

Too Late But Profitable: Railroads in Colombia, 1920-1950

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Outline

I. Development of the Colombian Transportation System

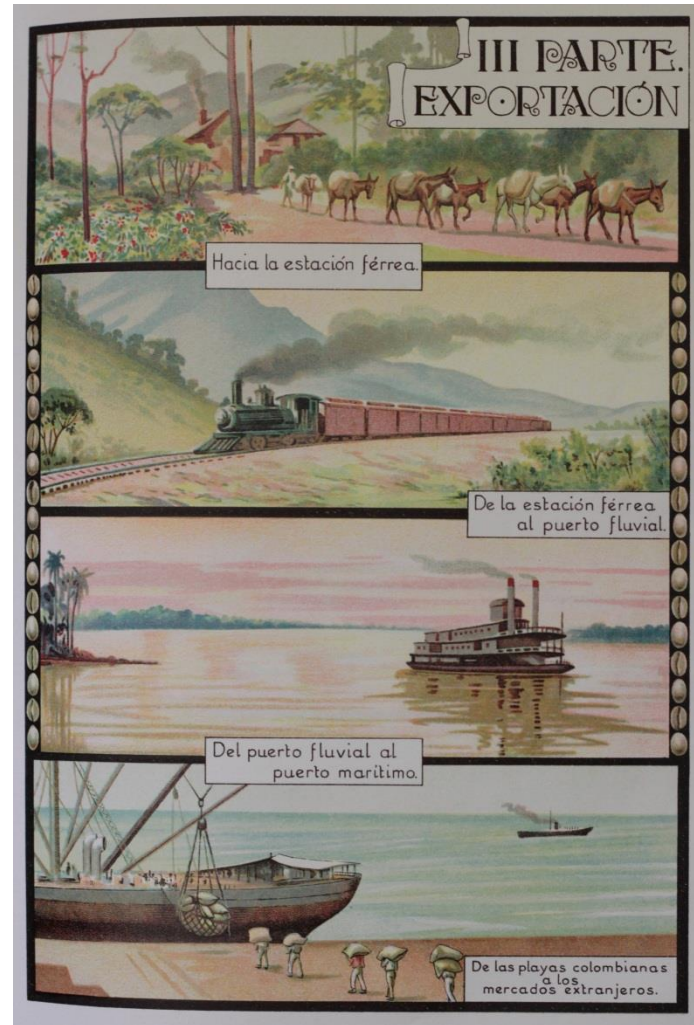
II. Dance of the Millions

III. Rates of Return, 1920-1950

IV. Conclusions

*"The problem of transportation may be the most fundamental one
in the economic history of the country"*
Frank Safford (2010).

