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The Great Depression in Colombia: A Stimulus to Industrialization, 1930-1953[1]

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Abstract

This paper analyzes the role of the Great Depression and protectionism in the Colombian industrialization of the early 1930s as well as the role of other determinants in the rapid industrialization that took place during the period 1934-1953. We conclude that the market pushed industrialization by reducing costs, generating economies of scale, learning by doing, giving place to agglomeration economies, and rapid technological change. This paper also examines the structure of the Colombian manufacturing sector in 1945, which was the result of the deep socio-economic transformations that took place in the previous decade. The results indicate that the industrialization process was uneven across regions, and that it was spatially concentrated. Estimations of a production function for industry in 1945 show that there were important differences in factor elasticities and productivities among sectors and regions, which led to different regional patterns of industrialization. In addition, the results indicate that labor productivity in 1945 was positively and significantly related to education and capital, whereas it was negatively related to the unskilled workers and the age of the firms.

Keywords: Industrialization, Great Collapse, market-led industry, Colombia.

JEL Codes Classifications: N1, N66, O14

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1 The authors are, respectively, economist, member of the Board of Directors and senior researcher at Banco de la República. The series Borradores de Economía is published by the Economic Studies Department at the Banco de la República (Central Bank of Colombia). The works published are provisional, and their authors are fully responsible for the opinions expressed in them, as well as for possible mistakes. The opinions expressed herein are those of the authors and do not necessarily reflect the views of Banco de la República or its Board of Directors. We thank Lizeth Molina for excellent research assistance. We are grateful for the comments and suggestions made by Jaime Bonet, Haroldo Calvo, Juan Esteban Carranza, Ana María Iregui and Enrique Lopez. Paper to be presented at the 17th *World Economic History Congress* in Kyoto, Japan, 3/7 August, 2015.

La Gran Depresión en Colombia: Un estímulo para la industrialización, 1930-1953

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Resumen

Este trabajo analiza el impacto de la Gran Depresión y del proteccionismo en el proceso de industrialización de Colombia a principios de la década de los treinta del siglo pasado, así como el impacto de otros determinantes en la rápida industrialización que tuvo lugar durante el periodo 1934-1953. Se concluye que el mercado impulsó la industrialización a través de la reducción de costos, generando economías de escala, aprendizaje mediante la experiencia, dando lugar a economías de aglomeración y a un rápido cambio tecnológico. Este trabajo también examina la estructura del sector manufacturero colombiano en 1945, que fue el resultado de las profundas transformaciones socio-económicas que tuvieron desde comienzos de la década de 1930. Los resultados indican que el proceso de industrialización fue desigual entre las regiones, y que estuvo espacialmente concentrado. Las estimaciones de una función de producción para la industria en 1945, muestran que se dieron importantes diferencias en las elasticidades factoriales y en la productividad entre sectores y regiones, lo que generó diferentes patrones de industrialización. Adicionalmente, los resultados indican que en 1945 la productividad laboral estaba positiva y significativamente relacionada con la educación y el capital, mientras que estaba relacionada negativamente con el porcentaje de trabajadores menos calificados y con la edad de las firmas.

Palabras claves: Industrialización, Gran Depresión, industrialización dirigida por el mercado, Colombia.

Código JEL: N1, N66, O14

I. Introduction

The growth of industry in Colombia was a slow and rather late process, compared to other Latin American countries such as Brazil and Mexico. During the nineteenth century, Colombian industry was very backward, mainly due to the lack of a transportation infrastructure and very low levels of total exports per capita. It was only in the 1930s when industrialization took off.

From 1930 to 1953, industrial production in Colombia grew at an average annual rate close to 6% per capita in constant pesos. This was one of the highest rates of industrial growth in this period among the largest economies of Latin America. It was a structural break with what had been the development of industry in Colombia before 1930. In the early 1930s, the devaluation of the peso in real terms, the Great Collapse in US exports, and the increase in protection from foreign trade were the main stimulus for industrial growth. All these variables changed negatively for the Colombian industry after 1934. However, in spite of these changes, Colombian industry continued to grow at unprecedented rates. Why did this happen?

The purpose of this article is twofold. First, we analyze the main factors that drove industrial development after 1930. In particular, we examine whether the industrialization process that occurred during this period was state or market-led. We conclude that it was the market that pushed industrialization by reducing production costs, generating economies of scale, learning by doing, giving place to agglomeration economies, and rapid technological change. Second, with the information collected from the first industrial census (which was carried out in 1945) we examine quantitatively the type of industry that resulted from the profound socio-economic transformations and external shocks that took place from 1930 to 1945. With this information we also estimate econometrically both a production function and the determinants of labor productivity for the Colombian industry, taking into account regional and sectoral differences. The analysis of this data is important because before the publication of the first industrial census there was no detailed or consistent information to enable an in-depth study of the behavior of the country's

manufacturing sector. Our results indicate that in that time the Colombian industry was highly concentrated in a few regions and sectors, with important differences in factor elasticities and productivities among both sectors and regions.

The paper is divided in three sections, in addition to this introduction. The second section discusses the main factors that determined the Colombian industrialization process during the period 1930-1953. Section three examines the structure of Colombian industry in 1945, and estimates econometrically both factor elasticities and productivities, and the determinants of labor productivity for the manufacturing sector. The last section concludes.

II. The Great Depression and Market-led Import Substitution in Colombia, 1930-1953

This section discusses the overall impact of the Great Depression on the Colombian economy and industry, with a particular emphasis on GDP growth, exports, flows of foreign investment and loans, as well as monetary and fiscal policies. Next, an analysis of the evolution of manufacturing, the sector which underwent the most profound economic transformation in this period, is presented. We emphasize the determinants of rapid industrialization during these years, within the context of the debate on whether this was a process generated by relative price changes or whether it was state-led. Finally, some of the general aspects discussed about industrial growth from 1930 to 1953 will be illustrated through examples and experiences drawn from the textile sector.

Colombia was one of the Latin American countries that were least affected by the Great Depression. In fact, in the period 1930-1953, the annual average growth of real GDP per capita was 1.6%, one of the highest in the region. From peak to trough real output only fell 2%, the smallest drop among a group 26 countries around the world, similar to the reduction experienced by India.[2] In fact, real GDP only fell in 1929, 1930, and 1931, for a total drop of 2%. However, beginning in 1932, its growth jumped to 6.6%, and thereafter continued to expand every year during the period under study (Meisel, 1990, p. 291).

[2] See Twomey. (1983), p. 223.

Why was the impact of the Great Depression on the growth rate of the Colombian economy so moderate and short lived? One of the main reasons was that Colombian coffee exports did relatively well during these years. Although coffee prices fell, the volume of bags of coffee exported grew at an annual average rate of 2.8% between 1930 and 1953. Thus, after 1933 the import capacity of Colombian exports was growing again (Graph 1). Also, the relative price change induced by the fall in the terms of trade stimulated a very quick process of import substituting industrialization, since the growth of the industrial sector had been negligible in the nineteenth century and very slow in the period 1905-1929.[3] For example, in 1927/1928, 80% of all textiles consumed in Colombia were imported (Wogart, 1978, p. 59). Thus, there was a large space for import substituting industrialization.

Graph 1
Import Capacity of Colombian Exports, 1925-1953*

Note: * Import Capacity is defined as terms of trade multiplied by export volume.
Source: CEPAL, El desarrollo económico en Colombia, Table 3.

Another reason why the Colombian economy was able to overcome the contraction generated by the Great Depression fairly successfully was that the peso was significantly devalued with respect to the US dollar. The nominal devaluation of the peso occurred in

[3] The total value of investment of the industrial firms established before 1900 represented only 15% of the value of investment of the industrial firms that existed in 1945. For details see Contraloría General de la República (1947), p. 20.

1933 and 1934, and, as a result, the real exchange rate increased by 22.5% and 25.9%, respectively (Meisel, 1990, p. 295). However, because of a higher deflation in Colombia than in the United States, there was also a real devaluation in 1930 and 1932, of 16.1% and 12.7%, respectively. As a result, the real exchange rate devalued by 69.2% from 1930 to 1934 (Meisel, 1990, p. 295). This significant relative price change stimulated a market-driven process of import substituting industrialization. The Great Collapse in production and exports of the United States, the country's main source of imported industrial goods, and increases in overall protection from foreign competition were additional stimulants for the Colombian industry in the early 1930s.[4]

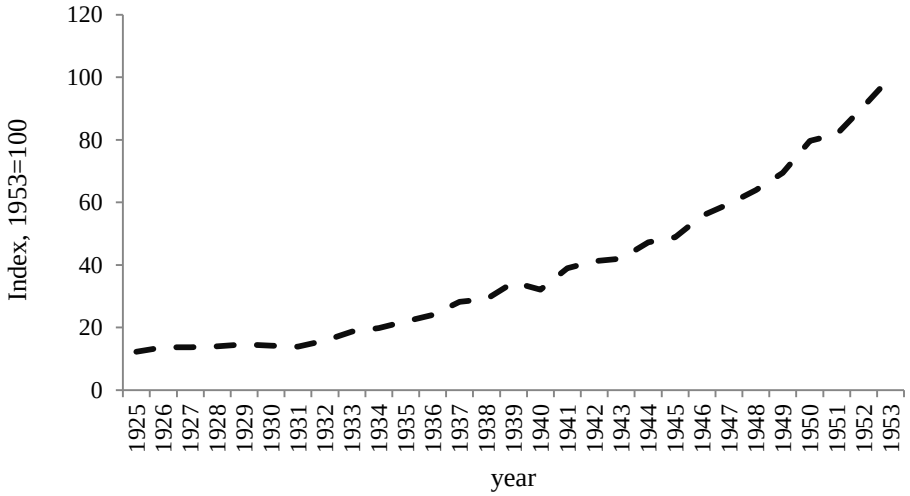
From 1930 to 1953, industrial production in Colombia grew at an average annual rate of 6% per capita in constant pesos. This was one of the highest rates of industrial growth in Latin America in this period.[5] It was a structural break from the industrial development in Colombia before 1930. For example, the average annual growth rate of industrial output from 1926 to 1929 was 1.1%. Graph 2 shows the important shift in the evolution of industry after 1930. As a result, the industrial sector increased its participation from 11% of GDP in 1925 to 21% in 1953, while the agricultural sector decreased from 59% of GDP in 1925 to 37% of GDP in 1953 (Graph 3).

