$, it is expected that the resulting matrix will exhibit non-zero elements outside the diagonal. Additionally, if $\rho \neq 0$, it is expected that the elements in the diagonal will not have the same value, that is, not equal to β. As mentioned above, in non-spatial specifications with $\rho = 0$ or $\gamma = 0$, the result simplifies to a scalar matrix βI_n.

In the context of growth regressions, the presence of non-zero elements outside the diagonal in the partial derivatives matrix within spatial models with $\rho \neq 0$ or $\gamma \neq 0$ means that there are two effects on the growth of a specific department caused by a change in the initial levels of GDP per capita across all departments. These include a direct effect caused by the change within its own department and an indirect effect caused by changes in others. The sum of these two effects constitutes the total effect.

In non-spatial models, since there are no interactions among observations, there are no indirect effects. Consequently, the total effect is equal to the direct effects, and, for all observations, it equals β. However, in spatial models with $\rho \neq 0$ or $\gamma \neq 0$, not only do indirect effects exist, but they typically differ across departments, leading to differences in the total effect. The magnitude of these indirect effects is contingent on the values of ρ and γ, as well as on the degree of connectivity with other departments, as measured by W.

As for the direct effects, their complexity depends on the value of ρ. In instances where $\rho = 0$, the direct effects are uniform for all departments and equal to β (see equation 5.12). However, when $\rho \neq 0$, the direct effect can vary for each department. In such scenarios, the direct effect

QUAERERE VERUM
Universidad de
SanAndrés

on the growth of a department *i*, attributed to changes in that department's initial level of GDP per capita, includes not only its own changes but also the effect of feedback loops. Within these feedback loops, department *i* affects department *j*, and reciprocally, department *j* also affects department *i*. Furthermore, more intricate paths may exist, such as from department *i* to *j* to *k* and back to *i*.

This feedback results from the fact that, despite the zero diagonal elements of $\boldsymbol{W}$, matrix powers of $\boldsymbol{W}$ (such as $\boldsymbol{W}^2$) within the Leontief multiplier in equations (5.12) and (5.13) may possess non-zero diagonal elements. It is important to emphasize that, in contrast to indirect effects, in feedback loops the impact of department j on i does not result from a change in the explanatory variable in j. Instead, it originates from a change in department i itself, affecting others and creating a feedback loop back to i.

The inclusion of matrix powers of $\boldsymbol{W}$ in the Leontief multiplier has additional implications. Specifically, while $\boldsymbol{W}$ has elements $w_{ij} = 0$ when observations i and j are not considered neighbors, the elements of $(\boldsymbol{I}_n - \rho\boldsymbol{W})^{-1}$ corresponding to non-neighboring observations may be non-zero if $\rho \neq 0$. In fact, it might even be the case that the entire matrix $(\boldsymbol{I}_n - \rho\boldsymbol{W})^{-1}$ is composed of non-zero elements. In this scenario, all elements of the matrix of partial derivatives of $E\boldsymbol{g}$ with respect to $\ln(\boldsymbol{y_0})$ in equation (5.10) would be non-zero. This means that a change in $\ln(y_0)$ of an observation i will affect not only the growth g of the observation itself (g_i), but also that of its neighbors (g_j with $w_{ij} \neq 0$), that of non-neighboring observations (g_j with $w_{ij} = 0$), an even the growth of the entire country. For example, a change in Capital Federal will affect its neighbors in Conurbano Bonaerense, the neighbors of Conurbano Bonaerense further into the province of Buenos Aires, and it may even have an effect on distant departments in the province of Jujuy, in the north of the country (though with less intensity). For this reason, the effect generated by ρ is commonly referred to as "global".

If $\rho = 0$, but $\gamma \neq 0$, the geographical scope of these effects is limited. In this scenario, the non-diagonal elements of the partial derivatives matrix will be non-zero only for observations i and j that are neighbors ($w_{ij} \neq 0$). Consequently, the change in $\ln(y_0)$ of an observation i will only affect itself and its neighbors, unlike the case when $\rho \neq 0$, where the impact extends to all observations. To illustrate, changes in the initial level of GDP per capita in Capital Federal would have an impact on the growth of the jurisdiction itself and that of Conurbano Bonaerense and other neighboring departments. However, these effects would not propagate beyond this localized network. Hence, the coefficient γ is said to generate a "local" effect.

Universidad de San Andrés

Finally, since in non-spatial linear models the matrix of partial derivatives is simply $\beta \boldsymbol{I_n}$, the indirect effects are zero, the direct effects are measured as β for all observations, and the total effects (the sum of the two previous measures) are also β. However, in the case of spatial models, given the complexity of the matrix of partial derivatives explained above, summarizing these effect measures is not so straightforward.

In this context, LeSage & Pace (2009) suggest reporting the direct effect as the average of the main diagonal elements of the partial derivatives matrix. As noted above, all these elements are equal to β (and thus their average) when $\rho = 0$, but this is not the case when $\rho \neq 0$. For indirect effects measuring spatial spillovers, they suggest adding the elements of each row or column, but omitting the diagonal elements, and then taking the average, with both alternatives leading to the same result. The average total effect is the sum the two previous effects. Additionally, the significance of these average effects can be obtained using Monte Carlo simulations by introducing random shocks in the error term.

5.3- Regional Patterns and Data for Argentina in the 1950s

To assess the impact of spatial effects on regional convergence in terms of GDP per capita in Argentina, it is necessary to have data on this indicator with a geographic disaggregation beyond the usual provincial level employed in previous chapters and common in the convergence literature for the country. Unfortunately, this detailed information is only available for the entire country for the 1950s, specifically for 1953 and 1959.

As discussed in previous chapters, this period marked a transition from an industrialization focused mainly on light branches, characteristic of the 1930s and 1940s, to one oriented towards heaviest branches, a shift that was fully consolidated in the 1960s. Notably, between 1953 and 1959, the sectors experiencing the highest growth rates in GDP were extractive industries and public services (electricity, gas, and water), followed by the manufacturing industry. Conversely, the agricultural sector faced stagnation during this time (BCRA, 1975). Simultaneously, the 1950s represented a period of transition from a high interventionist economic system to a more orthodox one (Eshag & Thorp, 1965). This era witnessed fluctuations in economic policies aimed at addressing different macroeconomic imbalances, including a balance of payments crisis, fiscal deficit, inflation, and structural challenges in transport and energy. Against this backdrop, the decade was marked by increasing social tensions.

These changes were the result of processes initiated in preceding decades[6]. During this period, the globalization backlash associated with the international crisis of 1930 and the two world wars stimulated the development of an industry oriented towards substituting imported manufactures, known as Import Substitution Industrialization (ISI). However, the accumulation of capital goods posed a challenge during the ISI period. Initially, because of the difficulties in importing machinery and equipment associated with external shocks. Subsequently, because of the distortions that increased their relative prices due to the policies adopted during the second postwar period (Díaz Alejandro, 1970; Taylor, 1994). In this context, the ISI period was focused on labor-intensive activities, such as textiles, food, and light metallurgy (e.g., appliances) oriented towards the domestic market.

One challenge encountered during this industrialization was the increasing demand for foreign exchange to import inputs and capital goods. Initially, in the immediate second postwar period, currencies were obtained from the exceptionally high values of exported agricultural products. However, by the end of the 1940s, international prices of agricultural commodities began to decline, giving rise to a shortage of foreign currency. This situation, together with a severe drought in 1952, prompted a shift in the direction of the economic policy towards encouraging agricultural exports and reducing imports associated with basic industries, such as steel, petrochemicals, transport, power generation, and metalworking. The expansion of these industries, facilitated by foreign investment, was ultimately achieved in the late 1950s and early 1960s under the Frondizi government.

Universidad de
SanAndrés

In this context, the regional economic structure of Argentina reflects a pattern rooted in the late nineteenth century (**Chapter II** characterizes the provinces and macro-regions). On one side, higher levels of per capita product are concentrated in regions such as Capital Federal and its surrounding areas, characterized by high population density, including the province of Buenos Aires. This group also includes the main part of the Pampean region, endowed with abundant natural resources to develop agricultural activities, and the sparsely populated Patagonian region, known for sheep farming, oil exploitations, and vast expanses of land. On the other side, the northern regions are characterized by lower relative levels of per capita product, with some facing serious challenges in economic development.

With the deepening of industrialization, activities related to industry and services emerged as the primary drivers of employment, fostering urbanization as a secondary effect. Greater Buenos

[6] A broad historical analysis can be found in Gerchunoff & Llach (2018); Belini & Korol (2012); Cortés Conde (2009); Di Tella & Dornbusch (1989); Díaz Alejandro (1970); Eshag & Thorp (1965); Ferrer (2008); Rapoport (2008); and Zalduendo (1975).

Aires became a focal point of attraction due to factors such as increased supply of basic services, the availability of labor, concentration of public spending, and a relatively high-income level among the population (Ferrer, 2008). The main industries were concentrated in Buenos Aires and the Pampean region. Notably, Capital Federal, Buenos Aires, Santa Fe, and Córdoba, all part of the Pampean region, contributed 87% of the national manufacturing GDP in 1953, as estimated by CFI-ITDT (1965/1962).

In the rest of the country, industrial development was centered around activities associated with regional industrial crops. For instance, Tucumán focused on sugar cane, *Cuyo* on vineyards, and other regions on crops such as cotton (Chaco), rice (Entre Ríos and Corrientes), Yerba mate (Misiones) and tobacco (Corrientes and Misiones). Additionally, as mentioned earlier, the oil industry was concentrated in Patagonia (this region accounted for 40% of the national extractive industries' GDP in 1953). Notably, Patagonia exhibited a low population density but boasted a high per capita income in relative terms.

The data from CFI-ITDT (1965/1962) on GDP and GDP per capita provide valuable insights into the relative growth of various provinces during the 1950s. The pace of this growth varied significantly among provinces, each influenced by distinct factors, as explored in **Chapter IV**. Some provinces with higher GDP per capita also experienced higher growth, such as Capital Federal (tied to urban activities) and provinces of southern Patagonia (associated with the growth of the hydrocarbon sector). Córdoba, a province with an intermediate GDP per capita level in the early 1950s, witnessed growth driven by the development of heavy industry, particularly in automobiles, metalworking, and steel. Additionally, factors related to markets for regional agricultural products of significant weight in certain provinces had negative effects in both low-income (Misiones) and high-income (Río Negro) provinces. There were also provinces with lower GDP per capita that saw relatively high growth compared to the rest of the country, such as Catamarca, attributed to public works initiatives. Given the diverse dynamics observed, which extended beyond the 1950s, identifying a clear pattern of behavior in terms of regional convergence seems complex.

This nuanced pattern is reflected empirically in the lack of support for the absolute regional convergence hypothesis proposed by Barro & Sala-i-Martin (2004) in studies covering most of Argentina's 20th century history. Notable studies, including Elías (1995) for 1953-1985, Marina (2001) for different sub-periods between 1953 and 1994, and Grotz & Llach (2013) for sub-periods between 1950 and 2010, have failed to consistently confirm absolute convergence. In cases where convergence is identified, it tends to be conditional (see equation 5.2), often incorporating controls such as measures of education to capture heterogeneities in terms of human

Universidad de San Andrés

capital that may affect stationary states. The only exceptions in which unconditional beta convergence is found are Aráoz & Nicolini (2016) for the period 1895-1914, and Figueras *et al*. (2014) since 1990. These periods represent substantially different economic regimes, characterized by greater openness compared to the rest of the 20th century.

All these studies rely on provincial data, which implies a low level of geographical disaggregation, since this level imposes a maximum of 24 observations. Moreover, these analyses overlook the spatial component, with Madariaga *et al.* (2005) being the only exception to the best of my knowledge. In their study of regional convergence among 23 provinces between 1983 and 2002, they employ a special filtering technique proposed by Getis & Griffith (2002) to remove spatial correlation from the data before applying dynamic panel methods. This filtering technique involves decomposing each variable into non-spatial and spatial components, treating spatial dependence as a nuisance factor. Consequently, they transform spatially autocorrelated variables into spatially independent ones, facilitating regression estimates without spatial components.

However, by removing the spatial components with this filter, the dynamics that these components can generate in regional convergence (see previous sections) are excluded from the analysis. This implies that, while the technique applied in Madariaga et al. (2005) addresses estimation issues caused by spatial correlation, it does not allow to quantify the effects that spatial interactions among provinces have on growth. The absence of this quantification results in a diminished depth in characterizing regional dynamics. For instance, this quantification helps to identify the direction in which spatial effects influence growth, pinpointing regions more likely to transmit shocks to others and those more likely to receive shocks. Such insights carry important implications for formulating effective public policies.

Within this framework, in the following section, the estimation of spatial growth regressions as the model of equation (5.8) aims to quantify regional interactions affecting growth and assess their impact on convergence within the Argentine context. It is worth mentioning that in spatial models, the challenges in statistical inference associated with a reduced number of observations (n) are much more pronounced compared to traditional models (Cressie, 1993). Thus, the use of provincial data ($n = 24$), as observed in the aforementioned studies, might be considered inappropriate when incorporating spatial effects. Instead of relying on provincial-level observations, the estimates here are derived from GDP per capita data at the departmental level (smaller administrative units within provinces) for the entire country. The use of these more geographically disaggregated data not only ensures a larger number of observations, necessary for accurate inference in estimating spatial models, but also enhances the internal homogeneity of the observations.

The primary source of information used is derived from CFI-ITDT (1965/1962) which provides, among other data, estimates of Argentina's GDP for the years 1953 and 1959 across the 24 major political jurisdictions (provinces) and 462 minor political jurisdictions (departments)[7]. These are the only estimates of GDP at the departmental level available for the entire country using a uniform methodology. To the best of my knowledge, this analysis marks the first use of this dataset to analyze within-country convergence in Argentina.

As for the reliability of the estimates, the methodology outlined in CFI-ITDT (1965/1962) is quite transparent. The estimates are based on extensive data collected through collaboration with various public and private organizations. Notably, during much of the second half of the twentieth century, CFI served as the official entity responsible for subnational GDP estimates. Population data at the departmental level, crucial for expressing GDP in per capita terms, come from the same source and involve an exponential interpolation of population between the censuses of 1947 and 1960[8].

As mentioned, unfortunately CFI-ITDT (1965/1962) stands out as the sole source offering GDP estimates at departmental level, covering the entire country. This limitation confines the analysis to a brief six-year span (1953-1959). Given that economic convergence is usually considered a long-term phenomenon, the use of a short period raises concerns. In brief intervals, GDP per capita and its growth are susceptible to significant influence from short-term shocks, potentially affecting the results of the estimates.

Thus, in the regional data for Argentina, a kind of trade-off exists between the number of geographic units (n) and the extension of the time lengths (T). Given the limited knowledge in the literature regarding the effect of spatial interactions on Argentine convergence, the choice has been made to prioritize the alternative that provides a greater number of observations necessary for the study It is important to note that several empirical studies of convergence based on spatial models, constrained by data limitations, undertake analyses with periods lasting less than ten years. Examples include Fischer (2018, 2011); LeSage & Fischer (2008); Eckey, Dreger & Türck (2009); Eckey, Kosfeld & Türck (2007); Kosfeld, Eckey & Dreger (2006); Paas & Vahi (2012); and Schlitte & Paas (2008). Fischer & Stirböck (2006) even use a 5-year period. The use of short time spans is also present in classical non-spatial studies of beta convergence, such

[7] The departments within the Province of Buenos Aires are officially referred to as *partidos* in statistical records, but for simplicity they will also be referred to as departments here. Data for the departments belonging to "Buenos Aires conurbation" are consolidated and published as a single entity in CFI-ITDT (1965/1962).
[8] CFI-ITDT also presents alternative estimates for Capital Federal population. I rejected these alternatives because the figures are inconsistent with those from 1960 population census. Also, the alternative chosen is methodologically comparable to that applied in the rest of the country.

