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Persistence vs. Reversal and Agglomeration Economies vs. Natural Resources. Regional inequality in Argentina in the first half of the twentieth century*

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Abstract

In this paper we present an estimation of the GDPs of the provinces in Argentina in 1914 which is the first consistent estimation of this variable for any period before the 1950s. Our results confirm that most of the economic activity in 1914 was located in the province of Buenos Aires; however, some peripheral areas in Patagonia were quite affluent in per capita terms suggesting that resource abundance was an important factor to explain levels of income. The comparison of relative incomes per capita with the available data for 1953 suggests a remarkable stability with no signs of reversal of income but rather persistence or even divergence.

Resumen

Este artículo presenta una estimación de los PIBs de las Provincias Argentinas en 1914, siendo la primera estimación consistente de esta variable para cualquier período anterior a 1950. Nuestros resultados confirman que la mayor parte de la actividad económica se localizaba en la provincia de Buenos Aires; sin embargo, algunas zonas periféricas de la Patagonia muestran elevados niveles de PIB per cápita, sugiriendo que la abundancia de recursos fue un factor importante para explicar niveles de ingresos. La comparación de los PIBs per cápita con datos disponibles para 1953 sugiere una notable estabilidad de los ingresos, sin signos de reversión sino más bien de persistencia e incluso divergencia.

JEL Classification Numbers: N0; R0

Keywords: regional development, inequality, Argentina, convergence, reversal.

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Persistence vs. Reversal and Agglomeration Economies vs. Natural Resources. Regional inequality in Argentina in the first half of the twentieth century

1. Introduction

Economic growth in Argentina between 1880 and 1914 was impressive. Cortés Conde emphasizes that this period witnessed the longest and the highest spell of growth in the Argentine history with an average growth rate of aggregate GDP of 6%. According with this author, the outstanding economic performance of that period was based on the incorporation of productive factors (land, capital and labour) and, less importantly, some growth of total factor productivity¹. This process of economic development, with growth rates higher than the USA, transformed the country in many aspects and located Argentina among the 10 richest countries in the world².

After 1914 and, in particular, after the Great Depression of the 1930's, the orientation of the macroeconomic policies of the country and the pace and nature of the economic development changed dramatically: the level of openness was reduced in terms of both international trade and movement of productive factors, the intervention of the public sector in the economy increased, gold-standard was abandoned and public expenditure and public deficits expanded as well as inflation rates; growth rates of per capita income decreased until at least the 50s.³ In this context, domestic markets become more important, the traditional specialization in agro-pastoral commodities weakened and industrial production accelerated in absolute and relative terms.

We know very little about the relative economic performance of the different regions of the country in these periods. For the period of the first globalization, the combination of the historical description of the economy of some regions, and some disperse quantitative approaches generates a picture of the spatial profile of the economic activities: some regions, mainly in the Centre-East of the country, had geographic characteristics associated to comparative advantages in agro pastoral activities and consequently specialized in grain and livestock production. Other areas, more peripheral in geographic terms, specialized in the production of consumption goods for the internal market (like sugar or wine) and eventually would have become more capital-intensive economies. There is a third group of provinces⁴, particularly in the South and the North-East, more recently incorporated to the "national" economy and with very low population density whose main economic activities were intensive in natural resources: extensive cattle-rising, forestry and mining. The relative affluence of these geographic areas before the middle of the twentieth century has not been calculated so far.

¹ See Cortés Conde, Roberto, *La Economía Política de la Argentina en el Siglo XX* (Buenos Aires: Edhasa, 2005), pp. 15-48

² In the period between 1900 and 1913, Argentina per capita GDP grew at an annual rate of 2.5%, while the United States did at 2.0%. In fact, in 1900, GDP was \$4,091 per capita while in Argentina was \$2,756, meaning it was 1.48 times greater. In 2008, the U.S. GDP was \$31,178 per capita while in Argentina it is only \$10,995, i.e. 2.8 times greater. See Comisión Económica para América Latina y el Caribe (CEPAL), Serie Macroeconomía del Desarrollo, Hofman, André A., 'Long run economic development in Latin America in a comparative perspective: Proximate and ultimate causes', Santiago, Chile. December 2001; and Maddison, Angus, *The World Economy. Volume 2: Historical Statistics*. (Paris: OECD Development Centre, 2006).

³ See Gerchunoff, Pablo and Llach, Luchas, *El ciclo de la ilusión y el desencanto: Un siglo de políticas económicas argentinas*, (Buenos Aires: Ariel), 2005, pp. 470-476; and Cortés Conde, *Progreso y Declinación de la Economía Argentina* (Buenos Aires: FCE, 1998).

⁴ These areas are usually not provinces but *Territorios Nacionales*. The national law 1532 passed in 1884 created nine *Territorios Nacionales* (Misiones, Chaco, Formosa –in the North-East-, La Pampa, Neuquén, Río Negro, Chubut, Santa Cruz and Tierra del Fuego–in the Centre and Patagonia); Los Andes –in the North-West- was created in 1900. These political units were not autonomous and their authorities were designated by the national executive power. Almost all of them became provinces in the first half of the 50s; the only exception was Los Andes whose territory was distributed among Jujuy, Salta and Catamarca. See Map 1.

The first consistent estimations of the GDP of the provinces in Argentina were published by the Consejo Federal de Inversiones (CFI) and Instituto Di Tella in 1965 and presented data for 1953, 1958 and 1959.⁵ Afterwards, the CFI started to reconstruct these variables for the Argentine provinces in a more systematic way and produced comparable series for the period 1953-1992.⁶ According to these information, in 1953 the province and city of Buenos Aires had the fifth highest GDP per capita while the four highest positions in the ranking of that variable correspond to provinces in Patagonia: Tierra del Fuego was the first one, Santa Cruz the second one and Chubut and Río Negro the third and fourth respectively. The other provinces in the fertile lands of Pampa Húmeda, Santa Fe, Córdoba and La Pampa, occupy 6th, 8th and 10th positions respectively.

The long run economic evolution of the Argentinian provinces is important not only to understand the regional dimension of the volatile process of economic growth of the country, but also to shed some light on two debates. The first one is related to the relative forces of economics of agglomerations vis-a-vis the consequences of the relative resource endowments. Agglomeration economies imply that some initial conditions can stimulate economic activities in some locations and the accumulation of workers (and population in general) in that locations produce a higher demand of goods and services that induce even more concentration of economic activities and eventually larger differentials in income per capita across regions⁷. On the other hand, resource abundance theory suggests that intrinsic comparative advantages, in particular natural endowments like fertile land or mineral resources, are crucial in defining the specific spatial distribution of economic activities and average incomes⁸. The relevance of these two theories have been tested for several countries using the evolution of regional average incomes in the long run. For instance, while agglomerations economies seem to explain an important share of the evolution of inequality of regional incomes in Spain between 1860 and 1930, resource abundance is what explains the spatial distribution of economic activities in Chile between 1890 and 1973⁹.

The other debate, in some sense related with the first one, is about the processes of persistence or reversal in the relative positions of nations and regions. Acemoglu and co-authors suggested that most affluent economies in the sixteenth century became relatively poorer in the twentieth century due to endogenous institutional settings. The unit of observation in this case was the country. This reversal would have taken place because richer and more densely populated areas would have developed worse institutions which produce a deleterious effect on economic growth when the process of industrialization required that a broad cross section of the society had well defined property rights and adequate incentives to invest.¹⁰ On the other hand Maloney and Valencia Caicedo, analysing information for several countries in the Americas, and Meisel, looking at population densities in Colombian regions, argue that persistence is the norm

⁵ CFI - Inst. Torcuato Di Tella, *Relevamiento de la estructura regional de la economía argentina*. (Buenos Aires, Ediciones CFI, 1962)

⁶ These series have been compiled by Elias in Elías, Víctor J, 'Un informe de la economía de Tucumán, sus determinantes y perspectivas', in Elías, Víctor J. (ed.), *Informe sobre la economía de Tucumán*, (Tucumán: Fundación del Tucumán, 1996). They are the basis of several analysis of the relative economic growth of the provinces for the second half of the twentieth century; see Elias, Víctor J., 'Convergencia en el cono sur' in Mancha Navarro, Tomás and Sotelsek Salem, Daniel (coords.) *Convergencia económica e integración. La experiencia en Europa y América Latina*, (Madrid: Pirmámide, 2001), pp. 135-146. and Marina, Adriana, 'Convergencia económica en Argentina: ¿Qué nos dice la evidencia empírica?' in Mancha Navarro and Sotelsek Salem, *Convergencia económica*, pp. 147-162.

⁷ Fujita, M., Krugman, P., Venables, A.J., *The Spatial Economy. Cities, Regions, and International Trade*. (MIT Press, Cambridge, MA, 1999).

⁸ Slaughter, Matthew J. 'Per Capita Income Convergence and the Role of International Trade'. *The American Economic Review Papers and Proceedings*, 87: 2 (1997), pp. 194-199.

⁹ Roses, Joan Ramón, Martínez-Galarraga, Julio and Tirado Daniel A., 'The upswing of regional income inequality in Spain (1860–1930)'. *Explorations in Economic History* 47 (2010), pp. 244-257 and Badía Miró, M. 'The evolution of the localization of economic activity in Chile in the long run: a case of extreme concentration', Mimeo. Universidad de Barcelona 2014.