[4] See O´Rourke (2009), p. 31. For the increase in tariffs and non-tariff barriers in the early 1930s, see Villar and Esguerra (2007), p. 112.
[5] From 1929 to 1945 Colombia had the highest growth rate of industrial production in Latin America. See Bertola and Ocampo (2012), p. 151.

Graph 2

Index of industrial production in Colombia in real terms per capita, 1925-1953

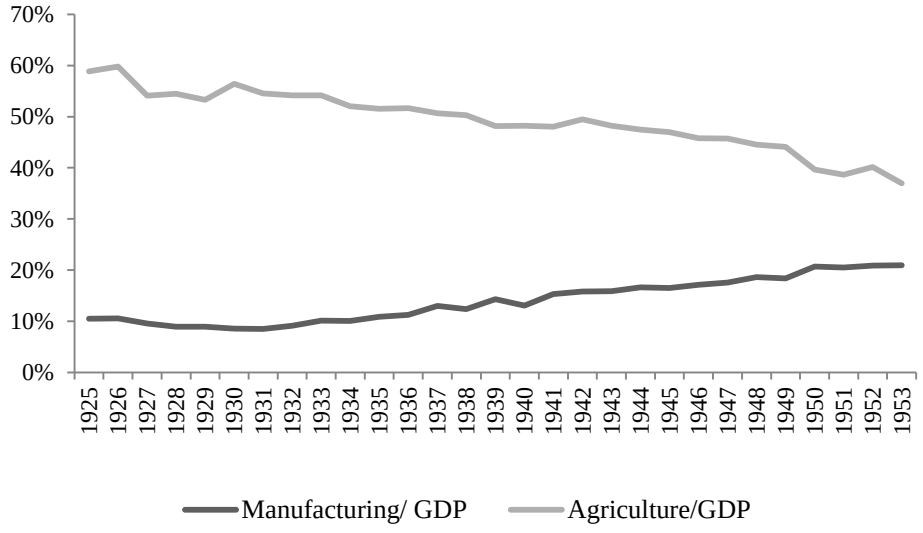
(Quantum index of industrial production)



Source: CEPAL, *El desarrollo económico en Colombia*, Table 131.

Graph 3

Share in GDP of the manufacturing and agricultural sectors



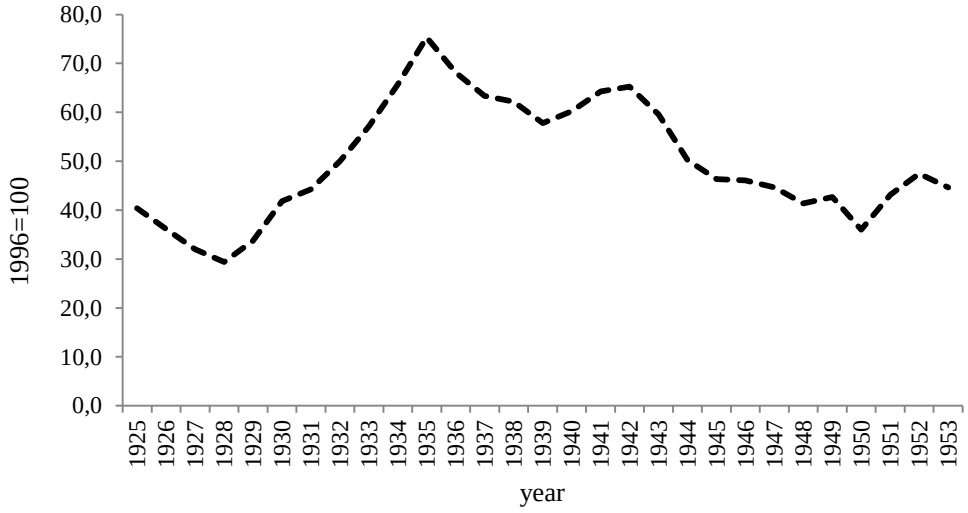
Source: CEPAL, *El desarrollo económico en Colombia*, Table 1.

As mentioned, in the early 1930s industrial growth in Colombia was stimulated by the devaluation of the peso in real terms from 1930 to 1934, plus the Great Collapse in US exports and the increase in protection from foreign competition. After 1934, all these

variables changed negatively for the Colombian industry. However, industrial growth continued unabated for the rest of the period under discussion. Why did this occur? Before answering this question it is important to show how after 1934 the real exchange rate of the Colombian peso with respect to the US dollar started to revalue, eliminating what had been the major stimulus for industrial growth in the period 1930-1934 (Graph 4).

Graph 4

Real Exchange Rate of the Colombian peso with respect to the US Dollar, 1925-1953



Source: GRECO (2002).

The two other sources of stimulus for industry in the early 1930s, the Great Collapse and protection from foreign competition, gradually reversed after the mid 30s.[6] Some authors, among them Ocampo (2000), have argued that the main stimulus after the mid-1930s was the state's active promotion of industry: "After 1934…a whole new series of interventionist policies were implemented...and direct promotion of new industries, among others (p.111)." Furthermore, in their economic history of Latin America, Bertola and Ocampo (2012) characterize the period 1930-1980 as one of state-led industrialization. In contrast, and referring to Colombia, the historian Palacios (2009) argues that: "…in this period of industrialization, 1930-1945, the role of the state was indirect and weak. With this we want

[6] Villar and Esguerra (2007), show that in the period 1934-1955 tariffs on imports had a diminishing trend (pp. 109- 112).

to say that in general it did not invest directly, neither did it orient its policies so that the country would industrialize as a priority, although there was an industrialist rhetoric... (p. 433)."[7]

The evidence suggests that, in the case of Colombia, from 1930 to 1953, there was no direct promotion of industrialization by the state. Instead the industrialization that took place during these years can better be described as market-led. Brando (2012) has argued that the tools often used by the state for the promotion of industry – trade policy, exchange rate, monetary and credit policies, and direct investment in the sector – had a limited application in Colombia.[8] Brando (2012) shows how "… the Colombian state did not provide financial aid, or implement deliberate trade-protectionist support, for industrialists to the degree hitherto argued (p. 3)." For the period 1930-1953 we agree with Brando, although after that date his argument is perhaps more controversial.

Brando (2012) analyzed in detail the sectorial distribution of credit in the period 1940-1967 and found no evidence that the industrial sector received a privileged treatment. Instead, the agrarian sector, especially coffee, was treated preferentially. Regarding trade policy, his argument is that in the 1930s and until the early 1960s protectionism was relatively marginal. Concerning the direct involvement of the state in the industrial sector, Brando argues that the Institute of Industrial Promotion (IFI, for its acronym in Spanish), the state agency created for that effect in 1940, was financially very weak. For example, in the period 1940-1967 its participation in industrial investment was never above 2.5% of the total (Brando, 2012, p. 196).

Finally, Brando (2012) states that the exchange rate was not an instrument of industrial promotion and that the "…prime determinant of Colombian exchange rate policy was the terms of trade variable (p. 144)." In his view, the overvaluation of the peso was low and the real exchange rate followed closely the terms of trade. Although we agree with Brando on this point, at least for the period 1935-1953, we think that what is relevant is not if the

[7] Original in Spanish. Translated by the authors.
[8] For details see Brando (2012).

real exchange rate was overvalued or not, but the trend that it followed. And, as can be observed in Graph 4, after 1935 the real exchange rate was revaluing, and thus was not a source of stimulus for industry.

The case of Colombia, where direct policies of the state did not favor the industrial sector after the Great Depression, perhaps differs from what happened in the rest of the larger Latin American economies. The reason for this apparent irregularity was probably the significant influence that the coffee sector had on economic policies, and especially in its defense of agrarian interests in macroeconomic policies, credit assignment, public investment, and foreign trade policies.[9]

That there was no state-led industrialization in the years 1935-1953, when the initial stimulus of the devaluation, the Great Collapse, and higher tariffs had dissipated, leads to the obvious question: Why was industrial growth so dynamic in this period? The evidence suggests that the positive shock of the early 1930s served as an inducement mechanism that broke the obstacles for industrial investment. Hirschman (1961) argued in his classic book, *The Strategy of Economic Development* (first published in 1958), that: "…development depends not so much on finding optimal combinations for given resources and factors of production as on calling forth and enlisting for development purposes resources and abilities that are hidden, scattered, or badly utilized (p. 5)." As a result of that initial stimulus for growth in industrial production, the most dynamic sectors, such as textiles, experienced the benefits of economies of scale, learning by doing, agglomeration economies, and incentives for technical change. We will illustrate these issues for the case of textiles, which was one of the fastest growing sectors. However, we will first discuss the important role of indirect state policies in providing a positive economic environment for industry, even if it did not directly promote it.