Universidad de San Andrés

as Barro & Sala-i-Martin (1991, 1992a), who use 6-year subperiods, and Barro & Sala-i-Martin (1992b, 2004), who use 5-year subperiods.

Related to the mentioned trade-off between the number of geographic units and the length of time considered, another issue emerges: the Modifiable Areal Unit Problem (MAUP). This problem arises when analyzing geographically aggregated data and concerns how the results may be affected by the shape and scale of the aggregation units (Manley, 2021). In the context of this chapter, this implies that the results obtained from analyzing data measured at the provincial scale may not be directly comparable to those obtained at the departmental scale. In particular, at the larger provincial scale, compared to the departmental scale, much of the more local-level detail within an analysis may be lost through the aggregation process. Thus, the scale effect can either enhance or smooth spatial processes. Therefore, the results obtained at the departmental level in this chapter can be seen as complementary to, rather than a substitute for, those obtained in the previous chapters.

To construct the elements of the matrix $\boldsymbol{W}$, essential in spatial models, it is necessary to link the variables of GDP and population with georeferenced information, ideally using the digital cartography of the Argentine departmental division adopted by CFI-ITDT (1965/1962). Specifically, CFI-ITDT adopted the boundaries established in 1958 by Insituto Geográfico Militar, the institution in charge of producing the official cartography of the national territory at that time, with some modifications: (a) the internal divisions of Buenos Aires City were computed as unique polygon; (b) the 17 *partidos* of the Buenos Aires Conurbation were grouped into only one area; (c) Berisso and Ensenada were added to La Plata; (d) in the extreme south, only the departments of the continental part of Tierra del Fuego were considered.

Universidad de SanAndrés

Beyond these adjustments, available digital maps with departmental boundaries for the whole country largely correspond to years after the 1990s, and boundary changes have occurred since 1958, sometimes significant ones. To address this issue, a digital cartography was created by modifying a more recent map sourced from the GADM database of Global Administrative Areas to align with the boundaries used by CFI-ITDT. In cases where departments underwent partitioning after 1958, the solution involved a straightforward consolidation of their current boundaries. Some cases, such as certain departments of the provinces of Tucumán, Tierra del Fuego and Buenos Aires, involved more intricate border changes (the original GADM limits and their modified version for those provinces are illustrated in **Figure A5.1** in the appendix)[9]. To facilitate the reconstruction in these cases, the Integrated Public Use Microdata Series

[9] The implementation of all these changes was carried out using Quantum GIS software.

(IPUMS) maps for 1970 (Ruggles *et al.*, 2003), Bolsi (1997) and *Ejército Argentino e Instituto Geográfico Militar* (1953) were consulted.

Regarding the data used in the analysis, **Table 5.1** presents the descriptive statistics for departmental GDP per capita for the years 1953 and 1959 along with the average annual growth rate. Notably, there is a large disparity in terms of per capita product, with a ratio exceeding 70 between the maximum and minimum departmental values for both years. Even after excluding departments from the upper and lower deciles, this ratio remains higher than five in 1953 and increases in 1959, suggesting a slight rise in GDP dispersion among departments. The coefficients of variation for both years suggest persistent dispersion, and even a weak divergence (no σ-convergence).

Table 5.1: Descriptive Statistics

	GDP per capita (thousands 1953 m$n)		**Average annual growth (%)**
	1953	**1959**	
Argentina total	6.73	6.23	-1.28
Mean	5.20	5.28	-0.25
Mnimum	0.64	0.50	-18.03
Maximum	46.50	35.59	21.67
1º decile	1.66	1.56	-6.40
9º decile	9.30	9.82	5.37
Standard deviation	3.70	4.01	-
Coeff. of variation	0.71	0.76	-
Max/Min	72.85	71.44	-
9º decile/1ºdecile	5.60	6.31	-

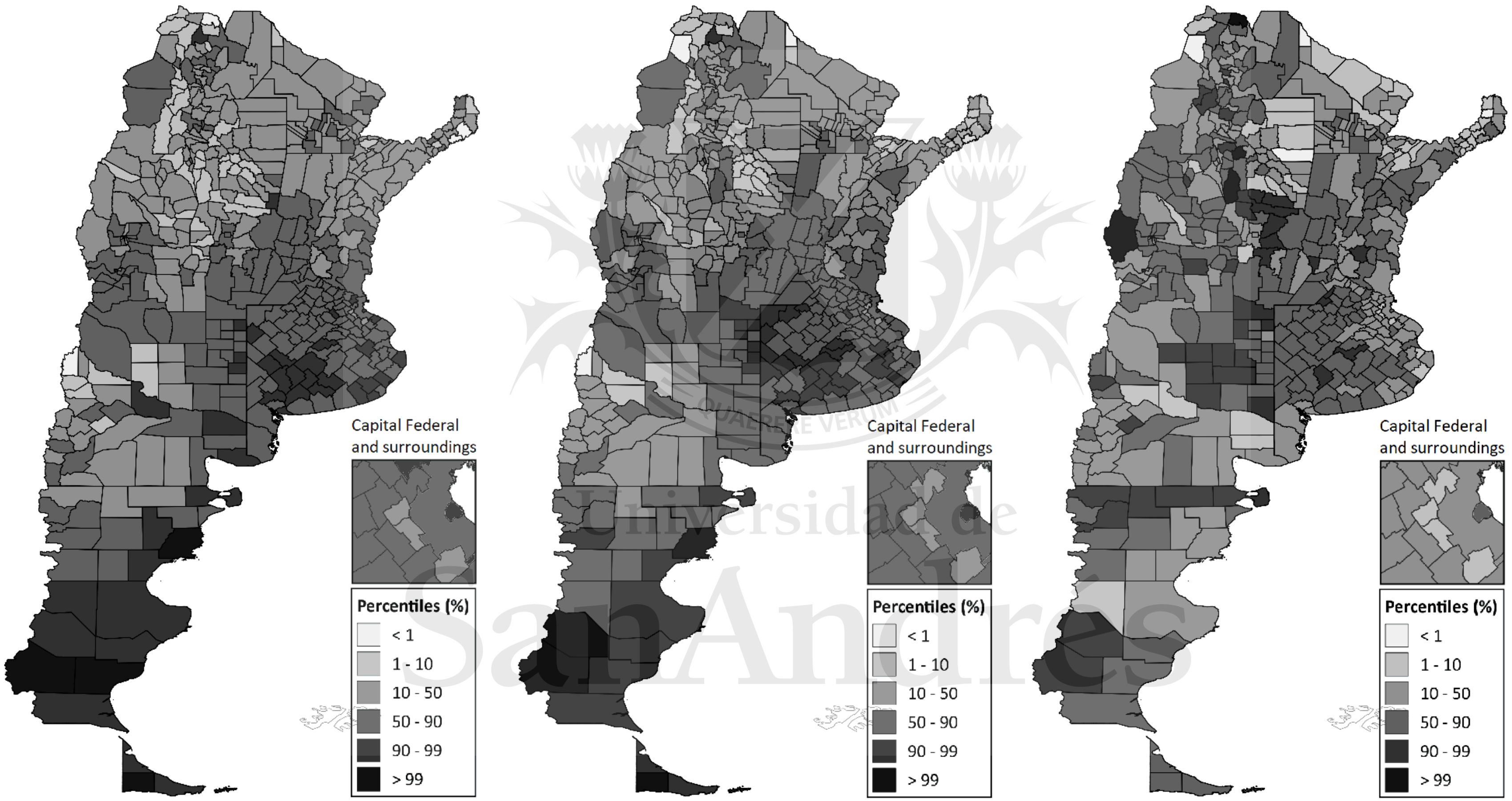
Note: The Peso Moneda Nacional (m$n) was the monetary unit in use in Argentina until 1970. 1 $ (current currency) is equivalent to 10^{13} m$n. Nº of observations: 462 departments.
Source: own elaboration.

Universidad de San Andrés

Figure 5.1 presents percentile maps depicting GDP per capita at current values for the years 1953 and 1959, along with their average annual growth. Darker shades on the maps indicate either higher levels of GDP per capita (maps A and B) or higher growth rates (map C). Both years exhibit a similar geographical pattern, with relatively low levels in the north of the country and higher levels in the Patagonian and Pampean regions. Notably, areas with the highest population share include Capital Federal (17% in 1953 and 15% in 1959), the *partidos* constituting the Buenos Aires Conurbation (14% in 1953 and 18% in 1959), and, far behind, Rosario (in the province of Santa Fe) with just over 3% in both years. Together, these three areas account for over 46% of the country's total GDP, with Capital Federal contributing approximately 30% on its own.

Figure 5.1: Percentile Maps

A - GDP Per Capita - Year 1953 | **B - GDP Per Capita - Year 1959** | **C- GDP Per Capita Growth (1953-1959)**



Source: own elaboration.

Universidad de San Andrés

According to the β-convergence hypothesis, initially poorer regions are expected to exhibit higher growth rates, and, conversely, richer regions are expected to exhibit lower growth rates. If this were true, the light-shaded areas in map A (**Figure 5.1**), which indicate poorer regions in 1953, should correspond to the dark-shaded areas in map C, which indicate fast-growing regions, and vice versa. However, this expected pattern does not appear to be evident in Argentina during the 1950s. Some departments in the Patagonian region (south), as well as some departments located in the center of the country, display relatively high initial levels and high growth rates, dark-shaded in both maps A and C. Conversely, some areas in the north exhibit relatively low initial levels and low growth rates, light-shaded in both maps A and C. This descriptive evidence suggests a lack of convergence.

5.4- Spatial Effects on Argentine Convergence

Using regional data on Argentine per capita GDP for the years 1953 and 1959 as a preliminary step in the study of convergence, growth regression (5.1) is estimated using provincial data (24 observations), following the approach used in much of the literature for Argentina and in the previous chapter. A negative and significant $\hat{\beta}$ would suggest absolute (non-conditional) β-convergence. Considering the results reported in the empirical literature (see **Section 5.3**), it is not surprising that OLS estimates do not reveal evidence of absolute convergence in GDP levels ($\hat{\beta} = 0.0156, p - value = 0.1925$)[10].

Estimating equation (5.1) with the 462 departmental-level observations yields conclusions ($\hat{\beta} = -0.0038, p - value = 0.3387$) (see **Figure 5.2** and the OLS column of **Table 5.2**), despite the concerns about using different geographic aggregation scales noted in the previous section. Indications of potential non-convergence were identified in the previous section, including the absence of a contrasting shading pattern between the maps in **Figure 5.1** representing the initial levels of GDP per capita (year 1953) and the one representing growth rates. Regions with opposing convergence behaviors were also identified, such as regions with high initial GDP per capita levels and high growth rates in the center and south of the country, and regions with low initial GDP per capita levels and low growth rates in the north of the country.

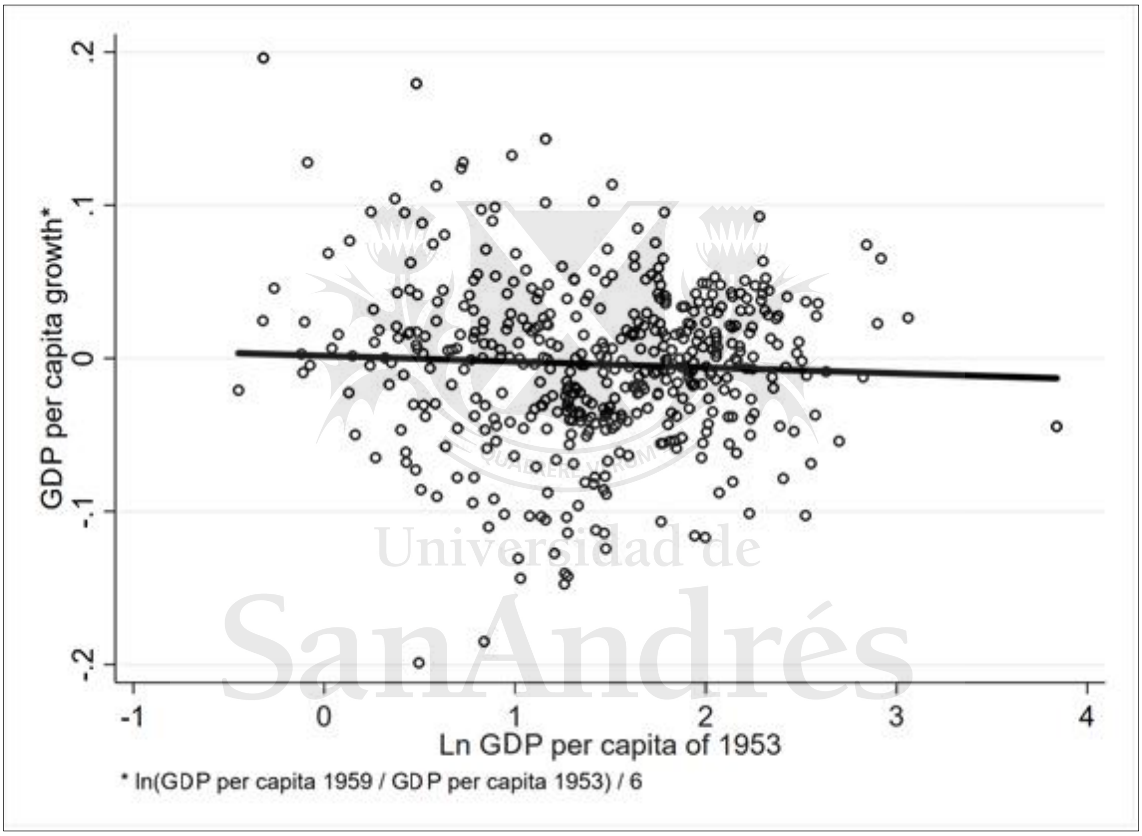
However, as highlighted in the initial sections of this chapter, the results of convergence analysis can be influenced by various forms of interaction among geographical units. For example, production activities may not always adhere to administrative boundaries, leading to regional interactions where one department uses resources (e.g., labor) from neighboring departments.

[10] The results are not tabulated in this chapter; however, they are presented in **Table 4.2** of **Chapter IV**.

Universidad de San Andrés

This is closely tied to production value chains, where segments of a chain may extend across a group of geographically close departments. Moreover, significant infrastructure development in one geographic unit can create positive externalities for neighboring units by improving connectivity and facilitating trade and mobility. The presence of these or other interactions implies that a factor affecting the GDP per capita of one department (or its growth) may also affect the growth of its neighbors.

Figure 5.2: Initial Departmental GDP Per Capita and Growth (1953-1959)



Note: The GDPs values for the year 1959 were deflated to 1953 using the Implicit Price Index of the national gross domestic product at factor cost of BCRA (1975).
Source: own elaboration.

Failing to account for such interactions could potentially alter the anticipated regional growth patterns under convergence. The empirical literature on other countries shows that the impact of these interactions is often uncertain, sometimes reinforcing convergence, and sometimes slowing it down. For example, in a hypothetical scenario where rich departments generate positive spillover effects in neighboring poorer departments, this dynamic could strengthen convergence.

