

**A Reassessment of Industrialization in South America:  
Argentina, Brazil, Chile and Colombia, 1890-2010**

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## Introduction

The largest economies in South America had one of the most impressive rates of industrial catch up between the late nineteenth century and the late 1970s (Bénétrix, et al., 2012, Williamson, 2006). The largest economies in the region had rapid catch up before 1920, in the 1930s, and then Brazil and Colombia had very rapid and sustained catch up with the global leaders between 1940 and 1980. The 1980s and early 1990s slowed down the region, but by the first decade of the twenty-first century all major economies started to industrialize rapidly again. As such, this rapid process of industrialization is one of the most impressive and important processes in the economic history of the Western World and deserve careful scrutiny.

In this paper we take a long term view and examine the patterns of industrialization in Argentina, Brazil, Chile, and Colombia. We first compile new series of manufacturing value added (i.e., industrial GDP), of labor productivity in manufacturing, and various macroeconomic and trade series from 1900 to 2010. We then study the industrial convergence and divergence with the global leaders (i.e., the United States, the United Kingdom, Germany, and Japan) and test some of the existing hypotheses explaining the industrialization of Latin America.

Our main insight is that the patterns of industrialization in South America are by no means homogeneous. We, therefore, argue that the industrialization of Latin America should not be explained using one single theory. The drivers of industrialization in each country are not the consequence of the adoption of a single set of policies or a consequence of a single shock that affected all countries in the same direction. We document enough heterogeneity in trends and responses to most shocks to lead us to defend the idea that we need a new set of approaches to study not only the heterogeneity in industrialization patterns across the region, but also within countries and within periods.

There are four basic explanations of the industrialization of Latin America. First, there is the “adverse shocks” theory (Furtado, 1959, Nations/ECLA, 1951, Prebisch, 1950, Tavares, 1972), which argues that as a consequence of adverse international shocks, such as wars, crises, or shocks to export prices, the relative price of exports decreases or the conditions to import worsen (e.g., financing channels are interrupted or there is scarcity of foreign exchange), the terms of trade deteriorates, and the internal demand for imports is gradually substituted by local manufactures. This hypothesis is related to Dutch Disease in the sense that this view posits that Latin America de-industrializes when there are commodity booms and there is Dutch Disease, appreciating the exchange rate and reducing import prices, and it re-industrializes when there are external shocks depreciating either commodity prices or exchange rates. Strictly speaking, then, in this view, negative external shocks should have short-term, and maybe even long-term, positive correlations with industrial GDP growth and labor productivity (as capacity utilization should increase as a consequence of external shocks).

The second view of the industrialization of Latin America can be characterized as the “endogenous industrialization view,” or industrialization as a product of export-led growth (Dean, 1969, Diaz-Alejandro, 1976). In this view, South America industrialized when commodity exports were thriving. In our view, export booms have a sort of “income effect” in the sense that they facilitate capital accumulation to finance industrialization and infrastructure, and they generate a positive demand shock in the local economy. Thus, South America industrialized when there were commodity booms (e.g., before the World War I) (Haber, 2006, Lederman, 2005, Williamson, 2011) and we should find a strong correlation between improvements in the terms of trade, real exchange rate appreciation, and industrial GDP growth. In fact, because the export boom facilitated the importation of capital (or increases in asset utilization), we also should see a correlation between favorable terms of trade, real exchange rate appreciations, and increases in industrial productivity.

A third competing view is that which sees import substitution industrialization as the product of an explicit, coherent policy design or development strategy. We refer to this view as the import-substitution industrialization (ISI) hypothesis. This view argues that the rapid industrialization of South America in the twentieth century was the product of a deliberate policy of development that included tariff protection or exchange controls, special preferences for firms importing capital goods for new industries, preferential import exchange rates for industrial raw materials, and an ample set of industrial policy tools that ranged from subsidies, targeted credit, pressure on foreign companies to open plants in the region, or the direct establishment of state-owned enterprises (Baer, 1972, Hirschman, 1968). Even though most of these policies were not undertaken simultaneously until after World War II, a modified version of the ISI hypothesis sees the role of government and import tariffs before 1930 as playing a fundamental role in the industrialization of South America (Versiani, 1979). In fact, we know that tariffs in Latin America were extremely high before 1930 in comparative terms (Coatsworth and Williamson, 2004). Thus, according to this view, we should expect to see correlations between spurts in industrialization and policy variables such as the average level of import tariffs or exchange rate regimes that promoted a depreciation of the real exchange rate.

Yet we can go further when examining the ISI view because beyond offering protection to industrialize the country, students of ISI in Latin America highlight that such policies intended to promote industrialization in stages. That is, governments, at least in theory, followed a series of policies to sequentially promote new industries in industries with higher value added and more technological complexity. Initially governments were supposed to promote consumer goods and basic building materials because of their simple technology and their low capital requirements. Then, governments supported more complex consumer goods industries, which required more sophisticated technologies and higher capital requirements. Finally, governments were to target more complex consumer durables, industrial inputs such as steel, engineering and chemical products, and other heavy industries (e.g., Brazil and Argentina ventured into aerospace) (Baer, 1972, Love, 2005). In theory this sequencing could include as a final link the development of a domestic capital goods sector or a complex sector of industrial raw materials. In practice some of the less capital intensive industries could

lobby governments not to develop intermediate goods that could lead to expensive inputs (Baer, 1972).

Therefore, while defenders of ISI saw the policy as working to develop industries with higher value added over time (and with higher productivity rates), its critics saw flaws in the implementation of such stages. For Diaz Alejandro (1970) ISI policies required careful industrial policy to achieve the sequencing described above. For him the “desired” industrial structure should have been one that combined growth with external equilibrium. In his view, the uneven speed at which different sectors can achieve full import-substitution requires a careful analysis of the limits imposed by the internal demand to sustain growth (e.g., when there is low income-elasticity of demand for consumer goods). Thus, once the initial ISI process started, unless the sectors developed in the first stage became competitive in external markets, they could stall long-term growth and become inefficient, therefore requiring more protection. That is, according to critics of import substitution part of the problem was that the system of protections and support created a powerful group of industrialists that blocked any effort to reduce protectionism and to make them competitive (Baer, 1972, Gómez-Galvarriato, 2007).

Since most of the explicit policies of protectionism to promote industrialization in stages were implemented explicitly in the post-WWII period (more or less between 1940 and 1980), there is an additional hypothesis that we can test (Colistete, 2009): the so-called “stagnationist hypothesis.” According to this hypothesis, ISI policies allowed domestic firms to charge high prices and protected them from competition, thus preventing the upgrading of technology, improvements in labor productivity, and the development of manufacturing exports (Bulmer-Thomas, 2003, Diaz Alejandro, 1970, Haber, 2006, Krueger, 1978, Macario, 1964). We can test this hypothesis by checking whether the rapid expansion in manufacturing GDP growth between 1940 and roughly 1980 was also accompanied by rapid industrial productivity growth. In fact, if this hypothesis is right, we should find that more protection (e.g., higher tariffs) were correlated negatively with labor productivity in manufacturing. That is, in this hypothesis ISI works in the extensive margin (increasing the number of firms or deploying more capital in manufacturing), but does not lead to improvements in the intensive margin (i.e., improvements in labor productivity or total factor productivity).

What we do in this paper is first present a new compilation of data to study the industrialization of South America and discuss some of the advantages and disadvantages of these new data series. Second, we study the evolution of industrialization since 1900 and describe the periods of convergence and divergence between the South American economies and a set of more advanced economies (i.e., the Germany, the United Kingdom, the United States, and Japan). We then test the hypotheses that come out of the views on the industrialization of the region.

We find rapid catch up in the early years of the twentieth century for Argentina and Brazil, but not for Chile and Colombia. Those two are very slow starters and do not show catch up growth until after WWII. In the 1930s there is a stronger convergence in Argentina, Brazil, Chile, and Colombia, but Argentina and Chile lose momentum thereafter, while Brazil and Colombia

actually gain momentum and have their golden era of industrialization between 1940 and the 1970s. Protectionism, either via tariffs or simply because of real exchange rate movements, was important after 1940, but not so much before. In that sense, we find evidence to support the idea of an endogenous process of industrialization before 1930 (i.e., not driven by protectionism) and we find some support for ISI in Brazil and Colombia, but not so much in Argentina and Chile. All four economies show also strong convergence to the global leaders after the year 2000.

We then subject our data to systematic test

## **Available data and preferred series**

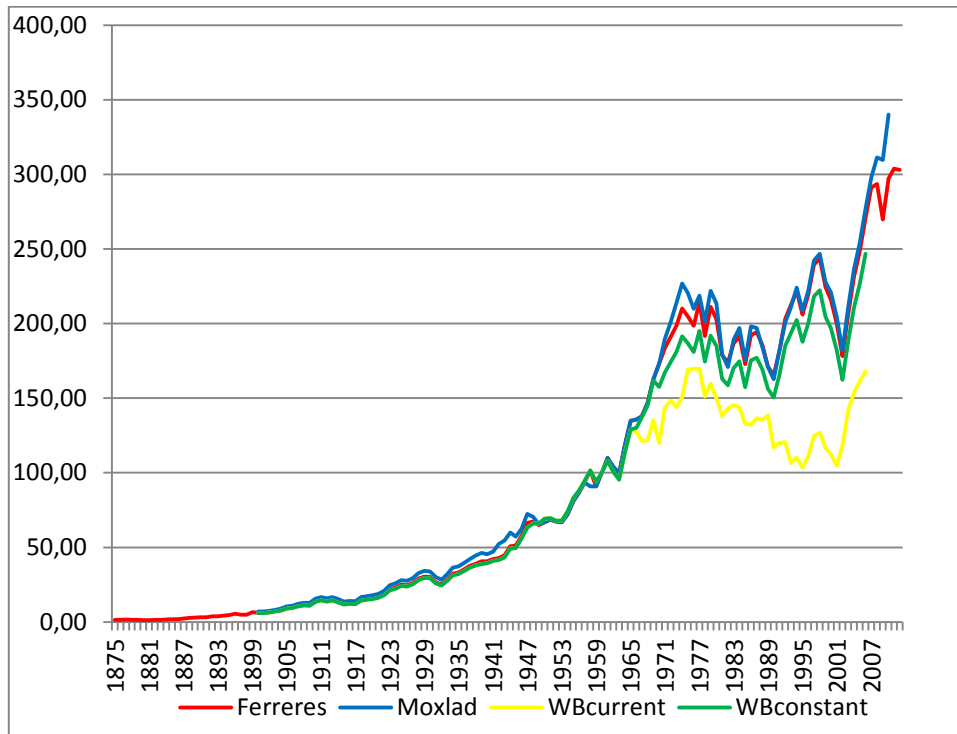
Data on industrial performance of Argentina, Brazil, Chile and Colombia has been produced by researchers and agencies at different times. The most frequently used sources for estimates of industrial output include the World Bank – World Development Indicators (WB) and the Economic Commission for Latin America (ECLA). A project initially based at Oxford University and now at the Universidad de la Republica, Montevideo, collected and collated substantial ECLA data and has made it easily accessible for free via an internet website named Moxlad (Moxlad, 2014). The data made public on this website is slightly different to data we collected directly from ECLA reports. Additionally, in each country a local expert has produced a series of industrial output. In this section we present the series provided by these, the most widely used sources, and point out the series' similarities and differences, and select one series as the most appropriate one to use for the rest of the chapter.

### *Argentina*

Four series of industrial manufacturing output are constructed for each country. The first series is 1900-2009 value added of manufacturing output in constant 1970 local currency unit (LCU) prices (Moxlad, 2014). The second and third series are constructed using 1900-1963 industrial product 1960 base index number from ECLA (1966), and extrapolated first with 1964-1965 manufacturing GDP growth rates from Argentina's central bank, and continued with 1966-2006 growth rates of WB value added manufacturing constant 2005 LCU (WB constant) and the growth rates of WB current value manufacturing current LCU deflated with the GDP deflator (WB current). The fourth series is 1875-2012 manufacturing output GDP in constant 1960 LCU constructed by local expert Orlando Ferreres (Ferreres and Fundación Norte y Sur, 2010).

The four series use different currency unit price base year and price indexes. Since an explicit or implicit price index is not always available, particularly with the ECLA (1966) manufacturing output index number series, it is not possible to convert all series into a given price year base. The alternative is to use growth rates of series following the ECLA series and convert the other three series to index number series with 1960=100. The Brazil, Chile and Colombia series present the same challenge and an analogous solution is applied to construct comparable series. The four series are presented in Figure 1.

**Figure 1. Argentina real manufacturing output index number series (1960=100), 1875-2012**



**Source and note:** The Moxlad series is value added manufacturing output in constant 1970 million LCU (Moxlad, 2014). The Ferreres series is the manufacturing sector GDP in constant 1993 million pesos from Fundación Norte y Sur (2010), for 1875-2009; continued using the growth rates of the industrial production index from Orlando Ferreres y Asociados (1993=100) for 2009-2012. The WB current series is the industrial product index number (1960=100) from UN & ECLA (1966) for 1900-1963; continued using the growth rates of manufacturing GDP in constant 1960 million pesos, from Banco Central de la República Argentina (BCRA) for 1964 and 1965; continued using the growth rates of the manufacturing value added current LCU and deflated by the GDP deflator in 1993 pesos from WB WDI for 1966-2006. The WB constant series is the industrial product indexes number (1960=100) from ECLA (1966) for 1900-1963; continued using the growth rates of manufacturing GDP in constant 1960 million pesos from BCRA for 1964 and 1965; continued using the growth rates of the manufacturing value added constant LCU from WB WDI for 1966-2006. The four series are converted into manufacturing output index number series (1960=100).

The Ferreres series is the longest one and the only to offer data on industrial output before 1900. After 1900, the four series follow a similar trend up to 1966. And after 1966 the Ferreres, Moxlad and WB constant series follow a similar trend, until they decouple in the 1970s. In 1971-1978 Moxlad series exhibits higher growth rates (and levels) than the Ferreres series. The Ferreres series used as primary data ECLA (1978) up to 1978 and then changed to the central bank's national accounts BCRA (1980).<sup>1</sup> After 1978, the three series follow a similar trend, at slightly different levels, up to 2006, when the WC constant series finishes.