During the period 1930-1953 macroeconomic policies were fairly orthodox and stable, except for the devaluation that took place from 1933 to 1934, and the suspension of foreign debt payments in the early 1930s with its subsequent renegotiation in the 1940s.

[9] On the topic of the organization and influence of coffee growers see Palacios (2009), pp. 429-464.

Participation of the public sector in GDP did not increase in the period, remaining close to 6.5%. Additionally, the fiscal balance of the central government showed a surplus during half of the years of this time period, and when there was a deficit it never exceeded 1.7% of GDP. After the devaluation of 1933-1934, the Central Bank adhered to a fixed exchange rate; the average annual inflation rate for 1935-1953 was 8.7%.

What the state did do effectively in the period 1930-1953 was to invest in the improvement of infrastructure, especially roads and electricity generation, all of which must have aided in the development of the industrial sector. Beginning in 1931, the Colombian state changed its policy of investment in transportation, from mostly investing in railroads to favoring roads for motor vehicles. From 1931 to 1950, on average, 77% of total investment in roads and railroads went to the former. Consequently, the length of the road network increased from approximately 5,750 km in 1930 to 20,600 km in 1950. This helped in the creation of a national market, as shown by the convergence of prices among the main cities in this period (Ramirez, 2007, p. 395 and pp. 426-444).

One of the major successes of government policy in this period was the growth in infrastructure for the generation of electricity, mostly hydroelectric. Production of electricity grew at an annual average rate of 9.9% between 1935 and 1955 (Cepal, 1957, p. 122). Since hydroelectricity is cheaper than thermoelectricity, industry benefitted from cost reductions. In 1945, the industrial sector consumed 31.3% of all the electricity produced in the country.[10]

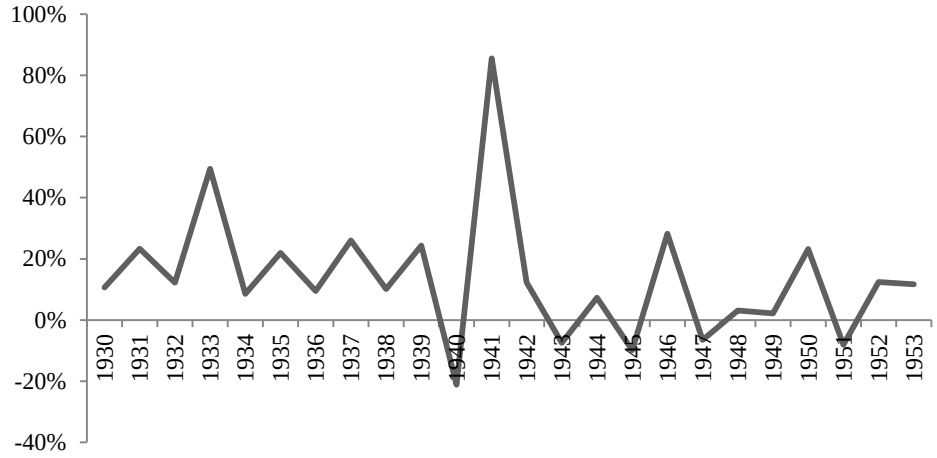
From 1930 to 1953, the manufacturing sectors that grew most rapidly were cement, beverages, shoes, leather, and textiles (Cepal, 1957). However, the most important one, because of its contribution to total industrial output, was that of textiles. This sector provided more than half of the increase in industrial value added during the 1930s and two thirds during World War II (Chu, 1972, p. 55). The average annual growth rate of its output in constant pesos from 1930 to 1953 was 10.6% (Graph 5). As a result, Colombian imports

[10] See Cepal (1957). For example, in that year textile manufacturing consumed 35.3% of the electricity demanded by the industry.

of textiles went from close to 30% of total imports in 1930 to around 8% in 1953 (Graph 6). This success was possible due to the rapid technological change in textile production in the 1930s. According to Echavarría (1999, p. 83) the main innovation was the substitution of mechanical looms by automatic looms. Their introduction allowed for a reduction in costs of as much as 80% in some products.[11] It also led to large economies of scale and the concentration of production in a few firms.

Graph 5

Annual Growth Rate of Textile Production in Colombia, 1930-1953

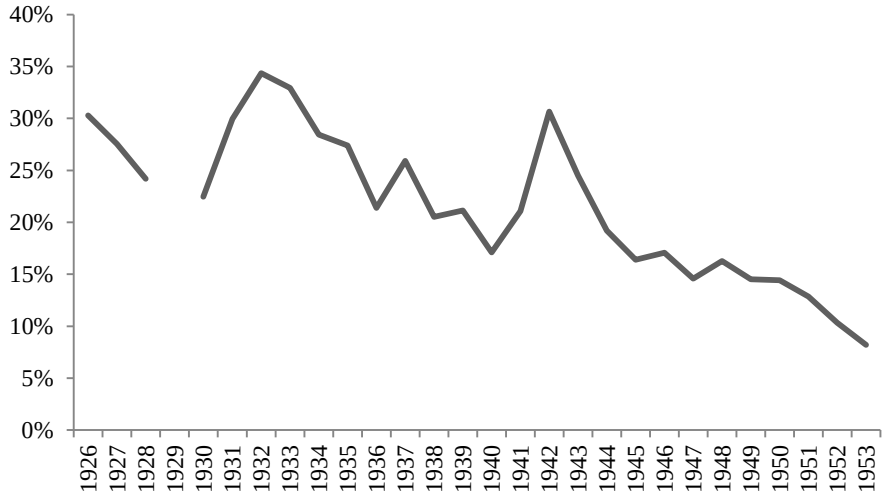


Source: CEPAL, *El desarrollo económico en Colombia* (1957), Table 131.

[11] Echavarría (1999), p. 85.

Graph 6

Participation of Imports of Textiles in Total Colombian Imports



Source: *Anuario de Comercio Exterior*, several years.

III. Colombian Industry in 1945

In this section, we examine quantitatively the type of industry that resulted from the socio-economic transformations and external shocks that occurred during the period under study. To this end, we analyze the data collected in the first industrial census of 1945. This census gathered detailed and consistent information about production, income, expenses, value added, capital, employment, including human capital of the workers, and financial data, among other aspects of the Colombian manufacturing sector.

In particular, we examine the composition and structure of industry by describing its main indicators by departments and sectors. We also estimate econometrically a production function for the industrial sector and the determinants of manufacturing labor productivity, taking into account regional and sectorial differences.

A. The Structure of Colombian Industry in 1945

By the mid-twentieth century, the industrial sector of Colombia was concentrated in a few regions and sectors. As shown in Map 1, by 1945 industrialization was very uneven across

regions. In fact, value added generated by industry was spatially concentrated in the departments of Antioquia, Cundinamarca, Atlántico, Valle del Cauca, and Caldas. This concentration generated higher wages in these regions. According to the *Primer Censo Industrial de Colombia*, in 1945 Antioquia and Cundinamarca had a larger proportion of workers (10%) that earned wages above $300. [12]

This concentration pattern was observed from the very beginning of the industrialization process. For example, Antioquia was home to 43% of Colombian industrial establishments in 1880. Furthermore, from 1901 to 1910 nearly 50% of the firms created in that period were located in three departments: Antioquia, Cundinamarca, and Santander; between 1941 and 1945, 58% of the establishments created were concentrated in Antioquia, Cundinamarca, Santander, and Valle del Cauca (*Primer Censo Industrial de Colombia*, 1945, Table A1, Appendix A). In 1953, the spatial concentration of industry was very similar to that of 1945, with Antioquia, Cundinamarca, Valle, Atlántico, and Caldas as the departments with the highest shares in industrial value added (Map 2).

The determinants for these regional patterns of industrialization of Colombia have been well studied by economic historians, especially for the case of Antioquia. For example, Brew (2000), Montenegro (2002), and Bejarano (2007) have argued that coffee expansion and gold production were essential factors for the accumulation of capital needed for industrial development in Antioquia. España and Sánchez (2010), on the other hand, state that a previous accumulation of human capital was the main factor explaining regional differences in the industrialization process. And Echavarría (1984) claims that it was the regional difference in investment in new technologies and technical changes that produced the regional differences.

We also consider that infrastructure developments played a major role in determining the spatial patterns of industrialization. In fact, by 1945, the departments of Antioquia, Cundinamarca, Santander, and Valle had the highest amount of kilometers in roads, which facilitated access to their domestic markets (Table 1).