However, if there is a cluster of uniformly poor departments, in this example there is no department that generates positive spillovers that foster convergence. Conversely, if all the rich departments are clustered together, the spillover effect could counteract the overall convergence.

As mentioned in **Section 5.2.2**, incorporating spatial effects requires the definition of a spatial weight matrix ($\boldsymbol{W}$). This matrix, typically predetermined by the researcher, must be exogenous. While there are numerous neighborhood criteria for selecting $\boldsymbol{W}$ (including geographic, economic, social, or even a combination of these), as explained in **Section 5.2.2**, a geographic criterion has been chosen here because of its advantages in terms of exogeneity (Anselin, 1999).

Various alternative methods exist for constructing $\boldsymbol{W}$ based on geographic criteria. Among the most common are those relying on contiguity, where spatial units sharing boundaries are considered neighbors – this can even be extended to include second-order neighbors, that is, the neighbors of neighbors. Another criterion involves defining neighbors based on a cut-off distance, with weights adjusted according to the distance of each neighbor. Alternatively, one can designate the same number of neighbors for each geographic unit, following the *k*-nearest neighbors approach. Additionally, it is also possible to combine criteria, which is the approach finally adopted.

When choosing a weight matrix, it is crucial to consider its density. In this sense, the effects of over-specifying the weight matrix (including a geographic unit as a neighbor that, in reality, is not) on the estimators tends to be more substantial than that associated with under-specification (not considering a geographic unit as a neighbor when it actually is) (Florax & Rey, 1995). In the former case, the weight matrix will exhibit high density in terms of non-diagonal positive values, while in the latter, the matrix will be too sparse. In the Argentine case, marked by considerable heterogeneity in department sizes (see **Figure 5.1**), using a distance threshold to ensure each one has a neighbor may result in a matrix that is overly dense in areas with small-size departments (e.g., the east of Buenos Aires province) and too sparse in areas with larger ones (e.g., the southern part of the country). The irregular shape of the departments presents a similar challenge when using a contiguity-based matrix.

Considering these factors, a decision was made to construct the matrix by assigning a fixed number of neighbors for each department. Additionally, a choice was made to penalize the weights based on geographical distance. Specifically, the matrix $\boldsymbol{W}$ will be generated using the geographic criterion of kth-nearest neighbors, using a weighting function derived from an adaptive Gaussian kernel defined as:

$$w_{ij} = \begin{cases} exp\left[-\frac{1}{2}\left(\frac{d_{ij}}{d_{i(k)}}\right)^2\right], & si\ d_{ij} \leq d_{i(k)}, i \neq j, \\ 0, & another\ case, \end{cases} \tag{5.14}$$

with d_{ij} representing the distance between nearby departments i and j and weighted by the maximum Euclidean distance of the nearest kth-neighbor of i, $d_{i(\text{k})}$ (calculated among the centroids of the departments). This function ensures that the departments closest to point i have a higher weight with respect to the kth neighbor, representing the last and farthest neighbor considered for such observation. While other alternatives for distance calculation could be proposed, such as using department capitals instead of centroid, or the least-cost path instead of linear distance, these possibilities are left for future research.

Once $\boldsymbol{W}$ is defined, as is customary in a weight matrix used in regression, the weights are rescaled so that each row of $\boldsymbol{W}$ adds up to 1. This ensures that the spatial lag for an observation is the weighted average of the values of its neighbors (see the explanation of Equation 5.6 in **Section 5.2.2**).

From the above, a notable concern arises regarding the definition of the number *k* of neighbors to use in the construction of $\boldsymbol{W}$. To reduce arbitrariness, an approach is adopted where the selection of kth neighbors is not done *ad hoc*. Instead, an optimal *k* is determined by identifying the minimum of the cross-validation (CV) function:

$$\min_{10 \leq k \leq 60} CV(k) = \sum[g_i - \hat{g}_{-i}(k)]^2, \tag{5.15}$$

$$= \boldsymbol{g}'(\boldsymbol{I} - \boldsymbol{W}_k)'(\boldsymbol{I} - \boldsymbol{W}_k)\boldsymbol{g}, \tag{5.16}$$

where $\hat{g}_{-i}(k)$ represents the estimated value of g_i under a k-nearest neighbors model with the omission of the observation i. A simple linear model for g_i was chosen, including only a constant without additional explanatory variables. That is, $\hat{g}_{-i}(k)$ represents the weighted average of the neighbors' growth, and $g_i - \hat{g}_{-i}(k)$ represents the difference between the growth of i and the "prediction" using the neighbors' average. The role of $\boldsymbol{W}_k$ in the *CV* function becomes more evident when expressed in matrix form (equation 5.15). Specifically, the number of neighbors k was chosen to be used in $\boldsymbol{W}_k$ such that the sum of the quadratic differences between the observed values and the predicted values (based on the neighbors defined by $\boldsymbol{W}_k$) is minimized. Additionally, to avoid a weight matrix with either very sparse or excessive density, the search range of k was restricted between 10 and 60. After applying the optimization criteria, the value of k was determined to be 14 neighbors.

Universidad de San Andrés

In other words, the outlined procedure can be summarized in the following steps: (1) Set a value for k, starting with 10; (2) Predict the growth of each department i based on the weighted average of the growth of its neighbors, $\hat{g}_{-i}(k)$, using the weights defined in $\boldsymbol{W}_k$; (3) For each department i, compute the squared difference between the prediction $\hat{g}_{-i}(k)$ and its true value $\hat{g}_{-i}(k)$; (4) Add these quadratic differences for each department i to obtain $CV(k)$, an overall measure of prediction error under the $\boldsymbol{W}_k$ matrix; (5) Repeat the above steps for the next value of k until $k = 60$ is reached; (6) Select the value for k corresponding to the minimum $CV(k)$ obtained in step 4.

Furthermore, as a robustness check, the results of this section are also presented based on an alternative weight matrix, yielding similar outcomes (see Appendix). In this regard, LeSage & Pace (2014) argue that it is not worth excessive effort to "fine-tune" the construction of the spatial matrix. This is because when variants of $\boldsymbol{W}$ share common elements, the results obtained with different $\boldsymbol{W}$ matrices exhibit more similarities than differences. They also argue that while variations in $\boldsymbol{W}$ might manifest in differences in parameter estimates (such as those of β and ρ), the average estimates of direct and indirect effects tend to be quite stable.

Once the weight matrix ($\boldsymbol{W}_{14}$) is defined, the analysis of spatial effects from estimates can be conducted considering departmental data. All results described below are presented in **Table 5.2**. Starting from the OLS estimation of equation (5.1) without spatial effects (OLS column in **Table 5.2**), a test is performed for the null hypothesis of non-spatial autocorrelation of $\boldsymbol{u}$. Rejection of this hypothesis would imply a misspecification of the OLS model, suggesting the need to incorporate spatial effects. The test employs Moran's I, and the obtained positive and significant value suggests a positive spatial autocorrelation. In other words, observations with similar values in the residuals tend to be close to each other in geographical space. This finding hints at the presence of spatial interaction that must be included in the model.

To determine the specification of the spatial effects to include, the approach follows Hendry's GETS strategy (see **Section 5.2.2**). Given that starting with the more general model of equation (5.7) is not possible, among the possible alternatives, the SDM specification (equation 5.8) is chosen as the starting point. This specification includes the spatial lag of the dependent variable, analogous to autoregressive models, and the spatial lag of the initial per capita GDP. As explained in **Section 5.2.2**, this choice is justified because it aligns with the natural specification in regional growth models (LeSage & Fischer, 2008), it links well with the Solow neoclassical model by incorporating spatial externalities, and it nests all the simplest spatial models, including the SEM, whose spatial component is not explicitly included in the SDM specification.

Universidad de San Andrés

Table 5.2: Estimation Results under Different Models

Models	OLS	SDM	OLS FE	SDM FE
Constant ($\hat{\alpha}$)	0.0016	-0.0182 ***	-0.0143 **	-0.0119
	(0.0069)	(0.0067)	(0.0067)	(0.0074)
$\ln(\boldsymbol{y_0})$ ($\hat{\beta}$)	-0.0038	-0.0386 ***	-0.0111 ***	-0.0349 ***
	(0.0040)	(0.0047)	(0.0038)	(0.0046)
$\boldsymbol{W} \times \ln(\boldsymbol{y_0})$ ($\hat{\gamma}$)	-	0.0502 ***	-	0.0420 ***
	-	(0.0066)	-	(0.0067)
$\boldsymbol{W} \times \boldsymbol{g}$ ($\hat{\rho}$)	-	0.6742 ***	-	0.4569 ***
	-	(0.0576)	-	(0.0791)
Direct effect	-0.0038	-0.0365 ***	-0.0111 **	-0.0338 ***
	(0.0040)	(0.0046)	(0.0038)	(0.0045)
Indirect effect	-	0.07230 ***	-	0.0470 ***
	-	(0.0137)	-	(0.0097)
Total effect	-0.0038	0.0358 ***	-0.0111 **	0.0132
	(0.0040)	(0.0130)	(0.0038)	(0.0085)
Moran's I	218.81 ***	-	53.56 ***	-
Wald test (FE)	-	-	21.02 ***	56.76 ***
LR common factor (H_0: $\gamma = \rho\beta$)	-	18.08 ***	-	17.45 ***
Convergence speed (annual %)	0.39	4.39	1.14	3.91
Half-life (years)	181	18	62	20

Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.
Source: own elaboration

Universidad de San Andrés

The selected spatial Durbin models were estimated by Quasi Maximum Likelihood (QML) (Lee, 2004), and the results are presented in the SDM column of **Table 5.2**. Both spatial components of the model, the global $\hat{\rho}$ and the local $\hat{\gamma}$, are found to be significant and positive, confirming the importance of geographical interactions. Regarding nested models within SDM, the significance of $\hat{\gamma}$ implies rejecting the reduction of a model to an SLM, and the significance of $\hat{\rho}$ rejects reducing the model to an SLX. Additionally, as indicated in **Section 5.2.2**, SDM can be simplified to SEM ($\lambda \neq 0, \rho = 0, \gamma = 0$) if $\gamma = -\rho\beta$. The Likelihood Ratio (LR) test of common factor evaluates this hypothesis, and, in this case, it is rejected at a 1% of significance level.

The Moran's I test result above may be sensitive to the presence of regional heterogeneities not considered in the OLS model. To account for the effects of unobserved regional heterogeneities, the OLS model is also estimated, including fixed effects for selected provinces[11] (OLS FE in

[11] To obtain more parsimonious estimates, the modeling strategy involved starting with a full set of provincial fixed effects (using one province as the baseline) and subsequently eliminating provincial fixed effects in a sequential manner based on the highest p-values, following a backward stepwise approach.

Table 5.2). Unlike the OLS and SDM models, OLS FE corresponds to a conditional model, similar to the one presented in equation (5.2). Therefore, if convergence is found, it is not absolute. The rejection of the Wald test on the provincial controls included in the OLS FE indicates their joint significance. This suggests the presence of provincial heterogeneity, implying that the original OLS model may be misspecified.

Regarding the inclusion of spatial effects in the OLS FE model, like the OLS model, Moran's I test also suggests the presence of autocorrelation in the residuals. This means that even with the inclusion of unobserved provincial heterogeneity effects (absolute spatial effect in the sense of Abreu *et al.*, 2005), there are still relative spatial effects pending capture.

In **Table 5.2,** the SDM FE model enhances the OLS FE model by incorporating the spatial components of the SDM models. Therefore, SDM FE simultaneously includes provincial controls as well as the local and global spatial effects. The results reveal significance for all these incorporated elements, evidenced by the rejection of the Wald test on the fixed effect controls (similar to the OLS FE estimation), and significant values for $\hat{\rho}$ and $\hat{\gamma}$ (similar to the SDM estimation). This means that the SDM FE results suggest the simultaneous detection of different stationary states by provinces and spillover effects among departments. However, in comparison to the SDM estimates, the inclusion of fixed effects seems to reduce the impact of spatial variables in SDM FE (the magnitudes of $\hat{\rho}$ and $\hat{\gamma}$ are lower in the latter). Lastly, regarding the specification, similar to the SDM case, the common factor test is rejected.

Without a complete marginal interpretation (see **Section 5.2.2**), both SDMs exhibit a positive spatial coefficient $\hat{\rho}$, indicating a contagion effect that generates positive feedback on the growth rate. As explained in **Section 5.2.3**, this effect is considered global, extending to all departments in the country rather than just neighboring ones. The positive sign of $\hat{\rho}$ suggests that the growth of a department is positively affected by the *GDP per capita growth* of other departments, albeit with less force as distance increases. Additionally, the spatial coefficient $\hat{\gamma}$ captures a positive local effect of the neighborhood's *initial GDP per capita* on the growth rate. This effect is local, affecting only the neighbors of a given observation rather than spreading throughout the entire territory like the global component. The positive sign of $\hat{\gamma}$ implies, for example, that if a department is a neighbor of a rich department, the former would benefit from a positive effect on its growth.

Through this procedure, a final model was selected, which included fixed effects for the following provinces: Córdoba, Chubut, Formosa, La Pampa, Misiones, Río Negro, Salta, and Santiago del Estero.

Universidad de San Andrés

Regarding the results in terms of convergence, unlike the non-spatial OLS model, the inclusion of spatial effects leads to a negative and significant $\hat{\beta}$ coefficient. In the case of OLS FE, the inclusion of provincial heterogeneity controls results in a negative and significant $\hat{\beta}$ (although in this case, it is conditional convergence). Additionally, the inclusion of spatial effects (SDM FE model) also yields a negative $\hat{\beta}$ coefficient of higher absolute value. Essentially, the two models that isolate spatial effects support the beta convergence hypothesis (unconditional in SDM and conditional in SDM FE). This suggests that spatial effects diminish the convergence effect, and the omission of these effects in the OLS specification provides one explanation for the non-significant $\hat{\beta}$ coefficient (or a lower rate in the conditional case). In other words, the non-spatial estimation compensates for the omission of the spatial interaction in the $\hat{\beta}$ coefficient, thereby delaying convergence among departments.

The interpretation of the results presented in the last two paragraphs must be taken with caution, since, as noted by LeSage and Pace (2009), with the inclusion of spatial effects, the marginal interpretation of the coefficients does not hold (**Section 5.2.3**). Therefore, for a proper interpretation, it is necessary to decompose the total effect of a change in the initial per capita GDP level on growth into direct and indirect effects. The latter is not present in the non-spatial models.

The direct effects of SDMs do not substantially differ from the $\hat{\beta}$ coefficients (**Table 5.2**). However, when comparing the direct effects of SDMs with the non-spatial models, although the $\hat{\beta}$ coefficients are negative in both cases, they are closer to zero in the non-spatial OLS and OLS FE models. Consequently, the latter seems to underestimate convergence. This underestimation is also reflected in the lower convergence speed and higher half-life in the non-spatial models compared to their spatial analogues. Since the results of the spatial models suggest convergence, this implies that a change in the initial level of GDP per capita of a department has a negative effect on the growth of the department (convergence), taking into account the feedback effects resulting from the interaction with other departments.

However, the indirect effects associated with spatial spillovers in the SDM and SDM-FE estimates have the opposite direction to the direct effects. That is, a unitary change of the initial per capita GDP level on the neighbors of a department has a positive effect on the growth of the department. The results show that the indirect effects not only compensate for, but sometimes also exceed the direct effects, hindering departmental convergence in both SDMs. This is reflected in a non-significant total effect for a unitary change in the initial level of GDP in SDM FE (non-convergence), and a significant positive total effect in SDM (divergence).