¹⁰ Acemoglu, Johnson and Robinson, 'Reversal of Fortune: Geography and Institutions in the making of the Modern World Income Distribution', *Quarterly Journal of Economics*:117:4 (2002), pp.1231-1294.

between the sixteenth and the twentieth century if the focus is placed on sub-national units; interestingly, Maloney and Caicedo claim that Chile and Argentina are the only examples in their sample of countries with a significant negative correlation of present and past prosperity.¹¹

In this paper we present a quantitative description of the economic structure of the fourteen Argentinean provinces and the ten national territories existing in 1914¹². For all these twenty four areas we analyse quantities of capital, land and labour, employment structure, capital per worker, land per worker, main cultivations, etc. The combination of these results with some information on factor prices and rates of return, leads to the calculation of the provincial GDPs which are the first consistent estimation of the affluence of the Argentine provinces for any period before 1953. The findings help to understand the regional dimension of the processes of economic development linked, before 1914, to the integration to international markets and, after 1930, to a policy of inward looking development and import substitutions. They show that at the beginning of the WW1, the province of Buenos Aires, including the city of Buenos Aires, is by far the most important area in the country, concentrating most of the population and the economic activity in what looks like a very strong case of agglomerations effects. However, and more surprisingly, other rich areas in per capita terms were in Patagonia where population density is very low and most of the value added was generated in cattle production; this suggest that comparative advantages created by natural endowments were important. The analysis of the evolution of income per capita in the provinces between 1914 and 1953 reveals a clear pattern of persistence with a remarkable stability in the relative positions of the provinces and no signs of convergence.

The rest of the paper is organized as follows: in section 2 we briefly introduce the main characteristics of the evolution of the Argentine economy between the end of the nineteenth century and the middle of the twentieth century. In section 3 we present the available estimations of the national GDP and previous estimations of the income per capita in some provinces for the period under consideration. Section 4 describes the methodology and data, section 5 presents the results and section 6 suggest some conclusions, an acknowledgement of some limitations of our approach and some lines for further research. The appendices at the end provide ancillary information on some topics discussed in the paper.

2. The economic evolution of Argentina in the first half of the twentieth century

The economic evolution of Argentina between 1860 and 1914 is a kind of archetypical example of rapid growth of average income in a context of integration in international markets, production of primary goods (wool, meat, cereals) and the expansion of productive land in the centre and south of the country.¹³ Since the pacification of the country in 1860, after fifty years of first independence and then internal wars, the expansion of land inputs was gradually complemented by an increase of labour supply because of the arrival of many migrants from Europe (mainly Spaniards and Italians) and the expansion of productive capital due to a significant inflow of foreign investment.¹⁴ The Centre-East part of the country, sometimes known as the Pampa

¹¹ In these analysis of the very long run is quite usual to make the debatable assumption that population density can be used as a proxy for prosperity; in the sixteenth century, the geographic area of what will be Argentina was characterized by high population density in the north (today poorer in relative terms) and low population density in the fertile lands of the centre and in Patagonia (today richer). See Maloney, William and Valencia Caicedo, Felipe, 'The Persistence of (Subnational) Fortune Geography, Agglomeration, and Institutions in the New World', *World Bank Policy Research Working Paper*, 6187 (2014). See also Meisel, Adolfo, 'No reversal of fortune in the long run: geography and spatial persistence of prosperity in Colombia, 1500-2005'. (Bogota: Banco de la República, 2014).

¹² One of the provinces is the combination of Capital Federal and the province of Buenos Aires. Even though it is possible to explore the Capital Federal separately from the province of Buenos Aires, we preferred to analyze them as a single unit because they were complementary economies with very close links and interconnections.

¹³ See Cortés Conde, Robert, *El Progreso Argentino 1880-1914*. (Buenos Aires: Sudamericana, 1979).

¹⁴ See Sanchez Alonso, Blanca, 'The other Europeans. Immigration into Latin America and the international labour market (1870-1930)'. *Revista de Historia Económica* 3 (2007), pp. 395-426; Cortés Conde, Roberto, *El Progreso Argentino*, pp. 149-190; Cortés

Húmeda, and including mainly the provinces of Buenos Aires and Santa Fe and some areas of Entre Ríos, Córdoba and La Pampa, was the epicentre of the expansion of cattle rising and cereal production¹⁵.

Secondary and tertiary sectors also expanded in this period but a slower pace. The growth of manufactures was mainly concentrated in the sectors processing local raw materials for both exports (chilled meat and grain processing) and domestic consumption (food and beverages). In 1914 these branches accounted for 42 % of total industrial production. In a regional perspective, the growth of the industrial sector was particularly important in some provinces that had natural comparative advantages in industrial crops. Tucumán, in the North-West, was a very important producer of sugar cane and had quite modern and capital intensive sugar mills and Mendoza (in Cuyo) specialized in the cultivation of vineyards and production of wine.¹⁶

The beginning of the WW1 was a large shock for the Argentinian economy. The collapse of the world markets of products and productive factors forced the country to rely much more in its own resources. Although the problems in the international markets could have been beneficial for the production of manufactured goods, the strong decline of imports of inputs and capital goods was an acute limitation: the decade between 1910 and 1919 witnessed the smaller growth rates of the manufacturing production between 1875 and 1934¹⁷.

Immediately after the armed conflict and before the Great Depression the country enjoyed a decade of robust growth¹⁸ related mainly with the recovery after the acute crisis of the previous years¹⁹. However, after 1930, economic conditions and economic policies changed in a more permanent way, economic growth decelerated and the country started a broader process of productive diversification. The change in the international context produced by the financial crisis of 1929 and the ensuing global economic recession was accompanied by a change in the national economic policies now oriented to higher levels of public intervention in the economy, imports substitution and stimulus to the industrial sector. In 1936 Argentina had the second largest industrial sector in South America (in relative terms) and the most dynamic branches were not only circumscribed to the traditional sectors of food processing (cereal mills, meat processing plants, sugar mills) but incorporated also many sectors oriented to the internal market (textiles, rubber, metals, electrical)²⁰.

The WW2 opened new possibilities for the expanding manufacturing sector: manufacturing exports were 2.9% of total exports in 1939 and increased to 19.2% in 1943.²¹ During the first period of the administration of Juan Perón (1946-1952), while exports from primary sector were

Conde, Roberto, *La Economía Política de la Argentina en el Siglo XX* (Buenos Aires: Edhasa, 2005), pp. 15-48 and Gerchunoff, Pablo and Llach, Luchas, *El ciclo de la ilusión y el desencanto: Un siglo de políticas económicas argentinas*, (Buenos Aires: Ariel, 2005), pp.13-59

¹⁵ Map 1 shows the location of the Argentine provinces.

¹⁶ Campi, Daniel and Richard Jorba, Richard, 'Transformaciones productivas, espaciales y sociales en la Argentina extrapampeana. El norte y Cuyo entre 1850 y 1890'. *Boletín Americanista*. 54 (2004), pp. 35 – 62.

¹⁷ Cortés Conde, Roberto, *La Economía Argentina en el Largo Plazo*, (Buenos Aires: Sudamericana, 1997), p. 207.

¹⁸ The average growth rate of the GDP per capita in the decade 1919-1929 was 1.75 % in Argentina which is higher than in USA (1.22 %), Canada (1.46 %) and Australia (0.32 %). See Gerchunoff, Pablo and Llach, Luchas, *El ciclo de la ilusión y el desencanto: Un siglo de políticas económicas argentinas*, (Buenos Aires: Ariel, 2005), p. 79

¹⁹ According to Cortés Conde, per capita GDP in 1912 was not surpassed until 1935 and according to Ferreres, per capita GDP in 1929 was only 11% higher than in 1912. See Cortés Conde, Roberto, 'Estimaciones del Producto Bruto Interno de Argentina 1875 – 1935' (Buenos Aires: Universidad de San Andrés, 1994) and Ferreres, Orlando J. (ed), *Dos siglos de economía argentina (1810-2004)*, (Buenos Aires, Fundación Norte y Sur, 2005).

²⁰ María Inés Barbero and Fernando Rocchi, 'Industry', in Della Paolera and Taylor (eds.), *A New Economic History of Argentina* (Cambridge: Cambridge University Press, 2003), p. 275.

²¹ Belini, Claudio, 'Industrial Exports and Peronist Economic Policies in Post-War Argentina'. *Journal of Latin American Studies* 44: 2 (2012), pp. 285-317.

penalized with strong controls in the international transactions and exchange rates, the industrial sector was favoured by many policies of subsidies and soft credits.²²

This process of expansion of the secondary sector and the associated structural change that characterized the two decades and a half between the crisis of 1930 and the end of Peronist administration, went hand-in-hand with an acceleration of the rural-urban migration and urbanization, in particular the growth of the city of Buenos Aires and its industrial belt.²³ After Perón was re-elected in 1952, the combination of high inflation, deficit of balance of trade and the growing awareness that the effect of the industrial policies was reaching a limit induced the *Segundo Plan Quinquenal*, less oriented to distributional issues and more focused on increasing efficiency and productivity.

3. Previous Estimations

There are mainly three estimations of the evolution of the national GDP in Argentina for the period before 1930 produced by Cortés Conde, Della Paolera and Ferreres and they generate a quite coincident picture of the trend of per capita income in Argentina in that period: vigorous growth between 1880 and 1914, a deceleration between 1914 and 1930.²⁴ For more recent years the best known estimation is the one by the Comisión Económica para América Latina (CEPAL hereafter) for the period 1900-1955 and uses information from a previous empirical work published by the Secretaría de Asuntos Económicos (SAE hereafter).²⁵ For the period 1900-1935, and despite some methodological differences, the estimation by CEPAL is quite coincident with the other series.