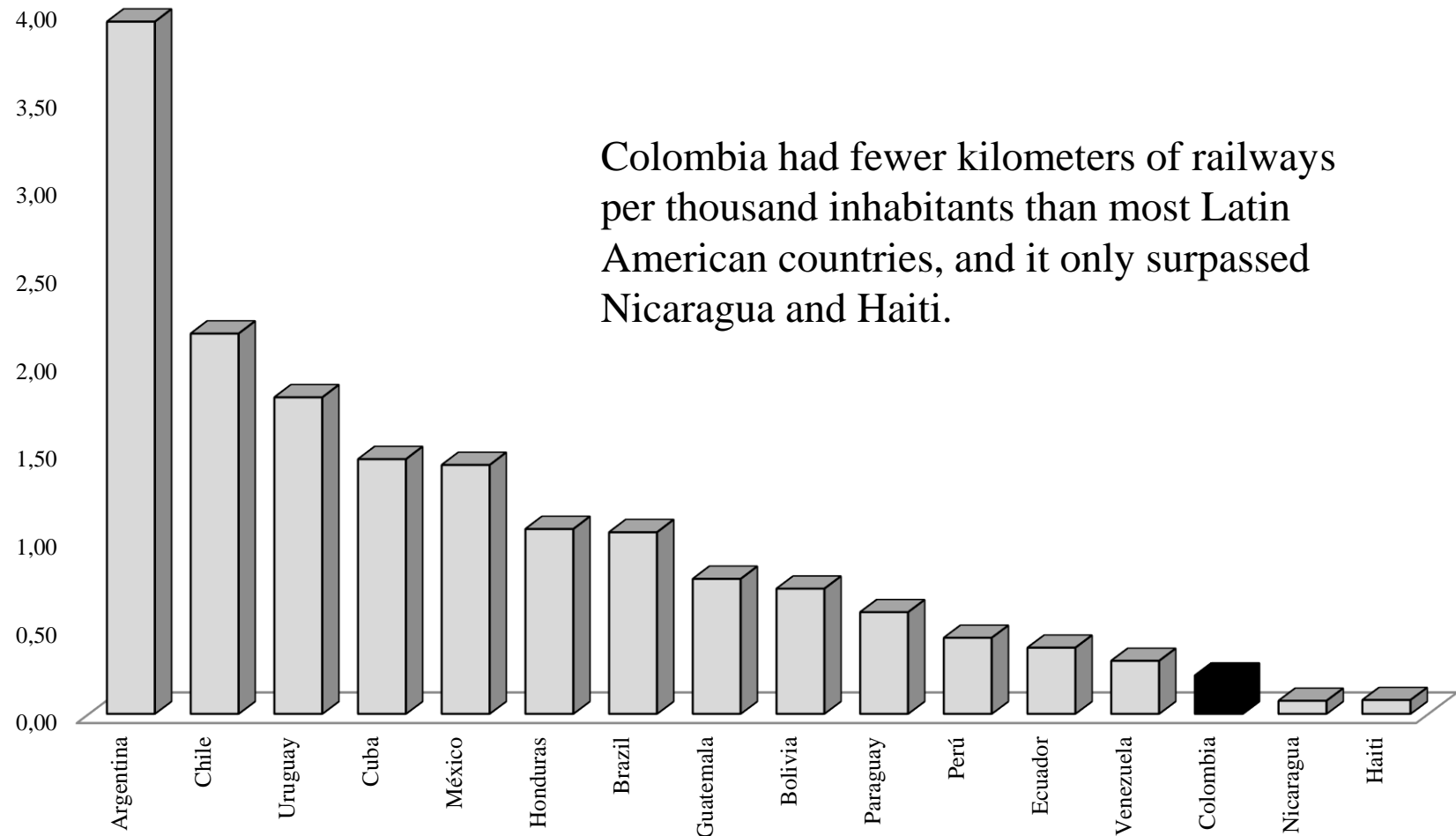
I. Development of the Colombian Transportation System



- In Colombia railroads were built rather late.
- Advances in the construction of railways was very slow:
 - Topographical and geographical conditions,
 - Lack of economic resources,
 - Bad institutions,
 - Inability of the government in establishing priorities in the development of transport infrastructure,
 - Lack of incentives for foreign capital to invest in the construction of railways,
 - Dispersion of the population (made it difficult and expensive to improve land transportation).

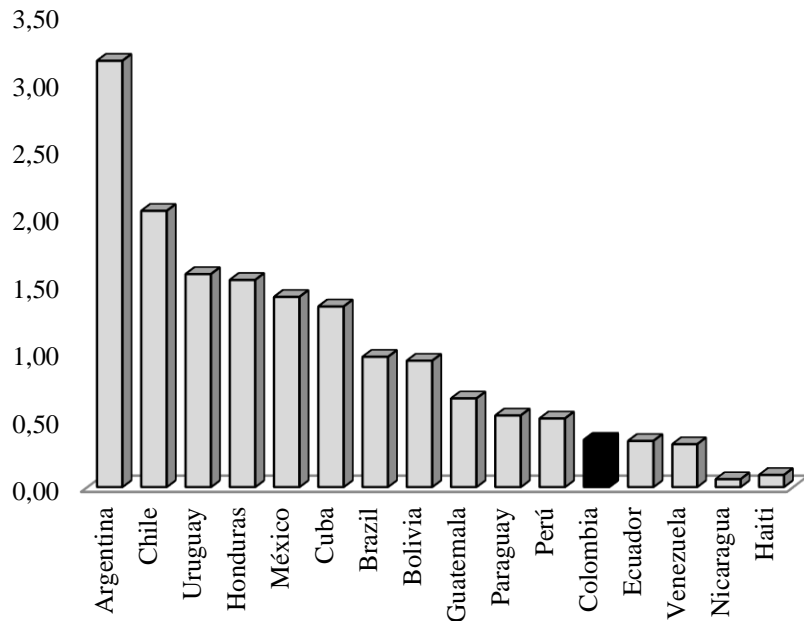
- Railroads developments in Colombia started in the 1870's, while other Latin American countries had started much early.
- Due to financial constraints and underdeveloped capital market faced by the country, these railroads were built under a concession system, financed by subsidies, and with guarantees over interest on capital investment and tax exemptions.
- This system was not successful in Colombia because of the lack of well-defined contract terms, property right problems and unclear regulation, which generated extra costs for the government, not only because of higher construction costs and incomplete works, but also in account of legal costs associated with litigations against the contractors.