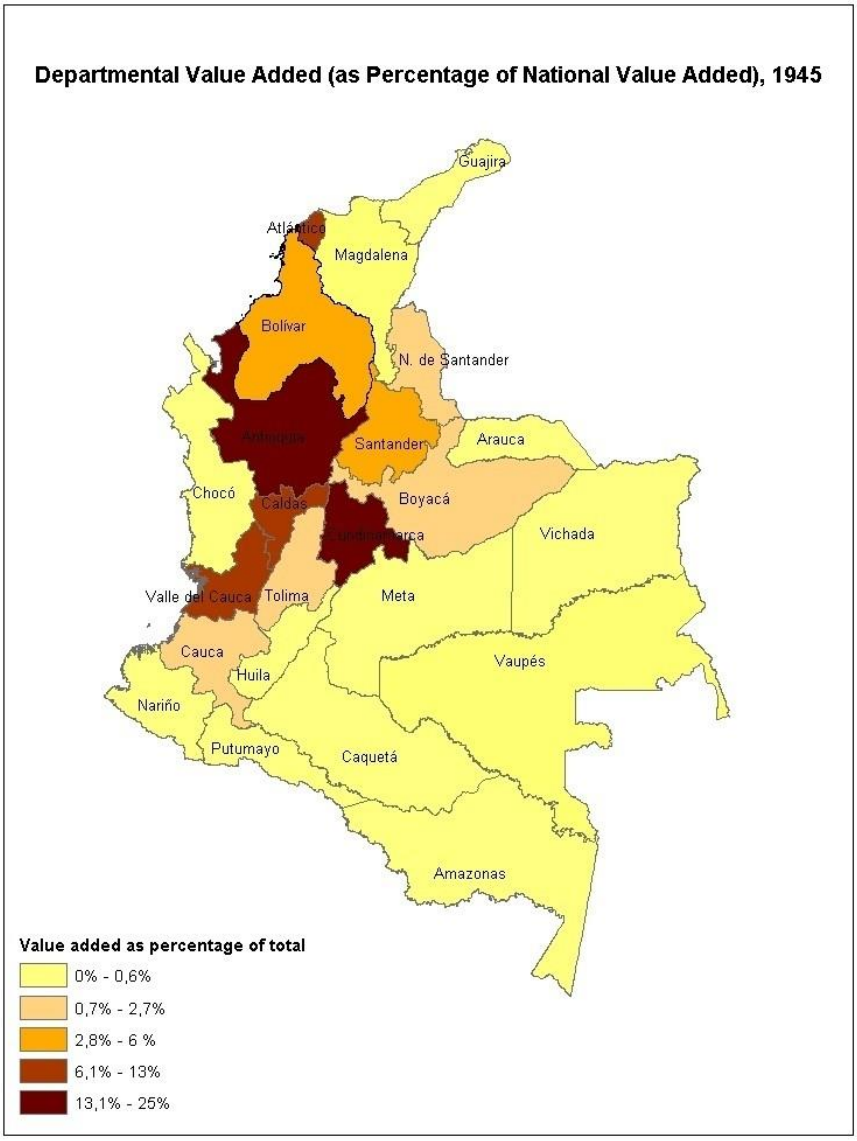
[12] Note that the average wage of industry in that year was close to $107.

Table 1
Length of roads by department in 1945
(Kilometers)

Department	Total (km)
Antioquia	2,008
Atlantico	393
Bolivar	882
Boyaca	1,408
Caldas	1,193
Cauca	851
Cundinamarca	2,831
Huila	1,000
Magdalena	1,127
Nariño	1,397
Norte de Santander	938
Santander	1,631
Tolima	766
Valle	1,462
Intendencias	613
Total	18,500

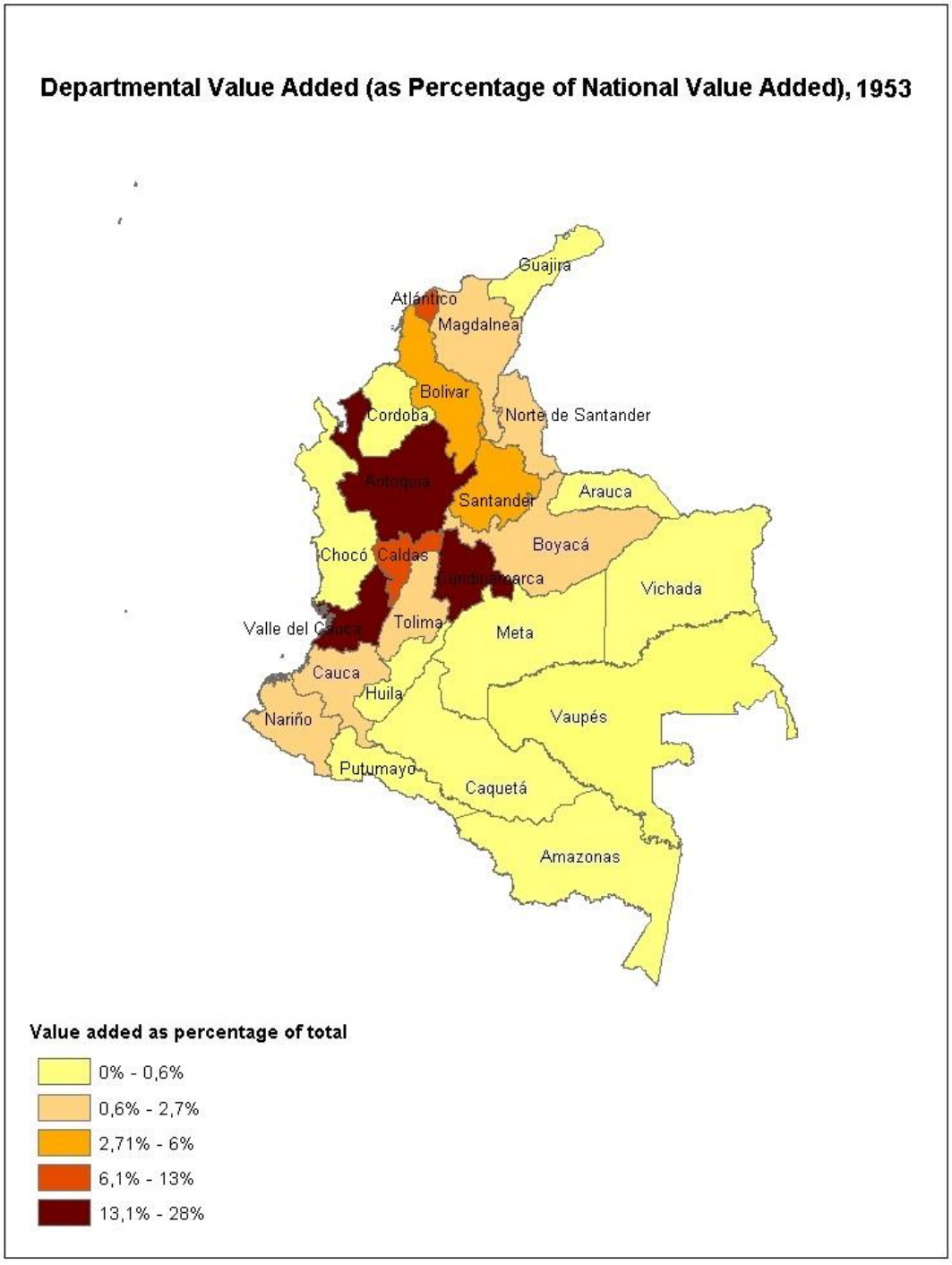
Source: Sociedad Colombiana de Ingenieros, *Anales de Ingeniería*, 1945.

Map 1
Departmental Industrial Value Added as percentage of National Industrial Value Added, 1945



Source: Elaborated using information from the *Primer Censo Industrial de Colombia*, 1945.

Map 2
Departmental Industrial Value Added as percentage of National Industrial Value Added , 1953



Source: Data from the *Anuario General de Estadística*, 1955.

The main characteristics of the Colombian industry in 1945 are presented in Tables 2 and 3.[13] Table 2 summarizes the key indicators by department. Cundinamarca, Antioquia, Atlántico, and Valle del Cauca not only employed a significant amount of labor, but also had the largest number of establishments and highest capital, equity, and energy purchased. Regarding human capital, on average, nearly 85% of the workers in manufacturing could read, indicating that industry demanded a relatively educated work force, in comparison to the total Colombian population in that period.[14] In particular, the departments with a higher proportion of literate workers were Cundinamarca and Antioquia, the departments with the highest level of industrialization. By 1945, on average, more than 85% of all raw materials in manufacturing were domestic. The departments located in the Caribbean Coast had the smallest percentage of domestic raw materials used in industry. Lastly, the coefficients of specialization, which measure regional manufacturing specialization, show that the regions with a higher coefficient (i.e. regions with sectors that have few firms or regions with few sectors) were less industrialized (e.g., Meta, Chocó and Caquetá).[15]

Table 3 presents a summary of the main statistics for major Colombian industries in 1945. The textile, food, beverage, and mineral sectors had the largest share of value added, energy purchased, capital, and equity. Conversely, rubber and plastic products, pulp, paper and its products, and oil for industrial use were the less dynamic sectors.[16] The largest share of employment was in textiles and food, followed by minerals and apparel. As to human capital, in all sectors most workers could read. In particular, the sectors with a higher percentage of literate workers were minerals, wood and its products, and tobacco and oil; the lowest percentage was found in food and rubber products.

[13] For a detailed description and analysis of the industrial census of 1945 and some industrial indicators for 1953, see Arango (1983).
[14] In 1940, the illiteracy rate in Colombia was 43%, and in 1950 was 38%.
[15] Table A2, Appendix A, shows some selected indicators of manufacturing for the main cities in 1945. Bogotá, Medellin, and Barranquilla were the most industrialized cities in the country, which coincides with the regional patterns. In addition, the data in Table A3, Appendix A, indicate that the regional distribution of industry in 1953 was very similar to that in 1945, with Antioquia, Cundinamarca, Valle, and Atlántico the most industrialized departments in the country.
[16] Table A4, Appendix A, shows selected indicators for manufacturing by sub-sectors in 1953. Beverages, food, and textiles remained the leading sectors.