The series by Ferreres, that covers all the twentieth century, combines the information from SAE with other sources and presents a picture quite similar to one by CEPAL in the overlapping years. In the 60s and the 70s many new estimations, mainly produced by the Banco Central de la República Argentina, improved the available information for the period after 1950 but without introducing new estimations for the period before that year.²⁶

The first set of consistent estimations to compare the level of economic activity across the provinces is provided by the CFI which published the series of *Producto Bruto Geográfico* (PBG)²⁷ for the Argentine provinces in 1884 (see below), 1953 and between 1959 and 1992. We

²² In this period, terms of trade were at the highest levels in the twentieth century. The impact on the agro-pastoral sector were limited because the IAPI (*Instituto Argentino de Promoción del Intercambio*) absorbed all the grain production in the country (at artificially low prices) to sell it in both the national and the international markets. Price discrimination helped to control inflation by keeping low food prices in the internal market and the revenues of the IAPI were used to expand public expenditures and provide cheap credit to the manufacturing sector.

²³ See Lattes, Alfredo and Recchini de Lattes, Zulma, *Migraciones en la Argentina. Estudio de las migraciones internas e internacionales basado en datos censales, 1869-1960*. (Buenos Aires: Ed. Di Tella, 1969) and Salvatore, Ricardo D., 'Stature growth in industrializing Argentina: The Buenos Aires industrial belt 1916-1950', *Explorations in Economic History* 46 (2009), pp. 70-92.

²⁴ The series by Cortés Conde is slightly more optimistic than the one by Ferreres about the growth spell before the WW1 and more pessimistic of the behaviour of the economy between 1914 and 1930. See Cortés Conde, 'Estimaciones del Producto Bruto Interno', Della Paolera Gerardo, Taylor Alan M. and Bózzoli Carlos G. 'Historical Statistics' in Della Paolera, Gerardo and Alan M. Taylor (eds.), *A new economic history of Argentina*, (Cambridge: Cambridge University Press, 2003), pp. 376-85, and Ferreres, Orlando J. (ed), *Dos siglos de economía argentina*.

²⁵ CEPAL. *El desarrollo económico de la Argentina*, (Santiago de Chile: CEPAL, 1958) and Secretaría de Asuntos Económicos, 'Producto e Ingreso de la República Argentina en el período 1935-1954', (Buenos Aires, 1955).

²⁶ See a brief introduction of the history of the estimations of the national accounts in Argentina in Mentz, Raúl, 'Sobre la historia de la estadística oficial argentina'. *Estadística Española* 33:128 (1991), pp. 501-532. For an assessment of the economic performance of Argentina vis-à-vis similar countries (Australia and Canada) see Sanz Villaroya, Isabel, 'Macroeconomic Outcomes and the Relative Position of Argentina's Economy, 1875-2000'. *Journal of Latin American Studies* 41 (2009), pp. 309-346.

²⁷ The denomination for the equivalent to the GDP for provinces in Argentina is called *Producto Bruto Geográfico*. The main difference between the notion of GDP and PBG is the unit of observation for measuring the economic activity. When GDP is estimated for countries and a firm has productive units in more than one country, differentiation between "National" product and "Domestic" product is used and the respective flows are incorporated in the balance of payments. When GDP is estimated for a geographic unit smaller than a country (for instance a province), the added value is directly assigned to the productive unit according its geographic location. In this article we will use the English acronym GDP following notation in Rosés for Spanish regions and Crafts for regional GDP in Britain. See Roses, Joan Ramón, Martínez-Galarrraga, Julio and Tirado Daniel A., 'The upswing of

have almost nothing for any period before the middle of twentieth century. The journalists and social observers Michael and Edward Mulhall published a series of Handbooks of the River Plate between 1863 and 1892 with descriptions of the geography and main economic activities (among other things) of the area. Some of these handbooks presented summaries of wealth or earnings per capita in the provinces of Argentina although, of course, they were rough calculations without any formal assessment of sources or methodology.²⁸ In a book by Elías, in addition to numbers of per capita PBG of the Argentine provinces between 1953 and 1992, the PBG for the year 1884 is added in the tables. Of course, the figures for 1884 have not been produced with the same methodology and sources used by CFI for the second half of the twentieth century but the citation of the sources does not provide details on this particular item²⁹.

There are some recent reconstructions of macro magnitudes for some Argentine provinces in the nineteenth century but they are not strictly comparable because the methodology applied in each case was different. Coria estimates the PBG of Mendoza in 1914 by calculating the added value for each branch of activity taking the difference between the production and the value of intermediate products; the methodology and sources to calculate gross value of production and the cost of intermediate goods differ across activities and several approximations and assumptions are made in each step of the estimation.³⁰ For Salta, Antonelli et al. estimate the provincial GDP between 1880 and 1930 at prices of 2000 combining techniques of added value per branch of activity and techniques based on the expenditures approach.³¹

The lack of reliable and consistent estimations of the level of economic activity in the provinces before the middle of the twentieth century has precluded the possibility of precise comparative studies and, in some cases, forced researchers to use imperfect proxies for testing hypothesis. For instance, Llach used the level of public expenditure as a proxy for income per capita at the end of the nineteenth century while the approach presented in the compilation by Gelman relied in a very imperfectly measured level of taxable wealth to suggest inferences on regional inequality in the middle of that century.³²

4. Methodology and Data

The most usual approach to calculate the regional (or provincial) GDP in historical contexts is the one proposed by Geary y Stark to estimate regional GDP in United Kingdom for decennial periods between 1861 and 1911 and based on the identification of a set of variables linked to the value added in such a way that they can be used as predictors of its level. In particular, they choose employment and sector specific productivity, assuming that this productivity is captured by sector specific wages. Crafts applied a modified version of this idea to estimate the GDP of the administrative regions between 1871 and 1911 on a decadal basis and suggests a methodological modifications based on using tax records in those cases in which wage data is

regional income inequality in Spain (1860–1930). *Explorations in Economic History* 47 (2010), pp. 244-257 and Crafts, Nicholas, 'Regional GDP in Britain, 1871-1911: some estimates'. *Scottish Journal of Political Economy* 52:1, (2005), pp. 54-64.

²⁸ The ranking of the provinces, and their relative position, change very much in the different editions of the Handbooks. For instance, while in 1884 Córdoba is in the 12th position (out of 14) in terms of income per capita, in 1891 is the 4th. Tucumán has earnings per capita 5% higher than the national average in 1884 (and it is in the 3rd position of the ranking) but its earnings are 27 % below the national average in 1891 (placing the province in the 6th position of the ranking).

²⁹ See Elías, Víctor J, 'Un informe de la economía de Tucumán, sus determinantes y perspectivas', in Elías, Víctor J. (ed.), *Informe sobre la economía de Tucumán*, pp. 24-132. In a previous work it is mentioned that the figures of provincial GDPs for 1884 come from Yearbook by Mulhall and Mulhall of 1885; see Elías, Víctor J., 'Regional Economic Convergence: the case of Latin American Economies'. *Estudios de Economía* 22: 2 (1996), pp. 159-176.

³⁰ Coria, Luis A., 'El producto bruto geográfico de Mendoza para 1914. Metodología y resultados', (Mendoza: FCE – UNCuyo, Argentina, 2004)

³¹ Antonelli, Eduardo, Carrazón Mena, Gastón and Romero, Fernando, *La Economía de Salta. Entre finales del Siglo XIX y comienzos del Siglo XX*, (Salta: Enfoques Alternativos, 2011).

³² Llach, Lucas, *The Wealth of the Provinces: The Rise and Fall of the Interior in the Political Economy of Argentina, 1880-1910*. (Harvard University: Ph.D. dissertation, 2007) and Gelman, Jorge, *El mapa de la desigualdad en la argentina del siglo XIX*. (Rosario: Prohistoria, 2011)

not available.³³ There are many estimations of the regional GDP in historical contexts based on the Geary and Stark methodology.³⁴

In this paper, we present an alternative approach to calculate several macroeconomic variables, including the provincial GDP, for the twenty-four provinces in Argentina in 1914; our methodology will be based on the identity between the GDP and the sum of the retributions to productive factors (labour, land and capital).

In order to calculate the added value in each province we will use the income approach to GDP and use the identity between the sum of the added values and the sum of the retributions to the productive factors. In particular we will assume that the provincial GDP (Y) for each province will be

$$Y_i = \sum_{i=1}^N L_i w_i + [r_A K_A + r_C K_C + r_I K_I + r_S K_S] + [q_A T_A + q_C T_C] + s_C C \quad (1)$$

The first term of the right hand side of the equation is the remuneration to labour that is equal to the sum of all the wages paid to workers across the N different occupations. The second term in brackets encompasses the rents (r) paid to physical capital (K) in agriculture (A), livestock production (C), and in establishments in industry (I) and services (S). The third term, also in brackets, is the rent (q) paid to land (T) in agriculture and in livestock production and the last term is the flow of income generated by livestock (C). In this equation we allow the rate of return to differ across sectors.