Kilometers of Railways per thousand inhabitants (1920)

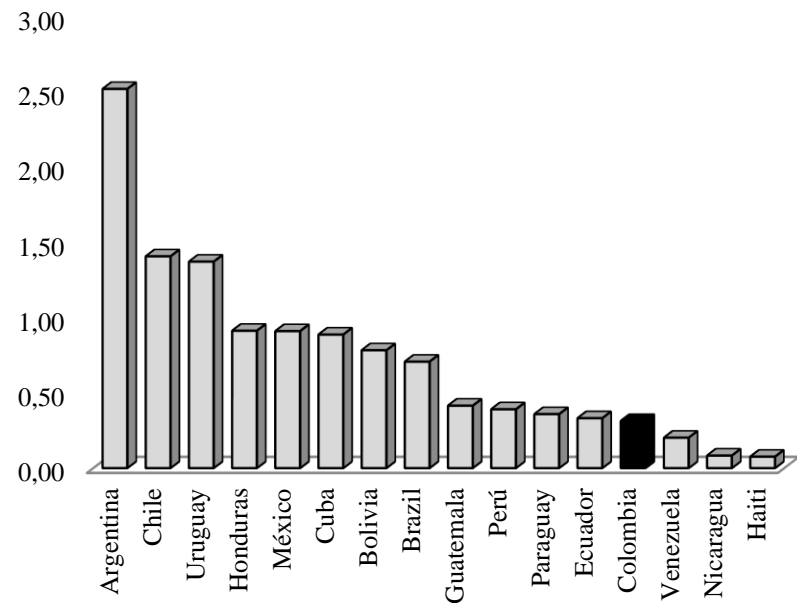


Kilometers of Railways per thousand inhabitants

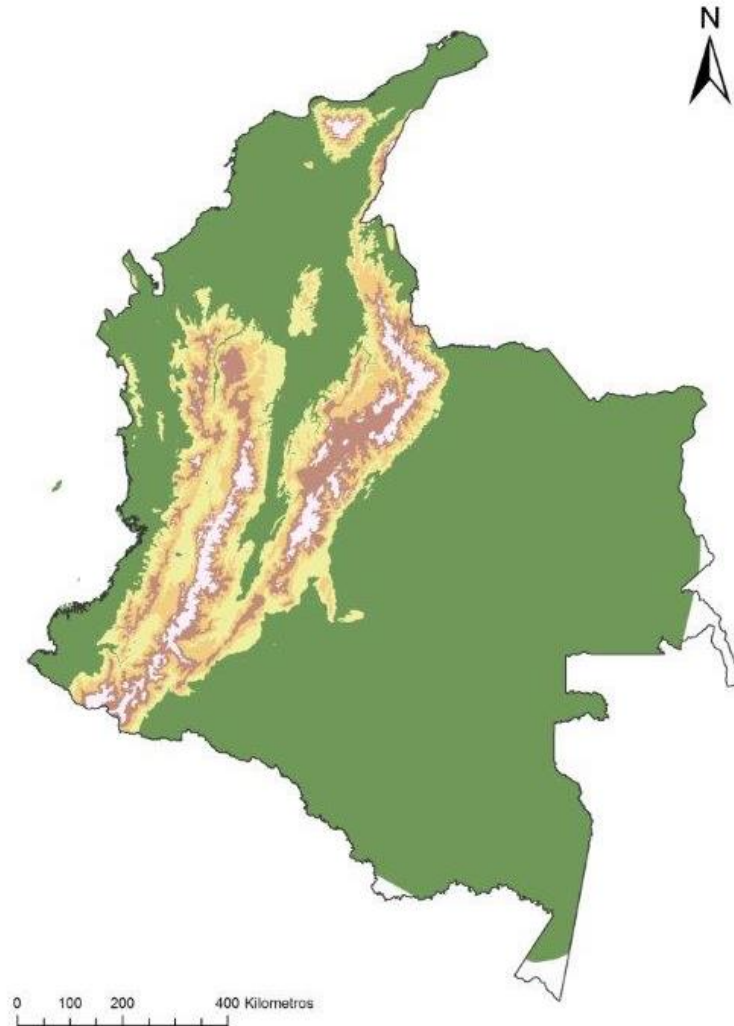
1930



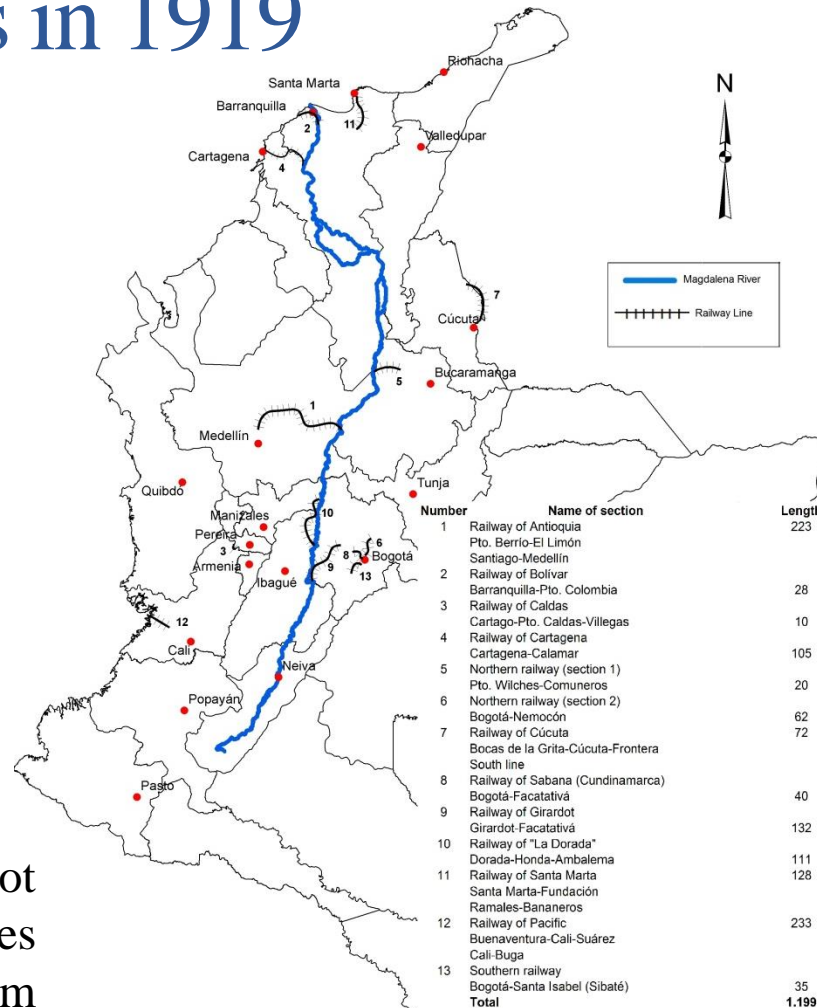
1950



Topography of Colombia



Railroads in 1919



Source: Bateman A. (1984). Bases para un programa de fomento para Colombia (1951).
Latorre E. (1986). Memorias del Ministerio de Transporte, varios años. Ortega A. (1932)

The system was not integrated; most lines were isolated from each other.

- Most of the railroads were constructed mainly to transport commodities, especially coffee, from producing regions to the Magdalena River and the seaports.

- By 1919, Colombia had about 1,200 km of railways, mostly concentrated in the central and northern regions.



- During the twenties, especially after 1925, an unprecedented amount of foreign capital arrived in the country.
 - Latin American countries became attractive for foreign investors by the higher interest rates paid on bonds issued by countries in the region.