One possible explanation for this result is that, due to the convergence effect, a department with a low initial level of GDP per capita is expected to have higher growth rates (as indicated by the negative sign of direct effects leading to convergence). In Argentina, however, there is a very marked clustering of departments with low levels on the one hand and high levels on the other (see **Figure 5.1**). In this setting, a high-level apartment could be "pushed up" by its high-level neighbors, while a low-level apartment could be "pushed down" by its low-level neighbors. Therefore, due to the "convergence effect", a low-level department tends to experience relatively higher growth. However, the "neighborhood effect" introduces a counteracting force, causing it to grow relatively less. If the neighborhood effect is strong enough, it results in a total positive or null effect of the initial level of GDP per capita on growth (non-convergence). In non-spatial models, the "convergence effect" is not isolated from the "neighborhood effect", so the results reflect both effects combined, which seems to indicate a reduced or null convergence.

5.5- The Spatial Diffusion Process

As discussed in **Section 5.2.3**, the total effects presented in **Table 5.2** represent the average response of departmental growth to a uniform change in the explanatory variable across all departments. The direct effect averages the responses of each department to changes in its own department, and the indirect effect averages the responses to changes in the other departments. It is important to note that these interpretations are based on average effects. As previously explained, in the context of SDM models, the responses of each department to changes in initial GDP, both in its own and in other departments, vary across departments. These different responses are related to each department's spatial positioning and the varying degrees of connectivity with others, as modeled by $\boldsymbol{W}$, in conjunction with the values of $\hat{\rho}$, $\hat{\gamma}$, and $\hat{\beta}$.

Given the diverse effects observed across departments, a question that may arise is which departments are more likely to "spread" their shocks to others. To study this, one approach involves simulating a shock in one department and calculating the average effect it has on the rest. By systematically carrying out this process out for each department, it becomes possible to measure the propagation effect that each department generates, referred to as the "Average Emission Effect". Additionally, it may also be of interest to know which departments are more susceptible or more responsive to shocks originating in other departments. The average response of a department to sequential shocks from all the others is called the "Average Reception Effect".

The method used to estimate these effects is derived from the approach proposed by Le Gallo *et al.* (2003). The presence of an autoregressive spatial lag indicated by a non-zero ρ implies that

Universidad de San Andrés

the element $(\boldsymbol{I} - \rho\boldsymbol{W})^{-1}$ in equations (5.11) and (5.12) acts in a way that a shock in department j affects all other departments. To simulate this propagation of shocks, it is necessary to recognize that, similar to equation (5.11), a model like the SDM FE discussed in the previous section can be reformulated as:

$$\boldsymbol{g} = (\boldsymbol{I} - \rho\boldsymbol{W})^{-1}[\alpha\boldsymbol{1} + \beta\ln(\boldsymbol{y_0}) + \gamma\boldsymbol{W} \times \ln(\boldsymbol{y_0}) + \boldsymbol{Z\varphi} + \boldsymbol{u}], \quad (5.17)$$

With this equation and the estimated coefficients from **Table 5.2**, it becomes possible to analyze how a shock affecting a particular department diffuses to all departments. In other words, a shock of magnitude s is introduced to a department j, replacing the value $\hat{u}_j$ in the error therm $\widehat{\boldsymbol{u}}$ with $\hat{u}_j + s$. Consequently, a growth prediction is generated for all departments after the shock is incorporated into department j. As explained, the magnitude of shock diffusion is influenced by the relative position of the department through the spatial weight matrix $\boldsymbol{W}$ and by the spillover effects represented by the estimated parameters ρ and γ.

Formally, let $\widehat{\boldsymbol{u}}_j$ be a $(n \times 1)$ vector containing the residuals of estimating the model (5.17), but adding a shock affecting department j:

$$\widehat{\boldsymbol{u}}_j' = (\hat{u}_1 \cdots \hat{u}_j + s \cdots \hat{u}_n) \quad (5.18)$$

Therefore, the $(n \times 1)$ vector $\boldsymbol{g}_j^*$ representing simulated growth in all departments after a shock in the error term of department j can be computed as:

$$\boldsymbol{g}_j^* = (\boldsymbol{I} - \hat{\rho}\boldsymbol{W})^{-1}\left[\hat{\alpha}\boldsymbol{1} + \hat{\beta}\ln(\boldsymbol{y_0}) + \hat{\gamma}\boldsymbol{W} \times \ln(\boldsymbol{y_0}) + \boldsymbol{Z}\widehat{\boldsymbol{\Psi}}\right] + (\boldsymbol{I} - \hat{\rho}\boldsymbol{W})^{-1}\widehat{\boldsymbol{u}}_j, \quad (5.19)$$

which can be further expressed as:

$$\boldsymbol{g}_j^* = \widehat{\boldsymbol{A}}^{-1}\widehat{\boldsymbol{X}} + \widehat{\boldsymbol{A}}^{-1}\widehat{\boldsymbol{u}}_j, \quad (5.20)$$

where $\widehat{\boldsymbol{A}} = (\boldsymbol{I} - \hat{\rho}\boldsymbol{W})^{-1}$, $\widehat{\boldsymbol{X}} = \left[\hat{\alpha}\boldsymbol{1} + \hat{\beta}\ln(\boldsymbol{y_0}) + \hat{\gamma}\boldsymbol{W} \times \ln(\boldsymbol{y_0}) + \boldsymbol{Z}\widehat{\boldsymbol{\Psi}}\right]$, and $\hat{\rho}$, $\hat{\alpha}$, $\hat{\beta}$, $\hat{\gamma}$, and $\widehat{\boldsymbol{\Psi}}$ are the QML estimations.

It should be noted that what has been shown so far has been focused on illustrating the effects on the growth of all departments in response to the introduction of a shock in a singular department (j). This process can be repeated sequentially by adding independent and not necessarily equal shocks to each department: $\boldsymbol{s}' = (s_1 \cdots s_j \cdots s_n)$. Then, for each shock s_j, a new vector can be created containing the residuals with the added shock in j. For example, $\widehat{\boldsymbol{u}}_1$ includes s_1 in department 1; $\widehat{\boldsymbol{u}}_2$ includes s_2 in department 2, and so on:

$$\left[\widehat{\boldsymbol{u}}_1 \cdots \widehat{\boldsymbol{u}}_j \cdots \widehat{\boldsymbol{u}}_n\right] = \begin{bmatrix} \hat{u}_1 + s_1 & \hat{u}_1 & \cdots & \hat{u}_1 \\ \hat{u}_2 & \hat{u}_2 + s_2 & \cdots & \hat{u}_2 \\ \vdots & \vdots & \ddots & \vdots \\ \hat{u}_n & \hat{u}_n & \cdots & \hat{u}_n + s_n \end{bmatrix}, \tag{5.21}$$

In the same way, it is possible to generate the vector $\boldsymbol{g}_1^*$ of simulated growth in all departments in the presence of s_1; $\boldsymbol{g}_2^*$ for s_2, and so on. Then, $\boldsymbol{G}^*$ represents the matrix of dimension $(n \times n)$ containing the vectors of simulated growth rates for each successive shock:

$$\boldsymbol{G}^* = \left[\boldsymbol{g}_1^* \cdots \boldsymbol{g}_j^* \cdots \boldsymbol{g}_n^*\right] = \widehat{\boldsymbol{A}}^{-1}\left[\widehat{\boldsymbol{X}} \cdots \widehat{\boldsymbol{X}} \cdots \widehat{\boldsymbol{X}}\right] + \widehat{\boldsymbol{A}}^{-1}\left[\widehat{\boldsymbol{u}}_1 \cdots \widehat{\boldsymbol{u}}_j \cdots \widehat{\boldsymbol{u}}_n\right], \tag{5.22}$$

Being $\mathbf{1}'$ a $(1 \times n)$ vector of ones, $\otimes$ the Kronecker product, and $\widehat{\boldsymbol{U}}$ a matrix of dimension $(n \times n)$ defined as $\widehat{\boldsymbol{U}} = \left[\widehat{\boldsymbol{u}}_1 \cdots \widehat{\boldsymbol{u}}_j \cdots \widehat{\boldsymbol{u}}_n\right]$, the above expressions for $\boldsymbol{G}^*$ and $\widehat{\boldsymbol{U}}$ can be reformulated as:

$$\boldsymbol{G}^* = \mathbf{1}' \otimes \widehat{\boldsymbol{A}}^{-1}\widehat{\boldsymbol{X}} + \widehat{\boldsymbol{A}}^{-1}\widehat{\boldsymbol{U}}, \tag{5.23}$$

$$\widehat{\boldsymbol{U}} = \mathbf{1}' \otimes \widehat{\boldsymbol{u}} + \boldsymbol{I}\boldsymbol{s}, \tag{5.24}$$

In summary, after estimating the SDM FE model from **Table 5.2**, the vector of residuals is sequentially adjusted n times by introducing the shocks s_j, resulting in the $\widehat{\boldsymbol{U}}$ matrix of equations (5.21) and (5.24). Subsequently, this matrix is used in equations (5.22) and (5.23) to derive the $\boldsymbol{G}^*$ matrix, where each column j represents the response of all departments to the shock on j. The next consideration is the determination of the values for the shocks s_j.

Two alternative shock schemes are defined: first, a simple one that can be considered as resulting from a fixed, uniform and exogenous sum of money received by each department; and another one where the sum depends on the number of inhabitants, thus uniform in per capita terms. However, it is worth clarifying that neither of these cases assumes an identical shock value s_j for all departments. As demonstrated below, this is because the received sum must be expressed in terms of the growth rate, which, in turn, depends on the GDP level of each department.

The first shock scheme can be thought as belonging to a public investment program where the total amount, L, is divided into $l = L/n$ parts (equally distributed among the departments). The shock s_j is then calculated as $s_j = \ln[\left(GDP_{1959,j} + l\right)/GDP_{1959,j}]/6$, where GDP_j represents the total value of gross product in department j. Substituting this result into expressions (5.21) and (5.22) yields a matrix of dimension $(n \times n)$ representing the responses under a <u>homogeneous</u> distribution of public investment.

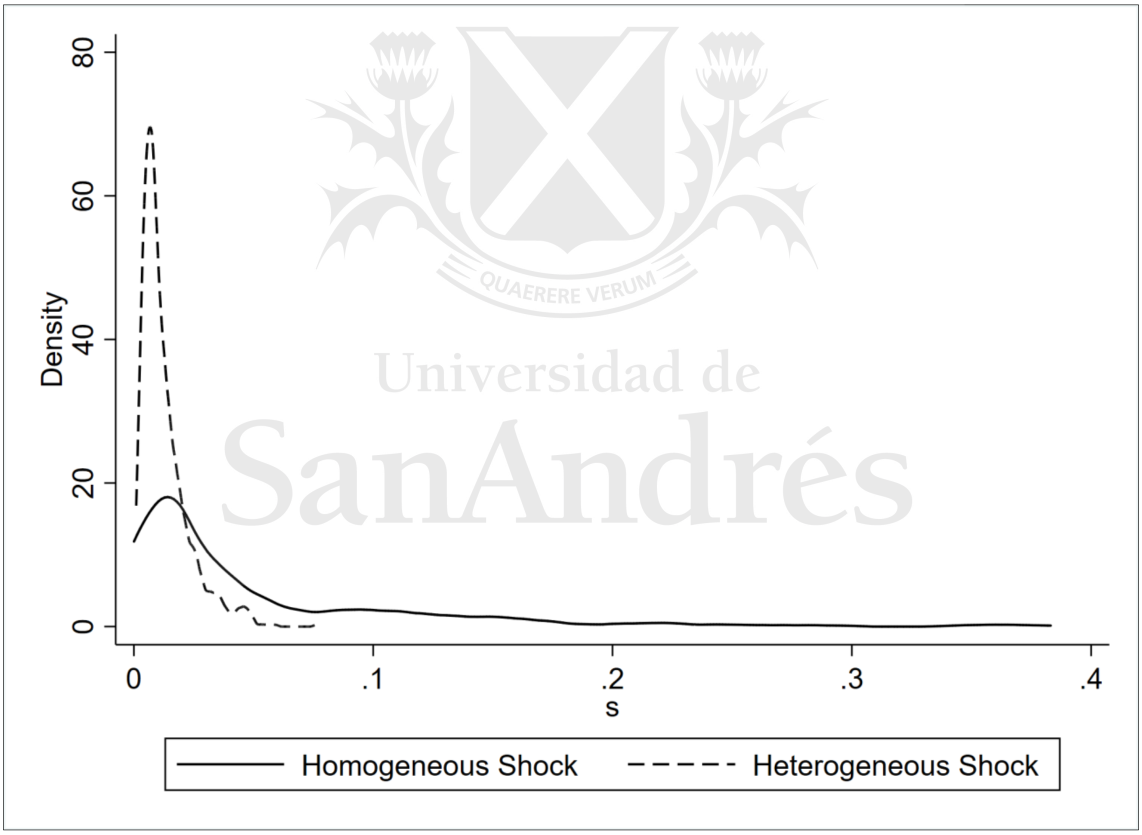
In the second shock scheme, the total amount L is divided into per capita parts, producing a <u>heterogeneous</u> shock, l_j, which depends on the total population: $l_j = L \times pop_j/POP$, where pop_j

QUAERERE VERUM
Universidad de San Andrés

is the population of department j and POP is the total population in the country. Then, the equation (5.21) is modified by replacing the s_j by $s_j = \ln[(GDP_{1959,j} + l_j)/GDP_{1959,j}]/6$. This shock can be considered as a lump sum granted to each inhabitant and, in the political arena, may appear more probable than the homogeneous shocks mentioned in the paragraph above.

Figure 5.3 presents the distribution of two simulated shock alternatives, s_j. When shocks are expressed in terms of per capita GDP growth rate (that is, in the form s_j), homogeneous shocks exhibit greater variability relative to the heterogeneous case. This is expected since the value of l for homogeneous shocks does not increase with population, as does l_j for heterogeneous shocks.

Figure 5.3: Simulated Shocks Distribution



QUAERERE VERUM
Universidad de
SanAndrés

Source: own elaboration.

Upon introduction of the shocks (either of the alternatives), the resulting $\boldsymbol{G}^*$ matrix is obtained. Each column j in $\boldsymbol{G}^*$ provides information on the emission effect of the spatial diffusion process from a particular department j to all the other departments. Since each emission effect is different, one approach to summarize this information is to calculate the average emission effect

(AEE) on the other departments. For example, for a shock in the department j, the computation of AEE_j is as follows:

$$AEE_j = \frac{1}{n-1}\sum_{i\neq j}(g_{ij}^{*} - g_i), \quad j = 1, \dots, n, \tag{5.25}$$

and, repeating the shock for all departments, the vector $\boldsymbol{AEE}$ is defined as:

$$\boldsymbol{AEE} = \frac{1}{n-1}[\boldsymbol{D} - diag(\boldsymbol{D})]'\boldsymbol{1}, \tag{5.26}$$

where $\boldsymbol{D} = \boldsymbol{G}^{*} - (\boldsymbol{1}'\otimes\boldsymbol{g})$, and the negative $diag(\boldsymbol{D})$ is applied to eliminate the impact on the own department.