Table 2

Selected Indicators of Manufacturing by Department, 1945

Departments, *Intendencias* and *Comisarias*	$(VA_D) / (VA_T)$ [1/]	$Employment_D / Employment_T$	$Establishment_D / Establishment_T$	Electric energy purchased	Capital	Equity	Unskilled workers per Skilled workers	Workers who could read	Domestic raw materials / Total materials	Male per Female workers	Coefficient of Specialization [2/]
	(%)	(%)	(%)	(%)	(%)	(%)	(times)	(%)	(%)	(times)	(Coeff.)
Cundinamarca	25.28	20.45	19.99	26.29	29.51	28.55	4.1	95.28	77.23	1.9	0.2621
Antioquia	25.19	25.59	16.41	30.30	24.56	28.90	7.3	94.85	70.39	1.5	0.2228
Atlantico	13.04	10.64	7.57	19.26	12.63	12.37	4.1	69.51	54.02	2.3	0.4100
Valle del Cauca	12.60	13.28	10.19	11.26	13.22	13.03	6.5	67.90	79.66	2.9	0.2989
Caldas	6.00	6.40	7.90	4.73	3.41	3.18	5.8	89.50	91.45	1.2	0.2436
Santander	5.29	7.38	10.09	1.31	5.40	4.39	7.7	71.64	91.16	0.8	0.4075
Bolivar	3.29	4.17	4.41	1.75	3.77	3.32	6.1	86.06	76.83	2.0	0.1935
Tolima	2.70	2.64	4.08	2.20	2.35	1.89	6.5	85.08	94.84	1.6	0.3287
Boyacá	2.19	3.44	8.45	0.45	0.82	0.76	16.4	88.74	90.92	1.4	0.4933
Norte Santander	1.12	1.62	3.20	0.21	0.92	0.80	9.9	92.09	88.45	1.6	0.2439
Cauca	1.08	1.30	2.01	0.29	1.74	1.42	6.8	91.49	90.26	6.0	0.3361
Magdalena	0.92	0.92	1.69	0.68	0.39	0.31	4.5	80.51	81.96	8.6	0.4649
Nariño	0.67	1.34	2.23	0.54	0.72	0.59	6.4	81.94	91.12	3.0	0.4513
Huila	0.35	0.58	1.03	0.50	0.37	0.31	7.7	87.62	94.70	1.6	0.1733
Intendencia Meta	0.18	0.12	0.36	0.22	0.12	0.10	3.4	76.92	98.53	24.2	0.7058
Intendencia Chocó	0.06	0.07	0.18	0.01	0.06	0.05	2.5	88.89	95.49	12.0	0.6159
Comisaria Caqueta	0.05	0.07	0.20	0.00	0.04	0.03	14.3	81.40	97.95	9.8	0.5148
Sum	100	100	100	100	100	100					

[1/] VA_D: departmental industrial Value Added, VA_T: Total industrial Value Added; $Employment_D$: number of unskilled plus skilled workers in a department, $Employment_T$: number of total unskilled plus skilled workers. $Establishment_D$: number of establishments in a department, $Establishment_T$: number of total establishments.

[2/] Measures the regional specialization and shows the degree of similarity of the regional industrial structure. The index varies between 0 and 1, when it gets close to 1 indicates greater specialization.

Source: *Primer Censo Industrial de Colombia*, 1945.

Table 3

Selected Indicators of Manufacturing by Sub-sectors in 1945

Sub-Sectors	$(VA_S) / (VA_T)$ [1/]	$Employment_S / Employment_T$	$Establishment_S / Establishment_T$	Electric energy purchased	Capital	Equity	Unskilled per Skilled workers	Workers who can read	Domestic raw materials / Total mat.	Coefficient of concentration [2/]
	(%)	(%)	(%)	(%)	(%)	(%)	(times)	(%)	(%)	(coeff.)
Textiles	20.03	21.22	4.29	37.06	19.93	23.23	10.77	88.89	40.02	0.4274
Food	17.17	20.31	25.70	20.76	20.51	19.05	7.82	76.37	92.57	0.2346
Beverages	12.45	6.93	5.38	8.37	18.42	18.04	4.09	93.21	75.37	0.2603
Nonmetallic minerals	9.13	8.27	7.08	9.69	9.00	8.75	10.70	100.00	67.91	0.2244
Metallurgy, machinery, metals	6.89	6.26	6.96	6.28	6.97	6.26	7.73	94.84	8.16	0.2544
Leather	5.52	6.59	11.70	2.97	3.10	3.37	10.70	83.57	83.27	0.1732
Publishing and printing	5.37	3.83	3.76	3.39	2.95	2.63	0.05	93.26	2.89	0.2291
Apparel	5.17	7.13	12.27	2.17	3.89	3.46	8.89	90.56	74.85	0.1739
Wood and its products	5.10	6.15	10.46	3.19	2.65	2.32	9.24	98.94	89.76	0.1172
Chemicals	4.53	4.02	4.84	2.81	5.09	4.90	2.78	91.69	43.27	0.1947
Tobacco	3.64	5.64	3.73	0.52	2.22	3.27	16.45	97.27	78.57	0.3824
Derivatives of mineral fuels	1.65	0.84	0.03	0.00	3.02	2.37	1.08	83.42	97.31	0.8958
Precision instruments and processing of precious metals	1.33	1.02	2.06	0.47	0.65	0.64	4.58	88.96	97.90	0.2231
Rubber and plastic products	1.16	0.72	0.54	1.35	0.55	0.77	4.96	78.95	76.10	0.3706
Pulp, paper and its products	0.45	0.44	0.48	0.47	0.49	0.47	8.28	94.27	6.43	0.3426
Other manufacturing	0.42	0.62	0.69	0.52	0.58	0.47	5.09	96.69	34.22	0.2681
Oils for industrial uses	0.01	0.01	0.03	0.00	0.01	0.01	4.50	96.27	48.07	0.6213
Sum	100	100	100	100	100	100				

[1/] VA_S: sector Value Added, VA_T: Total industrial Value Added; $Employment_s$: number of unskilled plus skilled workers in a sector, $Employment_T$: number of total unskilled plus skilled workers. $Establishment_s$: number of establishments in a sector, $Establishment_T$: number of total establishments. [2/] Measures sector concentration, when it is close to one it indicates a greater concentration.

Source: *Primer Censo Industrial de Colombia*, 1945.

As expected, the sectors with a higher percentage of imported raw materials were publishing and printing, pulp, paper and its products, metallurgy, manufacturing of machinery, and basic metals. These sectors imported raw materials which were not available in the country. On the contrary, food, wood, minerals and precision instruments and processing of precious metals used mostly local raw materials.

In general, manufacturing sub-sectors were also spatially concentrated (Table 4). For example, 57% of value added in the textile industry came from Antioquia.[17] Cundinamarca had 39% of the value added in beverages, 43% in nonmetallic minerals, and 44% in publishing and printing. Also 64% of value added in oils for industrial uses was produced in Valle, and 70% of value added in metallurgy, machinery and basic metals was produced in Antioquia, Cundinamarca, and Atlántico.

Lastly, important differences in labor and capital productivity among sectors are also observed (Table 5). Average labor productivity (VA/L) was larger for derivatives of mineral fuels, beverages, rubber and plastic products, publishing and printing, and minerals and metallurgy. On the contrary, tobacco, other manufacturing and apparel, had the lowest average labor productivity. In the case of average capital productivity (VA/K), it was larger for rubber and plastic products, wood and its products, publishing and printing, and leather, and lower for derivatives of mineral fuels, beverages, and food.

[17] The process of industrialization in Antioquia and the boom of the textile sector has been studied in detail by Montenegro (1982), Montenegro and Ocampo (1984), Echavarría (1999), and Villamizar and Echavarría (2007).

Table 4
Percentage of Valued Added by the Industrial Sector in the Departments, 1945

	Cundin.	Antioq.	Atlant.	Valle	Caldas	Santd.	Bolvr	Tolima	Boyc.	N. Sant.	Cauca	Magd.	Nariño	Total
Textiles	10.12	56.72	18.21	7.01	3.04	1.97	0.08	0.10	1.61	0.17	0.13	0.08	0.76	100
Food	22.98	10.86	8.60	19.44	10.52	2.97	8.59	6.81	2.49	1.56	2.26	0.89	0.73	100
Beverages	39.31	9.19	10.27	7.34	8.07	1.63	1.85	6.14	6.17	2.36	2.95	3.75	0.42	100
Nonmetallic minerals	43.39	27.51	2.90	12.77	3.32	4.94	1.00	0.77	0.88	0.91	0.79	0.38	0.12	100
Metallurgy, machinery, metals	20.05	25.52	25.07	13.92	4.84	1.53	2.66	3.62	1.06	0.50	0.13	0.16	0.22	100
Leather	22.03	24.71	15.06	11.53	9.11	5.24	1.14	1.52	3.74	2.97	0.48	0.26	0.90	100
Publishing, printing	43.87	22.23	9.55	11.15	4.50	2.06	2.63	0.68	0.50	0.73	0.55	0.63	0.42	100
Apparel	26.58	21.48	14.42	12.05	9.86	3.17	3.16	1.48	2.30	2.00	1.16	0.50	1.23	100
Wood, its products	24.15	17.21	20.83	12.31	7.16	2.85	3.91	1.18	2.52	1.01	0.84	2.85	1.68	100
Chemicals	31.33	13.85	20.86	16.38	5.42	1.46	6.85	1.04	0.53	0.49	0.82	0.33	0.39	100
Tobacco	13.71	21.15	6.13	15.60	0.00	29.83	8.10	2.39	0.05	0.48	0.28	0.00	1.38	100
Derivatives of mineral fuels	0.41	0.00	0.00	0.00	0.00	99.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Precision instruments, precious metals	32.95	28.95	4.25	10.58	4.52	5.56	8.45	2.39	0.19	0.18	0.85	0.00	0.35	100
Rubber, plastic products	24.91	10.93	4.19	56.67	0.70	1.48	0.16	0.25	0.00	0.71	0.00	0.00	0.00	100
Pulp, paper, its products	35.11	2.88	22.52	35.09	2.68	0.79	0.94	0.00	0.00	0.00	0.00	0.00	0.00	100
Other manufacturing	18.57	17.81	31.09	17.43	0.28	6.73	0.00	1.12	2.35	0.00	0.00	0.00	4.63	100
Oils for industrial uses	35.54	0.00	0.00	64.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100

Source: *Primer Censo Industrial de Colombia*, 1945.