The main source in which we base our research is the *Tercer Censo Nacional de la República Argentina*, collected on June, the 1st, 1914, during the administration of Dr. Roque Saenz Peña. From data included in Volume 2, “*Población*”, published in 1916, we produced the figures of total population and occupational categories. From Volume 5: “*Explotaciones Agropecuarias*”, published in 1919, we obtained the information on land used for agriculture and for cattle production. From Volume 6: “*Censo Ganadero*”, published in 1917, we obtained information on livestock and the value of land used for agriculture and cattle production. All the information related to Industry and Trade and Services was obtained from Volume 7, “*Censo de las Industrias*” and Volume 8, “*Censo del Comercio. Fortuna Nacional. Diversas Estadísticas*”, both published in 1917. Volumes 9 and 10 “*Instrucción Pública. Bienes del Estado*” and “*Valores Mobiliarios y Estadísticas Diversas*” provided information on public utilities, ports, hospitals among others. Another important source of information is the book “*Riqueza y renta de la Argentina. Su distribución y su capacidad contributiva*”, published by Alejandro Bunge in 1917; it was crucial to estimate the added value in agriculture and cattle production. More details about the way we used the information from Bunge in section 2.b.³⁵

Wages come from several sources mainly (but not exclusively) produced by the Bulletin of the National Department of Labour; they are described in detail below.

³³ Geary, F., y Stark, T., ‘Examining Ireland’s post-famine economic growth performance’, *The Economic Journal*, 112, (2002), pp. 919-935. And Crafts, N. F. R., ‘Regional GDP in Britain, 1871-1911: some estimates’. *Scottish Journal of Political Economy* 52:1, (2005), pp. 54-64. More recently, Geary and Stark have suggested that the modification introduced by Crafts is neither tested nor testable and that the results using the original method are closer to the official statistics when they are available. See Geary, F., y Stark, T., ‘Regional GDP in the UK, 1861–1911: new estimates’, *The Economic History Review*. 68 (205), pp. 123-144.

³⁴ See Roses, Joan Ramón, Martínez-Galarraga, Julio and Tirado Daniel A., ‘The upswing of regional income inequality’, Buyst, E., ‘Continuity and change in regional disparities in Belgium during the twentieth century’. *Journal of Historical Geography* 37:3 (2011), pp. 329-337. Schulze, M.S., ‘Regional income dispersion and market potential in the late nineteenth century Hapsburg Empire’. London School of Economics Working Papers 106/07, 2007; Felice, E., ‘Regional value added in Italy, 1891-2001, and the foundation of a long-term picture’. *Economic History Review* 64 (2011), pp. 929-950.

³⁵ Alejandro Bunge was an economist with a vast working experience in the Labour Department and the Nacional Statistics Office, academic activities in the Universities of La Plata and Buenos Aires and a deep knowledge of the functioning of the Argentine economy. See Bunge, Alejandro E., *Riqueza y Renta de la Argentina. Su distribución y su capacidad contributiva*, (Agencia General: Buenos Aires, 1917).

4-a. Labour remuneration

To calculate labour remuneration, we use the census of 1914 that classifies all the workers of each province in 436 occupations (so N in expression (1) is 436) and gives information on the total number of male, female, Argentine and foreigner workers in each category. These numbers will be the L_i in equation (1). One of the “Occupations” mentioned by the census is the “*Varias y sin especificar*”, with 1,793,661 individuals in Argentina. Although this broad and loosely defined category can represent many things, we will assume that it is mainly capturing the non-active population.³⁶ The other categories associated to non-active population are students, retired, beggars and rentiers, for which we assume income zero. Adding to the other categories, it turns out that total active population in Argentina in 1914 would be 3,121,091 individuals and the share of active population following the definition already mentioned is 39.5%.

Information about wages comes mainly from:

1. A report in a bulletin published by the Departamento Nacional del Trabajo (DNT hereafter) for 1912 quoting wages for around fifty categories from thirteen provinces (Buenos Aires, Catamarca, Córdoba, Corrientes, Entre Ríos, Jujuy, La Rioja, Mendoza, Salta, San Juan, San Luis, Santa Fe and Tucumán).³⁷ The province of Santiago del Estero and the national territories (Los Andes, in the North West; Chaco, Formosa, Misiones in the North East; La Pampa in the Centre; Neuquén, Chubut, Río Negro, Santa Cruz and Tierra del Fuego in the South) are excluded from the report. In general, the largest categories in the provinces with the largest populations are included in the report which makes that the active population of the provinces included in the report is 2,883,656 while the active population in the provinces excluded from the report is only 237,435.
2. For Buenos Aires we have also used information of wages for another ninety categories in that province presented in an *Anuario Estadístico del Trabajo* published by the *Departamento Nacional del Trabajo* in 1916 with information for 1914. The wages are in the pages 111-165 of that report.³⁸
3. There is a report by the DNT with wages for some categories in the national territories of Misiones and La Pampa.³⁹

From the information above we have assigned wages to 1,628,918 individuals in thirteen provinces (Buenos Aires, Catamarca, Córdoba, Corrientes, Entre Ríos, Jujuy, La Rioja, Mendoza, Salta, San Juan, San Luis, Santa Fe, Tucumán) and two national territories (La Pampa y Misiones). This is 52.19% of active population in the country.

We do not have direct information for the provinces of Santiago del Estero, Chaco, Formosa, Neuquén, Chubut, Santa Cruz, Tierra del Fuego and Los Andes. Total active population in these provinces is only 182,321 individuals (5.8 % of the total active population in the country). For these provinces we have assigned a wage similar to the closest and/or more similar province for which we have information. In particular:

1. We have used wages from Catamarca (the province of the North-West with the lowest average salary) for Santiago del Estero and Los Andes.⁴⁰

³⁶ When describing this category, the commentators of the Census claim that they include those individuals “... that in each province were without a known occupation, profession or mean of livelihood at the time of the census”. República Argentina, *Tercer Censo Nacional*, Vol. 1 (Rosso: Buenos Aires, 1916), p. 258.

³⁷ Departamento Nacional del Trabajo, *Boletín del Departamento Nacional del Trabajo* (1912), pp. 1084-1093.

³⁸ There are twenty-nine categories for which we have information both in the report from the DNT and from the *Anuario Estadístico del Trabajo*. The average is slightly larger in the 1912 Report and the correlation is 0.55.

³⁹ Departamento Nacional del Trabajo. *Boletín del Departamento Nacional del Trabajo*, (1912) p. 1094.

⁴⁰ The *Territorio de los Andes* was located in the western parts of the provinces of Salta, Catamarca and Jujuy in the area of *Puna*. This is a very arid land and most of the economic activity was based on primary low productivity activities.

2. For the five *Territorios Nacionales* in the Patagonia (Neuquén, Chubut, Río Negro, Santa Cruz and Tierra del Fuego) we have used a proportion of the wages in La Pampa. This proportion comes from a report of the BDNT for 1907 with quotations of wages for *peones* in La Pampa and four of the national territories (the exception is Neuquén). The details of the process are in the appendix.
3. For San Luis, we have used wages similar to those in Córdoba. There is a report by the BDNT with wages in several provinces in 1907. Wages for the categories *peon-jornalero*, carpenter, tinsmith, building worker and blacksmith (the largest categories in general) in the two provinces are very similar. Assuming that the relative wages across these two provinces did not change very much between 1907 and 1914 we have imputed the wages from Córdoba in each category in San Luis.

To impute a wage to the remaining categories in all the provinces we have classified them in four groups according to the skill required for doing the job described in the category.⁴¹ The first group is the one with the lowest requirement of skills and the most typical categories are *Jornalero, Peón, Vendedor Ambulante, Domésticos and Camareros*; the most typical categories in the second group are *Albañiles, Carpinteros, Costureras and Herreros*; the third group includes categories like *Mecánicos, Electricistas and Sastres*; the fourth group includes categories like *Abogados, Médicos and Arquitectos*.⁴² The wage assigned to categories without information in the three first groups is the weighted average wage of the categories with information in each group. For instance, all the workers in categories without information in group 1 (for instance in Buenos Aires: *Camareros, Mucamos, Limpiadores*) are imputed the weighted average wage of all the categories with information in that group (for instance in Buenos Aires *Jornaleros, Peones, Serenos, Estibadores*).

Given that we do not have any data for categories in group 4 for 1914 or any other close date we have used some information of wages of accountants, lawyers and physicians in Salta and Tucumán in 1889 and 1895 to define a plausible ratio between these wages and wages in other less skilled categories. Then we applied this ratio to impute a wage to the individuals in the fourth group. More details are provided in the Appendix 1.

In order to combine all these pieces of information from different sources we had to make other adjustments as follows: we have transformed all the quotations from 1912 to values of 1914 using the price index by Bunge.⁴³ Although most of the quotations of wages are on a daily basis, some of them are in a monthly basis; to put all the information on a daily basis we assumed that there are 25 days of work per month.⁴⁴ In some cases, the sources mention that some workers, in addition to the monetary wage, receive food or shelter or both. In these occasions, the monetary value of the food or shelter is added to the monetary wage in order to get the full wage. The criteria to adjust the monetary wage are explained in the appendix.

In the census, the name of some occupational categories suggest that their income is not generated by pure raw labor but they are more like entrepreneurial profits linked to administration of capital or land (for instance *comerciantes, industriales, rentistas, hacendados, agricultores*, etc). In these cases, we have assumed that their income is actually already taken into account when the returns to capital, land and livestock are calculated and therefore we have

⁴¹ The determination of the required skill was based on the definitions of the tasks involved in each one plus contemporary descriptions of the kind of jobs plus (and mainly) common sense. The list of the 436 categories and their assumed respective level of required skill is available from the authors upon request.