Additionally, it is possible to calculate an alternative effect defined as the average reception effect (ARE). This effect represents the average response of department i to successive shocks in each of the remaining departments. The calculation is as follows:

$$ARE_i = \frac{1}{n-1}\sum_{j\neq i}(g_{ij}^{*} - g_i), \quad i = 1, \dots, n, \tag{5.27}$$

$$\boldsymbol{ARE} = \frac{1}{n-1}[\boldsymbol{D} - diag(\boldsymbol{D})]\boldsymbol{1}, \tag{5.28}$$

Furthermore, the total impact of the public investment program on each department can be computed with a simple modification of the ARE formula: the own effect can be added into the equation of ARE, obtaining the average of total reception effect ($ATRE$):

$$ATRE_i = \frac{1}{n}\sum_{j=1}^{n} g_{ij}^{*} - g_i, \tag{5.29}$$

$$\boldsymbol{ATRE} = \frac{1}{n}[\boldsymbol{D}]\boldsymbol{1}, \tag{5.30}$$

Figure 5.4 shows the AEE corresponding to each department for the homogeneous shocks (left) and heterogeneous shocks (right). It is possible to distinguish departments with a higher AEE, that is, those that act as “shock diffusers”. In both types of shocks there are common areas such as the central area in the Northwest of the country, the Northwest of Patagonia and, within the Northeast region, the west of the province of Corrientes and the center of Misiones.

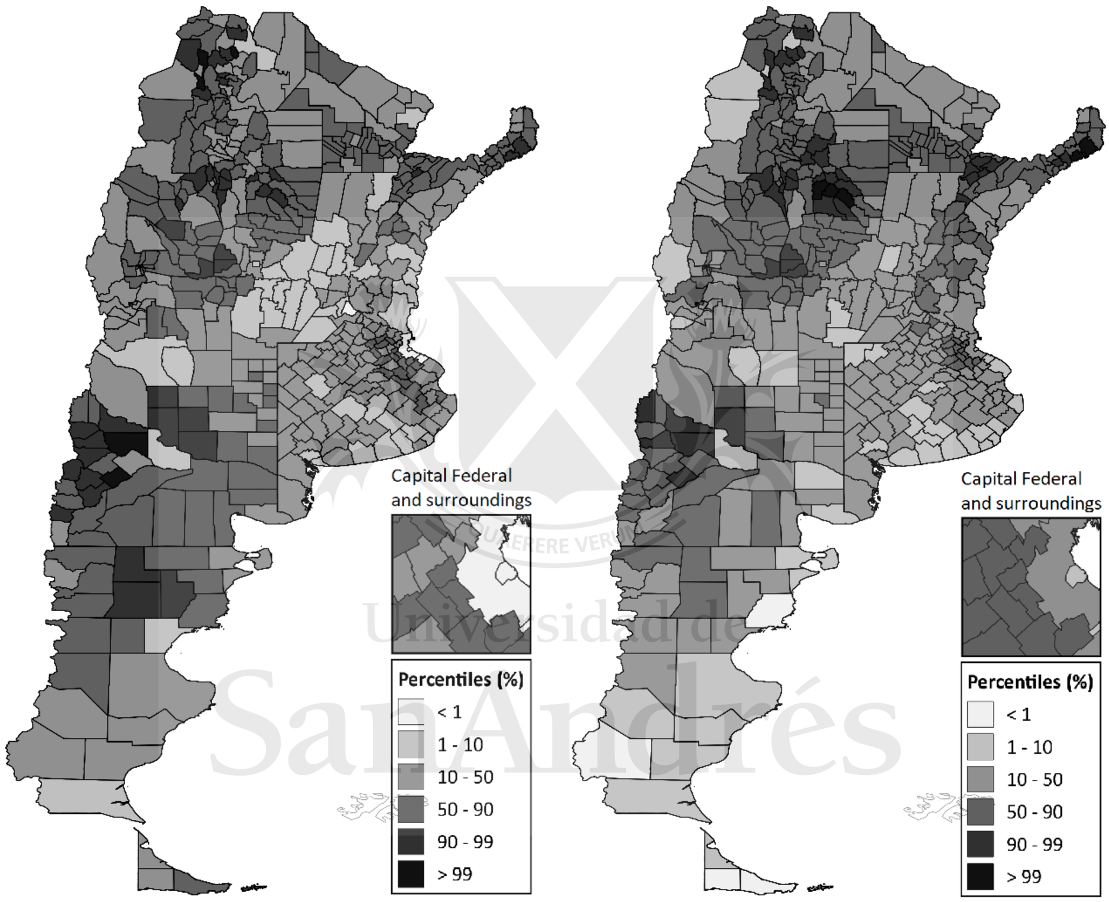
Comparing the primary diffuser zones between the homogeneous and heterogeneous shock schemes, it becomes evident that, in the homogeneous scheme, the AEE is higher mainly in departments with relatively low population. Furthermore, by comparing the spatial distribution of the AEE for each shock scheme in **Figure 5.4**, alongside the spatial distribution of GDP per capita in **Figure 5.1**, a noteworthy inverse relationship between the emission effect and the level of income can be observed. This suggests that poorer departments are more likely to transmit

QUAERERE VERUM Universidad de San Andrés

shocks to others than richer ones. However, when monetary shocks (l or l_j) are transformed into rates of change (s_j), they exhibit a greater relative impact on lower-income departments. This implies that these departments have a more substantial shock to propagate compared to rich departments.

Figure 5.4: Spatial Distribution of Average Emission Effects

Homogeneous Shocks **Heterogeneous Shocks**



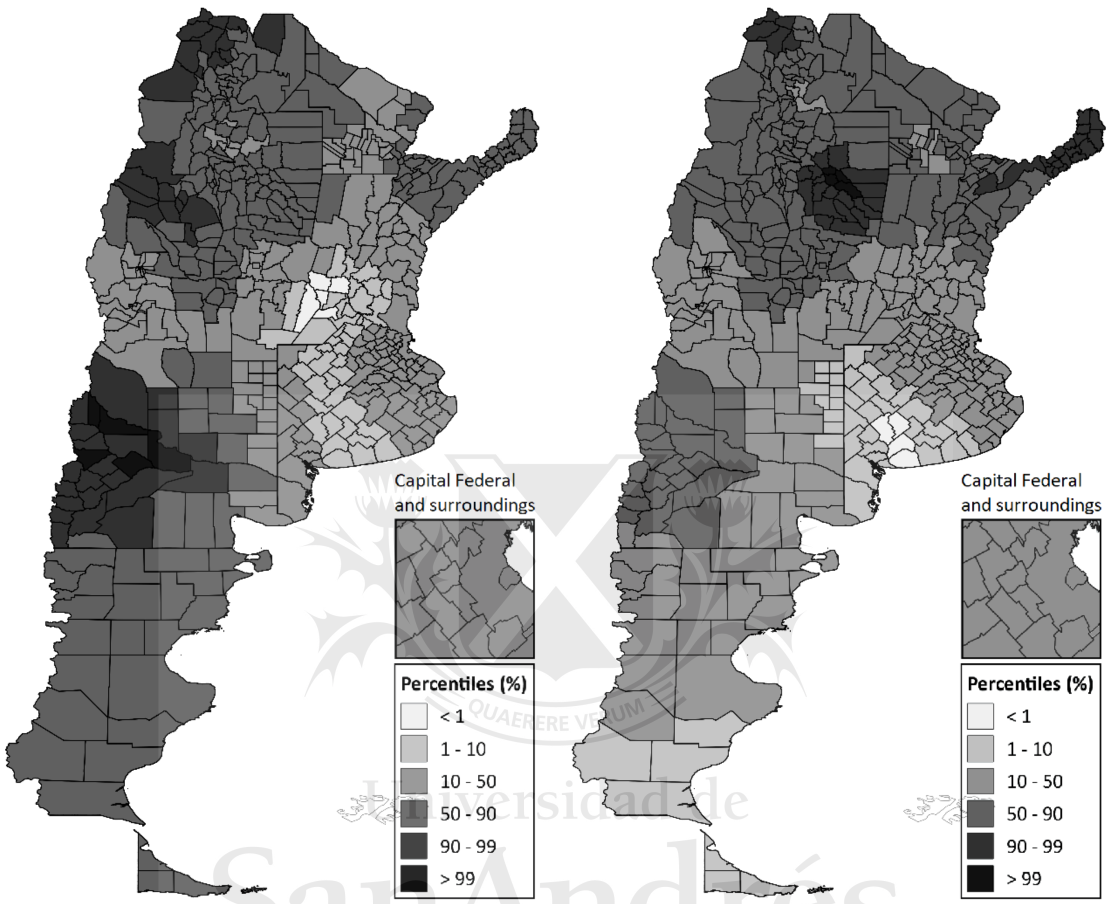
Source: own elaboration.

Universidad de San Andrés

In the case of the ARE, depicted in **Figure 5.5**, the spatial pattern is notably clearer compared to the AEE. In both the homogeneous and heterogeneous shock schemes, clusters with the highest intensity of shock reception are generally located in the northern regions of the country. However, with the exception of the highly receptive cluster in the north of Jujuy, the specific location of the highly receptive clusters within the north vary according to the scheme. In the heterogeneous shock scheme, they are found in the provinces of Santiago del Estero and Misiones, while in the homogeneous scheme, they are located in La Rioja. Furthermore, the homogeneous scheme exhibits a high reception cluster in the North of Patagonia, located in the southern part of the country.

Figure 5.5: Spatial Distribution of Average Reception Effects

Homogeneous Shocks **Heterogeneous Shocks**



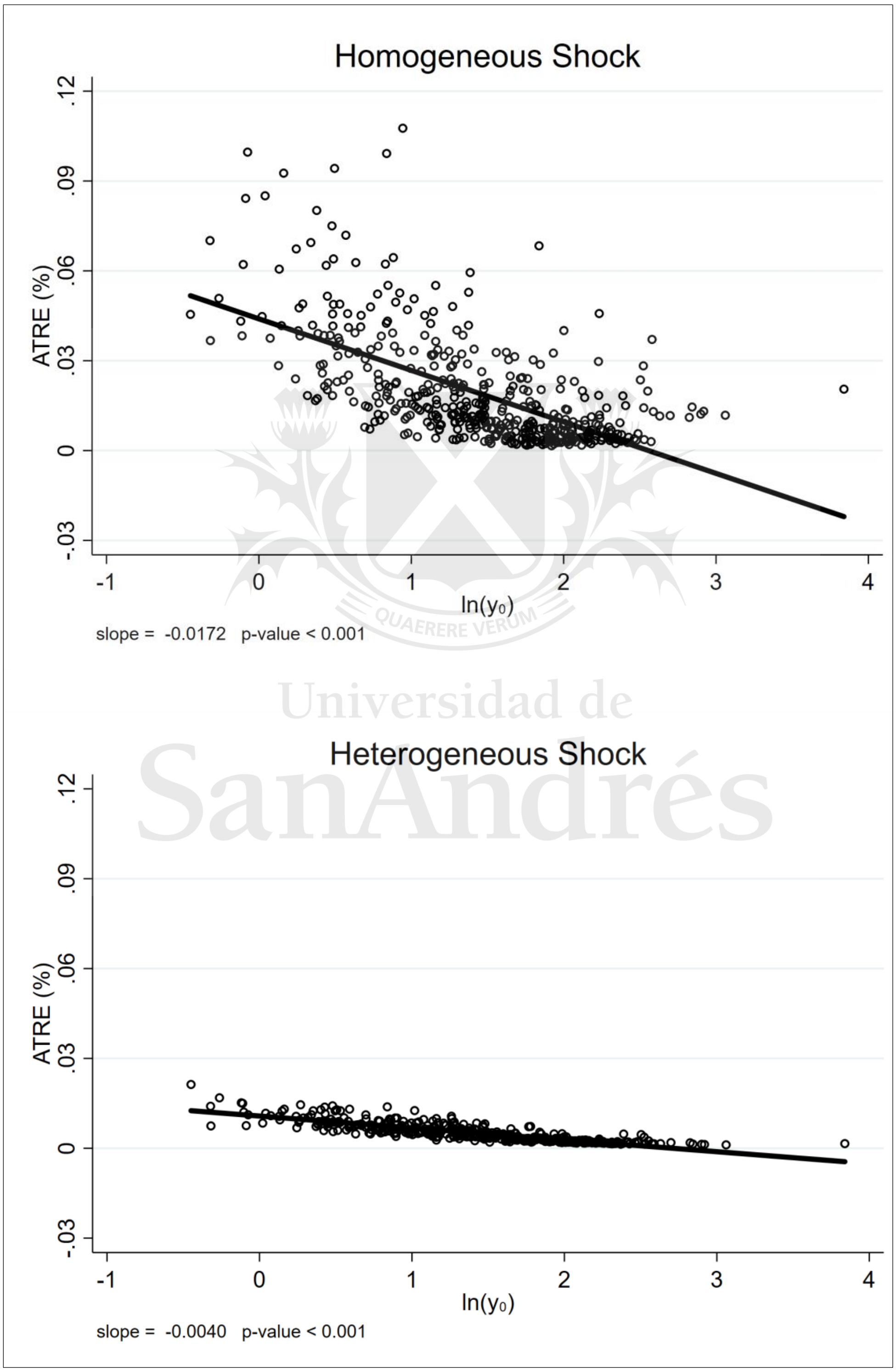
Source: own elaboration.

Universidad de San Andrés

Moreover, in both shock schemes, there is generally an inverse relationship between ARE and the level of GDP per capita. Additionaly, when considering only the departments with the highest ARE, those in the homogeneous scheme exhibit, on average, a higher GDP per capita than those in the heterogeneous scheme.

Regarding the $ATRE$ effect, it represents the expected growth in the long-run, after the shocks on every region reach the steady state. That is, it is the sum of ARE and the direct effect. **Figure 5.6** shows the $ATRE$ for each department simulated under both alternative shock schemes, along with the initial GDP per capita level. The negative slope in both homogeneous and heterogeneous schemes indicates a negative association between the total reception of shocks and the income indicator. This means that when all departments receive a positive shock (as simulated), the spatial spillovers seem to work in favor of the poorer ones, contributing to convergence across departments.

Figure 5.6: Initial per capita GDP and Total Reception Effects Average



Source: own elaboration.

Universidad de SanAndrés

Additionally, the steeper slope observed for the homogeneous scheme compared to the heterogeneous scheme in **Figure 5.6** suggests that this “pro-convergence” dynamic is more pronounced in the former case. In general, the largest difference in $ATRE$ values between the two shock schemes occurs in departments with low population and low income. This discrepancy is partly explained by the fact that in these departments, the own shock they receive in the homogeneous scheme is greater.

In general, the simulations performed and their corresponding results in terms of emission, reception, and total effects empirically highlight the non-trivial nature of considering spatial dependence effects in convergence analyses. Specifically, for the departments of Argentina, the results indicate that the shocks received by one department have the potential to affect the growth rates of other departments, and the dynamics of this diffusion process vary across the country’s territory. Furthermore, it has been observed that the strength of both emission and reception of shocks is associated with the characteristics of each department, including population or income levels and their connectivity with other departments.

5.6- Final Comments

The impact of the geographic context on regional growth is a well-established aspect within the academic literature. It is widely recognized that inherent characteristics associated with each geographic unit, such as climate, natural resource availability, and regional affiliations, can affect its growth patterns. However, the intricacies of growth dynamics go beyond these inherent features; the interactions among geographic units also play a crucial role. These interactions manifest in various forms, including the flow of goods, human and capital resources, as well as different types of spatial externalities. Scholars like Ertur & Koch (2007) have investigated the relevance of these spatial effects by modifying the neoclassical Solow model to include spatial externalities.