 - In the case of Colombia, the institutional reforms proposed by the Kemmerer Mission and the expansion of the export and production capacity, especially in the coffee sector, made the country attractive.
- Those funds were used mainly for the construction of much needed public infrastructure, especially railroads. In fact, the amount invested in railroad construction until 1929 represented 45% of the foreign loans.

Foreign Debt and Railroad Investment in Colombia (1924-1933)

Foreign Debt / Exports: 1924-1950

(Millions of US dollars)

Year	Public Foreign Debt ^{1/}	Exports	Debt/Exports (Percentage)
1924	28.9	85.5	33.8
1926	54.0	109.8	49.2
1928	158.7	130.7	121.4
1930	157.9	109.5	144.3
1932	154.4	66.9	230.8
1934	150.4	93.7	160.5
1936	145.8	90.0	162.0
1938	137.8	91.3	151.0
1940	129.0	95.8	134.6
1942	129.2	109.5	118.0
1944	123.2	130.1	94.7
1946	117.0	201.2	58.1
1948	114.6	317.0	36.2
1950	109.0	393.6	27.7

Note: ^{1/} Public Foreign Debt includes: central government debt, municipal debt and departmental debt.

Source: Public Foreign Debt from Avella, M. (2004), Table 50, p. 18, and Exports from GRECO (2002).