<sup>1</sup> "Cuentas Nacionales a Precios de 1970" (1980), BCRA.

In 2007-2010 the Moxlad and Ferreres series diverge. Most likely, political manipulation of the Argentinian Public Institute of Statistics (INDEC) after 2007 overestimated industrial output. While Moxlad uses ECLA as the main source of primary data, and ECLA in turn uses INDEC, Ferreres re-estimates manufacturing output data constructing an industrial production index comparable to pre-2007 INDEC methodology. This methodology incorporates higher inflation rates, thus reducing the real value of nominal indicators.

The most salient difference between series is between the WB current series and the other three series. The first important difference is in 1967, when the WB current denotes a drop in industrial output for a couple of years, while the other three series signal growth. The second difference is in 1989, when again the WB current series marks a decline in industrial output for more than half a decade, while the other three series point to growth.

The correlation coefficient for growth rates confirms the similarity between the Ferreres, Moxlad and WB constant series, with the Pearson correlation coefficient ranging 0.95-0.98. The salient difference is also confirmed as the WB current series and the other series are correlated at most at 0.80.

We prefer the Ferreres series of industrial output for several reasons. First, it is the longest series and the only covering the years preceding 1900. Second, for the first half of the 20<sup>th</sup> century the series is identical to that in ECLA – all series come from exactly the same source and are almost identical. Third, it incorporates substantial local knowledge and adjusts the series in a sensible manner and with consistent criteria over the whole series.

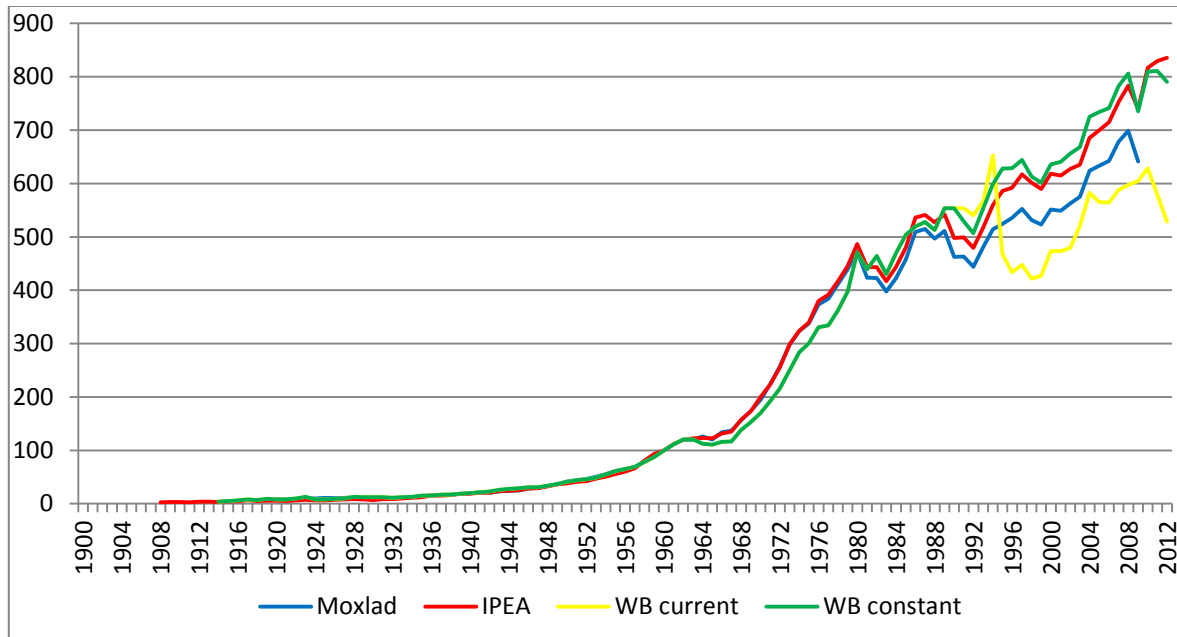
### *Brazil*

A similar set of four series are constructed for Brazil as for Argentina. The Moxlad (2014) series is constructed in an identical manner. The WB constant and current series are also constructed analogously, but since the ECLA and WB data do coincide in 1963, the two series are chained using growth rates and there is no need to resort to alternative data sources. The local expert series is produced by Brazilian government agency Institute of Applied Economic Research (IPEA). The series is industrial value added current LCU deflated by the GDP deflator 1908-1970; and extrapolated using the growth rates of industrial value added current LCU deflated by the industrial GDP deflator growth rates 1971-2012. The four series are an index number series (1960=100) and are presented in figure 2 (IPEA, 2014).

The four series follow similar trends up to 1963. In 1963-1980, the IPEA and Moxlad series move together while the WB constant and current series grow at a slightly slower pace. The four series move roughly together between 1980 and 1989. After 1989, the four series begin to follow similar trends but at different growth rates and noticeable differences appear between series, up to 1994. In 1994, the WB current series signals a sharp decline in manufacturing output for about half a decade, while the other three series all continue to grow at slightly different growth rates – again the most salient difference between the series. In 1997 the three series drop as the international financial crisis starts. The Moxlad series finishes in 2009, and the IPEA and WB constant series continue moving closely together 2009-

2011, when the IPEA series indicates manufacturing output growth while the other signals a sharp decline. We are concerned about the differences after 2009, but we ignored them for the present analysis as we use data mostly up until 2010.

**Figure 2. Brazil real manufacturing output index number series (1960=100), 1908-2012**



**Source and note:** The data presented in figure 2 are manufacturing output index number series (1960=100). Moxlad series is the value added manufacturing output in constant 1970 million LCU from Moxlad. IPEA series is the nominal industrial valued added in thousand reais, deflated by GDP deflator in 1970 prices from IPEA for 1908-1970; continued using the growth rates of the nominal industrial value added in thousand reais, deflated by the industrial GDP deflator in 1970 prices from IPEA (2014) for 1971-2012. WB current series is the industrial product index number (1960=100) from ECLA (1966) for 1914-1963; continued using the growth rates of the manufacturing value added in current LCU deflated by GDP deflator in 2000 prices from WB WDI, 1963-2012. WB constant series is the industrial product indexes (1960=100) from ECLA (1966) for 1914-1963; continued using the growth rates of the manufacturing value added in current LCU deflated by GDP deflator in 2000 prices for 1964-1989; continued using the growth rates of the manufacturing value added constant LCU for 1990-2012, from WB WDI. The four series are converted into manufacturing output index number series (1960=100).

The correlation coefficient between the growth rates of the different series is lower than the case of Argentina. The Moxlad and the IPEA series have a Pearson correlation coefficient of 0.80, but between Moxlad and IPEA, on the one hand, and the WB series, on the other, it is in the range 0.60-0.65. We believe the differences in these series can be driven by the price indices used after 1989. With the hyperinflation of 1989-1994 it is easy to have big differences in the data if the price indices are not sensitive enough to prices changes in the economy. As we elaborate below, the World Bank uses a price deflator that moves faster than the deflators most of our sources use, and that explains part of the divergence in that series.

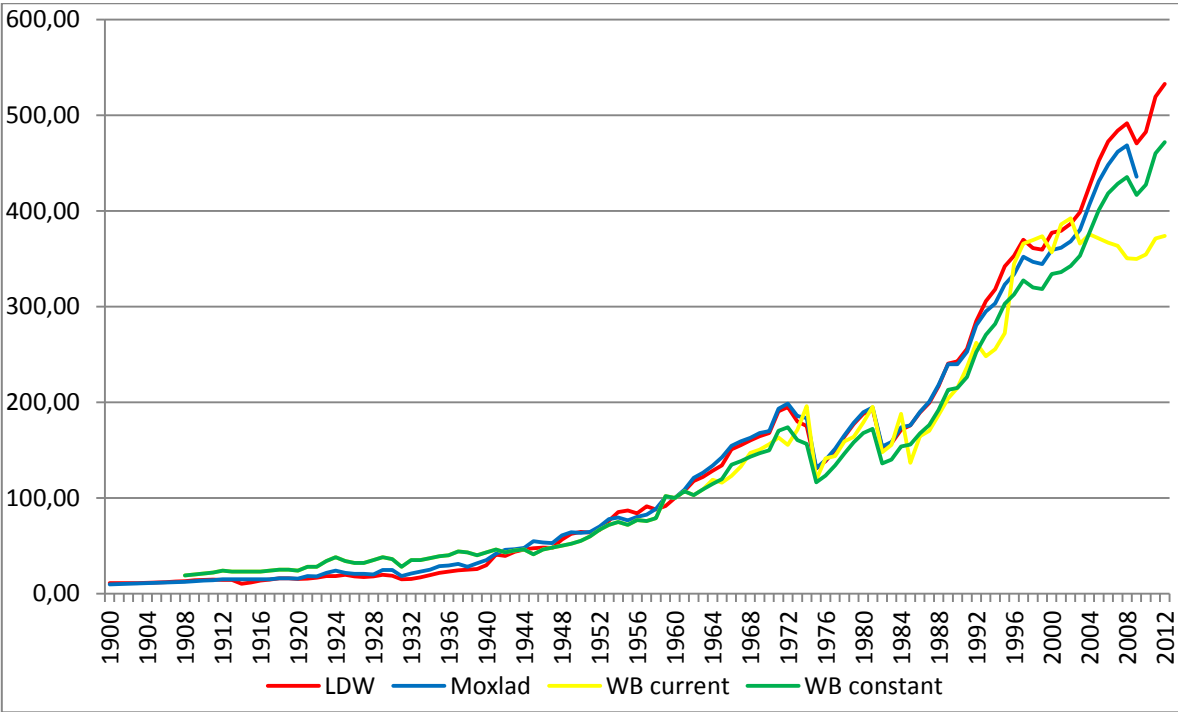


We prefer the IPEA (2014) series of industrial output for several reasons. First, it is slightly longer than the other three series. Second, it incorporates substantial local knowledge to adjust the series in a sensible manner and with consistent criteria along the whole series period.

*Chile*

A similar set of four series are constructed for Chile. The Moxlad series is constructed in an identical manner. The WB constant and current series are also constructed analogously, but since the ECLA and WB data coincide in 1963, there is no need to resort to alternative data. The local expert series, produced by Díaz, Lüders, and Wagner (DLW), measures 1900-2004 manufacturing value added in 1996 constant LCU and it is extrapolated 2005-2012 using real manufacturing GDP growth rates from Banco Central de Chile (BCeCh) (Díaz, et al., 2007). The four series are converted into an index number series (1960=100) and are presented in figure 3.

**Figure 3. Chile real manufacturing output index number (1960=100), 1900-2012**



**Source and note:** The data presented in Figure 1 are manufacturing output index series, all converted to 1960 base year. The Moxlad series is the value added constant manufacturing output in constant 1970 million LCU from Moxlad. The Díaz, Lüders, and Wagner (DLW) series is the manufacturing value added in 1996 million LCU from Díaz, et al. (2007), for 1900-2004; continued using the growth rates of the real manufacturing GDP from Banco Central de Chile (BCeCh) for 2005-2012. WB current series is the industrial product index (1960=100) from UN & ECLA (1966) for 1900-1963; continued using the growth rates of the manufacturing value added in current LCU deflated by GDP deflator in 2008 prices for 1964-2012 from WB WDI. WB constant series is the industrial product index (1960=100) from UN & ECLA (1966) for 1900-1963; continued using the growth rates of the manufacturing value added in constant LCU for 1966-1999 and 2003-2012 from WB WDI; and in 1999 and 2002 the implicit

manufacturing GDP deflator from BCeCh are used instead of WB-WDI. The four series are converted into manufacturing output index number series (1960=100).

The Moxlad, the WB constant and the DLW series follow similar trends along the whole period, with short lived small divergences. Initially, the WB constant and current series grow slightly faster, 1908-1948, and then the Moxlad and DLW series grow slightly faster 1949-1972. After 1972 the Moxlad, DLW and WB constant series move together, at slightly different growth rates that slowly build-up into noticeable differences at the end of the period. The most salient difference is between the WB current and the other three series. The first important difference is observed in 1971, 1984, 1992 and 1999, when the WB current series drops for one year, while the other three series signal manufacturing output growth. In 2002 the WB current series drops sharply for about six years, while the other three series point to manufacturing output growth up to the 2008 international financial crisis.<sup>2</sup>

The Chile series are less correlated than those of Argentina or Brazil. The DLW and Moxlad series Pearson correlation coefficient is 0.65. The correlation coefficient between these two series and the WB series range 0.40-0.72.

We prefer the DLW series of industrial output for several reasons. First, it is slightly longer than the other three series. Second, it incorporates substantial local knowledge to adjust the series in a sensible manner and consistent criteria are used to construct the whole series.

### *Colombia*

A similar set of four series are constructed for Colombia. The Moxlad, WB constant and current series are also constructed analogously. The local expert series is constructed by Colombia's central bank (Banrep) using the real manufacturing GDP for 1925-1949; extrapolated using the real manufacturing industry GDP growth rate for 1950-1970; and the real manufacturing industry GDP growth rate for 1970-1996, from Banco de la República (1998). The four series are converted into an index number series (1960=100) and are presented in figure 4.