The omission of spatial interactions in econometric models can potentially be a critical specification error. Fortunately, advancements in spatial econometrics offer a means to empirically address these effects, particularly in the context of economic convergence. Studies focused on analyzing convergence across geographic units within countries, such as those conducted by Rey & Montouri (1999), Le Gallo *et al.* (2003), and Sun *et al*. (2017), consistently highlight the significance of spatial effects in shaping convergence patterns. However, the strength and direction of the impact on convergence patterns resulting from the inclusion of these spatial effects vary from case to case. This variability can be attributed to the multitude of pathways through which

Universidad de San Andrés

geographic units can influence each other, with each pathway having a different degree of importance.

In the context of Argentina, there is noticeable scarcity of literature that incorporates the effect of spatial interactions in the examination of convergence within the country. In fact, as far current knowledge, the work of Madariaga *et. al.* (2005) stands as the only existing study that acknowledges the presence of regional interactions. However, instead of measuring the effect of spatial interactions, this study removes them from the analysis employing spatial filtering techniques. In view of this, the main objective of this chapter is to quantify the effects of spatial interactions in the study of convergence among geographical units within Argentina.

Regional analyses for Argentina typically use data that is geographically disaggregated into 24 administrative units (provinces). However, the inference problems associated with a small number of observations are exacerbated in spatial models. In an effort to address this limitation, departmental data was used for the entire country, resulting in a dataset comprising over 400 observations. It is worth noting that, to the best of current knowledge, this represents the first study of Argentine convergence using departmental-level data.

The departmental GDP per capita data for the entire country is limited to the early and late 1950s. This temporal constraint is situated within a specific historical context, marked by a transition between two stages of ISI. The initial phase, characterized by a focus on light industry, gained momentum in response to the 1930 crisis and lasted until the 1950s. Subsequently, a heavier industrialization phase consolidated by the early 1960s.

The estimation of non-spatial models using provincial GDP data for the 1950s reveals no evidence of absolute convergence in Argentina. This is consistent with the results of other studies conducted for the country, which also find no absolute convergence across provinces during much of the second half of the 20th century. When departmental data for the 1950s is used instead of provincial data in non-spatial models, the lack of evidence for absolute convergence persists.

In contrast, when the effects of spatial interactions are included in the estimates using departmental data, there is evidence of absolute convergence. Furthermore, including province fixed effects to account for regional heterogeneity in non-spatial models also reveals convergence, with spatial interaction effects further strengthening this convergence. This means that in the Argentine case, spatial effects counteract convergence, and the significance of convergence becomes evident only when these effects are taken into account. Moreover, the omission of these effects contributes to the previously observed lack of empirical evidence for absolute convergence in the country throughout much of the twentieth century.

Universidad de SanAndrés

Compared to other countries, the increase in the speed of convergence when spatial effects are considered aligns with findings in European countries for the period 1980-1995 (Le Gallo *et al*., 2003) and in Brazil for 1970-1995 (Magalhães *et al*., 2005). It should be noted, however, that in some cases, the opposite occurs – a reduction in the speed of convergence. Examples include the United States with data for 1924-1994 (Rey & Montouri, 1999) and Colombia for 1970-2005 (Royuela & García, 2015).

In the case of Argentina, the results indicate the presence of spatial effects, manifesting as both local and global spatial spillovers. Local spatial spillovers imply that alterations in the initial GDP per capita of a department influence the growth of its neighboring departments. On the other hand, global spatial spillovers imply that changes in the growth of a department not only affect its neighbors but can propagate across the entire country.

The consequences of spatial interactions are evident in the fact that the growth shocks received by one department will also affect other departments. However, it is crucial to note that the degree to which a department affects others and is affected by them may vary across the entire territory. The last section of the chapter shows these differences by calculating the emission and reception effects for each department in response to two alternative simulation schemes involving positive random shocks. These simulations reveal that the positive shocks within the Argentine departments contribute to convergence, where spatial diffusion amplifies the effects on the growth of departments with relatively lower levels of GDP per capita.

Universidad de San Andrés

Finally, it is worth noting that the use of departmental-level GDP data has constrained the duration of the time span studied here. However, the consistency of the results obtained from non-spatial models with those of longer-span studies at the provincial level provides reassurance. Moreover, despite these limitations, the results presented in this study mark a significant advancement in the empirical analysis of spatial effects in the context of regional economic growth in Argentina, a subject that has practically been overlooked until now. It remains for further research to explore the spatial effects on departmental convergence, using alternative economic indicators beyond GDP per capita to address the temporal constraints of the data.

5.7- Appendix Chapter VI

To assess the robustness of the findings, particularly regarding the existence of spatial effects, an analysis with an alternative specification was employed using a different weighting matrix. To generate this matrix, a bi-quadratic one was used, instead of an adaptive Gaussian kernel:

$$w_{ij} = \begin{cases} \left[1 - \left(\frac{d_{ij}}{d_{i(k)}}\right)^2\right]^2, & si\ d_{ij} \leq d_{i(k)}, i \neq j, \\ 0, & another\ case, \end{cases} \tag{5.31}$$

Using this alternative specification of $\boldsymbol{W}$, the optimal k determined through the cross-validation function (CV) function was found to be 14. Notably, there were no significant changes in the results, as evidenced in **Table A5.1**.

Table A5.1: Results of Different Models Using Spatial Matrix under Adaptive Bi-square Kernel

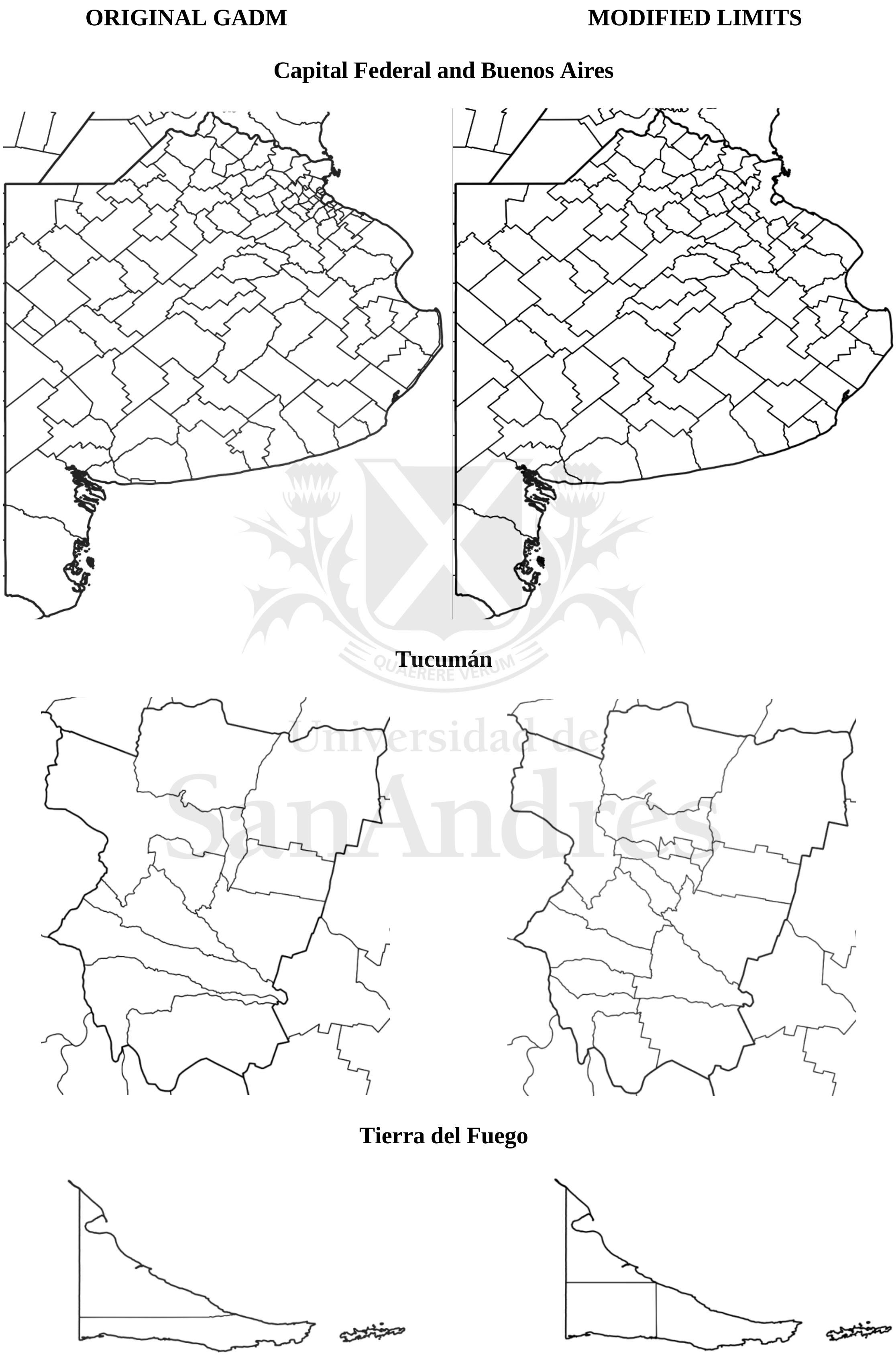
Models	**OLS**	**SDM**	**OLS FE**	**SDM FE**
Constant ($\hat{\alpha}$)	0.0016	-0.0116 **	-0.0143 **	-0.0062
	(0.0069)	(0.0058)	(0.0067)	(0.0074)
$\ln(\boldsymbol{y_0})$ ($\hat{\beta}$)	-0.0038	-0.0383 ***	-0.0111 ***	-0.0351 ***
	(0.0040)	(0.0048)	(0.0038)	(0.0047)
$\boldsymbol{W} \times \ln(\boldsymbol{y_0})$ ($\hat{\gamma}$)	-	0.0458 ***	-	0.0386 ***
	-	(0.0061)	-	(0.0062)
$\boldsymbol{W} \times \boldsymbol{g}$ ($\hat{\rho}$)	-	0.6496 ***	-	0.4634 ***
	-	(0.0492)	-	(0.0627)
Direct effect	-0.0038	-0.0355 ***	-0.0111 **	-0.0334 ***
	(0.0040)	(0.0046)	(0.0038)	(0.0045)
Indirect effect	-	0.0568 ***	-	0.0400 ***
	-	(0.0113)	-	(0.0087)
Total effect	-0.0038	0.0213 **	-0.0111 **	0.0066
	(0.0040)	(0.0108)	(0.0038)	(0.0077)
Moran's I	188.45 ***	-	66.31 ***	-
Province controls test.	-	-	21.02 ***	50.16 ***
LR common factor (H_0: $\gamma = \rho\beta$)	-	19.17 ***	-	17.92 ***
Convergence speed (annual %)	0.39	4.36	1.14	3.94
Half-life (years)	181	18	62	19

Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

Source: own elaboration.

Universidad de San Andrés

Figure A5.1: Original GADM and Modified Limits. Provinces with Complex Modifications



Source: own elaboration.

Universidad de San Andrés

5.8- References

ABREU, M., DE GROOT, H. & FLORAX, R. (2005): "Space and Growth: A Survey of Empirical Evidence and Methods". *Région et Devéloppment*, 21, pp. 12-43.

AGHION, P. & HOWITT, P. (1998): *Endogenous Growth Theory*. Cambridge: MIT press.

AHMAD, M., & HALL, S. (2017): "Economic growth and convergence: Do institutional proximity and spillovers matter?". *Journal of Policy Modeling*, 39(6), 1065-1085.

ANSELIN, L. & BERA, A.K. (1998): "Spatial Dependence in Linear Regression Models with an Introduction to Spatial Econometrics" In: *Handbook of Applied Economic Statistics* (pp. 237-289). Giles, Eds., Marcel Dekker, NY

ANSELIN, L. & REY, S. (2014): *Modern Spatial Econometrics in Practice: A Guide to GeoDa, GeoDaSpace and PySAL*. GeoDa Press, Chicago.

ANSELIN, L. (1988): *Spatial Econometrics: Methods and Models*. Kluwer, Dordrecht.

ANSELIN, L. (1999): "Spatial econometrics". *Working Paper, Bruton Center, School of Social Science*, University of Texas, Dallas.

ANSELIN, L. (2002): "Under the hood issues in the specification and interpretation of spatial regression models". *Agricultural Economics* 27, 3 (2002), pp. 247--267.

ANSELIN, L., BERA, A. K., FLORAX, R., & YOON, M. J. (1996): "Simple diagnostic tests for spatial dependence". *Regional science and urban economics*, 26(1), 77-104.

ARÁOZ, M. F. & NICOLINI, E. (2016): "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". *Anales LI Reunión Anual de Asociación Argentina de Economía Política*.

ARBIA, G. (2006): *Spatial econometrics: statistical foundations and applications to regional convergence*. Springer Science & Business Media.

ASUAD SANÉN, N. & QUINTANA ROMERO, L. (2010): "Crecimiento económico, convergencia y concentración económica espacial en las entidades federativas de México 1970-2008". *Investigaciones Regionales*, 18.

Banco Central de la República Argentina (BCRA) (1975): Sistema de Cuentas del Producto e Ingreso de la Argentina. Vol II: Cuadros Estadísticos.

Universidad de San Andrés

BARRO, R. J. & SALA-I-MARTIN, X. (1991): “Convergence across states and regions”. *Brookings papers on economic activity*, 107-182.

BARRO, R. J. & SALA-I-MARTIN, X. (1992a): “Convergence”. *Journal of political Economy*, 100(2), pp. 223-251.

BARRO, R. J. & SALA-I-MARTIN, X. (1992b): “Regional Growth and Migration: A Japan–United States Comparison”. *Journal of the Japanese and International Economies*, 6, December, 312–346.

BARRO, R. J. & SALA-I-MARTIN, X. (2004): *Economic Growth*. 2nd Edition.

BAUMOL W. (1986): “Productivity growth, convergence and welfare: what the long run data show”. *American Economic Review*, 76, pp. 1072-85.

BELINI, C. & KOROL, J. C. (2020): *Historia económica de la Argentina en los siglos XX y XXI*. Ed. Siglo XXI.

BOLSI, PUCCI, CAILLOU, LAANES, ORTIZ & MADARIAGA (1997): *Problemas Poblacionales del Noroeste Argentino*. Instituto de Estudios Geográficos. Facultad de Filosofía y Letras. Universidad Nacional de Tucuman.

BUNGE, A. (1940): *Una nueva Argentina*. Buenos Aires.

CAPELLO, R. & NIJKAMP, P.,(eds.) (2009): *Handbook of Regional Growth and Development Theories*. Edward Elgar Publishing).

CAPELLO, R. & NIJKAMP, P.,(eds.) (2019): *Handbook of Regional Growth and Development Theories: Revised and Extended Second Edition.* Edward Elgar Publishing).

CHE, N. X. & SPILIMBERGO, A. (2012): “Structural reforms and regional convergence”. *SSRN.*

Consejo Federal de Inversiones y Centro de Investigaciones Económicas Instituto Torcuato Di Tella (CFI-ITDT) (1965): *Relevamiento de la estructura regional de la economía argentina*. Buenos Aires: Ediciones CFI. (Reprinted from Universidad Torutato Di Tella, 1962).