⁴² The complete list of the categories in each group is available under request.

⁴³ Inflation was quite mild until precisely 1914 and increased substantially afterwards due mainly to the First World War. The index numbers constructed by Bunge are as follows: 1910:100; 1911:101; 1912: 105; 1913:108; 1914:108; 1915: 117; 1916:125; 1917; 146. Bunge, Alejandro, 'Costo de la vida en Argentina entre 1910 y 1917'. *Revista de Economía Argentina*, 1:1 (1918), pp. 39-63.

⁴⁴ If hours per day were 9 it implies a $25 \times 12 \times 9 = 2700$ hours which is the quantity we have in England between circa 1870 and 1910. See Voth, Hans Joachim, 'Time and work in eighteenth-century London', *The Journal of Economic History* 58:1 (1998), pp. 29-58.

set their labour incomes equal to zero.⁴⁵ There are 624,702 “entrepreneurs”. So, after excluding the entrepreneurs, the percentage of individuals within the active population for which we have direct information of wages in the sources is 65.25%.

4.b. Capital used in industry and services

Secondary and tertiary sectors are usually identified with industry and services respectively. We include in the secondary sector (also called Industrial Sector) all the activities associated to the transformation of food and raw materials through industrial processes and other activities like building, energy, siderurgy, textiles, etc. The tertiary sector includes commercial activities, transportation, financial services, insurances, education, etc.⁴⁶

The capital stock for each of the sectors mentioned in the previous paragraph was obtained directly from the Census, volumes 7 and 8, corresponding to Industry and Commerce respectively. The capital stock used in Industry encompasses both fixed capital (building, land, machinery and implements) and working capital (all the material used in the process of production).⁴⁷ The branches of activity under consideration are General Industries, Mills, *Saladeros*, Wine factories, Beer factories, Sugar Mills, Distilleries, Gas Factories, and Electric Light plants. We have also considered capital stocks in Railways, Tramways, Ports, Public Utilities, Printing and Hospitals.⁴⁸ After the compilation of all the information, the editor of the census mentioned that: *“Lo que puede afirmarse es, que bajo ningún concepto, podrían reputarse como exagerados los capitales que aparecen como aplicados a la producción industrial; habría que considerarlos, por el contrario, inferiores un 30 por ciento”*⁴⁹. Taking into consideration this statement we will expand total capital in the secondary sector by a 43%.

Some branches included in the Services Sector are “Food”, “Clothes and Toiletries”, “Teaching”, “Building”⁵⁰, “Transports”. It is important to mention that, even though the Census label this sector as Commerce, it includes several activities that are not specifically trade but are related with the provision of general services. In this case the underestimation of the capital stock seems to be even larger than in the case of Industry and the number of the census should be increased by a 100%. The commentator of the census, Alberto B. Martínez, said: *“los mismos inconvenientes que observó el censo de 1895, consistentes en una manifestación incompleta de los capitales declarados, que aquel censo calculó en un 50%, deben haber existido en 1914, porque siempre, y en todas partes, aún en los países más habituados a este género de investigación, los capitales declarados, tanto en el comercio cuanto en la industria, son inferiores a los verdaderos”*⁵¹.

To calculate $r_I K_I + r_S K_S$, which is the contribution of secondary and tertiary sectors to total output, we have used a rate of return to capital of 8%. In the General Considerations published in the Census we can read *“El interés del dinero, estimado por el ilustre patricio [Nicolás*

⁴⁵ We have also estimated GDPs by assuming that these categories have some labour incomes like all the other categories. Of course the levels of income per capita increase in every province (the national average increases by 17%) but the relative positions of the provinces and the main qualitative results of the paper are very similar. The result of this estimation are available upon request.

⁴⁶ The value added in the Government Sector, usually proxied by the sum of the wages of public servant, is incorporated in our estimation when we calculate the retribution to labour.

⁴⁷ República Argentina, *Tercer Censo Nacional*, vol. 7 (Rosso: Buenos Aires, 1917).

⁴⁸ The information of Tramways, Ports, Public Utilities, Printing and Hospitals come from volumes 9 and 10 of the Census. Information about Railways comes from República Argentina, Ministerio de Obras Públicas. *Estadística de los Ferrocarriles en Explotación. Tomo XXII. Año 1913*, (Talleres Gráficos del Ministerio de Obras Públicas, 1916). Public Utilities from República Argentina, *Tercer Censo Nacional*, Volume 9, p. 461; Tramways from Volume 10, pp. 429-430; Ports from Volume 9, p. 453; Printing from Volume 9, p. 277 and Hospitals from Volume 10, p.517-520.

⁴⁹ República Argentina, *Tercer Censo Nacional*, vol. 7, p. 48.

⁵⁰ It is not building activity in itself but the selling of inputs and raw materials for the building process.

⁵¹ República Argentina, *Tercer Censo Nacional*, vol. 8 (Rosso: Buenos Aires, 1917), p. 133.

Avellaneda] en un 12% (unas décadas antes, bajo Rodríguez y Rivadavia, era 25 y 30%), es actualmente del 8%".⁵²

4-c. Land and capital in primary sector

Regarding income in agriculture and pastoral activities, the information used in this paper comes mainly from the *Tercer Censo Nacional* Volumes 5-6 and Bunge⁵³. To get the added value generated by land in agriculture, we used data from the Census on quantity of land used in agriculture (vol. V, p. 683) and yearly rents (in pesos) in each province (Vol. 5, pg. 742 and ss.). The underlying assumption here is that rents are a good proxy for the valued added by unit of land. In this way, the value added by land in agriculture would be $q_A T_A$ where q_A is the yearly rents and T_A is land used in agriculture.

In order to estimate the valued added by other productive factors (in this case, capital) we use information from the Census on the value of fixed capital (stables, fences, etc.) and machinery and implements. Given that the Census does not discriminate between capital in agriculture and capital in pastoral activities, we rely on the analysis by Bunge⁵⁴ who claims that 1/3 of the fixed capital was used in agriculture and 2/3 in livestock production; regarding machinery and implements we assumed that 100 % was used in agriculture.⁵⁵

The value of capital in agriculture is combined with a rate of return of 8 % and the value added by this productive factor is obtained with the formula $r_A K_A$

Bunge suggests that the yearly value added in livestock production is equal to 15% of the value of the livestock.⁵⁶ Given that the census provides total value of the livestock in each province⁵⁷ it is possible to calculate the added value by livestock production in each province. However this would not be equal to $r_c K_c + q_c T_c + s_c C$ in equation 1 because the number provided by Bunge includes the retribution to labour. Unfortunately it is not possible to discount the value added by labour in livestock production (obtained from our estimation of the value added by labour and described in the previous sub-section) because there are many occupations in the Census classification that incorporate workers from both agriculture and livestock production.⁵⁸ Bunge (1917, p. 74) clarifies that once the return of capital and land is discounted, 1/3 of the remaining goes to labour and 2/3 is the economic return of livestock. So, if the value added of land and capital is calculated, it is possible to get the combined value added by both labour and livestock as a residual and then, use the shares 1/3 and 2/3 suggested by Bunge to obtain the retribution of each of them.

Total return of land in cattle production ($q_c T_c$) is obtained using the value of land rents per hectare (in pesos) and the quantity of land. The quantity of land is obtained by using the total quantity of animals of each kind in each province⁵⁹ and technical equivalence coefficients on the ratio between livestock and land.⁶⁰

⁵² República Argentina, *Tercer Censo Nacional*, vol. 6 (Rosso: Buenos Aires, 1917), p. 42.

⁵³ Bunge, Alejandro E., *Riqueza y Renta de la Argentina*

⁵⁴ Bunge, Alejandro E., *Riqueza y Renta de la Argentina*. p. 74.

⁵⁵ In the volume 5 of the census there is a table with the value of machinery and implements in agriculture per province that provides the same numbers than in the table with the values for agriculture and livestock production together. República Argentina, *Tercer Censo Nacional*, vol. 5, p. 585.

⁵⁶ Bunge, Alejandro E., *Riqueza y Renta de la Argentina*. p. 47.

⁵⁷ República Argentina, *Tercer Censo Nacional*, vol. 6, p. 17.

⁵⁸ This is particularly true in the case of *peones* and *jornaleros*.

⁵⁹ República Argentina, *Tercer Censo Nacional*, vol. 6, p. 3.

⁶⁰ The equivalent coefficients are provided by Astori and correspond to Uruguay in the central decades of the twentieth century; they indicate the quantity of land required to raise a unit of each kind of livestock. Astori, Danilo. *La evolución tecnológica de la ganadería uruguaya 1930-1977*, (Ed. Banda Oriental: Montevideo, 1979).

The value added by capital is calculated using the total value of capital in agro-pastoral establishments and, as we mentioned before, following Bunge in that 2/3 correspond to pastoral establishments. The rate of return of this capital, according to Bunge is 4 %.⁶¹

From the two previous paragraphs, we obtained $q_c T_c$ and $r_c K_c$. The value $s_c C$ is obtained by subtracting these two values from the total valued added in agriculture and multiplying the result by 2/3 (in order to discount the value added by labour).

5. Results

Combining all the information described in the previous sections we obtain a total national GDP of 4,232 million of current pesos of 1914. Table 1 shows the contribution of the provinces to the national GDP is clearly unbalanced: more than half of national GDP corresponds to BACF; Santa Fe represents 12 %, Córdoba 8 %, and Entre Ríos close to 4 %. The value added in these four provinces, archetypical of the agro-pastoral production in the Pampa Húmeda, represents almost 80 % of the national GDP. With a minor contribution are Tucumán and Mendoza with 3 % each; the only other province with more than 2 % is Corrientes. This description is very robust to changes in the methodology.