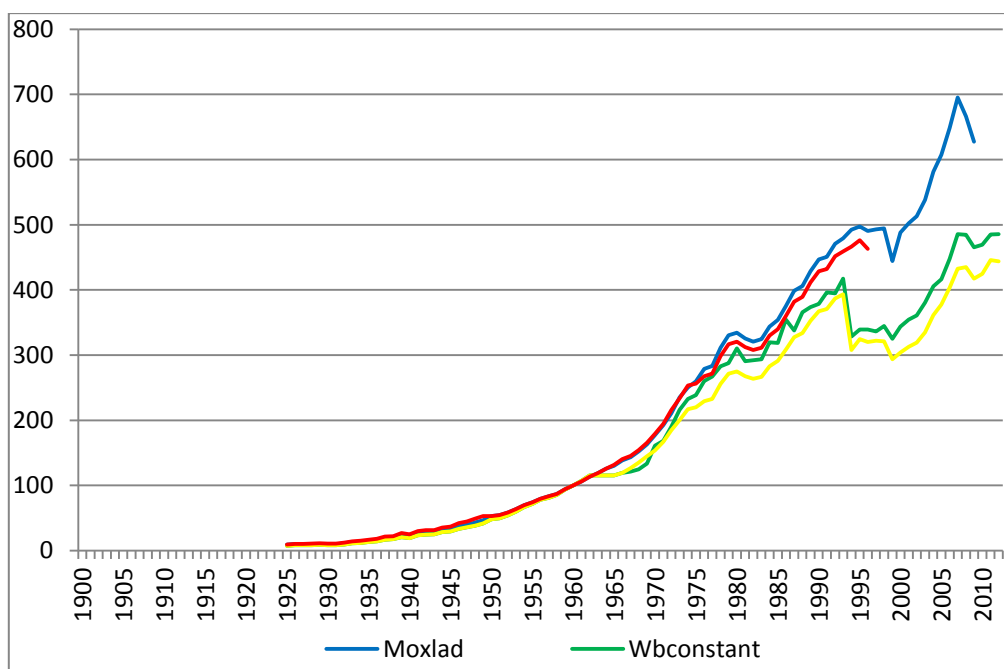
The four series follow similar trends and growth rates up to 1963. After 1963 the four series follow similar trends but slightly different growth rates, up to 1993. In 1993 the Moxlad and Banrep series continue and increasing trend, at different growth rates, while both WB series denote a sharp decline in manufacturing activity that continues up to the 1994 financial crisis and recession.

The four series are relatively highly correlated. The Moxlad and Banrep series are highly correlated, with a Pearson correlation coefficient of 0.94. These two series, in turn, have correlation coefficients with WB series ranging 0.78-0.84.

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<sup>2</sup> The differences between WB current of the other three series persist even after correction of WB-WDI errors in the implicit manufacturing deflator for 1999 and 2002 with Chile's Central Bank data.

**Figure 4. Colombia real manufacturing output index number (1960=100), 1925-2012**



**Source and note:** The implicit and explicit price indexes required to set all series in 1950 pesos are not available. To compare the five series the 1925 manufacturing output level in 1950 pesos is then continued using the growth rates of each of the five different series available. The 1925 observation is manufacturing output in 1950 million pesos from Banco de la República (1998). The Moxlad series is value added manufacturing output in 1970 constant LCU from Moxlad, 1925-2009. Moxlad series 1900-1925 series most likely represents GDP growth, not industrial growth. WB current series is industrial product index number (1960=100) from UN & ECLA (1966) for 1925-1962; continued using the growth rate of manufacturing value added current LCU deflated by GDP deflator in 2005 prices from WB WDI for 1963-2012. WB constant series is industrial product index number (1960=100) from UN & ECLA (1966) for 1925-1962; continued using the growth rate of manufacturing value added constant LCU from WB WD, for 1963-2012. Banrep series is manufacturing GDP in constant 1950 LCU for 1925-1949; continued using the growth rate of manufacturing industry GDP constant 1958 LCU for 1950-1970; and the growth rate of manufacturing industry GDP constant 1975 million LCU for 1970-1996, from Banco de la República (1998). The four series are converted into manufacturing output index number series (1960=100).

We prefer the Banrep series of industrial output. The series incorporates substantial local knowledge to adjust the series in a sensible manner and consistent criteria are used to construct the whole series.

A feature of WB current series in all countries deserves a comment. At some point in time, frequently in the 1990s, the WB current series decouples and declines in all countries, and moves in opposite direction to the expert and Moxlad series, and for Argentina, Brazil and Chile also in opposite direction to the WB constant series. This means that the aggregate GDP deflator is increasing at a faster rate than the producer price index typically used to deflate manufacturing value added.

In Argentina, this pattern is observed 1989-1994, during trade and capital market liberalization. In Brazil, it is observed 1994-1997, in the late stages of the trade and capital market liberalization. In Chile it is observed for short periods after 1971, 82, 94, 99 and a longer 2002-2007 period. In the second half of the 1990s and early 2000s Chile reduced (further) its tariffs and completed various trade agreements. In Colombia it is observed 1993-1995, at the end of the trade and capital market liberalization. Trade and capital market liberalization and the implied rapid structural change these economies experienced at the time seem to coincide with the acceleration in the GDP deflator compared to the producer price index. But faster growth rate in the GDP deflator than in the producer price index during trade liberalization is a striking feature.

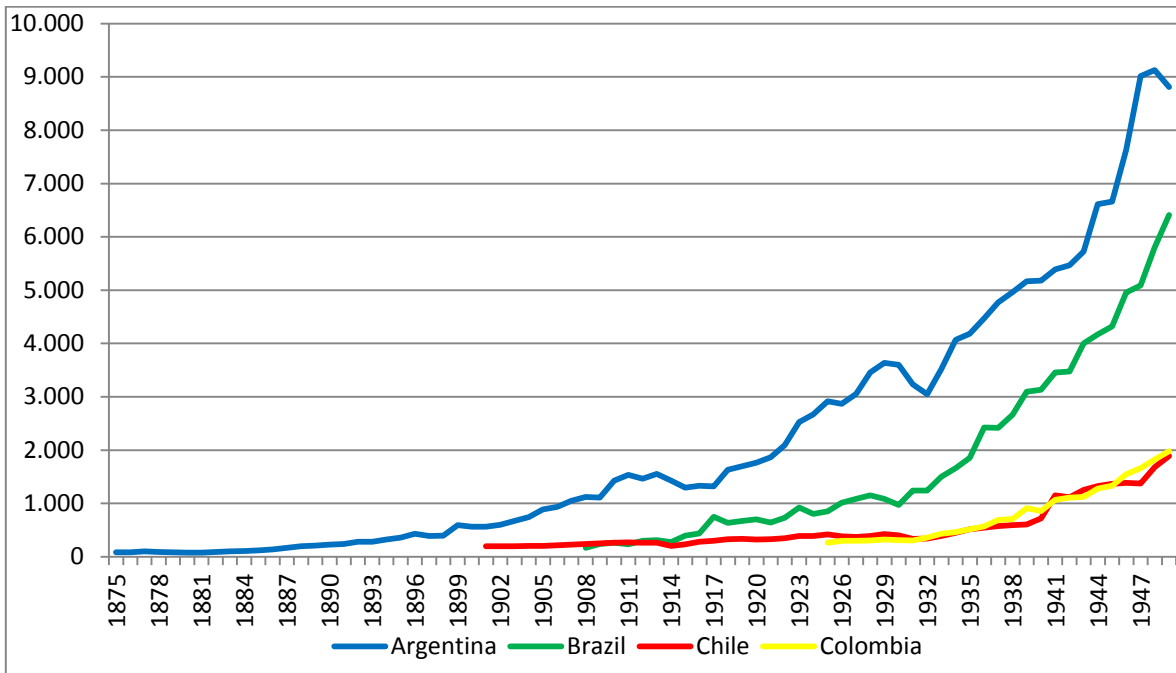
In principle, if goods produced at home and abroad are of similar quality, imports should help to keep both the GDP deflator and the producer price index at slow growth rates. Some possible explanations to this feature exist. Statistics agencies in these countries changed their methodologies to construct price indexes. If the share of imported goods is higher in the producer price index than in the GDP deflator, the effects of trade liberalization and exchange rate appreciation may help to explain this feature. As trade liberalization is experienced, the structure of the economy changes rapidly, including consumption patterns, and the quality of goods consumed may increase. As the quality of goods increases, and because consumer prices in Latin America are not adjusted to changes in quality of goods, it is likely that absolute consumer price indices also increase. Finally, high inflation may lead to faster growth rate in the consumer price index than in the producer price index, particularly in economies that are relatively open and have small manufacturing industry sectors.

#### *Preferred series*

The four preferred series identified are not directly comparable. The series are in local currency units. Additionally, the series are in index number form to overcome the difficulties of not having common price indexes for all series, but also make difficult comparing economies that grow fast at different times. To make these series comparable the growth rates of each series is anchored on the manufacturing value added 2009 current dollar observation from WB WDI. In this way the series are converted into the same currency and it is simple to compare the four series.

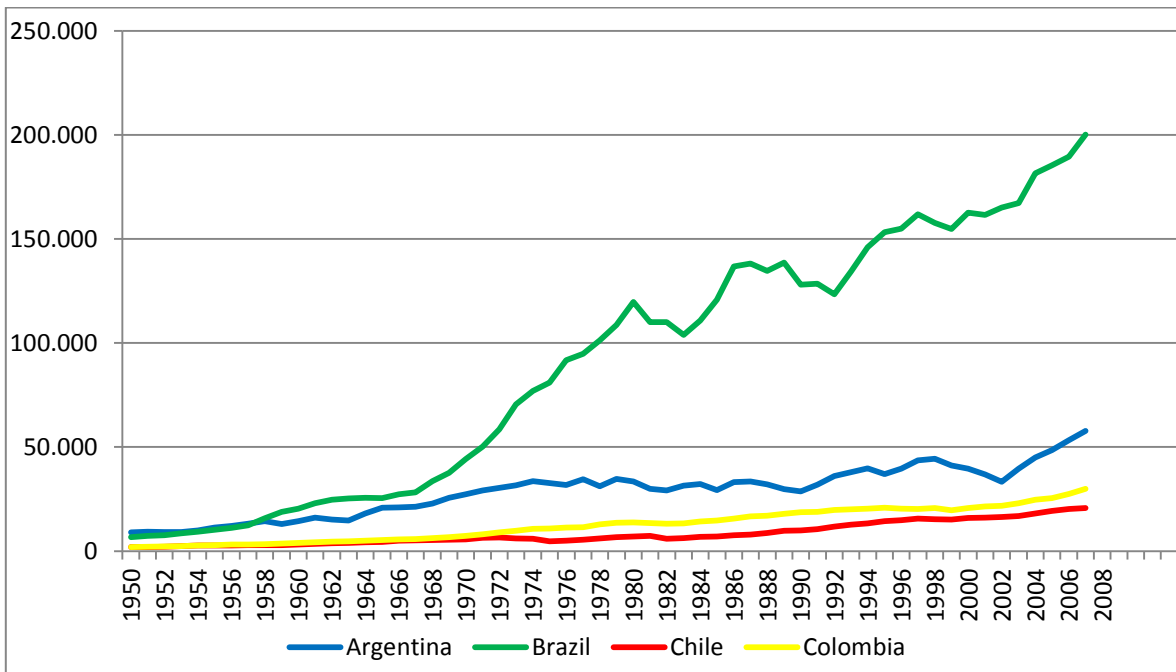
Figure 5 presents the evolution of the four series during the late nineteenth and the first half of the twentieth centuries. Argentina starts its industrialization process earlier than the other three countries. The first clear and substantive acceleration of industrial output in all four countries seems to be experienced during the 1930s and 1940s.

**Figure 5. Manufacturing value added Argentina, Brazil, Chile and Colombia, 2009 US dollars, 1870-1949**



Source: See text.

**Figure 6. Manufacturing value added Argentina, Brazil, Chile and Colombia, 2009 US dollars, 1950-2009**



Source: See text.

Figure 6 presents the evolution of the four series during the second half of the twentieth century. The series indicate Brazil surpassed Argentina's manufacturing value added in the 1950s, and then grew at a relatively fast pace, compared to the other three countries. Industrial growth in Brazil was interrupted by external and internal crisis that led to sharp and short downturns in 1981, 1990 and 1997. In the 1950s Colombia also overtakes Chile in industrial production and continues growing faster than Chile up to the 1990s. In 2009 manufacturing value added in Brazil was about 4 times larger than in Argentina, and about 8 times larger than Colombia and Chile.

## Industrialization in South America: Convergence and Divergence

In this section we examine in more detail the growth of the manufacturing sector in Argentina, Brazil, Chile and Colombia, using our data series and some of the existing narratives of this process. We present for the first time a narrative that compares the largest economies in the region, their process of convergence to the global industrial leaders and convergence/divergence within the region itself.

In Table 1 we show the growth rates of manufacturing value added in South America vs. a set of global leaders and in Table 2 we show the rate at which our countries of interest converged with these global leaders and with the United States in particular. In Table 2 we present net growth rates or the rate of growth of industrial GDP in each country in South America net of the growth of more developed countries. This table shows that there is a lot of heterogeneity in the industrialization experience of Argentina, Brazil, Chile and Colombia.

Table 2 helps us by showing only the net growth rates after we subtract the growth in developed countries. In this sense, positive (net) growth rates mean there is convergence and negative (net) growth rates imply South American nations are diverging from the leaders.

**Table 1. Industrial GDP Growth Rates, South America vs. Global Leaders**

	Leaders (avg.)	GER	UK	USA	JAP	ARG	BRZ	CHL	COL
1900-1919	3.2	2.7	1.0	5.8		4.8	9.8	2.4	
1920-1930	2.6	1.0	2.9	3.9		6.5	2.6	1.5	1.7
1931-1943	5.2	2.2	2.7	9.9	6.3	3.3	10.0	7.5	8.7
1944-1972	5.6	4.7	4.3	3.1	10.2	5.3	8.7	5.4	7.2
1973-1990	2.2	1.8	0.8	1.7	4.5	-0.6	4.0	1.8	4.3
1991-2007	1.9	1.4	0.5	4.0	1.5	3.7	2.5	4.2	2.7

Source: See Appendix. Developed country growth rates from Bénétrix et al.(2012)

According to our findings in Table 2, before 1930 convergence with the global leaders was only strong in Argentina and Brazil, but not in Colombia and Chile. This is consistent with what the literature had found when studying these big economies (Haber, 2006, Williamson, 2011). Yet, Chile and Colombia seem to have had a slow start. In that sense, the hypotheses that adverse shocks such as WWI or the Great Depression gave an impulse to the industrialization of these economies do not seem to be the case according to this data. Perhaps the big exception is Brazil in the 1930s and Argentina in the 1920s. But there is not enough evidence to believe such shocks really did the big push. The aftermath of World War II seems to be a more important moment for most of these economies.