Table 5
Average Labor and Capital Productivity by Sub-sectors in 1945[1/]
(Index, total sectors=100)

	VA/L	VA/K
Textiles	94.40	100.52
Food	84.57	83.73
Beverages	179.51	67.57
Nonmetallic minerals	110.34	101.49
Metallurgy, manufacture of machinery, basic metals	110.03	98.95
Leather	83.75	178.15
Publishing and printing	141.07	183.40
Apparel	72.49	132.73
Wood and its products	82.98	192.73
Chemicals	112.58	88.90
Tobacco	64.40	163.76
Derivatives of mineral fuels	196.33	54.81
Precision instruments and processing of precious metals	130.36	206.30
Rubber and plastic products	159.95	211.55
Pulp, paper and its products	93.60	84.50
Other manufacturing	67.85	72.21
Total sectors	100.00	100.00

[1/] VA: Valued Added; L: labor force; K: capital
Source: *Primer Censo Industrial de Colombia*, 1945.

B. Determinants of Labor Productivity in 1945: an Econometric Exercise

i) Factor Elasticities for the Manufacturing Sector

In this section we estimate a production function for the Colombian manufacturing industry to calculate both factor elasticity and productivity indices, taking into account the regional and sectorial differences that prevailed in 1945. To this end, we also use the information from the First Industrial Census of Colombia carried out that year.[18] As described in the previous section, there are significant regional and sectorial differences that should be taken into account in the analysis.

[18] See Appendix B for a description of the variables used in the estimation.

We first estimate factor elasticities and factor productivities by manufacturing sub-sectors. For our calculations we follow Iregui *et al.* (2007), who estimated total factor productivities and factor elasticities for the Colombian manufacturing industry by metropolitan area and industrial sector for the period 1975-2000. We estimate a Cobb-Douglas production function with constant returns to scale (restricted model), including information for 17 territorial units and 17 sectors for the year 1945.[19] In a second exercise we remove the assumption of constant returns to scale (unrestricted model).

Specifically, we start with the following equation:

$$Y_{ij} = A_{ij} K_{ij}^{\alpha} L_{ij}^{1-\alpha} \qquad (1)$$

Where *Y* is value added, *K* is capital[20], *L* is the labor force, *A* is productivity (TFP), α is a positive parameter, and *i* and *j* indicate territorial units and manufacturing sectors, respectively. Taking logs from (1) we have the equation to be estimated:

$$lnY_{ij} = lnA_{ij} + \alpha lnK_{ij} + (1-\alpha) lnL_{ij} \qquad (2)$$

Initially, we estimate equation (2) for the complete sample (pooling the information from the 17 sectors and 17 territorial units). Table 6 shows the results for both the restricted model, which assumes constant returns to scale, and the unrestricted one, which removes this assumption. The results indicate that both labor and capital elasticities are very similar in the two models; consequently, the assumption of constant returns of scale is supported

[19] The territorial units included in the estimation are: Cundinamarca, Antioquia, Atlántico, Valle del Cauca, Caldas, Santander, Bolívar, Tolima, Boyacá, Norte Santander, Cauca, Magdalena, Nariño, Huila, *Intendencia* of Meta, *Intendencia* of Chocó, and *Comisaría* of Caquetá. The sectors are: Textiles, Food, Beverages, Minerals in Metallurgy, Metallurgy, Manufacture of Machinery, Basic Metals, Leather, Publishing and Printing, Apparel, Wood and its products, Chemicals, Tobacco, Derivatives of mineral fuels, Precision instruments and processing of precious metals, Rubber and plastic products, Pulp, paper and its products, Other manufacturing, and Oils for industrial uses.

[20] Corresponding to the capital that firms reported in the 1945 Census. Another good proxy for capital stock for that year is the firms' fixed assets (Pombo and Cortes, 1991). The estimation results using fixed assets are very similar to the results when capital reported by the firm is used. These results are not reported here but are available upon request. Given that information for industry before the industrial census of 1945, is very scarce, it is very difficult to construct a series of capital stock for the first half of the twentieth century. Pombo and Cortes (1991) calculated the capital stock for total industry for the period 1955-1988 using the methodology of the perpetual inventory.

by the data. In particular, labor elasticity (E_l) is equal to 0.784 in the unrestricted model, and 0.699 in the restricted one; and capital elasticities (E_k) are 0.271 and 0.301, respectively. Our estimations show that industry in 1945 was highly labor-intensive. These results are similar to those of Sanchez *et al.* (1996), who estimated an elasticity of labor of 0.63 and capital of 0.37, which is then used in the determination of the contribution to growth of production factors in the Colombian industrial sector during the period 1950-1994. In addition, Eslava *et al.* (2004) estimated a labor elasticity of 0.74 and a capital elasticity of 0.32, for the manufacturing industry during the period 1982-1998. Our results for labor elasticity are lower and for capital elasticity are higher than those found in Iregui *et al*. (2007), who estimated a labor elasticity of 0.85 and a capital elasticity of 0.15 for Colombian manufacturing in the period 1975-2000.[21]

Table 6
Labor and Capital Elasticities for Industry, 1945

Variables	Unrestricted Model (elasticity)	Restricted Model (elasticity)
Labor (E_l)	0.784***	0.699***
	(0.057)	(0.041)
Capital (E_k)	0.271***	0.301***
	(0.044)	(0.041)
Dummy_Sectors	YES	YES
Observations	210	210
R-squared	0.947	

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations.

Table 7 shows factor elasticities by industrial sector.[22] As observed, there are important differences among them. The elasticity of labor varies between 0.470 in metallurgy, machinery and basic metals, and 0.887 in the apparel sector, and 0.886 in beverages. In all cases, labor elasticities are larger than capital elasticities, except for metallurgy, machinery and basic metals, indicating that in this sector the marginal productivity of capital is higher than that of labor. If we remove the assumption of constant returns to scale, we obtain

[21] Interestingly, in general, factor elasticities calculated using the 1945 Industrial Census are quite similar to those estimated using surveys for later periods. The study of the evolution of these elasticities is beyond the scope of this paper, and will be subject of further research.
[22] Factor elasticities per sectors are only calculated for those sectors having complete data.

similar results (Table 8). Increasing returns to scale are present in beverages, leather, minerals, and chemicals; the other sectors show constant returns to scale.

Heterogeneity is also important to determine factor elasticities by territorial units.[23] As shown in Table 9, both labor and capital elasticities differ significantly among departments.[24] The more labor-intensive departments were Atlántico, Bolivar, and Cundinamarca, while the less labor-intensive were Antioquia, Caldas, and Tolima. Interestingly, factor elasticities for Antioquia (E_L =0.72; E_K = 0.28) and Bolivar (E_L =0.82; E_K =0.18) are almost the same as those estimated by Iregui *et al*. (2007) for Medellin (E_L = 0.72; E_K =0.28) and Cartagena (E_L = 0.81; E_K = 0.19) for the period 1975-2000.

[23] Table C1, Appendix C, shows the results for the unrestricted model.
[24] In the case of Valle del Cauca, contrary to our expectations, we obtain a negative elasticity of capital, for which we cannot provide an economic explanation.

Table 7
Labor and Capital Elasticities by Industrial Sub-sectors, 1945
(Restricted model - constant returns to scale)

Variables	Food	Publishing and printing	Beverages	Leather	Wood and its products	Metallurgy, machinery, basic metals	Nonmetallic minerals	Chemicals, pharmaceuticals	Textiles and Apparel
Labor (E_l)	0.568***	0.604*	0.886***	0.597***	0.748***	0.470***	0.697***	0.687***	0.624***
	(0.087)	(0.330)	(0.118)	(0.090)	(0.134)	(0.104)	(0.089)	(0.090)	(0.152)
Capital (E_k)	0.432***	0.396	0.114	0.403***	0.252*	0.530***	0.303***	0.313***	0.376**
	(0.087)	(0.330)	(0.118)	(0.090)	(0.134)	(0.104)	(0.089)	(0.090)	(0.152)
Observations	16	16	17	15	17	15	16	15	29
R-squared	0.964	0.963	0.955	0.989	0.956	0.992	0.974	0.988	0.962

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations.