The emergence of Buenos Aires as the main centre of the economic development in Argentina was completed by 1914. The regions of the Interior (the Andean provinces like Mendoza, La Rioja and Catamarca, the central provinces of Córdoba and Santiago del Estero and the Northern provinces of Tucumán, Salta and Jujuy), allegedly more important in the colonial period, were dwarfed by the importance of BACF. This district, does not only have a very important participation in the production of agro-pastoral goods but also incorporates the city of Buenos Aires with large secondary and tertiary sectors. A 56.9% of total capital in manufacturing and 61.8 % of total capital in commerce are in BACF.

Our approach generates an estimation of the national GDP per capita of \$ 530.07 which is relatively close to the figure of \$ 572 estimated by Cortés Conde and the \$ 615 by Ferreres.⁶² This similitude is remarkable given that the methodology used for our estimation is very different from the one used in previous approaches.⁶³

The share of wages in national GDP is 60.7% but it has relevant variations across provinces. We have provinces in the North, like Jujuy and Tucumán, which have very high shares well above 75 %.⁶⁴ These shares are quite high but they are perhaps partially explained by the fact that many areas of Argentina land was extremely abundant and it has a very low marginal productivity, capital was very scarce and most of economic activities were characterized by labour-intensive and low-productivity processes which results in high shares of labour in total production.

⁶¹ This rate of return is different from the one assumed for capital in secondary and tertiary sectors in section 4.b (8%). Given that the assumptions are originated in the assessment of experts in each sector, we preferred to stick to their opinion. If we reduce the rate of return in section 4.b to 4%, the levels of GDP in each province diminish but all the relative positions of the provinces remain basically the same.

⁶² Cortés Conde, 'Estimaciones del Producto Bruto Interno', p. 20 and Ferreres, Orlando J. (ed) *Dos siglos de economía argentina*. Ferreres provides the GDP at constant prices of 1993 (pp. 170-173). This value has been transformed to prices of 1914 using the consumer price index (pp. 449-450)

⁶³ If a labour income is imputed to the individuals classified as entrepreneurs following the criteria defined in section 4.a, the national average GDP would be 631 pesos.

⁶⁴ It has been argued that the long-run average share of capital in the US is 0.33 leaving 0.67 to labour and human capital. Wages, in our estimation, are taking into account both the retribution to raw labour and to human capital. See Caselli, Francesco, 'Accounting for cross-country income differences'. In Aghion and Durlauf (eds.) *Handbook of Economic Growth*. Vol. 1 A. (Amsterdam: Elsevier, 2005), p. 686.

Table 1: Provincial aggregate and per capita GDP in 1914

	Aggregate GDP		GDP Per Capita	Ranking per capita	GDP per worker	Ranking per worker	Activity Rate
	Current 1914 \$	Share					
BACF	2.300.625.968	54,9%	631,56	3	1.531,47	4	41%
Santa Fe	532.209.298	12,7%	591,58	5	1.549,73	3	38%
Entre Ríos	178.049.434	4,2%	418,57	14	1.209,99	10	35%
Corrientes	111.844.857	2,7%	322,27	21	940,31	17	34%
Córdoba	360.575.324	8,6%	490,26	8	1.282,50	7	38%
San Luis	56.479.653	1,3%	485,78	10	1.513,15	5	32%
Santiago	59.736.414	1,4%	228,28	24	549,24	24	42%
Tucumán	125.199.469	3,0%	376,05	17	894,58	18	42%
Mendoza	122.905.621	2,9%	442,85	12	1.207,56	11	37%
San Juan	40.468.725	1,0%	339,35	19	1.042,66	14	33%
La Rioja	31.040.546	0,7%	389,20	15	1.018,26	15	38%
Catamarca	24.056.452	0,6%	239,63	22	654,08	23	37%
Salta	47.632.564	1,1%	337,99	20	755,70	20	45%
Jujuy	35.949.115	0,9%	469,12	11	844,17	19	56%
Chaco	19.465.143	0,5%	420,65	13	997,50	16	42%
Chubut	11.947.159	0,3%	517,98	6	1.230,02	9	42%
Formosa	9.417.396	0,2%	488,43	9	1.069,79	13	46%
La Pampa	62.896.895	1,5%	620,66	4	1.752,83	2	35%
Los Andes	860.263	0,0%	345,90	18	672,61	21	51%
Misiones	12.736.330	0,3%	237,78	23	662,28	22	36%
Neuquen	10.986.423	0,3%	380,60	16	1.089,81	12	35%
Rio Negro	20.832.816	0,5%	493,18	7	1.257,72	8	39%
Santa Cruz	11.041.224	0,3%	1.109,89	1	1.929,27	1	58%
T. del Fuego	2.541.785	0,1%	1.015,09	2	1.350,58	6	75%
Argentina	4.189.482.513	100,0%	530,07		1.342,31		39%

Note: BACF includes the province of Buenos Aires and the city of Capital Federal

In order to calculate the share of each economic sector (primary, secondary and tertiary) in the GDP we need to define the economic sector of each factor of production. This is trivial for land and livestock which are, by definition in our approach, in the primary sector. When providing the value of capital, the census is very specific whether it belongs to the primary, secondary and tertiary sectors. In the case of labour, the Census organizes the list of occupational categories in sixteen groups which, in most of the cases, can be easily assigned to an economic sector. The important exceptions are the categories *Jornaleros* and *Peones* which are in the group “General designations without indication of a specific profession”. To solve this problem we have assumed that the total amount of wages of workers in these categories in each sector was proportional to the relative added value of capital, land and livestock generated in each sector.

With this methodology we can distribute the GDP of each province into the three main economic sectors. At the national level, the relative size of each sector is quite similar to the one obtained

by Cortés Conde with 34% of value added in the primary sector, 28.5% in the secondary and 37% in trade and services.⁶⁵ The provinces with the highest proportion of secondary sectors are Tucumán, Mendoza and Chaco (Table 2). In the cases of Tucumán, the size of the industrial sector is linked to sugar mills; in Mendoza the most important industry is wine production while the secondary sector in Chaco is almost exclusively in the branches of sugar production (46%) and the building sector (45%).⁶⁶ The provinces with the highest participation of the primary sector are La Pampa, Los Andes which is understandable given the relative abundance of land in those provinces.

Table 2: Share of wages and sectorial distribution of GDP. Argentine provinces 1914

	Share Primary	Share Secondary	Share Tertiary	Share Wages
BACF	26,4%	29,5%	44,1%	64,2%
Santa Fe	45,7%	20,7%	33,6%	53,9%
Entre Ríos	40,8%	27,2%	32,0%	57,7%
Corrientes	49,6%	25,2%	25,2%	59,3%
Córdoba	52,3%	24,9%	22,8%	49,2%
San Luis	54,5%	24,1%	21,4%	46,5%
Santiago del Estero	51,9%	27,6%	20,4%	64,2%
Tucumán	17,4%	49,6%	33,0%	78,5%
Mendoza	18,5%	45,2%	36,3%	64,4%
San Juan	30,0%	35,1%	34,9%	62,5%
La Rioja	29,6%	19,0%	51,4%	31,0%
Catamarca	35,6%	24,7%	39,6%	53,3%
Salta	34,5%	32,3%	33,2%	71,5%
Jujuy	36,4%	41,8%	21,7%	77,6%
Chaco	31,5%	42,2%	26,2%	60,8%
Chubut	50,7%	11,3%	38,0%	47,7%
Formosa	56,4%	23,1%	20,5%	53,6%
La Pampa	71,4%	8,3%	20,4%	36,1%
Los Andes	60,3%	30,3%	9,4%	69,5%
Misiones	18,0%	36,2%	45,9%	65,7%
Neuquen	44,2%	24,4%	31,4%	56,1%
Rio Negro	52,1%	12,1%	35,8%	54,6%
Santa Cruz	50,7%	15,9%	33,4%	53,2%
Tierra del Fuego	46,8%	19,2%	34,0%	68,9%
ARGENTINA	33,9%	28,4%	37,7%	60,7%

Note: BACF includes the province of Buenos Aires and the city of Capital Federal

⁶⁵ Cortés Conde, 'Estimaciones del Producto Bruto', p. 17.

⁶⁶ The main activities in the building sector in Chaco are in the production and processing of wood (*quebracho*) which is incorporate by the Census in the category "*Obrajes forestales y extracto de quebracho, leña y carbon de madera*".

The first positions in the ranking of per capita GDP are occupied by Santa Cruz, Tierra del Fuego, Buenos Aires, La Pampa, and Santa Fe (5th column of Table 1). The poorest provinces are Misiones, Catamarca, Santiago del Estero, Corrientes and Salta. The GDP of Santa Cruz is 109 % higher than the national average while Buenos Aires has a GDP 19% higher than the national average.

Most of the descriptions of Argentina in the beginning of the twentieth century emphasize the comparative advantage of the cereal-growing and cattle-rising area in the centre of the country, corresponding approximately to the provinces of Buenos Aires, Santa Fe and parts of Córdoba, Entre Ríos, and La Pampa. In this context, the relative positions in our results of some provinces like Santa Cruz and Tierra del Fuego in Patagonia are surprising.