The golden era of industrialization for most countries seems to have been either the 1930s, when compared to all the leaders, or the 1940-1970s, when compared to the United States alone. When comparing to all the global leaders, half of the group (i.e., Argentina and Chile) has very weak to no convergence after 1930 and the other half (Brazil and Colombia) have a relatively strong and persistent convergence after 1930. Yet, when compared to the United States, all of our countries of interest showed convergence between the 1940s and the 1990s.

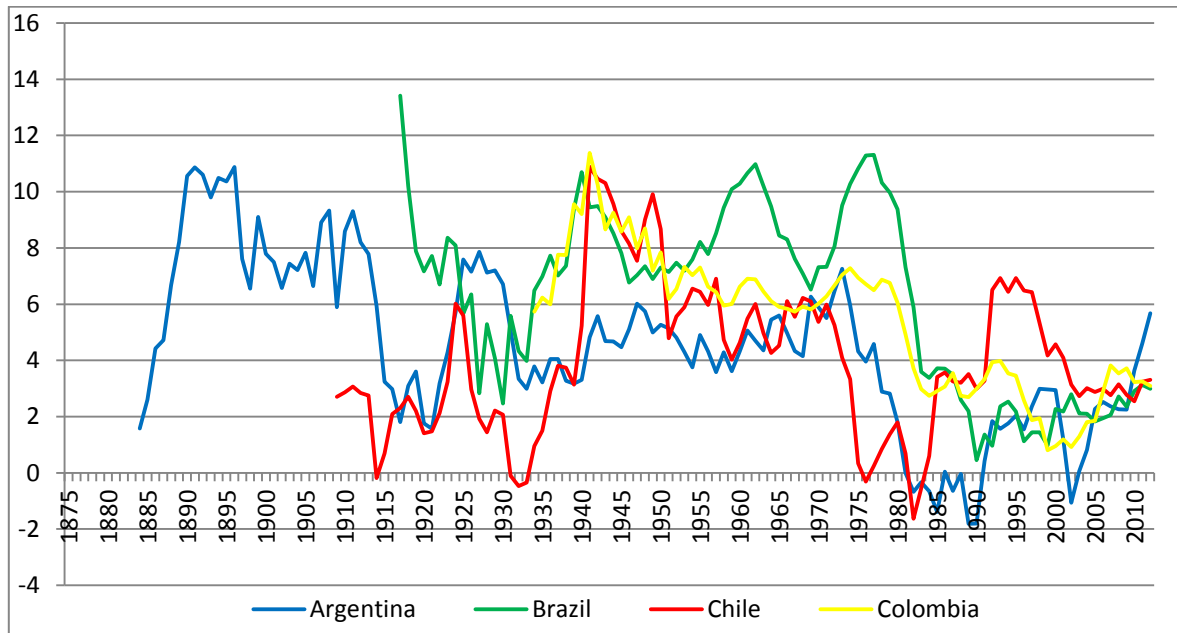
**Table 2. Convergence/Divergence among South American Nations and the Developed Country Leaders (net rates of growth of industrial GDP)**

	Leade rs (avg.)	<u>Growth in Lat Am - growth in leaders</u>				<u>Growth in Lat Am - United States</u>			
		Argentina	Brazil	Chile	Colombia	Argentina	Brazil	Chile	Colombia
1900-1919	1.4	1.6	6.6	-0.7	-1.9	-1.0	4.0	-3.3	
1920-1930	0.5	3.9	0.0	-1.0	-0.9	2.6	-1.3	-2.4	-2.2
1931-1943	2.1	-1.9	4.8	2.2	3.4	-6.6	0.1	-2.4	-1.2
1944-1972	1.1	-0.2	3.1	-0.2	1.6	<b>2.2</b>	<b>5.6</b>	<b>2.3</b>	<b>4.1</b>
1973-1990	0.2	-2.8	1.8	-0.4	2.1	-2.2	<b>2.3</b>	<b>0.1</b>	<b>2.7</b>
1991-2007	1.4	1.9	0.7	2.3	0.9	-0.3	-1.5	0.2	-1.3

Source: See Appendix. Developed country growth rates from Bénétrix et al.(2012)

Now, what does this evidence tells us about the endogenous growth and the import substitution hypothesis? The endogenous growth hypothesis is a powerful explanation of what we find in Table 1. That is, if we believe there were no explicit import substitution industrialization policies before the 1940s and that growth happened because of the export boom, then the endogenous industrialization hypothesis seems to prevail. Yet, in Table 2 we see a different side of it, because during the first stage (1900-1919) only Brazil seems to be catching up to the industrial leaders and only before 1920. Thus, the endogenous industrialization hypothesis could perhaps explain part of the initial industrialization spurt, but we need to test this systematically below to see if it is truly the terms of trade and exchange rates that drive industrialization before 1930.

**Figure 7. Ten-year moving average growth rate of manufacturing value added  
Argentina, Brazil, Chile and Colombia, 2009 US dollars, 1870-2009**



**Source:** See text.

In Figure 7 we present ten-year moving average growth rates of manufacturing value added. The data confirms Argentina began its industrialization early and at high growth rates. Our estimates of the decade long average industrial growth rate was always higher than 6 percent and at times close to 11 percent before WWI. Argentina was the front-runner in the process of industrialization in the first part of the twentieth century, despite the fact it was experiencing a sustained export-boom based on primary products. This process was an endogenous, private-sector-led process, fully correlated with the dynamism of the export growth economy. For instance, the industrial boom was tightly linked to the development of agriculture, which being more labor intensive than cattle rising, produced forward and backward linkages “a la Hirschman,” accelerating urbanization rates and giving rise to a new consumer class that demanded manufactured goods. The initial industrial boom, in fact, was dominated by the processing of food, beverages, textiles, wool and leather, tobacco, and glass, with some important firms competing successfully with consumer goods imports. It was the beginning of an “easy” import substitution process. However, there were some natural resource obstacles to develop a competitive “heavy” industry; such as the scarcity of coal, iron and other minerals. This scarcity of important resources precluded the development of machinery and metallurgical firms in large scale. Therefore firms relied heavily on imported intermediate and capital inputs (Barbero and Rocchi 2003, Diaz Alejandro 1970, Rocchi 2006)

The industrialization process of Brazil, Chile, and Colombia began later (much later for Colombia). In the 1910s Chile’s industrial output was growing a modest average 3 percent , while Brazil’s was growing at 14 percent per year. Cano (1977), for instance, attributes much of the performance of Brazilian industry to the almost forced import substitution during



World War I (WWI), when the disruption in coffee trade, in banking, and in shipping, complicated the importation of consumption goods. For Haber (1991), Suzigan (1986) and Musacchio (2009) the easy financing Brazilian textile and industrial firms had between 1905 and 1914, and the spurt in machinery imports in those years, may be behind the impressive manufacturing take off in the 1910s in Brazil.

In Chile, Palma (2000) argues that in spite of a virtual world monopoly of sodium nitrate exports, the Chilean economy avoided Dutch Disease and started to industrialize in the 1890s. According to this author Chile had an active policy of protection, increases in export tariffs and stable real exchange rate that propelled the local industry. We do not have data on industrial GDP growth for Colombia in this initial period, but we know that there were two coffee booms, following the valorization programs in Brazil (in 1906 and on and off in the 1920s). Those coffee booms helped the Colombian industry and for the first time long-lasting manufacturing firms were established after 1900. Moreover, it was in the second coffee boom that the manufacturing sector could also take advantage of a nascent financial and transportation infrastructure.

Performance during the roaring twenties seems to have been varied across South America. Argentina, Brazil and Chile experienced growth spurts during the first half of the decade, and then average growth rates declined. For Argentina, the 1920s were the period of most rapid convergence in the period we are studying. Industry grew at an average annual rate of 6.5 percent based mostly on the expansion of incumbent firms. A major structural transformation occurred not only in the “traditional” sectors (food, beverages, tobacco, meatpacking houses, sugar mills, and tanning firms) but most importantly in new sectors such as rubber products, chemicals, pharmaceuticals, machinery and electrical equipment. The “front-runner” was expected to enter into a second phase of industrialization. The new sectors, altogether, doubled their share in manufacturing industry increasing from 13 percent in 1920 to 21 percent in 1930. This process took place well before an attempt to have an explicit state-led import-substitution strategy (Pineda, 2009).

In Chile, in the 1920s, the decline in the nitrate industry due to the improvement in the production of synthetic nitrates in the core countries was a first blow to Chilean exports. The decade started with a 50% nominal devaluation rate and an increased degree of protection which produced a transitory spurt in manufacturing. Yet, with the still very high terms of trade, the real exchange rate appreciated substantially and the rate of manufacturing growth diminished and even became negative in some years (Muñoz, 1968, Palma, 2000). Thus, the 1920s decade proved to be the weakest in terms of manufacturing growth for Chile. In fact, according to our estimates, the rate of growth of Chile’s manufacturing sector was relatively slow, with no convergence, until the 1930s.

In the 1930s, the growth rates of the four countries are impressive. Brazil, Chile and Colombia’s industrial output grew at an average 11 percent during the 1930s. In contrast, Argentina, the regional leader, had industrial growth rates of 3.3 percent, making it the only country diverging from the industrial leaders. Brazil and Colombia were not as hard hit by the depression thanks to the rapid recovery of terms of trade, due to their coffee valorization

programs. In fact, our late comer, Colombia, experienced rates of growth above 9 percent during 1930s, to a large extent because of the improvement in transportation infrastructure, a large depreciation of the exchange rate, and the beginning of explicit protectionist policies (Echavarría, 1993, Ocampo and Montenegro, 2007).

Chile was probably the country that suffered the most during the Great Depression: exports declined in 1929-1932 by 50%, imports by 83% and the terms of trade declined by more than 50%. Chile needed to pursue another model and the policy reaction was immediate. The government engineered a devaluation rate of more than 300% between 1932 and 1935 resulting in a depreciation of real exchange rates and an increase of the real cost of imports of about 100%. The result was an acceleration in industrial output average annual growth of 7.5% (Muñoz, 1968). All in all, South America benefited from the reactions to the Great Depression, both in the short term and long term. In our empirical section below we find econometric evidence supporting this view of the Great Depression.

While Colombia, Chile and Brazil continued deepening their industrialization in the 1930s, expanding their textile sectors and beginning to develop other industries (Lederman, 2005, Stein, 1957), Argentina seemed to have missed an opportunity to deepen its industrial base. Diaz Alejandro (1970) argues that by mid 1930s there was a missing opportunity to implement a targeted industrial policy that would have enabled Argentina to follow a smooth transition through sequential industrialization phases. According to this author, unless there was another export boom in sight, which Argentina did not experience ever again (e.g., its terms of trade were much lower than those of the 1900-1930 period), the endogenous industry phase turned into one in which from having current account surplus, the country faced recurrent external disequilibria. For Diaz Alejandro, the after thirties signaled the beginning of a long Argentine delay in relation to the core and Latin American countries (Taylor, 1998).

After WWII, Argentina exhibits a relatively stable industrial growth rate ranging between 4 percent and 6 percent, Brazil had an unstable but high growth rate ranging between 7 percent and 11 percent, and Chile and Colombia's industrial growth rate decreased to a still highly respectable average of 6 to 7 percent. This is the golden era of import substitution industrialization (1944-1973), when governments in the region implemented explicit policies to protect and promote the substitution of consumer goods, and to some extent intermediate goods, at least in Brazil (Leff, 1968). Additionally, this period of rapid growth coincided (or caused) the rapid urbanization of these countries and led manufacturing to surpass agriculture as the most important employer, with the exception of Argentina that underwent this process beforehand (Baer, 2008, Baer, 1972, Hirschman, 1968)

It is during this period when Brazil becomes the regional leader in total manufacturing output, displaying rapid growth in industrial productivity as well. According to Leff (1968) the rapid growth in industrial output in Brazil between the 1940s and the 1960s was due to the development of new activities, rather than the expansion of traditional activities. This is when Brazil differentiates from the pack. In fact, between WWII and 1960 Brazil experienced rapid industrial growth in metallurgical, mechanical, electrical material, and transportation

equipment industries. These industries' contribution to industrial value added went from 6.3 percent in 1920, to close to 15 percent in 1950, then doubling to 30 percent by 1960. Furthermore, one big difference in the Brazilian case was that by 1949 the local capital goods industry provided over 60 percent of the domestic demand for industrial equipment. This development is even more impressive if we consider that the nascent capital goods industry developed despite facing competition from foreign imports until at least the 1960s, when imports of machinery had preferential exchange rate treatment and duty-free importation. In fact, Leff (1968) argues, the development of the Brazilian capital goods industry was so impressive, that the "domestic supply coefficient [for capital goods] was more than three times larger than in Argentina during the same years" (p. 8).

Therefore, during this period, our "front-runner," Argentina, lags behind, at least relative to Brazil, Colombia and to itself. Katz and Kosacoff (2000) argue that the inward orientation is a partial explanation for a performance well below its growth potential because external contestability was not a threat for domestic producers. But most importantly, the ISI was an "incomplete model"; the inadequate growth of exports during this whole period was still an obstacle to the industrialization process. Furthermore, the development of big-scale heavy industry firms required a continuous injection of public subsidies.

Chile did not perform well in the postwar years. In the 1950-1972 period, during the heyday of the ISI period, the manufacturing industry was still growing at 5 % in a context of very high monetary instability—as in Argentina—and stop and go macroeconomic policies that resulted in sudden swings in relative prices. This instability was also combined with unstable rules of the game in the design of trade policies. Hence, the literature on Chile argues there was not a smooth ISI strategy with stellar results in Chile (Cortes Douglas, et al., 1981, Ffrench-Davis, et al., 2000, Muñoz, 1968).