Table 8
Labor and Capital Elasticities by Industrial Sub-sectors, 1945
(Un-restricted model)

Variables	Food	Publishing and printing	Beverages	Leather	Wood and its products	Metallurgy, machinery, basic metals	Nonmetallic minerals	Chemicals, pharmaceuticals	Textiles and Apparel
Labor (E_l)	0.488** (0.209)	0.891** (0.361)	1.020*** (0.115)	0.815*** (0.102)	0.661*** (0.159)	0.463*** (0.149)	0.896*** (0.183)	0.929*** (0.104)	0.591*** (0.153)
Capital (E_k)	0.471*** (0.141)	0.167 (0.347)	0.159 (0.099)	0.308*** (0.088)	0.280* (0.139)	0.534*** (0.130)	0.208* (0.107)	0.179* (0.082)	0.384* (0.146)
Returns	constant	constant	increasing	increasing	constant	constant	increasing	increasing	constant
Observations	16	16	17	15	17	15	16	15	29
R-squared	0.964	0.963	0.955	0.989	0.956	0.992	0.974	0.988	0.962

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations.

From the estimation of equation 2, which includes fixed effects by sectors, we also calculate the productivity parameters by manufacturing subsectors. To obtain the productivity parameters by sectors, we calculate the antilogarithms of the fixed effects coefficients, which result from the estimation of equation 1. For details of this methodology, see Iregui et al (2007, p.39).

Table 10 shows that the most productive sectors were precision instruments and processing of precious metals, beverages, rubber and plastic products; in contrast, the least productive sectors were textiles, apparel, and food. These results are similar to those by Iregui *et al* (2007) for the period 1975-2000, who found that the most productive sector was beverages and the least productive were apparel and textiles.

In sum, the results show that there were important differences in factor elasticities and productivities for both sectors and regions, which led to different regional patterns of industrialization.

Table 9
Labor and Capital Elasticities by Departments, 1945
(Restricted model - constant returns to scale)

Variables	Antioquia	Atlántico	Bolivar	Caldas	Cundinamarca	Santander	Tolima	Valle del Cauca
Labor (E_l)	0.718*** (0.126)	0.986*** (0.121)	0.818*** (0.114)	0.571*** (0.114)	0.861*** (0.131)	0.775*** (0.105)	0.627*** (0.080)	1.007*** (0.046)
Capital (E_k)	0.282** (0.126)	0.014 (0.120)	0.182 (0.114)	0.429*** (0.114)	0.139 (0.131)	0.225* (0.104)	0.373*** (0.080)	-0.007 (0.046)
Observations	16	15	14	14	17	16	14	16
R-squared	0.954	0.959	0.980	0.971	0.978	0.954	0.933	0.952

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations.

Table 10

Productivity Index by Industrial Sectors, 1945
(Index, average sectors =100)

Sector	Productivity Index
Textiles	77.09
Food	85.71
Beverages	122.48
Nonmetallic minerals	93.50
Metallurgy, machinery, basic metals	99.47
Leather	92.38
Publishing and printing	105.63
Apparel	85.11
Wood and its products	104.26
Chemicals	89.21
Tobacco	98.98
Precision instruments and processing of precious metals	140.32
Rubber and plastic products	105.84

Source: Authors' calculations based on the estimation of equation 1.

ii) Determinants of Labor Productivity in 1945

In order to determine the main factors that affected manufacturing labor productivity, we estimate the determinants of labor productivity for Colombian manufacturing in 1945. To carry out the empirical analysis we pooled the information from the 17 territorial units and 17 manufacturing sectors included in the Census. This allows us to have 289 possible observations. However, for some variables there are missing values, so we ended with 199 observations.

Specifically, we estimate the following equation[25]:

$$ln\left(\frac{VA}{L}\right)_{ij} = \alpha_0 + \alpha_1 ln\left(\frac{K}{L}\right)_{ij} + \alpha_2 X_{ij} + e_i \qquad (3)$$

[25] This is an extension of equation (1).

Where *VA*, *L*, and *K* were defined above; *X* is a set of control variables that could affect labor productivity, such as worker education (number of workers that could read / total workers) as a proxy of human capital; the share of domestic raw materials in total raw materials (in order to capture some of the effects of import substitution), the share of unskilled workers to type of employment, and the average age of firms. We also included fixed effects per sectors.

The results of Table 11 show that there is a positive and significant relationship between education and labor productivity, indicating that better educated workers had higher productivity. Similarly, the elasticity of capital is positive and significant as shown in the previous section. On the contrary, the share of unskilled workers and the average firms' age by sector has a negative and significant relationship with labor productivity. In the first case, the results suggest that sectors with more unskilled workers will tend to have lower labor productivity. In the second case, labor productivity is lower for older firms, suggesting that the industry that emerged after the Great Depression was more productive. Finally, the coefficient of the share of domestic raw materials in total raw materials is not significant in the determination of labor productivity.

Table 11

Determinants of Labor Productivity (VA/L) of the Industrial Sector in 1945

	Coefficients / (standard errors)	Coefficients / (standard errors)	Coefficients / (standard errors)
Ln (capital/L)	0.253***	0.252***	0.286***
	(0.047)	(0.047)	(0.046)
Education	0.007**	0.006**	0.008***
	(0.003)	(0.003)	(0.003)
Share of domestic raw material	0.001	0.001	-0.0001
	(0.001)	(0.001)	(0.001)
Share of unskilled workers	-0.007***	-0.007***	
	(0.002)	(0.002)	
Average age of firms		-0.054*	-0.056*
		(0.030)	(0.030)
Constant	4.857***	4.857***	4.479***
	(0.507)	(0.507)	(0.539)
Dummy_Sectors	YES	YES	YES
Observations	199	199	199
R-squared	0.363	0.452	0.339

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations.

IV. Conclusions

In this paper we first analyzed the overall impact of the Great Depression on the Colombian economy, in particular its role in the country´s industrialization. We also examined other determinants of rapid industrialization during the period 1930-1953, namely state-led (e.g. protectionism, and provision of public goods) and market led (economies of scale, learning by doing, agglomeration economies, incentives to technical change).We conclude that the market induced industrialization by reducing costs, generating economies of scale, learning by doing, and by rapid technological change.

We also examine the structure of Colombian manufacturing in 1945, which emerged as a result of the profound socio-economic transformations of the previous decade. The industrialization process was uneven across regions. It was spatially concentrated, mainly clustered in the departments of Antioquia, Cundinamarca, Atlántico, Valle del Cauca and Caldas. Similarly, industrial value added was concentrated in a few sectors: textiles, food, beverage and minerals. In addition, manufacturing sub-sectors were also highly spatially concentrated.

The production function estimated for the industrial sector, shows that in 1945 there were important differences in factor elasticities and productivities for both subsectors and among regions. The results show that the industrial sector as a whole was highly labor-intensive. In addition, the estimations indicate that labor productivity was positively and significantly related to education and capital, whereas it was negatively related to the share of unskilled workers and the age of firms.

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Appendix A

Table A1

Number of Firms Established by Period

Departments	up to 1880	1881 to 1900	1901 to 1910	1911 to 1920	1921 to 1930	1931 to 1940	1941 to 1945
Antioquia	15	24	32	94	191	501	430
Atlantico		4	10	30	83	235	228
Bolivar	3	5	13	21	47	128	128
Boyaca	2	13	16	31	92	244	261
Caldas		1	11	31	96	272	205
Cauca	3	1	10	10	16	57	61
Cundinamarca	6	22	30	102	231	579	590
Huila		1	2	5	5	39	29
Magdalena		3	4	4	19	61	42
Nariño			3	11	26	87	47
Norte Santander	3	5	6	12	40	98	86
Santander	1	7	19	53	132	268	315
Tolima			6	13	55	122	117
Valle del Cauca	2	5	8	32	116	308	320
Intendencia Chocó			1	0	3	7	3
Intendencia Meta			0	3	0	15	10
Comisaria Caqueta			0	2	1	5	8
Total	35	91	171	454	1,153	3,026	2,880

Source: *Primer Censo Industrial de Colombia*, 1945.

Table A2

Selected indicators of Industry by Main Cities in 1945

Cities	$Employment_C$/ $Employment_T$ (%)	$Establishment_C$ / $Establishment_T$ (%)	Capital (%)	Equity (%)	Unskilled per Skilled workers (times)
Medellín	17.30	10.05	18.62	22.02	6.73
Barranquilla	10.54	7.39	12.60	12.35	5.05
Cartagena	2.12	1.73	1.64	1.55	5.15
Bogotá	15.68	13.50	23.92	22.90	4.57
Santa Marta	0.41	0.60	0.19	0.15	4.52
Bucaramanga	3.36	3.59	0.98	0.87	10.28
Cali	7.10	4.92	6.37	6.12	5.85
Total	100	100	100	100	

Note: $Employment_C$: number of unskilled plus skilled workers in a city, $Employment_T$: number of total unskilled plus skilled workers. $Establishment_C$: number of establishments in a city, $Establishment_T$: number of total establishments
Source: Primer Censo Industrial de Colombia, 1945.