The position of some provinces is partially explained by the share of workers in total population. Some areas of more recent settlement and/or receiving important flows of migrants have higher shares of active population and therefore their GDP per worker is relatively smaller than the GDP per capita. For instance, activity rates⁶⁷ were 75 % in Tierra del Fuego, 58 % in Santa Cruz, 56 % in Jujuy and 51 % in Los Andes while the national average is 39 %. When ranked by GDP per worker, the provinces in the top are Santa Cruz, La Pampa, Santa Fe and Buenos Aires; Tierra del Fuego falls to the 6th position, and Los Andes falls from the 18th position to the 21st and Jujuy from the 11th position to the 19th.

In addition to the share of workers in total population, all the provinces in Patagonia (and Formosa in the North-East) have a comparatively large quantity of livestock per capita and this explains a large part of the positions of Santa Cruz and Tierra del Fuego. In Santa Cruz, income generated only by cattle-rising is \$ 330.67 per capita which is higher than total GDP per capita in provinces like Catamarca, or Santiago del Estero. In Tierra del Fuego income generated by cattle-rising was \$ 235.57 while the national average is \$ 61.90 per capita and in Buenos Aires it is \$ 63.95 per capita.

While in general terms the country specialized in agro-pastoral production for the international markets, both Tucumán and Mendoza experienced a process of industrialization related to ecological comparative advantages. In Tucumán the cultivation of sugar cane and the industrial production of sugar was the main economic activity since the last decades of the nineteenth century and our estimation suggests that 49.6% of the GDP is generated in the secondary sector. In Mendoza, the most relevant economic activities in the period were associated to grape growing and wine production and 45.2% of the valued added in the province corresponds to the secondary sector. In spite of these similarities, highlighted in many comparative studies⁶⁸, our results show that their macroeconomic characteristics present important differences: GDP per capita in Mendoza is higher than the national average and clearly higher than in Tucumán that occupies the 17th position in the ranking. The main reason for this result is that capital per capita in the secondary sector is much higher in Mendoza than in Tucumán

Our estimation confirms the crucial role of Buenos Aires and its hinterland in the economy of Argentina in the beginning of the twentieth century. BACF's is one of the most affluent in per capita terms and has a demographic weight that reinforces its dominant position. One of the reasons for this pattern is related to resource abundance and comparative advantages: BACF concentrates an important share of the lands best suited to agro-pastoral production which was in the core of the integration of the country to the international markets. Although the share of primary activities in BACF's GDP is not very high (26.4 %), Buenos Aires contributes with a 42.8% of the total added value in primary activities. Another important reason is the

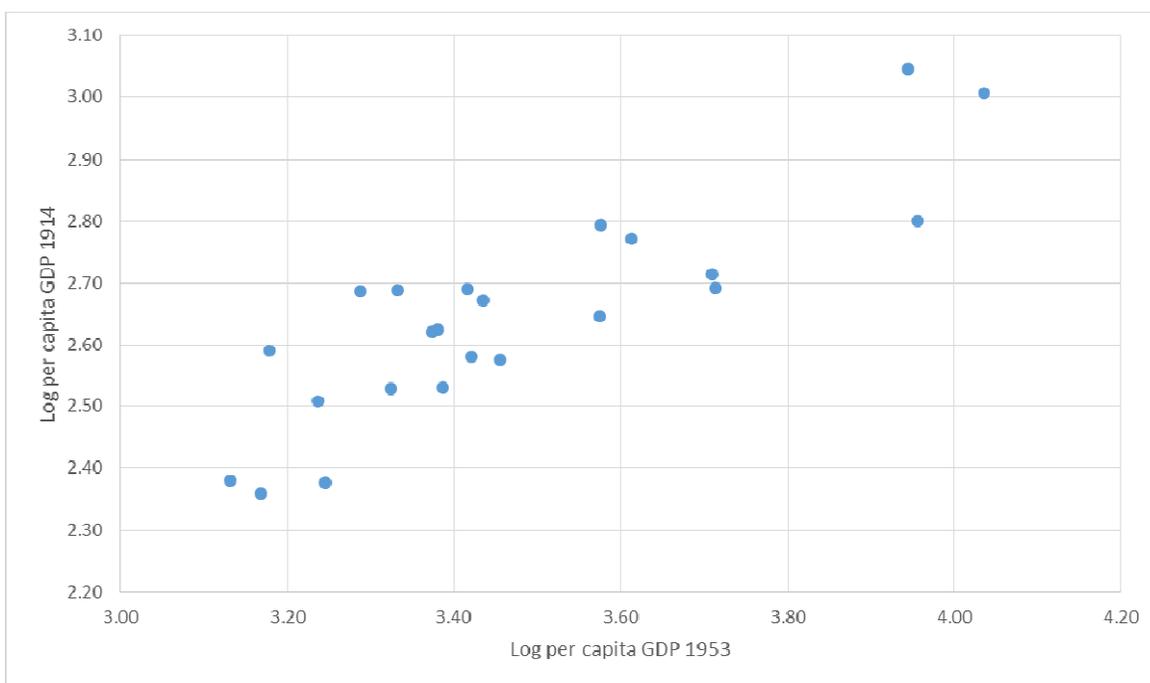
⁶⁷ Activity rate is defined as the number of workers (employed and unemployed) divided total population.

⁶⁸ Campi, and Richard Jorba, 'Transformaciones productivas'.

concentration of manufacturing and provision of services in the city of Buenos Aires: the 57.1% of added value in the manufacturing sector and 64.2% of added value in services are generated in BACF. This location of secondary and tertiary sectors in the city of Buenos Aires is linked mainly to agglomeration economies: the remarkable urban expansion of Buenos Aires is no linked to any “fundamental”. In the long run the importance of Buenos Aires was first stimulated by the choice of this city as the capital of the Viceroyalty of Buenos Aires in 1776 and its emergence of the main port in Argentina in the first decades of the nineteenth century.⁶⁹

Our estimation does not only provide the basic information to understand the relative affluence of the provinces in 1914 but also opens the possibility to make a more formal analysis of the regional dimension of the development and change that took place in Argentina in the first half of the twentieth century.

**Graph 1: Logs of income per capita
Argentine Provinces, 1914 and 1953**



Sources: Own estimation and CFI - Inst. Torcuato Di Tella, *Relevamiento de la estructura regional*.

Graph 1 shows the relationship between the logs of income per capita of provinces in 1914 and 1953. Even though there are almost 40 years of profound changes in economic structure and economic policies, the association is remarkable. In 1953, the average of the three richest provinces (Buenos Aires, Santa Cruz and Tierra del Fuego) is almost 6.6 times the average of the three poorest provinces (Catamarca, Santiago del Estero and La Rioja). In 1914 this distance was 3.9 times (the richest provinces are the same three than in 1953 and the three poorest are Misiones, Catamarca and Santiago del Estero). A simple linear regression between the two variables show that GDP in 1914 can explain more than 70 % of the variance of the

⁶⁹ Halperín Donghi, Tulio, *Reforma y Disolución de los imperios ibéricos 1750-1850*. (Buenos Aires: Alianza América, 1985), pp. 47-49. On the slow evolution of Buenos Aires and its emergence as an important commercial centre at the end of the colonial period, see Kossok, Manfred, *El virreinato del Río de la Plata*, (Buenos Aires: Hyspamérica, 1986), pp. 68-79.

GDP in 1953 and elasticity is larger than one (implying that a small distance among provinces in 1914 becomes a larger distance in 1953). In Argentina in the first half of the twentieth century, we do not observe reversal, no convergence but rather persistence and, if anything, divergence.⁷⁰

If we interpret the regional distribution of income in 1914 as the result of more than 40 years of outward-looking development strategies it seems that this distribution is not affected by the dominant set of economic policies: in particular, moving from economic openness and low levels of state intervention 1914 to a higher levels of intervention and more inward looking policies in 1953 does not produce any important change in the relative position of the provinces.

This result does not coincide with the conclusions offered by Maloney and Valencia Caicedo for the very long run. Although their general claim is that there is persistence in income per capita in most of the countries of the Americas between pre-colonial times and today, they find reversal in Argentina (and Chile) in the sense that the more densely populated areas five hundred years ago would have been the areas with lower income per capita at the end of the twentieth century. Of course, it is possible that there was a reversal before the 1914 that is not captured in our analysis. However, an interesting implication of our results, is that, if there was a reversal, it is not linked to the process of industrialization, but rather it took place in a context of integration in the international economy, or even before, in a situation of dependence within a colonial system.⁷¹

The three provinces with the highest GDP per capita both in 1914 and 1953, Tierra del Fuego, Santa Cruz and BACF, have very different economic structures: BACF, even though it is in the most suitable area for agro-pastoral activities has a rather small contribution of primary sector in total GDP (26% in 1914 and 15% in 1953).⁷² The most important sectors in this province are associated to agglomeration economies: the contribution of the tertiary sector to total GDP in BACF in 1914 was 44.1% and 47.1% in 1953.⁷³ In this province, and despite the absolute advantages in agro-pastoral production, agglomeration economies were more important than resource abundance.