Now, the fact that Brazil and Colombia have rates of industrial GDP growth large enough to allow them to converge to the global leaders does not imply that the policies of those years were optimal in those countries. In all of South America protectionism created perverse incentives, as we show below, increases in import tariffs were not correlated with improvements in labor productivity. Moreover, if we think about the counterfactual, what our findings imply is not that the policies promoted during the ISI period were good, especially because other countries in other regions (especially in East Asia) had larger and more sustained growth rates. In our view the relevant counterfactual is that Latin America did well relative to itself, but the region could have industrialized faster if it had introduced the right incentives to keep domestic producers improving efficiency in the long run. With the data that we have today, unfortunately, we cannot test this counterfactual.

In the 1970s, all four countries experience deceleration to an industrial average growth rate of 2 percent to 4 percent, depending on the country and by the 1980s, all countries suffer major downturns. As a matter of fact, the 1970s were a decade of de-industrialization.

In the 1980s, with the debt crisis that started in Mexico and then spread around the region, Argentina and Brazil's industrial output growth rate continues decreasing; reaching even

negative levels for the former. The 1980s crisis hit Brazil and Argentina like no other shock in the twentieth century, industrial GDP growth rates decreased across the board, and despite rapid exchange rate depreciations, domestic industry suffered because of the contraction in domestic demand and the sudden stop in capital inflows (Frieden, 1991). With low terms of trade, a sequencing of real devaluations and real appreciations of exchange rates, the reversal was unavoidable (Berlinski, 2003, Llach and Gerchunoff, 1997). Argentina and Brazil, in fact, end up running hyperinflationary policies in the late 1980s that end up forcing their governments to open up. In contrast, Chile and Colombia went through the crisis relatively unscathed, with a slight deceleration in industrial GDP to 3 percent per year.

The 1990s were a period of rapid structural change, liberalization, and deregulation in our four countries, with Chile forging ahead with reforms, and Argentina, Brazil, and Colombia following. Under liberalization we actually observe a rebound from the dismal 1980s, but with extremely modest rates of growth. The industrial complex in Argentina and Brazil maintains average growth rates close to 2 percent, while Chile's industrial performance improves substantially reaching average growth rates of even 7 percent. The success of Chile in the 1990s stems from the fact that its manufacturing sector gained international competitiveness, mostly in the so-called extractive industries, but also in some of the medium and high technological content industries. In our estimates the Chilean manufacturing sector is the best performer of the period with an average annual rate of growth of 4.2 percent. Terms of Trade substantially improved since 1995, the government follows a policy to run a nominal exchange rate crawling peg set to avoid sharp swings in the real exchange rate (Huelva and Núñez, 2010).

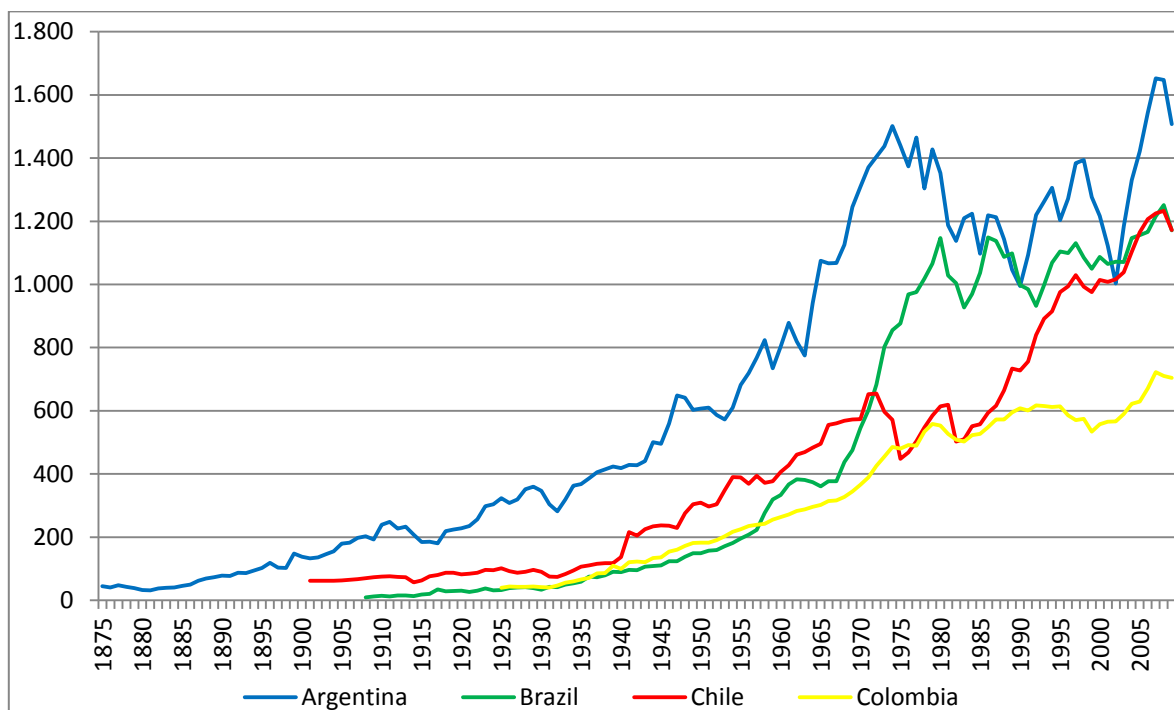
In the 1990s, Argentina and Brazil have a slow performance partly because the appreciated exchange rate and flat terms of trade. Colombia, in stark contrast with Chile and with its own past, experiences its worst decade of the twentieth century in terms industrial growth, with just over 2% average growth per annum. In this country, while trade and capital market reform advanced, the oil sector developed and terms of trade improved, there was a cycle of deep appreciation-depreciation-appreciation of the exchange rate (Ocampo and Montenegro, 2007, Tovar, 1998).

Finally, during the first decade of the 21<sup>st</sup> century, Brazil, Chile and Colombia experienced modest average growth while Argentina's manufacturing output exhibits a sharp decline and a sharp rebound after 2005. During this period the industrial growth rates in all of the four countries under study converge with the industrial leaders as a group (see Table 2), but once we compared them only with the growth of the industrial sector in the United States, only Chile has rates high enough to show convergence. Brazil, Argentina, and Colombia actually underperform the United States between 1991 and 2007, despite having favorable terms of trade thanks to high commodity prices (especially after 2003). Brazil and Argentina enjoy rapid growth in agribusiness-related industries, but only Argentina manages to convert the favorable terms of trade into rapid manufacturing growth, while Brazil has a mediocre performance.

### *Industrial GDP per capita*

Figure 8 presents manufacturing value added per capita for each country, 1870-2009. Argentina performed better than the other three countries for most of the century, until the 1980s. Since then Argentina underperformed its neighbors. Still the growth is impressive; industrial output per capita grew from \$48 dollars to \$1,501 in 1974. Growth was interrupted by the WWI, the onset of the Great Depression, and half a decade after WWII. After 1974 Argentina's industrial output per capita exhibited high instability. Brazil, on the other hand, caught-up to Argentina after starting at less than \$10 dollars per capita, reaching \$1,150 in 1980. The fast and almost continuous growth in manufacturing output per capita in Brazil between 1950 and 1980, and in most countries in the region, is in stark contrast with the highly unstable performance after 1980.

**Figure 8. Industrial value added per capita Argentina, Brazil, Chile and Colombia, 2009 US dollars 1870-2009**



**Source:** See text.

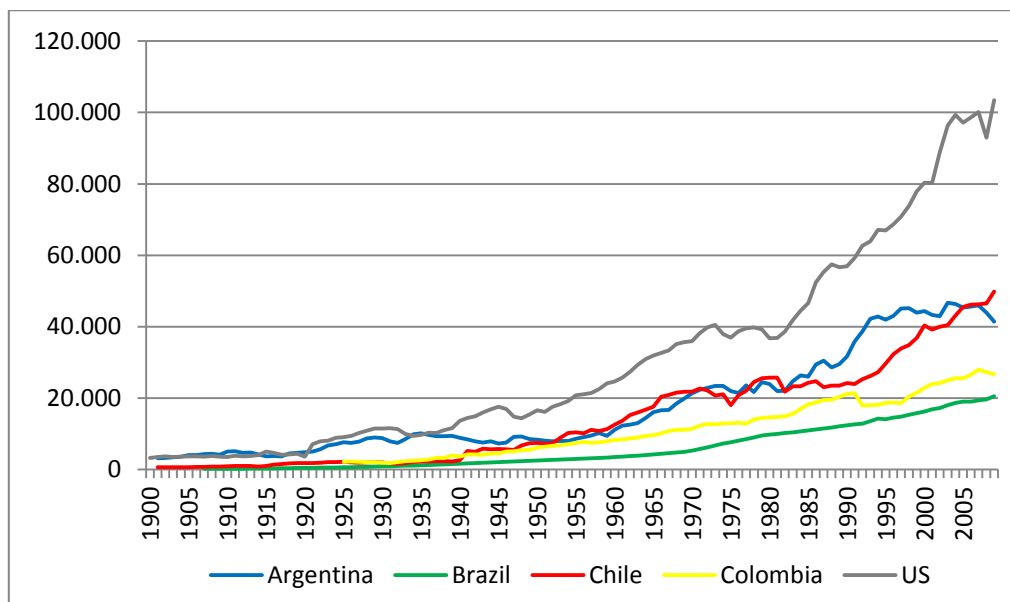
Chile experienced a similar catch-up process to Brazil, but with a different pace. Initially, the industrial output per capita is stagnant at about \$100 dollars, and after an unstable and long decade it speeds up and almost continuously to reach \$1,200 in 2007. On the other hand, Colombia's performance has been less bumpy than that of the other three countries, but substantially slower; reaching only about \$700 dollars manufacturing value added per head.

## Labor productivity growth

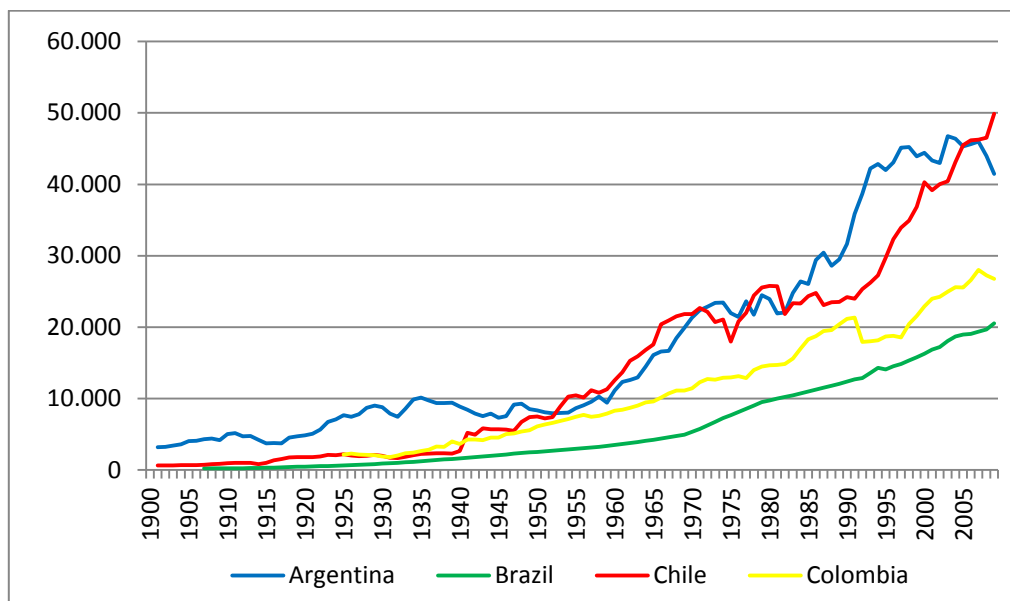
It is important to note that the convergence process we have been talking about measures mostly the size of the industrial sector as a whole, and not the productivity of it. We consider productivity an important indicator of performance and catching up, particularly in South America where protectionist policies have been blamed for the lackluster performance of industry in the second half of the twentieth century. In Figure 9 we plot our estimates of manufacturing labor productivity (manufacturing value added per worker in \$1,000s of 2009 dollars) against estimates of labor productivity in the United States. Using this metric is clear that there is rapid catch up in the first half of the twentieth century, all the way to the 1950s, but that thereafter there is mostly divergence.

In Figure 10 we plot only the South American countries under study to examine the process of convergence and divergence within the region. The first important finding is that Argentina and Chile are the industrial leaders of the region when it comes to productivity per worker. Since the agribusiness complex is included in the Argentine series, part of the results may be driven by the efficiency of the agricultural industries in that country. The second finding of interest is that Chile has an impressive performance since the 1990s, not only catching up to Argentina, but passing it after 2007. At the end Chile comes out as the regional leader when it comes to productivity. Finally, Colombia has higher productivity per worker than Brazil, at least since the 1950s, when we have data for the former. Both countries have similar productivity per worker in the 1960s and 1970s, but the Brazilian manufacturing industry slows down in 1980s and stagnates thereafter. In contrast, the Colombian industry continues to improve its productivity almost continuously until the 2000s.

**Figure 9. Labor productivity in Argentina, Brazil, Chile, Colombia and United States, in thousand 2009 dollars, 1900-2009**



**Figure 10. Labor productivity in Argentina, Brazil, Chile and Colombia, 1,000s 2009 dollars, 1900-2009**



Therefore, the story that comes out of our estimates of labor productivity is somewhat puzzling for experts in the region. Argentina and Chile are the regional leaders. Colombia follows closely and Brazil lags behind. The low labor productivity in Brazil is puzzling, especially given how much our estimates of employment in the sector are underestimated. One plausible explanation is that the scale of the industrial sector in Brazil (which over 10 times bigger than that of Argentina by employment) may be obscuring the productivity of its best companies. Still, we are conscious that these estimates should be taken with a grain of salt because there is a lot of measurement error in our series, from error in the way manufacturing is measured (e.g., whether they include mining and agribusiness or not) to the way we, and other sources, have estimated the size of the labor force.

**Table 3. Average labor productivity growth rate Argentina, Brazil, Chile, Colombia and the United States**

	Argentina	Brazil	Chile	Colombia	US
1900-1919	1.5	4.5	3.8		1.0
1920-1930	6.0	6.3	0.4		6.7
1931-1943	-1.4	5.7	4.3		2.3
1944-1972	3.5	3.9	4.0	3.0	3.0
1973-1990	1.6	4.0	-0.5	2.7	1.9
1990-2009	1.6	2.4	2.9	1.1	3.0

Source: See appendix.