Table A3

Selected Indicators of Industry by Departments in 1953

Departments	$(VA_D) / (VA_T)$[1/] (%)	$Employment_D / Employment_T$ (%)	$Establishment_D / Establishment_T$ (%)	Electric energy purchased (%)
Antioquia	25.67	23.74	15.82	26.15
Cundinamarca	24.82	24.04	23.30	24.55
Valle del Cauca	17.17	17.44	13.40	17.96
Atlántico	8.55	9.21	6.85	11.22
Caldas	7.14	6.09	7.86	5.06
Santander	4.65	6.26	9.05	3.27
Bolívar	2.84	3.03	3.59	2.76
Tolima	2.45	2.60	4.42	2.31
Norte de Santander	1.52	1.73	3.82	1.10
Boyacá	1.20	1.68	3.82	1.14
Nariño	1.02	1.39	2.54	1.22
Magdalena	0.89	0.70	1.42	0.74
Cauca	0.77	0.78	1.15	0.81
Huila	0.58	0.51	1.19	0.46
Meta	0.36	0.20	0.48	0.59
Córdoba	0.27	0.41	0.92	0.43
Caquetá	0.05	0.06	0.15	0.11
Chocó	0.02	0.07	0.07	0.10
San Andrés	0.02	0.03	0.08	0.00
Amazonas	0.01	0.03	0.06	0.02
Total	100	100	100	100

[1/] VA_D: departmental industrial Value Added, VA_T: Total industrial Value Added; $Employment_D$: number of unskilled plus skilled workers in a department, $Employment_T$: number of total unskilled plus skilled workers. $Establishment_D$: number of establishments in a department, $Establishment_T$: number of total establishments
Source: *Anuario General de Estadística*, 1955.

Table A4

Selected Indicators of Industry by Sub-sectors in 1953

Sub-sectors	$(VA_S) / (VA_T)$[1/] (%)	$Employment_S / Employment_T$ (%)	$Establishment_S / Establishment_T$ (%)	Electric energy purchased (%)
Beverages	22.71	5.54	2.19	8.39
Food	18.19	20.83	24.78	23.76
Textiles	17.78	18.51	4.94	22.62
Manufacture of footwear and clothing	6.64	14.38	25.36	1.92
Non-metallic mineral products	6.58	8.97	8.63	15.84
Chemicals	5.93	5.01	4.26	4.17
Tobacco	3.72	3.32	3.31	0.49
Publishing and printing	2.84	3.93	3.03	1.75
Rubber and plastic products	2.37	1.43	0.63	2.60
Manufacture of metal products	1.97	3.36	3.39	3.43
Construction of transport materials	1.94	2.82	3.66	2.33
Leather	1.74	2.02	2.56	2.76
Derivatives of mineral fuels	1.64	0.80	0.11	1.05
Wood and cork	1.12	2.13	4.15	3.05
Other manufacturing	1.06	1.48	1.90	0.69
Pulp, paper and paper products	1.03	0.99	0.45	2.20
Manufacture of wooden furniture	0.94	2.06	3.92	0.72
Construction of electrical machinery	0.70	0.91	1.03	0.28
Basic metal industry	0.55	0.71	0.58	1.23
Construction of non-electrical machinery	0.45	0.79	1.13	0.71

[1/] VA_S: sector Value Added, VA_T: Total industrial Value Added; $Employment_s$: number of unskilled plus skilled workers in a sector, $Employment_T$: number of total unskilled plus skilled workers. $Establishment_s$: number of establishments in a sector, $Establishment_T$: number of total establishments.
Source: *Anuario General de Estadística*, 1955.

Appendix B

Table B1
Description of Variables

Abbreviation	Name	Definition
Sector	Sector	Industrial sector
Education	Workers who read	Share of worker who could read.
Domestic raw Materials	Share of domestic raw materials	Share of nominal value (in Colombian pesos) of domestic raw materials offered for manufactures (i.e., after paying all costs inherent to the same expense) to total raw materials in manufacturing
Total raw materials	Total raw materials	Nominal value (in Colombian pesos) of total raw materials offered for manufactures (i.e., after paying all costs inherent to the same expense).
VA	Value Added	The value added by industry is obtained by deducting from the cost of goods manufactured the sum of the values for the raw materials used, fuels and lubricants consumed, and purchased power and the amount spent each year in salaries, wages , insurance, leasing and depreciation (nominal value in Colombian pesos)
K	Capital	Two alternative definitions: capital reported by the firm, and fixed assets reported by the firm.
ENECOM	Electric energy purchased	Electricity purchased by the establishments from July 1, 1944 to June 30, 1945 (nominal value in Colombian pesos)
L	Labor	Employees: Skilled workers. Anyone who works for a monthly salary and who performs preponderantly intellectual work. Worker: Unskilled workers. Any person who works piecework or earns a wage or salary daily or weekly, and whose activity is mainly manual.
MUJL	Share of females in total workers	Ratio of females among the total number of persons employed.
ESTAB	Establishments	Total industrial establishments to June 30, 1945
Age_firms	Average age of firms.	Average age of the firm by department or sector in 1945.
VA/L	Labor productivity	Ratio between value added and the number of total workers (skilled plus unskilled workers).
K/L	Capital/Labor	Ratio between capital and the number of total workers (skilled plus unskilled workers).
Unskilled workers	Share of unskilled workers.	Ratio of unskilled workers to total workers

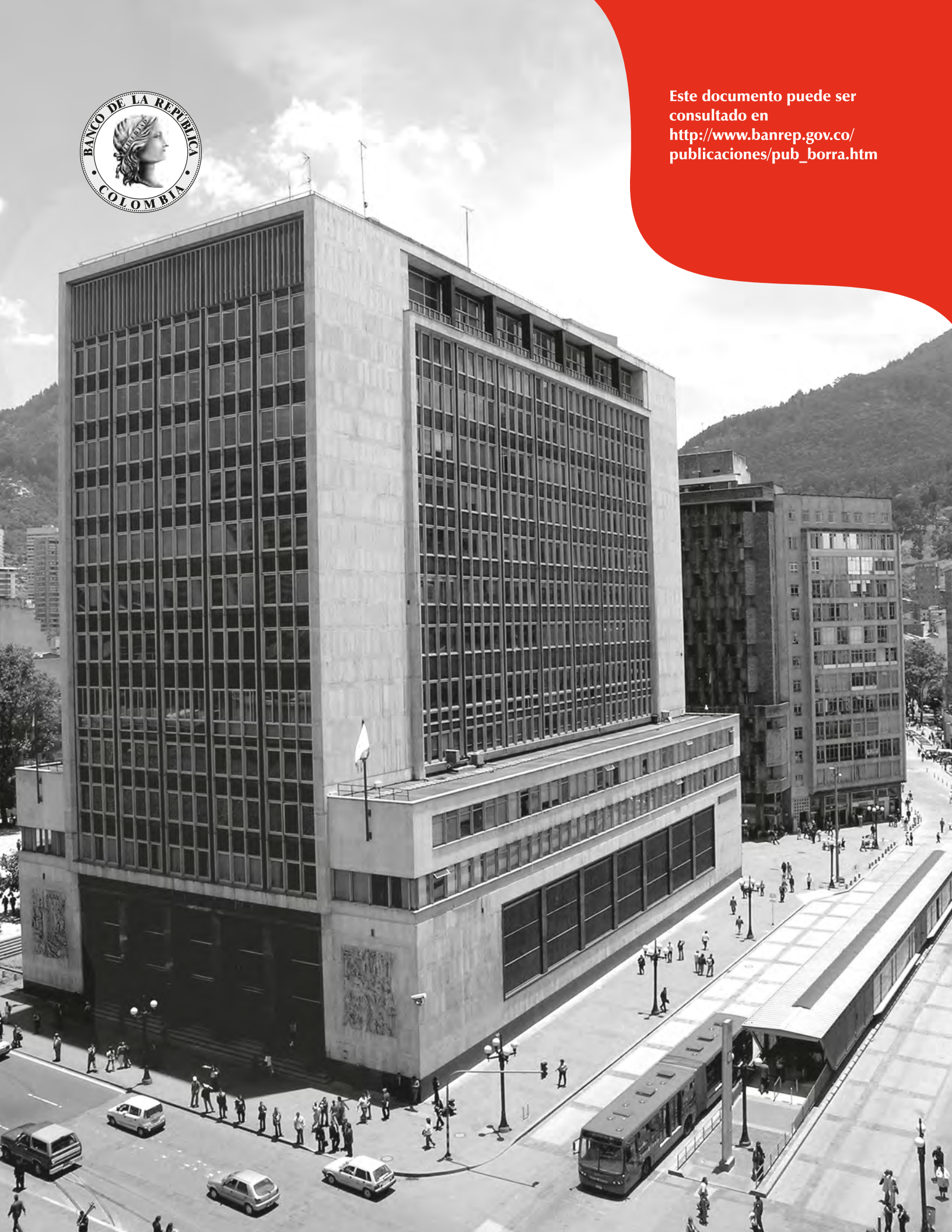
Source*: Primer Censo Industrial de Colombia*, 1945.

Appendix C

Table C1
Labor and Capital Elasticities by Departments, 1945
(Un-restricted model)

Variables	Antioquia	Atlantico	Bolivar	Caldas	Cundinamarca	Santander	Tolima	Valle del Cauca
Labor (E_l)	0.723***	1.091***	0.923***	0.771***	0.804***	0.606***	0.585***	1.008***
	(0.145)	(0.142)	(0.106)	(0.122)	(0.159)	(0.119)	(0.127)	(0.064)
Capital (E_k)	0.279**	-0.012	0.207*	0.355***	0.147	0.285***	0.366***	-0.008
	(0.116)	(0.129)	(0.099)	(0.094)	(0.143)	(0.094)	(0.067)	(0.045)
Returns	constant	increasing	increasing	increasing	constant	decreasing	constant	constant
Observations	16	15	14	14	17	16	14	16
R-squared	0.954	0.959	0.980	0.971	0.978	0.954	0.933	0.952

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations.



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