CORTÉS CONDE, R. (2009): *The political economy of Argentina in the twentieth century*, Cambridge Books.

CRESSIE, N. (1993). *Statistics for spatial data*. John Wiley & Sons.

QUAERERE VERUM Universidad de SanAndrés

DALL'ERBA, S. & LE GALLO, J. (2008): "Regional convergence and the impact of European structural funds over 1989-1999: a spatial econometric analysis". *Papers in Regional Science*, 87, pp. 219-244.

DE DOMINICIS, L. (2014): "Inequality and Growth in European Regions: Towards a Place-based Approach". *Spatial Economic Analysis*, 9(2).

DEBARSY, N. & ERTUR, C. (2019): "Interaction matrix selection in spatial autoregressive models with an application to growth theory". *Regional Science and Urban Economics*, 75, 49-69.

DI TELLA, G. & DORNBUSCH, R. (1989): *The Political Economy of Argentina, 1946–83*. Springer.

DÍAZ ALEJANDRO, C. (1970): *Essays on the economic history of the Argentine Republic*. Yale University Press.

ECKEY, H. F., DREGER, C., & TÜRCK, M. (2009): "Regional convergence in the enlarged European Union". *Applied Economics Letters*, 16(18), 1805-1808.

ECKEY, H. F., KOSFELD, R., & TÜRCK, M. (2007): "Regional convergence in Germany: a geographically weighted regression approach". *Spatial Economic Analysis*, 2(1), 45-64.

Ejército Argentino e Instituto Geográfico Militar (1953): *Atlas de la República Argentina.*

ELHORST, J. P. (2014): *Spatial Econometrics. From Cross-Sectional Data to Spatial Panels*. Springer.

ELÍAS, V. (1995): "Regional economic convergence: The case of Latin American economies". *Estudios de Economía*, 22(2), pp. 159-176.

ERTUR, C. & KOCH, W. (2007): "Growth, technological interdependence and spatial externalities: theory and evidence". *Journal of Applied Econometrics*, 22(6), pp. 1033-1062.

ERTUR, C., LE GALLO, J. &BAUMONT, C. (2006): "The European regional convergence process, 1980-1995: Do spatial regimes and spatial dependence matter?". *International Regional Science Review* 29, 1 (2006), pp. 3--34.

ESHAG E. & THORP R. (1965): "Economic and social consequences of orthodox economic policies in Argentina in the post-war years". *Bulletin of the Oxford University Institute of Economics & Statistics*, 27(1), pp. 1-44.

FERRER, A. (2008): *La economía argentina: desde sus orígenes hasta principios del siglo XXI*.

Universidad de SanAndres

FIGUERAS, A. J., CRISTINA, D., BLANCO, V., ITURRALDE, I. Y CAPELLO, M. L. (2014): “Un aporte al debate sobre la convergencia en Argentina: la importancia de los cambios estructurales”. *Revista Finanzas y Política Económica*, 6(2).

FISCHER, M. M. (2011): “A spatial Mankiw–Romer–Weil model: theory and evidence”. *The Annals of Regional Science*, 47(2), pp. 419-436.

FISCHER, M. M. (2018): “Spatial externalities and growth in a Mankiw-Romer-Weil world: Theory and evidence”. *International Regional Science Review*, 41(1), 45-61.

FISCHER, M. M., & STIRBÖCK, C. (2006): “Pan-European regional income growth and club-convergence”. *The Annals of Regional Science*, 40(4), 693-721.

FLORAX, R. & FOLMER, H. (1992): “Specification and estimation of spatial linear regression models: Monte Carlo evaluation of pre-test estimators”. *Regional science and urban economics* 22, 3 (1992), pp. 405--432.

FLORAX, R., & REY, S. (1995): “The impacts of misspecified spatial interaction in linear regression models”. *New directions in spatial econometrics*, 111-135.

GERCHUNOFF, P. & LLACH, L. (2018): *El ciclo de la ilusión y el desencanto: políticas económicas argentinas desde 1880 hasta nuestros días*. Crítica Argentina.

GETIS, A. & GRIFFITH, D. A. (2002): “Comparative spatial filtering in regression analysis”. *Geographical Analysis*, 34(2), pp. 130-140.

GROTZ, M. & LLACH, J. J. (2013): “Coparticipación casi sin convergencia, 1950-2010”. In *Consecuencias económicas y políticas del federalismo fiscal argentino* (No. 338 (82) (091)). Universidad Nacional de La Plata, La Plata.

HENDRY, D. (1979): “Predictive failure and econometric modelling in macroeconomics: The transactions demand for money”. In *Economic Modelling: Current Issues and Problems in Macroeconomic Modelling in the UK and the U*, pp. 217-242.

HERRERA, M., MUR, J., & RUIZ, M. (2019): “A comparison study on criteria to select the most adequate weighting matrix”. *Entropy*, 21(2), 160.

International Monetary Fund (2019): “Chapter 2: Closer Together or Further Apart? Within-country Regional Disparities and Adjustment in Advanced Economies”. *In World Economic Outlook, October 2019: Global Manufacturing Downturn, Rising Trade Barriers*, pp. 65--92.

Universidad de San Andrés

ISLAM, N. (2003): “What have we learnt from the convergence debate?”. *Journal of Economic Surveys*, 17(3), pp. 309-362.

JOHNSON, P. & PAPAGEORGIOU, C. (2020): “What Remains of Cross-Country Convergence?”. *Journal of Economic Literature* 58, 1 (2020), pp. 129-75.

KELEJIAN, H. & PIRAS, G. (2014): “Estimation of spatial models with endogenous weighting matrices, and an application to a demand model for cigarettes”. *Regional Science and Urban Economics*, 46, 140-149.

KELEJIAN, H. & PRUCHA, I. (1998): “A generalized spatial two-stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances”. *The Journal of Real Estate Finance and Economics*, 17(1), 99-121.

KELEJIAN, H. & PRUCHA, I. (1999): “A generalized moments estimator for the autoregressive parameter in a spatial model”. *International economic review*, 40(2), 509-533.

KOSFELD, R., ECKEY, H. F., & DREGER, C. (2006): “Regional productivity and income convergence in the unified Germany, 1992–2000”. *Regional Studies*, 40(7), 755-767.

LE GALLO, J., ERTUR, C. AND BAUMONT, C. (2003): “A spatial econometric analysis of convergence across European regions, 1980–1995”. In *European regional growth* (pp. 99-129). Springer, Berlin, Heidelberg.

LEE, L. (2004): “Asymptotic distributions of quasi-maximum likelihood estimators for spatial autoregressive models”. *Econometrica*, 72(6), 1899-1925.

LESAGE, J. & FISCHER, M. (2008): “Spatial growth regressions: model specification, estimation and interpretation”. *Spatial Economic Analysis*, 3(3), 275-304.

LESAGE, J. & PACE, R. (2009): *Introduction to Spatial Econometrics*. Boca Raton: Chapman & Hall/CRC.

LESAGE, J. & PACE, R. (2014): “The biggest myth in spatial econometrics”. *Econometrics*, 2(4), 217-249.

LUCAS, R. E. (1990): “Why Doesn’t Capital Flow from Rich to Poor Countries?”. *The American Economic Review*, 80(2), 92–96.

MADARIAGA, N., MONTOUT, S., & OLLIVAUD, P. (2005): “Regional convergence and agglomeration in Argentina: a spatial panel data approach”. MSE, Université Paris Pantéon-Sorbonne. *Cahiers de la MSE*, bla05006.

Universidad de San Andrés

MAGALHÃES, A., HEWINGS, G. J., & AZZONI, C. R. (2005): "Spatial dependence and regional convergence in Brazil". *Investigaciones Regionales-Journal of Regional Research*, (6), 5-20.

MANKIW, N. G., ROMER, D., & WEIL, D. N. (1992): "A contribution to the empirics of economic growth". *The Quarterly Journal of Economics*, 107(2), pp. 407-437.

MANLEY, D. (2021): "Scale, aggregation, and the modifiable areal unit problem". In *Handbook of regional science* (pp. 1711-1725). Berlin, Heidelberg: Springer Berlin Heidelberg.

MANSKI, C. (1993): "Identification of endogenous social effects: The reflection problem*". The Review of Economic Studies* 60, 3 (1993), pp. 531--542.

MARINA, A. (2001): "Convergencia económica en Argentina: ¿qué nos dice la evidencia empírica?". In *Convergencia económica e integración: La experiencia en Europa y América Latina* (pp. 147-162). Ediciones Pirámide.

MORAN, P. (1950): "Notes on continuous stochastic phenomena", *Biometrika* (1950), pp. 17--23.

MUR, J. & ANGULO, A. (2009): "Model selection strategies in a spatial setting: Some additional results". *Regional Science and Urban Economics*, 39(2), pp. 200-213.

OECD (2014): *How's is the Life in Your Region? Measuring regional and local well-being for policy making*. OECD Publishing, Paris

ORD, J. K. & CLIFF, A. (1973): *Spatial autocorrelation*. London: Pion.

ORD, J. K. (1975): "Estimation methods for models of spatial interaction". *Journal of the American Statistical Association*, 70(349), 120-126.

PAAS, T., & VAHI, T. (2012): "Economic growth, convergence and innovation in the EU regions. Discussions on Estonian Economic Policy". *Theory and Practice of Economic Policy*, 20(1).

PUGA, D. (1999): "The rise and fall of regional inequalities*". European economic review* 43, 2 (1999), pp. 303--334.

RAPOPORT, M. (2008): *Historia económica, política y social de la Argentina (1880-2003).* Number 982. Editorial Emecé.

Universidad de San Andrés

REY, S. & MONTOURI, B. (1999): “U.S. Regional Income Convergence: a Spatial Econometric Perspective”. *Regional Studies*, 33, pp. 145-156.

REY, S. J., & LE GALLO, J. (2009): “Spatial analysis of economic convergence”. In *Palgrave handbook of econometrics* (pp. 1251-1290). Palgrave Macmillan, Londres.

RODRIK, D. (2013): “Unconditional convergence in manufacturing”. *The Quarterly Journal of Economics*, 128(1), 165-204.

ROMER P. (1986): “Increasing Returns and Long-Run Growth”. *Journal of Political Economy*, 94, 5, pp. 1002-1037.

ROYUELA, V. & GARCÍA, G. A. (2015): "Economic and Social Convergence in Colombia", *Regional Studies* 49, 2 (2015), pp. 219-239.

RUGGLES, S., KING, M. L., LEVISON, D., MCCAA, R., & SOBEK, M. (2003): “IPUMS-international”. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 36(2), 60-65.

SALA-I-MARTIN, X. (1996a): “The classical approach to convergence analysis”. *The economic journal*, 106(437), 1019-1036.

SALA-I-MARTIN, X. (1996b): “Regional cohesion: evidence and theories of regional growth and convergence”. *European economic review*, 40(6), 1325-1352.

SAWERS, L. (2018): *The other Argentina: the interior and national development*. Routledge, New York.

SCHLITTE F. & PAAS T. (2008): “Regional Income Inequality and Convergence Processes in the EU-25”. *Scienze Regionali*, FrancoAngeli Editore, vol. 2008(Suppl. 2), pages 29-49.

SOLOW, R. (1956): “A contribution to the theory of economic growth”. *The Quarterly Journal of Economics*, 70(1), pp. 65-94.

STIMSON, R. J., STOUGH, R., & NIJKAMP, P. (2011): *Endogenous regional development: perspectives, measurement and empirical investigation*. Edward Elgar Publishing.

SUN, X., CHEN, F. AND HEWINGS, G. J. (2017): “Spatial Perspective on Regional Growth in China: Evidence from an Extended Neoclassic Growth Model”. *Emerging Markets Finance and Trade*, 53(9), pp. 2063-2081.

QUAERERE VERUM
Universidad de
SanAndrés

TALASSINO, M. R. & HERRERA GÓMEZ, M. (2021): "Impacto de los efectos espaciales en la convergencia regional. Análisis departamental para la Argentina". *Documento de trabajo RedNIE*, 2021-42.

TAYLOR, A. M. (1994): "Tres fases del crecimiento económico argentino". *Revista de Historia Economica-Journal of Iberian and Latin American Economic History*, 12(3), 649-683.

TOBLER, W. R. (1970): "A computer movie simulating urban growth in the Detroit region". *Economic geography*, 46(sup1), 234-240.

United Nations (2020): *World Social Report 2020: Inequality in a Rapidly Changing World*.

WHITTLE, P. (1954): "On stationary processes in the plane". *Biometrika*, 434-449.

ZALDUENDO, E. A. (1975): "Las desigualdades económicas entre las regiones de Argentina". *CEPAL Documento* B/14.

QUAERERE VERUM
Universidad de
SanAndrés

CHAPTER VI

CONCLUSION

6.1- Closing Remarks

In Latin American countries, regional economic inequalities are widely recognized as a significant concern, with the Argentine case being no exception. These inequalities stem from various factors, including geographical variations, which are linked to differences in natural resource endowment and market accessibility, as well as socioeconomic path dependence. In dynamic terms, different economic trajectories among a country's regions can either mitigate or exacerbate these inequalities. To explain the variability in regional growth performances, several hypotheses have been proposed in the literature. For example, neoclassical growth models anticipate convergence among regions, while theories rooted in New Economic Geography predict the opposite, emphasizing the role of agglomeration economies. Additionally, other hypotheses suggest changing inequality trajectories, such as Williamson's (1965) inverted-U pattern, which suggests an initial increase followed by a subsequent decline in inequality as economies develop.

Regarding the Argentine case, extensive research has examined the dynamics of regional disparities within the country, with most findings indicate a lack of convergence in provincial GDP per capita at least since the 1950s. Prior to this period, quantitative data on macroeconomic aggregates at the provincial level, such as GDP, are notably scarce, posing serious limitations for studies reliant on such data. Recent advancements have partially addressed these limitations, providing provincial GDP estimates for the late 19th and early 20th centuries. Nevertheless, the new evidence remains insufficient to fully analyze much of the first half of the 20th century. This information gap is particularly regrettable considering the historical significance of this period for Argentina, as it marked a transition from an economy centered on the export of raw agricultural materials to an inward-looking model of Import Substitution Industrialization that was characterized by increased state intervention. This transformation, together with major international events such as the two World Wars and the 1930 crisis, could have potentially influenced the economic trajectories of Argentine provinces differently, given their distinct productive profiles.

This thesis has addressed this issue by providing new quantitative evidence on crucial macroeconomic variables at the provincial level for the second quarter of the 20th century, enabling the analysis of the relative long-term regional performance. It begins with a descriptive study that traces the evolution of provincial and regional GDP and GDP per capita from 1895 to 2004.

Subsequently, a more formal analysis delves into the evolution of regional inequality patterns and the presence of economic convergence, focusing on the period spanning from 1914 to 1959, a period virtually overlooked in the previous literature on the subject. Additionally, the study explores the role played by factors such as sectoral structure and spatial interactions in shaping the evolution of regional inequality patterns.