Yet assuming the broad trends can be trusted, what is surprising is how little convergence there is in labor productivity within South America, especially when compared to manufacturing per capita. Another way to look at these patterns of convergence and

divergence is to look at the growth rates of labor productivity in Table 3. This Table highlights some of the features obscured in the previous charts. The growth rates show how the initial process of industrialization, before 1930, was accompanied by rapid growth in productivity. That productivity growth continued in Brazil, Chile, and Colombia until the 1980s, then there was a period of stagnation in all countries (the slowdown in Brazil is not clear in Table 3 because the high growth rates in the 1970s bring the average for 1973-1990 up). Since the 1990s, despite the hype and the commodity booms in the region, labor productivity growth has been slow in the region, especially when compared to the United States.

## **TESTING THE THEORIES OF SOUTH AMERICAN INDUSTRIALIZATION**

Now that we have long term series of industrial GDP growth, of the convergence rate of industrial GDP growth (relative to the four global leaders), growth industrial GDP per capita, and labor productivity growth, we can use them as dependent variables and we can perform a series of statistical tests to examine if the basic hypotheses of the theories of Latin American industrialization hold. Thus, in this section we construct a series of simple tests to explore basic correlations between important policy, macro, and trade variables and our four different dependent variables.

To keep things simple we first test simultaneously the correlation between our dependent variables and the growth in net barter terms of trade, growth in real exchange rate, and growth in the average import tariff by country. The hypotheses we test are rather simple, as per the endogenous industrialization hypothesis we would expect to find positive and significant correlations between terms of trade and industrial and productivity growth. We expect a negative relation between the changes in the real exchange rate index (where an increase in our real exchange rate index implies a depreciation) and our measures of industrial growth and productivity. Also, at the risk of oversimplifying things, we would expect changes in the average import tariff to be positively correlated with industrial growth (the ISI hypothesis). Yet, the correlation between changes in tariffs and productivity is complicated, because more protectionism should be correlated with improvements in productivity if it is creating the right incentives for domestic producers, but could also be negatively correlated if it is creating lazy or complacent domestic industries (the stagnationist hypothesis).

Now, we do not expect to find correlations between these variables over the entire period (1900-2010). Most likely, the correlation between those variables and our dependent variables varied across periods. Thus, we add interactions between these variables of interest and the periods we included in Table 2: the so-called Belle Epoque 1900-1919, the 1920s, 1931-1943, the golden era of import substitution 1943-1972, the crisis years of 1972-1990, and the liberalization years that go between 1990 and 2010.

In this initial exercise we choose a simple specification then in which we have



$$\Delta y_t = \alpha + \beta_1 * \Delta y_{t-1} + \beta_2 * \Delta NBTOT_{t-1} + \beta_3 * \Delta RER_{t-1} + \beta_4 * \Delta Tariff_{t-1} + \sum_{j=1}^5 \theta_j * periods_j$$

$$+ \sum_{j=1}^5 \varphi_j * (\Delta NBTOT_{t-1} * periods_j) + \sum_{j=1}^5 \gamma_j * (\Delta RER_{t-1} * periods_j)$$

$$+ \sum_{j=1}^5 \delta_j * (\Delta Tariff_{t-1} * periods_j) + \epsilon_t$$

Where  $y_t$  is one of our four dependent variables (industrial GDP growth, of the convergence rate of industrial GDP growth, growth industrial GDP per capita, and labor productivity growth),  $NBTOT$  is an index of net barter terms of trade,  $RER$  is an index of the real dollar exchange rate, and  $Tariff$  is the average import tariff. We then interact a one period lag of those variables of interest with our five time dummies for each of the periods we want to study (we exclude the 1920s for estimation purposes). Finally,  $\epsilon_t$  is an error term. We run this specification country by country.

The results of this exercise are presented in Tables 4 and 5. In Specifications 1 through 4 of Table 4 we use industrial GDP growth as dependent variable, and in Specifications 5 to 8 we use the convergence rate of industrial GDP. The effects are not clean, but we find that the net effect of the NBTOT is positive and significant in the periods 1900-19 and 1944-1972. For the other periods we have more of an average negative effect. The average effect of the real exchange rate on industrialization is not very clear as most coefficients are not significant. Yet we find some negative effects for Argentina and Chile during the Belle Epoque, and for Argentina in 1991-2007. So, we have only weak support for the endogenous industrialization hypothesis using these estimates.

[Table 4 around here]

We do not find a strong and significant correlation between industrialization or convergence and tariffs, except for Argentina, which shows positive correlation between industrialization and the growth in tariffs, but has a negative correlation between tariffs and industrialization during the golden era of ISI (1944-1972). This is more in line with the stagnationist hypothesis, which argues that protectionism did not necessarily contributed to the dynamism of industrialization in South America. In Brazil average tariffs have some significant coefficients, but on the net the effects are close to zero or slightly positive during the ISI period (1944-1972). The results when we use the convergence rate are relatively weak, as we only find significant correlations between changes in tariffs and convergence in Brazil.

Table 5 uses industrial GDP per capita and labor productivity as dependent variables. The results are again weak. Changes in NBTOT have net positive correlation with industrialization per capita, particularly in 1900-19 and 1944-1972, the average effect. These correlations are

weaker when we use productivity data. Changes in real exchange rate have negative correlation with our measures of productivity, but the effects are weak for most countries except for Colombia—where the effects are large and significant. In sum, the evidence supports the endogenous industrialization hypothesis, at least because of the sign of the coefficients.

[Table 5 around here]

In Table 5 there is weak support for the ISI hypothesis. Changes in tariffs are either not significantly correlated with productivity or they have a negative net effect. That is, our results support the stagnationist hypothesis, but rather weakly. In fact, for Argentina there are some positive effects of changes in tariffs and productivity so the evidence is mixed.

We now turn to test whether external shocks were important drivers of the industrialization of South America. In order to do that we modify our simple specification used above, by adding dummies for World War I (1914-1918), the Great Depression (1929-1933), World War II (1939-1945), and the Debt Crisis (1982-1989). This time we use a panel with data for the four countries, we add country fixed effects and we interact the dummies for the shocks with the country dummies. In this way we can see if the shocks have common effects or country-specific effects. In these specifications we do not include any interactions with any of the independent variables as we are only interested in looking at the effect of external shocks.

The results of the regressions that look at the short term effect of external shocks are in Table 6. We find that World War I had actually negative effects for Argentina and Chile. In Brazil, which according to (Cano, 1977) industrialized rapidly during the period, we find only modest improvements. We do not have data for Colombia until 1925, thus it is excluded from this part of the analysis. The Great Depression is correlated with high industrial growth rates in Colombia (our excluded category), and has positive, although less stellar, effects in Brazil and Chile. In Argentina the Great Depression actually has negative effects. World War II again has a positive correlation with our industrialization indicators in Colombia (the excluded category) and Brazil and Chile also have high rates, yet less stellar. Still, taking the net effects it seems like all of our countries converge with the global leaders during WWII. The debt crisis of the 1980s actually does little damage to Colombia (the excluded category) and Chile, but Brazil and Argentina actually suffered and had a significant slowdown, which led to divergence from the global leaders.

The literature on external shocks has focused on the short term consequences of such shocks, but one could think that there are medium to long term consequences of a truly adverse shock, such as World War I, the Great Depression, or World War II. Therefore, we construct dummies that measure the long-term effect of these shocks. Our dummies for the long term effects of external shocks include a dummy for WWI that goes from 1919 to 1925; for the Great Depression it goes from 1929 to 1938; for World War II it goes from 1939 to 1949; and

for the debt crisis we keep our original variable, which captured the effect of the crisis throughout the 1980s (1982-1989). The results of the regressions that use the long-term dummies are in Table 7. We can see that WWI has almost no effect. The post-Great Depression years have a positive effect in Colombia, and to a lesser extent in Argentina, Chile and Brazil. World War II has a positive effect in Colombia and Chile, and to a lesser extent in Argentina and Chile. That is, once we allow for long term effects, the Great Depression and World War II seem to be correlated with periods of rapid industrialization in South America.

We are not sure the evidence is overwhelmingly in favor of the external shocks hypotheses, but if there were ever beneficial external shocks for South America they were the Great Depression and World War II. Both of these shocks had positive short and long term effects in the region (to a lesser extent in Argentina). The Debt Crisis of the 1980s, on the other hand, was the single worst shock for Argentina and Brazil, but left almost unscathed Chile and Colombia.

## **CONCLUSION**

In this paper we have compiled new estimated of industrial GDP growth, labor productivity, and a set of variables related to international trade, capital accumulation, and macroeconomic policy. In this first attempt we describe the new series, explain which series seem to be the best to study long term industrialization, and we test a series of hypotheses on the industrialization of the region.

We uncover strong convergence with a set of global leaders (Germany, the US, the UK, and Japan) early in the century, at least in Argentina and Brazil, and for most countries in the interwar years. In the post-WWII years the strongest growth rates take place in Colombia, Brazil, and Chile.

We then try to study systematically some of the hypotheses that have explained these patters. We find only weak evidence to support the endogenous industrialization hypothesis, which posits that improvements in terms of trade and commodity booms should be robustly correlated with more industrialization. We find even weaker evidence linking trade protection in the form of tariffs and industrialization. In some countries higher tariffs did lead to an increase in the size of the industrial sector, but it did not happen across the board. In fact, in Argentina we find negative correlation between industrialization and tariffs. We also do not find significant correlations between changes in tariffs and changes in labor productivity, which supports weakly the idea that during periods in which tariffs were relatively high there was no significant improvement in productivity.

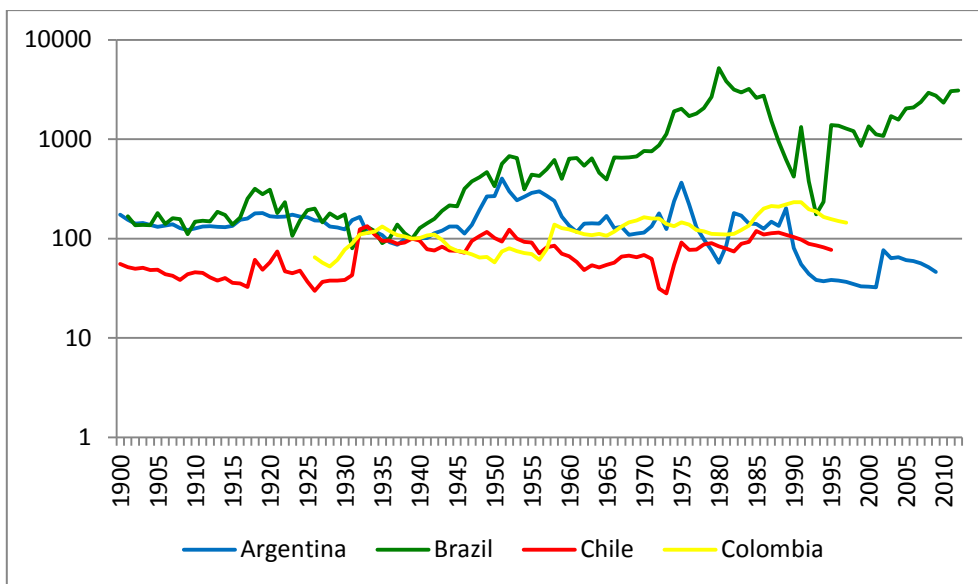
Finally, we show that the only two external shocks that could have led to faster rates of industrialization in South America were the Great Depression and World War II. Despite all the hype about the effect of WWI on the industrialization of countries like Brazil, our evidence does not support that period as one of rapid industrial growth. Part of the problem we have with our estimates is that shocks to terms of trade or exchange rates that could generate protection for the domestic industry in South America were shocks that also made more expensive the financing and importation of machines from the developed world. Other than

Brazil, none of the countries we study develop a large domestic machinery manufacturing sector, therefore, the dependence to external capital is crucial in these nations.