The province of Santa Cruz (the second richest in both 1914 and 1953) seems to be a pristine example of land abundance: in 1953, 46.3 % of the provincial GDP comes from livestock production and the second most important sector is mining with an 11.3 %.⁷⁴ In 1914 the primary sector accounted for 50.7 % of provincial GDP (Table 2). The province of Santa Fe, in the 5th position in the ranking of GDP per capita in 1914 produces 45.7% of its value added in the primary sector in 1914 and most of it corresponds to agriculture. The province with the highest income per capita in both 1914 and 1953, Tierra del Fuego, is an example of a combination of land abundance with the impact of economic intervention: while 28.0 % of provincial GDP in 1953 is due to livestock production, the second most important sector is Government with 23.6 % and the third one is Industry with a 12.4 % (CFI-Instituto Di Tella, 1962, Table 64).⁷⁵ In 1914,

⁷⁰ A more formal test of convergence can be applying the empirical strategy suggested by Barro, R. and Sala-i-Martin, X. 'Convergence', *Journal of Political Economy* 100: 2, (1992), pp. 223-51. The test for beta convergence fails to find statistically significant evidence of convergence in the period 1914-1953.

⁷¹ These authors suggest that the reversal taking place in Argentina in the long run is partially due to the fact that "The very small population related to extraction of natural resources has relatively high levels of human capital and remuneration and hence, we may still and that areas which the indigenous avoided are now relatively well-off in per capita terms". See Maloney and Valencia Caicedo, 'The Persistence of (Subnational) Fortune', pp. 5-6. Our findings call for at least a qualification of this hypothesis: already in 1914 some areas in the very south of Argentina were very rich in per capita terms because of land abundance and livestock production and this activities were not necessarily associated to high wages.

⁷² In fact, BACF is the province with the 4th lowest contribution of the primary sector to total GDP.

⁷³ In the tertiary sector in 1953 we include the branches "Trade", "Transportation and communications", "Electricity, gas and water", "Finance", "Housing", "Government" and "Other Services". CFI - Inst. Torcuato Di Tella, *Relevamiento de la estructura regional*, p. 205.

⁷⁴ CFI - Inst. Torcuato Di Tella, *Relevamiento de la estructura regional*, pp. 205.

⁷⁵ Fishing is fourth with a 12.3 %.

the primary sector in Tierra del Fuego accounted for 46.8% of GDP and most of that is pastoral production.

6. Conclusions, caveats and further research

The first contribution of this paper is a systematic and comparable estimation of the economic structure of Argentine provinces in 1914 and the first estimation of provincial GDPs for any period before the Second World War. Our methodology, based on the approach of identifying GDP with the return to productive factors (labour, capital, land and livestock), relies on many debatable assumptions but is transparent, fully traceable and of scalable precision as long as new and better information is made available.

Our estimations confirm the paramount importance of Buenos Aires in the national economy and the relevant position of the central geographic area –the Pampa Húmeda- in the productive profile of the country: The province of Buenos Aires (including the city of Buenos Aires) produces more than half of the added value of the country while the other provinces with relevant participation in the national GDP are Santa Fe, Córdoba and Entre Ríos all of them in the area suitable for cereal-growing and cattle-rising activities. More in the peripheral regions, Mendoza and Tucumán, usually described as important industrial centres, contribute with a 3 % each.

Our findings about the regional dispersion of income per capita and income per worker are more surprising. While BACF and Santa Fe are, as expected, among the richest provinces, other peripheral provinces like Santa Cruz or Tierra del Fuego are located in the first places of the rankings. The reasons for the high income per capita in these four provinces are different: in BACF in 1914 the tertiary sector contributes with 44 % of total GDP while the share of the primary sector is only 26%. In the other three provinces leading the ranking of per capita GDP, the added value generated in the primary sector is more than 45 %. However, there is a marked difference between the provinces in Patagonia, in which cattle-rising is by far the most important activity, and Santa Fe in which agricultural production is more than twice as important as livestock production. The geographical pattern of the affluence of the provinces in Argentina at the beginning of the twentieth century seems to be the result of a combination of agglomeration effects in city and port of Buenos Aires and comparative advantages in primary activities in other provinces with high income per capita.

Our results for 1914 open the possibility to understand better the process of regional development in Argentina in the first half the twentieth century. Provincial GDPs in 1914 are highly associated to provincial GDPs in 1953. This result is remarkable because suggests a strong stability of relative GDPs even in very different contexts of levels of development, relative prices and economic policies. If there is any reversal in the levels of GDP per capita in the Argentine provinces, it is not associated to the process of industrialization, urbanization and structural change that took place in the first half of the twentieth century.

Many improvements can be suggested in our process of combining data with what we think are plausible assumptions. The rate of return of the assets in each sector is based in specific information from the census and some quotations from alternative sources but, given the crucial role they play in our results, more detailed research about these variables is one of our priorities.

The calculation of the income of workers is based in quite detailed and robust data sets but several points deserve a closer analysis and more research: the first one is the definition and calculation of income of the categories that are probably including not only workers but also entrepreneurs and self-employed (like *agricultores* or *comerciantes*). The second one is the income of the occupational categories with high levels of human capital and probably high incomes (like lawyers and accountants) for which we have just few quotations in the sources.

The third one is the characteristics of work of *jornaleros* in particular the economic sector in which they do their job. Another important point related with the income of workers is the percentage (of workers and/or time) of unemployment.

Despite all the limitations of our estimations and the caveats associated to them, we are convinced that our contribution is an important step toward a better assessment of the relative economic performance of the Argentine provinces and a deeper understanding of the implications of their process of economic development in the first half of the twentieth century.

7. Appendix

7.1 Wages of skilled workers

In *Memoria Descriptiva de la Provincia de Salta* for 1889 there are some quotations of wages of accountants, lawyers and physicians in Salta in that year;⁷⁶ in the *Anuario Estadístico de la Provincia de Tucumán* for 1895 there are quotations of wages of accountants in Tucumán in that year.⁷⁷ Monthly wage of a lawyer in Tucumán in 1895 was \$ 400. In Salta in 1889 physicians earned \$ 100, accountants earned \$ 125 and lawyers \$ 150. So lawyers would earn 20 % more than accountants and physicians would earn 20 % less. Assuming that relative wages in these groups are similar we have that a physician would earn \$ 320 and a lawyer \$ 480. In Tucumán there were 76 lawyers, 19 accountants and 60 physicians. So the weighted average of these three categories is \$ 408.25. In 1895 monthly wages of the main categories in group 2 were \$103.5 for carpenters and \$ 98 for blacksmiths and there were 1461 carpenters and 343 blacksmiths. So the weighted average is \$ 102.45. All this would imply that group 4 should earn 4 times more than category 2 which is the criteria we have used in all the provinces to assign a wage to individuals in category 4.⁷⁸

In La Rioja none of the categories included in group 3 of skill is covered by our sources so we have used the weighted average of group 3 in Catamarca (\$ 4.5) for all the individuals belonging to group 3 in La Rioja.

7.2 Food and shelter in the wage

There are estimation of the average share of food in household expenditures among working class families between 1907 and 1912 in Buenos Aires is 54.80 % and the average number of children in those families is 2.51.⁷⁹ Using the adult-equivalent table of INDEC (2004) we assume that each child is equivalent to 0.7 adult man and an adult woman is equivalent to 0.74. This implies that a family with 2 children will have 3.14 equivalent adults. So, the share of food consumption to each equivalent adult will be $54.80/3.14=17.45$ %. The share of expenditures in shelter is 22.47 % and with the same criteria the share of expenditures for adult equivalent will be 7.15 %. Given that it is not clear that the quotations mentioning food refer to all the meals in a day or just a subset of them, we will assume that if a worker receives food it implies an increase of the wage of 14 % and if she/he receives food and shelter, it implies an increase of the wage of 20 %.

⁷⁶ Solá, Miguel, *Memoria Descriptiva de la Provincia de Salta*. (Impresiones Mariano Moreno: Buenos Aires, 1889), pp. 222.

⁷⁷ Provincia de Tucumán, *Anuario de Estadísticas de Tucumán*. Vol 2. (1895), pp. 608.

⁷⁸ In most of the provinces average wage in Group 1 is between \$2 and \$ 3 per day; in Group 2 is between \$ 3 and \$ 4.5; in Group 3 between \$ 4 and 5.5 and in Group 4 is \$ 12 and \$ 15. Given that the relative size of Group 4 is quite small, making alternative assumptions about wages in this Group does not change our result in a significant way.

⁷⁹ Correa Deza, María Florencia and Nicolini, Esteban. "Consumption patterns of workers' families in Argentina between 1907 and 1935". Unpublished Mimeo. Universidad Nacional de Tucumán, 2014.

7.3 Wages in Patagonia

The BDNT of 1907 reports that the wages of *peones* in La Pampa and Patagonia are as follows:

	La Pampa	Río Negro	Santa Cruz	Chubut	Tierra del Fuego
Quotation (1)	50	50	60	40	45
Daily full wage	2.4	2.4	2.88	1.92	2.16
Relative wage to La Pampa	1	1	1.2	0.8	0.9
(1) In all the cases food and shelter are added to the monetary wage. The daily wage is calculated assuming that food and shelter is equivalent to 20 % of the monetary wage (see above in this appendix).					

Based in this information, we have assumed that wages in each occupational category in each of the four Provinces in the table (besides La Pampa) are a proportion of wages in that category in La Pampa. For instance: each occupational category in Santa Cruz is assumed to have a wage which is 20 % higher than the wage in that category in La Pampa.

Given that Neuquén is not in the report by the BDNT and there is no information whatsoever about prevalent wages in that province, we will assume that wages are similar to those in Rio Negro by geographic proximity (See map 1).

Map 1: Political division of Argentina, year 1914