Chapter II sets the scene. It provides a detailed examination of the main characteristics of Argentine regions, the major national and international historical events spanning from the colonial era to the beginning of the 21st century, and the way the literature has quantitatively studied the economic changes at regional level during this period. The chapter begins by summarizing the key regional differences in factor endowments and the resulting production profiles, primarily driven by these differences. Overall, Argentina has been characterized by a notable contrast between its relatively rich capital and south, and the comparatively poorer north, a trend evident at least since the 20th century. On the one hand, the capital, located in the Pampean region at the country's geographic center, serves as the focal point for much of the manufacturing and service sectors, particularly within Greater Buenos Aires. Moreover, the Pampean region benefits from favorable soil and climate conditions conductive to the production of exportable agricultural goods. On the other hand, the southern part of the country has historically been associated with sheep ranching and later with the exploitation of hydrocarbon reserves. In contrast, the north, relatively less prosperous, includes some provinces that stand out for crop production and related industrial activities, mainly catering to the domestic market. These provinces hold a somewhat less disadvantaged than other northern provinces that have not been able to specialize in these agro-industrial activities.

Universidad de SanAndrés

This chapter also summarizes the main historical events that took place in the country, which have shaped Argentina's economy. Given the diverse productive profiles of each region and their varying access to national markets, contextual changes have had varying impacts. For instance, the geographical distribution of economic activity in the colonial period differed significantly from that in the late nineteenth century. Argentina's economic center shifted from the north, which was linked to Upper Peru markets during the colonial period, to the Pampean region by the late 19th century. Historical events such as the Bourbon reforms, wars of independence, and internal conflicts contributed to this change, aligning the economic focus with European markets, and leaving the north behind. In the late 19th and early 20th centuries, Argentina's economy was marked by a high degree of openness to international factor flows (labor and capital), exporting agricultural raw materials and importing manufactured goods. This scenario began to change somewhat after the turn of the 20th century and intensified with World War I and the 1930 crisis, leading to the rise of the domestic-oriented industrial sector. This marked the onset of the Import Substitution Industrialization (ISI) period, which persisted until at least the mid-1970s and primarily benefited urban regions, especially Greater Buenos Aires.

In Argentina, the ISI period can be divided into two stages: a lighter industrialization phase based on labor-intensive activities, lasting until about the 1950s, and a heavier industrialization phase focused on more capital-intensive activities, especially since the 1960s. During the first stage, state support for industrialization was initially limited. However, this changed during the Second World War, gaining further emphasis in the postwar period, especially under the Perón government. In the "heaviest" stage of the ISI period, governments and policies tended to be more unstable. Finally, during much of the last quarter of the 20th century, there was a prevailing trend toward dismantling previous industrial policies.

As previously mentioned, the existing literature has been able to study regional dynamics relatively accurately using provincial GDP data available since the 1950s. However, the precision of studies conducted for the earlier period, known as the light ISI stage, was limited by the scarcity of quantitative evidence. In general, researchers often had to rely on proxies to measure relative provincial economic performance, such as tithes, wealth, fiscal revenues, demographic indicators like population size and mortality rate, and incomplete economic indicators such as industrial employment and wages, or indexes excluding the tertiary sector. The drawback of relying on these indicators is their potential to yield misleading results when used as substitutes for provincial GDP. The only exceptions in this period are quite recent estimates for the years 1895 and 1914, which enable a comparison of relative GDP and GDP per capita levels with 1953, the next available provincial estimate. However, given the significant events that occurred during this period, it is reasonable to assume that provincial dynamics were intricate. The main takeaway from this chapter underscores the necessity of incorporating additional estimates for the intervening years into the debate on regional development in Argentina.

Chapter III addresses this need by constructing provincial GDP estimates for the years between 1914 and 1953, specifically 1937 and 1946, and incorporating them into the analysis of regional inequality. Throughout the chapter, the estimation procedure is meticulously detailed to ensure maximum traceability. Briefly, national sectoral GDP figures are used, with each sector distributed among the provinces based on the construction of provincial indicators linked to each sector (top-down method). This process involves economic disaggregation into 14 sectors, which, despite requiring extensive data collection, improves the precision of the estimates and allows the inclusion of the sectoral component in the analysis. For some sectors, it was possible to replicate the construction of the provincial indicators for the year 1953, enabling a comparison with an existing estimate for that year, derived from a more comprehensive dataset. This comparison reveals a high degree of similarity, supporting the credibility of the methodology

QUAERERE VERUM Universidad de SanAndrés

applied for 1937 and 1946. Additionally, the main regional patterns unveiled by these new estimates are consistent with the data available for the nearest years (such as 1953) and harmonize with the historical narrative. These patterns include GDP concentration in the Pampean region, higher GDP per capita in Capital Federal and Patagonia, and lower levels in the north of the country.

Regarding regional dynamics, previous findings indicate a reduction in GDP per capita disparities among provinces between 1895 and 1914, followed by an increase until the beginning of the 21st century. By 1953, measures of interprovincial inequality had surpassed the initial figures of 1895. The inclusion of new data from 1937 and 1946 reveals that inequality was already higher in 1937 than in 1895, with most of the increase occurring between 1914 and that year. After a slight decline during the Second World War, the general trend in interprovincial inequality in subsequent periods was upward, albeit less pronounced than in the 1914-1937 period. According to the inverted U-shaped inequality pattern proposed by Williamson (1965), after the initial increase observed at the onset of the ISI period (1914-1937), inequality should subsequently decline at some point. However, this anticipated decline does not seem to have materialized in the country. Moreover, estimates of GDP per capita reveal that the increase in inequality observed during much of the 20th century was characterized by a widening gap between the initially rich regions (Capital Federal and Patagonia) and the rest. In the case of Capital Federal, the presence of agglomeration economies may have been a potential driving force, while Patagonia's economic advancement can be attributed to the exploitation of oil resources in the region.

Universidad de San Andrés

Chapter IV delves deeper into the analysis initiated in **Chapter III**, providing a more detailed exploration of the regional dynamics of GDP, including sectoral components, with a specific focus on the light stage of the Argentine ISI. This chapter uses provincial GDP and GDP per capita data for 1914, 1937, 1946, 1953, and 1959, along with provincial GDP per worker data for 1914, 1946, and 1959. These datasets enable the subdivision of the period spanning from 1914 to 1959 into shorter intervals, each characterized by distinct features in terms of the national and international economic and political context. For example, the period from 1914 to 1937 marked a phase of deglobalization associated with World War I and the 1930 crisis. The period from 1937 to 1946 included World War II, while the years from 1946 to 1953 coincided with a large part of the first two Perón's governments, which were characterized by a heightened degree of state intervention in the economy. Lastly, the period from 1953 to 1959 represented a transition towards heavier industrialization and a gradual retreat from Peronist state intervention.

In an initial exploration, aside from Capital Federal, no significant success is observed in terms of GDP per capita and GDP per worker in the Pampean region when compared to other regions.

This observation is striking considering the key role attributed to the Pampean region in historical accounts of the Argentine ISI period. In fact, when excluding Capital Federal, this region even experienced a decline in GDP share and, relative to the nation as a whole, in GDP per capita and per worker between 1914 and 1937. Although the GDP share of the province of Buenos Aires recovered after 1937, associated with the growth of industry in the Buenos Aires conurbation, the relative GDP per capita did not. In the rest of the Pampean region, both indicators continued their descent during most of the Peronist era, only beginning their recovery between 1953 and 1959.

The analyses presented in **Chapters III** and **IV** consistently highlight the relative growth of GDP per capita in Capital Federal and Southern Patagonia compared to the rest of the country throughout practically the entire 20th century. This success can be linked to the findings of Maloney & Valencia Caicedo (2016), who explore long-term changes in regional development patterns in Argentina. Specifically, they investigate the hypothesis of persistent fortunes in the Americas at the subnational level from the pre-colonial period to the beginning of the 21st century. Their research reveals a common trend across subnational units: a positive correlation between per capita income today and population density, acting as a proxy for productivity, in the precolonial period. This correlation supports the hypothesis of persistence. However, they highlight Argentina and Chile as the only two exceptions that represent a reversal of fortune. Prior to the Bourbon reforms of the late 18th century, the territory now known as Capital Federal had minimal integration into the colonial economy, while Patagonia never integrated during the colonial era. Despite this initial backwardness, these regions eventually became the ones with the highest GDP per capita in Argentina, while the northern regions of the country, initially prosperous due to their commercial ties with Upper Peru, lagged behind. This historical narrative aligns with the observations made in **Chapter II.**

However, the results of **Chapters III** and **IV** of this thesis also show that this reversal was far from being a continuous and uninterrupted process. In 1895, years after the independence and unification of the country and in the context of the agro-export model, the provincial GDP per capita estimates by Aráoz & Nicolini (2016) for that year reveal that the reversal was already well advanced: Capital Federal and the provinces of Patagonia were among the richest territories, while the territories identified by Maloney & Valencia Caicedo (2016) as initially more prosperous fell to intermediate and even lower positions. Between 1895 and 1914, however, this reversal seems to have stalled and transformed into a process of convergence: the GDP per capita of Capital Federal grew slightly less than that of the country as a whole. Although its GDP share grew, this growth was offset by population growth, driven by the influx of international migrants to the area. Additionally, the provinces identified as poor by Maloney & Valencia

Caicedo (2016) that remained impoverished in 1895 experienced growth rates above the national average between that year and 1914. The decades after 1914, corresponding to the ISI period, are characterized by the persistence of provincial positions at the extremes of the distribution (the richest and the poorest), with several shifts in intermediate positions. Moreover, since that year, the data show an increase in the relative GDP per capita of Capital Federal and the Patagonian provinces, a trend sustained throughout the rest of the 20th century. Although the period between 1914 and 1937 saw an interruption in convergence, some territories that had remained poor since colonial times exhibited relatively high growth rates between 1937 and 1946, during World War II. This latter period also witnessed convergence between middle-income areas in the north of the country, associated with agricultural manufactures for domestic markets, and the Pampean areas linked to exportable agricultural activities. However, this convergence ceased in the post-war period, with no clear association observed between income and growth between 1946 and 1953. In the subsequent years, this ambiguous pattern persisted, but with Capital Federal and Patagonia continuing their upward trajectory compared to the rest of the country.

The diversity in the sectoral structure of the economies of Argentina's provinces is a factor that potentially influences the observed disparities in their GDP per capita levels and the evolution of these disparities. In this regard, **Chapter IV** takes advantage of the sectoral breakdown of provincial GDP estimates to incorporate sector-specific elements into the analysis. Interestingly, the results suggest a pattern that diverges from the historical narrative: the secondary sector's contribution to the GDP of the Pampean region (excluding Capital Federal and Buenos Aires) is lower than in any other region of the country. This is likely due to the significant weight of the exportable agricultural sector in the Pampas. Additionally, there is a relatively high participation of the secondary sector in the least lagging provinces in the north, where industrial crops and, in some cases, even mining activities play a significant role. In the most lagging northern provinces, the tertiary sector's prominence stands out, but it is mainly driven by activities related to the government sector.

Despite the sectoral differences mentioned above, the results in **Chapter IV** suggest that they do not seem to be the main factor behind the regional asymmetries in terms of GDP per worker. In particular, there is greater heterogeneity in productivity across provinces within a sector than across sectors. Moreover, from a dynamic perspective, while there is some convergence among provinces in terms of sector-specific GDP per worker (especially in the secondary sector), this convergence does not necessarily lead to overall convergence in GDP per worker. This finding aligns with Rodrik's (2013) hypothesis, which suggests that convergence is more likely to occur in specific sectors, notably manufacturing, and may not be sufficient to translate into overall convergence.

Universidad de San Andrés

Beyond some nuances for specific periods and changing rhythms, the results presented in **Chapters III** and **IV** in terms of provincial GDP per capita dynamics broadly indicate a lack of convergence during the light stage of the Argentine ISI. **Chapter V** explores the potential role of spatial interactions among geographic units in explaining this absence of convergence. The analysis considers that the growth of GDP per capita in one region can be influenced by either the growth or the existing level of GDP per capita in other regions, particularly those that are geographically proximate. However, the econometric tools for this analysis require more observations than the 24 provided by the provincial-level data. To address this limitation, data on GDP per capita at the department level (the second-level administrative division) for the years 1953 and 1959 were used.

This analysis reveals that, initially, the most backward regions experience faster growth rates than the richer ones (convergence). However, this growth is counteracted by the impact of interactions with neighboring regions. Specifically, the results for Argentina suggest the presence of clusters of departments with similar levels of GDP per capita. Therefore, the effect of spatial interactions suggests that rich departments benefit from their also rich neighbors, while poor departments are hindered by being surrounded by also poor neighbors. The direction of these effects implies divergence rather than convergence, and their significance in the results is substantial enough to counteract convergence. Consequently, estimations of absolute convergence models for Argentina that do not account for spatial interactions only reflect the net effect: no convergence.

Universidad de
SanAndrés

The inclusion of spatial interactions in the models presented in **Chapter V** enables the propagation of potential shocks among different geographic units. In other words, if one region experiences a shock, it can affect other regions. However, not all regions have the same capacity to transmit these shocks. The findings of the chapter for the Argentine case reveal that departments with greater transmission capacity are located in the northwest of the country, the northwest of Patagonia, and, within the northeast region, the west of the province of Corrientes and the center of Misiones. In general, it seems that poorer departments are more capable of transmitting shocks to others than richer ones. Similarly, variations in the capacity to receive shocks among departments were observed. The results suggest that if all departments were to receive a positive shock, the effect of spatial interactions would work in favor of the poorer ones, thereby contributing to convergence among departments.

Overall, the work documented in this thesis shows that alongside economic heterogeneities among different regions of the country, such as in GDP per capita levels, there are also different developmental paths influenced by the prevailing political and economic context. Additionally, the analyses based on quantitative information may not always support conventional historical narratives. While this study represents a contribution to the understanding of Argentine economic history during an understudied period, particularly from a regional and quantitative perspective, it is far from complete. Several aspects warrant further investigation, as outlined in **Chapter V**, providing opportunities for future research based on the findings presented here. For instance, while highly geographically disaggregated data offer new analytical possibilities, uniformly constructed departmental GDP data for the entire country are only available for the 1950s. It is therefore necessary to construct similar economic activity indicators at the local level for additional years.

Moreover, while this thesis has examined various factors contributing to regional disparities to differing extents, there is potential for further expansion in this analysis. For instance, it could include factors related to transportation infrastructure, particularly rail and road networks, or delve into political considerations, such as the distribution of fiscal resources among provinces, and provincial institutions. Additionally, there is scope to explore regional patterns of inequality using alternative techniques beyond the more conventional ones employed here, like cluster analysis, which enables the identification of groups of provinces sharing common characteristics, such as sectoral production patterns.

While there is ample opportunity for future investigation to delve deeper into specific aspects, I hope that this thesis serves as a significant contribution to the exploration of Argentina's economic history during the ISI period. In this regard, important progress has been made in studying the diverse paths taken by regional economies and the underlying factors driving them. This study has laid the groundwork for a more comprehensive analysis of economic transformations in Argentine regions during this pivotal period of its history.

QUAERERE VERUM
Universidad de
SanAndrés

6.2- References

ARÁOZ, M. F. & NICOLINI, E. (2016): "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". *Anales LI Reunión Anual de Asociación Argentina de Economía Política*.

MALONEY, W. F., & VALENCIA CAICEDO, F. (2016). "The persistence of (subnational) fortune". *The Economic Journal*, 126(598), 2363-2401.

RODRIK, D. (2013): "Unconditional convergence in manufacturing". *The Quarterly Journal of Economics*, 128(1), 165-204.

WILLIAMSON, J. G. (1965). "Regional inequality and the process of national development: a description of the patterns". *Economic development and cultural change*, 13(4, Part 2), 1-84.