## Appendix

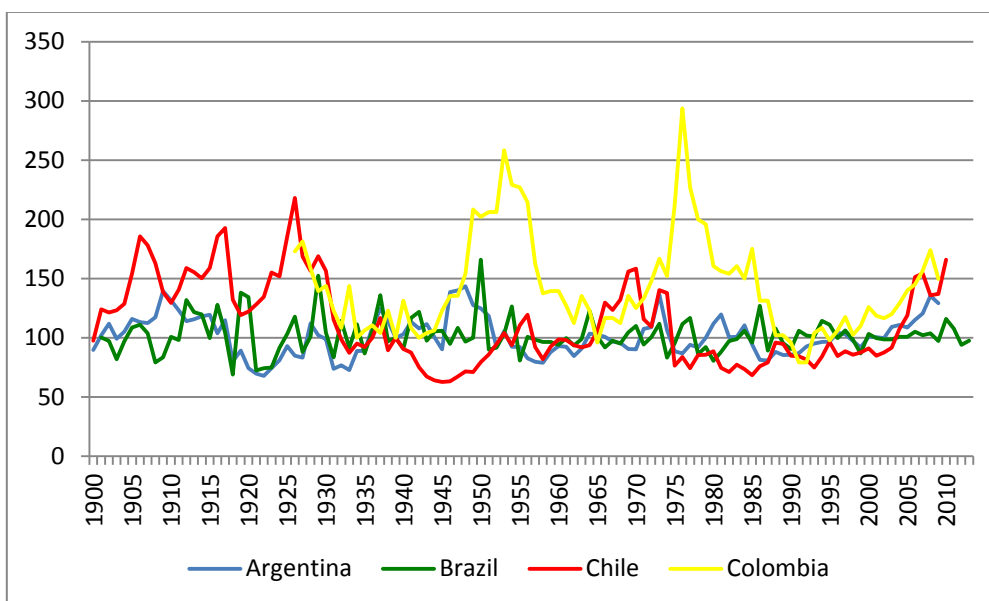
Trade and macroeconomic series related to our tests

**Figure 11. Real import price distortion index for Argentina, Brazil, Chile and Colombia, 1900-2012 (1939=100)**



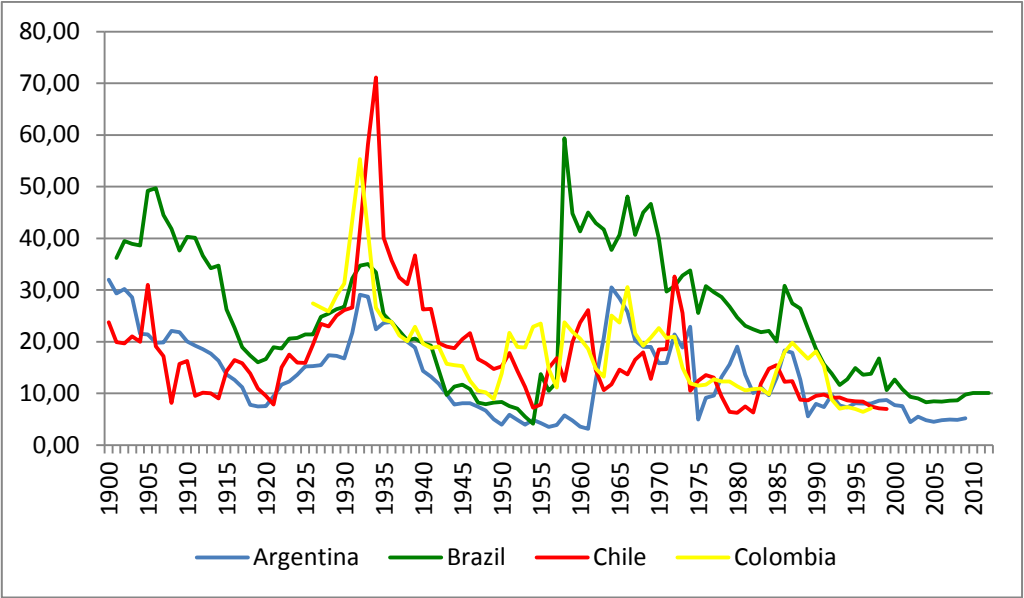
Source: as in appendix.

**Figure 12. Net Barter Terms of Trade index for Argentina, Brazil, Chile and Colombia, 1900-2012 (1939=100)**



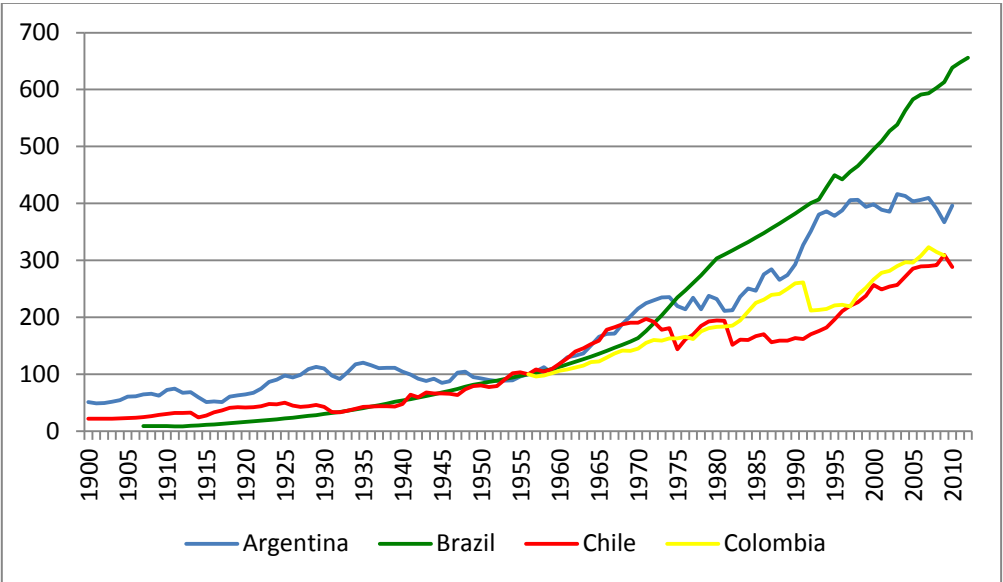
Source: as in appendix.

**Figure 13. Average import tariff in percent (% over current LCU) for Argentina, Brazil, Chile and Colombia, 1900-2012**



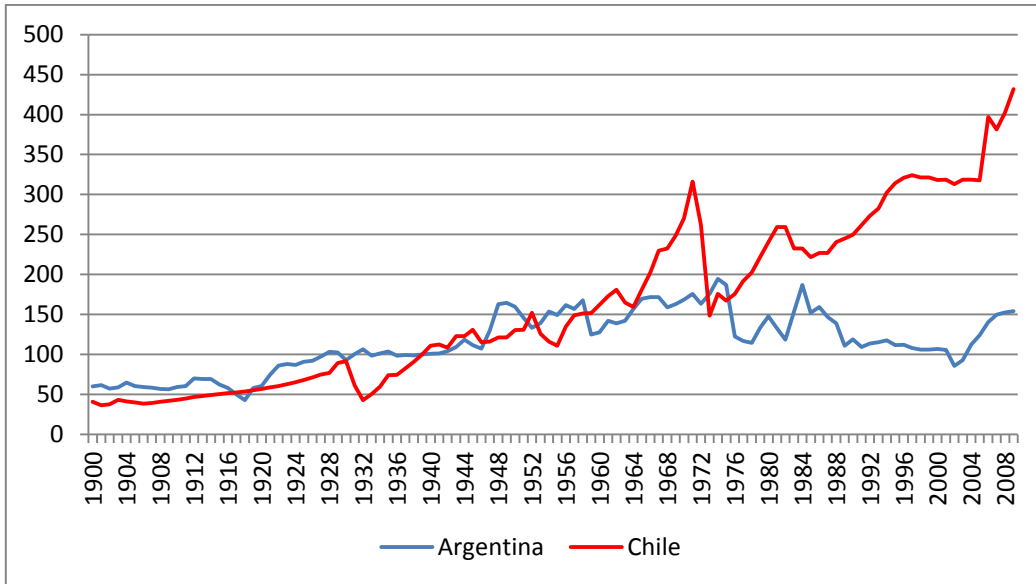
Source: as in appendix.

**Figure 14. Labor productivity index for Argentina, Brazil, Chile and Colombia, 1900-2012 (1956=100)**



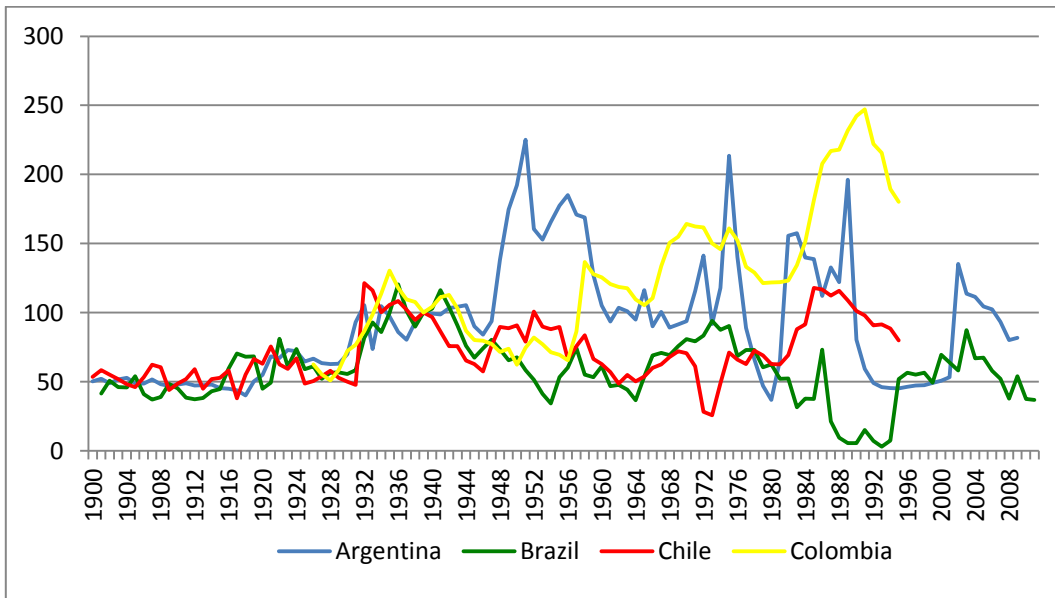
Source: as in appendix.

**Figure 15. Real Manufacturing Wages index for Argentina and Chile, 1900-2012 (1939=100)**



Source: as in appendix.

**Figure 16. Real exchange rate index for Argentina, Brazil, Chile and Colombia, 1900-2012 (1939=100)**



Source: as in appendix.

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**Table 4. OLS Regressions to Test Endogenous Industrialization and ISI (Industrial GDP growth and Convergence) in South America**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ind gdp grwth Argentina	Ind gdp grwth Brazil	Ind gdp grwth Chile	Ind gdp grwth Colombia	Convergen ce rate Argentina	Convergen ce rate Brazil	Convergen ce rate Chile	Convergen ce rate Colombia
Growth of NBTOT (t-1)	-13.2*	-20.7*	-27.6	24.9**	-23.1	-13.5	-21.7	24.9**
	[7.143]	[10.732]	[18.918]	[10.373]	[17.352]	[8.169]	[22.839]	[10.373]
Gr NBTOT*1900-19	56.6***	57.5**	39.1*		40.6	44.8	6.6	
	[18.820]	[24.792]	[21.137]		[29.779]	[33.688]	[24.077]	
Gr NBTOT*1931-43	28.7**	6.4	22.1	-4.1	17.4	-8.9	16.0	-4.1
	[12.706]	[12.859]	[27.189]	[19.697]	[19.941]	[12.113]	[32.690]	[19.697]
Gr NBTOT*1944-72	30.0***	22.9*	41.3*	-24.3*	37.8*	8.8	22.9	-24.3*
	[8.872]	[11.690]	[21.982]	[14.123]	[19.257]	[12.838]	[26.674]	[14.123]
Gr NBTOT* 1973-90	9.5	24.5*	32.5	-28.1**	25.1	11.3	33.5	-28.1**
	[21.402]	[14.108]	[27.865]	[11.394]	[29.043]	[15.936]	[26.966]	[11.394]
Gr NBTOT* 1991-2007	7.4	17.5	37.1	-31.7**	69.3	14.0	24.0	-31.7**
	[41.034]	[17.203]	[23.443]	[12.669]	[42.669]	[15.200]	[29.409]	[12.669]
Growth of RER (t-1)	1.5	21.2**	8.0	54.0	-7.7	12.8	8.5	54.0
	[10.970]	[10.339]	[12.844]	[76.462]	[20.108]	[10.725]	[12.042]	[76.462]
Gr RER*1900-19	-65.0***	24.6	-36.2*		-62.3**	40.2	-5.2	
	[17.459]	[79.786]	[21.246]		[31.190]	[79.936]	[20.075]	
Gr RER*1931-43	-16.7	-3.7	-5.6	-55.0	-6.9	-8.6	-12.8	-55.0
	[12.527]	[13.790]	[14.092]	[92.139]	[20.388]	[18.167]	[13.183]	[92.139]
Gr RER*1944-72	-13.8	-20.0	4.0	-61.6	-0.9	-15.7	-2.6	-61.6
	[12.340]	[12.085]	[17.313]	[75.674]	[21.140]	[13.939]	[19.032]	[75.674]
Gr RER* 1973-90	6.3	-11.4	-13.5	-76.4	15.5	-0.7	-12.7	-76.4
	[11.518]	[11.505]	[19.452]	[75.600]	[20.862]	[12.602]	[17.296]	[75.600]
Gr RER* 1991-2007	8.8	-21.4**	-2.2	-46.1	16.1	-13.4	-36.9	-46.1
	[12.585]	[10.358]	[20.983]	[75.776]	[21.529]	[10.737]	[25.862]	[75.776]
Growth of Avg Tariff (t-1)	29.6**	-92.4*	8.1	-30.0	11.6	-92.1*	8.3	-30.0
	[12.115]	[51.522]	[9.444]	[119.339]	[20.733]	[48.452]	[10.108]	[119.339]
Gr. Tariff * 1931-1943	-15.9	63.6	-15.9	56.1	6.7	107.2*	-21.5	56.1
	[17.765]	[54.694]	[19.443]	[129.144]	[22.600]	[59.475]	[14.226]	[129.144]
Gr. Tariff * 1944-1972	-30.9**	94.8*	-3.4	27.7	-14.6	93.3*	-3.0	27.7
	[12.210]	[51.568]	[10.609]	[118.813]	[20.806]	[48.606]	[11.873]	[118.813]
Gr. Tariff * 1972-1990	-17.0	83.4	-6.2	32.7	3.1	80.4	-11.9	32.7
	[12.352]	[53.080]	[11.380]	[118.518]	[21.154]	[49.761]	[12.467]	[118.518]
Gr. Tariff * 1991-2007	-13.8	92.5*	31.9	24.4	0.2	94.2*	21.9	24.4
	[17.774]	[52.475]	[27.077]	[117.485]	[24.808]	[49.447]	[34.296]	[117.485]
Dummy for 1900-19	-1.3	-6.1	-3.0		-3.1	-5.5	-1.4	
	[2.648]	[8.371]	[3.320]		[4.215]	[8.050]	[3.456]	
Dummy for 1944-1972	1.2	0.8	-0.4	-2.0	-1.4	-1.5	-1.3	-2.0
	[1.809]	[2.149]	[2.726]	[3.981]	[2.516]	[3.274]	[3.007]	[3.981]
Dummy for 1973-1990	-5.6**	-4.2	-2.4	-1.4	-5.4**	-1.9	-1.1	-1.4
	[2.245]	[2.850]	[3.452]	[3.730]	[2.639]	[3.377]	[3.333]	[3.730]
Dummy for 1991-2007	-0.9	-7.5***	0.6	-3.6	-0.9	-4.1	1.6	-3.6
	[2.596]	[2.310]	[2.612]	[3.941]	[2.868]	[3.052]	[2.880]	[3.941]
Dep. Variable (t-1)	0.1	-0.4***	0.2	0.1	0.1	-0.3*	0.0	0.1
	[0.110]	[0.147]	[0.158]	[0.212]	[0.125]	[0.189]	[0.124]	[0.212]
Constant	3.7***	10.9***	4.2*	3.4	1.5	5.5*	1.0	3.4
	[1.355]	[2.131]	[2.329]	[3.651]	[1.753]	[2.812]	[2.471]	[3.651]
Observations	109	103	99	71	106	103	99	71
R-squared	0.32	0.38	0.16	0.24	0.22	0.21	0.10	0.24
Adjusted R-squared	0.15	0.21	-0.09	-0.05	0.02	-0.01	-0.16	-0.05
F stat	5.33	3.88	2.06	6.57	5.03	0.87	0.81	6.57
F p value	0.00	0.00	0.01	0.00	0.00	0.64	0.70	0.00

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5. OLS Regressions to Test Endogenous Industrialization and ISI (Ind. GDP per capita and labor productivity) in South America**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ind gdp grwth per cap Argentina	Ind gdp grwth per cap Brazil	Ind gdp grwth per cap Chile	Ind gdp grwth per cap Colombia	Labor prod growth Argentina	Labor prod growth Brazil	Labor prod growth Chile	Labor prod growth Colombia
Growth of NBTOT (t-1)	-12.2* [7.326]	-20.6* [10.731]	-26.7 [18.396]	18.3* [9.764]	-13.3* [7.435]	0.6 [0.464]	-26.1 [17.371]	26.8** [11.485]
Gr NBTOT*1900-19	53.8*** [18.445]	57.5** [24.721]	38.1* [20.656]		55.4*** [19.466]	5.7 [5.199]	33.7 [20.299]	
Gr NBTOT*1931-43	27.6** [12.551]	6.1 [12.967]	21.7 [26.402]	-0.7 [18.849]	26.4 [16.792]	-0.7 [0.593]	23.0 [25.083]	
Gr NBTOT*1944-72	28.5*** [9.075]	22.3* [11.853]	40.0* [21.496]	-13.7 [11.114]	33.4*** [8.872]	-0.8 [0.645]	41.3** [20.112]	-22.5* [11.882]
Gr NBTOT* 1973-90	8.3 [21.101]	26.2* [13.815]	31.7 [27.236]	-18.4 [11.272]	10.8 [19.008]	-1.3 [1.355]	14.6 [26.100]	-34.5*** [12.108]
Gr NBTOT* 1991-2007	6.9 [40.640]	16.8 [17.498]	36.3 [22.735]	-19.4* [11.328]	-12.0 [20.828]	-4.2 [4.455]	49.9*** [18.171]	
Growth of RER (t-1)	0.7 [10.907]	21.2** [10.338]	8.0 [12.705]	229.1*** [65.349]	4.3 [12.542]	-0.7 [1.821]	9.1 [13.395]	15.4 [13.709]
Gr RER*1900-19	-64.9*** [17.186]	23.6 [79.697]	-35.8* [20.919]		-80.9*** [18.203]	-12.2 [7.980]	-33.8 [21.555]	
Gr RER*1931-43	-15.4 [12.441]	-3.6 [13.883]	-5.5 [13.899]	-245.8*** [85.348]	-13.4 [15.593]	0.6 [1.592]	-6.9 [14.410]	
Gr RER*1944-72	-13.2 [12.243]	-20.4* [12.096]	4.1 [17.096]	-228.9*** [66.177]	-20.5 [13.890]	0.9 [1.867]	3.1 [17.588]	-17.2 [14.163]
Gr RER* 1973-90	6.9 [11.446]	-12.1 [11.392]	-13.5 [19.200]	-239.3*** [66.809]	2.7 [13.249]	-0.0 [1.990]	-16.3 [17.493]	
Gr RER* 1991-2007	9.7 [12.471]	-21.5** [10.358]	-1.2 [20.423]	-223.1*** [66.523]	2.4 [13.014]	-0.1 [1.851]	18.9 [14.951]	-65.4 [42.290]
Growth of Avg Tariff (t-1)	24.1** [11.920]	-91.8* [51.576]	8.2 [9.289]	-392.4*** [99.106]	39.5*** [13.656]	0.5 [3.265]	8.1 [9.289]	-0.7 [5.758]
Gr. Tariff* 1931-1943	-11.2 [17.628]	63.6 [54.785]	-15.6 [18.968]	396.8*** [98.228]	-18.3 [19.941]	-0.5 [3.834]	-15.2 [18.691]	
Gr. Tariff* 1944-1972	-25.3** [12.005]	94.1* [51.620]	-3.7 [10.393]	391.1*** [99.023]	-38.7*** [13.717]	-0.7 [3.265]	-3.4 [10.684]	1.3 [5.877]
Gr. Tariff* 1972-1990	-11.8 [12.173]	83.4 [53.031]	-6.4 [11.214]	398.3*** [98.924]	-31.6** [14.264]	2.2 [3.516]	-9.6 [10.281]	
Gr. Tariff* 1991-2007	-8.5 [17.467]	93.1* [52.599]	30.2 [26.365]	389.6*** [98.675]	-22.8 [15.660]	-0.4 [4.130]	-6.6 [16.484]	33.0** [12.023]
Dummy for 1900-19	-3.0 [2.570]	-6.2 [8.358]	-2.6 [3.278]		-1.7 [2.711]	-0.2 [0.778]	0.6 [3.422]	
Dummy for 1944-1972	1.3 [1.782]	-0.1 [2.160]	-0.8 [2.627]	-6.8* [3.471]	2.6 [1.980]	-0.2 [0.345]	0.6 [2.545]	5.8** [2.569]
Dummy for 1973-1990	-5.1** [2.207]	-4.7* [2.838]	-2.3 [3.383]	-9.4** [3.733]	-0.1 [2.538]	-0.6 [0.364]	-2.0 [3.231]	4.4* [2.560]
Dummy for 1991-2007	-0.1 [2.558]	-6.4*** [2.287]	0.7 [2.543]	-13.2*** [3.918]	1.3 [1.970]	-0.4 [0.558]	2.7 [2.348]	
Dep. Variable (t-1)	0.1 [0.111]	-0.4*** [0.146]	0.2 [0.158]	-0.3 [0.208]	0.2* [0.097]	0.8*** [0.105]	0.1 [0.156]	-0.3 [0.210]
Constant	1.9 [1.288]	8.0*** [1.997]	2.8 [2.285]	12.4*** [3.747]	0.3 [1.594]	1.3* [0.663]	2.2 [2.173]	-1.1 [2.418]
Observations	109	103	99	71	109	105	99	41
R-squared	0.31	0.37	0.15	0.39	0.35	0.75	0.16	0.60
Adjusted R-squared	0.13	0.20	-0.10	0.16	0.18	0.68	-0.08	0.42
F stat	5.01	3.49	2.12	116.52	4.29	35.70	3.59	1.61
F p value	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.15

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6. Regressions Testing the Short Term Effect of External Shocks on the Industrialization of South America**

VARIABLES	(1)	(2)	(3)	(4)
	Ind gdp grwth ST Shocks	Ind gdp gr per cap ST Shocks	Convergence rate ST Shocks	Labor prod growth ST Shocks
WWI dummy	-4.3*** [0.047]	-4.7*** [0.030]	-3.7*** [0.088]	-4.5*** [0.099]
WWI*Brazil	4.0*** [0.038]	4.2*** [0.042]	3.2*** [0.040]	4.6*** [0.034]
WWI*Chile	1.3*** [0.010]	1.6*** [0.018]	1.5*** [0.016]	2.5*** [0.028]
Great Dep dummy	7.0*** [0.379]	2.6*** [0.356]	6.9*** [0.340]	-6.0*** [0.246]
Great Dep * Argentina	-11.8*** [0.319]	-7.5*** [0.335]	-3.7*** [0.235]	2.4*** [0.212]
Great Dep * Brazil	-4.7*** [0.290]	-2.4*** [0.295]	-1.9*** [0.237]	4.1*** [0.160]
Great Dep * Chile	-3.7*** [0.065]	-2.2*** [0.058]	-1.1*** [0.045]	
WWII dummy	5.8*** [0.027]	3.7*** [0.037]	5.7*** [0.019]	3.8*** [0.178]
WWII * Argentina	-6.3*** [0.011]	-3.8*** [0.043]	-4.3*** [0.066]	-10.3*** [0.078]
WWII * Brazil	-2.8*** [0.045]	-1.8*** [0.063]	-1.7*** [0.029]	-1.3*** [0.035]
WWII * Chile	0.3*** [0.074]	0.9*** [0.089]	1.0*** [0.045]	
Debt crisis dummy	-0.3 [0.209]	-2.0*** [0.196]	-0.3* [0.193]	2.2*** [0.067]
Debt crisis * Argentina	-4.7*** [0.203]	-2.4*** [0.208]	-3.9*** [0.104]	-1.6*** [0.125]
Debt crisis * Brazil	-1.7*** [0.134]	-0.8*** [0.112]	-1.3*** [0.156]	-1.9*** [0.108]
Debt crisis * Chile	-0.1 [0.061]	0.5*** [0.067]	0.3*** [0.043]	-2.5*** [0.017]
Chg in NB terms of trade (t-1)	1.5 [2.640]	1.9 [2.946]	-1.1 [1.851]	1.8 [1.186]
Chg, RER (t-1)	0.2 [0.486]	0.5 [0.583]	-0.2 [0.262]	-0.1 [0.810]
Chg, In avg, tariff (t-1)	0.5 [0.523]	0.7** [0.292]	-0.5 [0.671]	0.4 [0.539]
Argentina FE	4.2*** [0.046]	-0.9*** [0.034]	0.1* [0.051]	1.1*** [0.042]
Brazil FE	5.9*** [0.046]	0.6*** [0.040]	1.7*** [0.067]	2.1*** [0.092]
Chile FE	3.3*** [0.026]	-1.5*** [0.019]	-1.2*** [0.029]	1.4*** [0.033]
Constant	0.5*** [0.072]	3.5*** [0.078]	0.5*** [0.048]	1.8*** [0.011]
Observations	383	383	380	356
Num. of countries	4	4	4	4
R2 overall	0.09	0.06	0.06	0.11
R2 within	0.05	0.04	0.05	0.09
Chi2	150.09	36.18	7.73	3.79
Chi2 p value	0.00	0.00	0.05	0.29

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

VARIABLES	(1)	(2)	(3)	(4)
	Ind gdp grwth LT Shocks	Ind gdp grwth per cap LT Shocks	Convergence rate LT Shocks	Labor prod growth LT Shocks
WWI dummy	0.2 [4.128]	0.3 [4.021]	-2.5 [3.749]	-1.2 [3.706]
WWI LT (1914-1925)	0.2 [1.930]	-0.5 [1.892]	3.1* [1.708]	1.1 [1.774]
WWI LT * Brazil	-0.1*** [0.034]	0.3*** [0.027]	-0.5*** [0.047]	1.9*** [0.035]
WWI LT * Chile	-0.2*** [0.010]	0.1*** [0.019]	-0.0** [0.014]	0.2*** [0.026]
Great Dep dummy	-3.5 [3.868]	-6.3*** [1.130]	5.4*** [1.062]	-3.1 [2.046]
Great Depression LT (1929-1938)	5.4*** [1.915]	8.4*** [0.524]	0.8* [0.478]	-0.9 [0.929]
GD LT * Arg	-4.6*** [0.235]	-6.3*** [0.264]	-2.8*** [0.171]	0.2 [0.122]
GD LT * Brazil	-1.2*** [0.145]	-2.0*** [0.148]	-1.1*** [0.131]	2.5*** [0.085]
GD LT * Chile	-1.1*** [0.012]	-1.6*** [0.011]	-0.4*** [0.024]	
WWII dummy	-0.8 [1.463]	-0.3 [1.409]	-0.9 [1.374]	-1.4 [2.451]
WWII LT (1939-1948)	7.3*** [0.980]	5.3*** [0.956]	7.3*** [0.933]	4.1** [1.662]
WWII LT * Argentina	-6.0*** [0.026]	-4.2*** [0.041]	-3.8*** [0.054]	-7.0*** [0.095]
WWII LT * Brazil	-2.6*** [0.100]	-1.8*** [0.126]	-1.6*** [0.043]	-0.8*** [0.054]
WWII LT * Chile	-0.3*** [0.084]	0.2** [0.091]	0.6*** [0.067]	
Debt crisis * Argentina	-4.5*** [0.065]	-4.0*** [0.073]	-3.7*** [0.116]	0.9*** [0.165]
Debt crisis * Brazil	-1.7*** [0.046]	-1.7*** [0.032]	-1.3*** [0.083]	-0.6*** [0.076]
Debt crisis * Chile	-0.0*** [0.015]	-0.0*** [0.011]	0.4*** [0.030]	-1.7*** [0.028]
Chg in NB terms of trade (t-1)	0.8 [2.630]	1.4 [2.942]	-1.3 [1.806]	2 [1.480]
Chg. RER (t-1)	0.2 [0.407]	0.5 [0.514]	-0.3 [0.392]	-0.1 [0.727]
Chg. In avg. tariff (t-1)	0.9** [0.432]	1.0*** [0.344]	-0.3 [0.645]	0.6 [0.536]
Argentina FE	4.2*** [0.009]	-0.2*** [0.012]	0.1*** [0.016]	0.4*** [0.044]
Brazil FE	6.2*** [0.054]	1.6*** [0.074]	2.1*** [0.050]	1.1*** [0.101]
Chile FE	3.4*** [0.039]	-0.7*** [0.038]	-1.2*** [0.038]	0.8*** [0.040]
Constant	-0.0* [0.019]	2.3*** [0.029]	0 [0.015]	2.2*** [0.020]
Observations	383	383	380	356
Num. of countries	4	4	4	4
R2 overall	0.08	0.07	0.08	0.09
R2 within	0.05	0.06	0.07	0.08
Chi2	1.34	45.31	3.00	3.30
Chi2 p value	0.72	0.00	0.39	0.35

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1