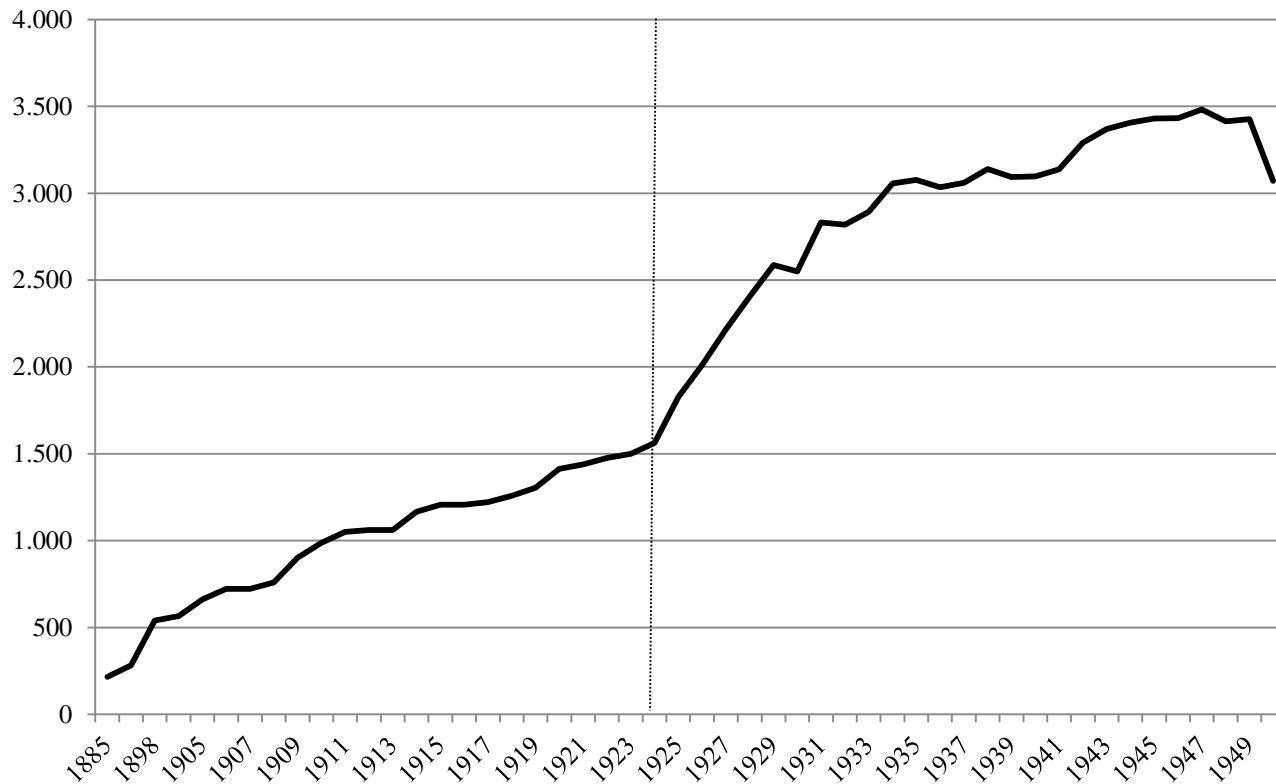
By 1928, the level of public foreign debt had reached 159 million dollars. However, the flow of foreign loans ceased with the Great Depression and, as a result, the debt/export ratio dropped drastically since 1936.

Investment in Railroads from the US Compensation (Distribution, %)

Name of the railroad	Millions of pesos	Share in investment (%)
Norte Sec. 2	2.972	18.3
Norte Sec. 1	2.531	15.6
Tolima-Huila-Caqueta	2.336	14.4
Pacífico	2.298	14.2
Subv. To Medellín al río Cauca railroad	1.200	7.4
Cable Cucuta-Rio Magdalena	0.951	5.9
Del Carare	0.831	5.1
Subv. To Caldas railroad	0.800	4.9
Troncal Occidente	0.550	3.4
Nariño	0.439	2.7
Nacederos-Armenia	0.295	1.8
Central de Bolivar	0.278	1.7
Subv. To Cundinamarca Railroad	0.223	1.4
Sur	0.166	1.0
Puente de Girardot	0.152	0.9
Subv. To Santander-Timba Railroad	0.058	0.4
Cable de Manizales	0.050	0.3
Subv. To Ambalema-Ibagué Railroad	0.050	0.3
Ibague-Armenia	0.030	0.2
Total Railroads	16.209	100.0
Others	9.042	
Total US Compensation	25.251	
Investment in Railroads/ American Compensation (%)	64.19	

Source: Pachon, A. and Ramirez, M. T. (2006)

Total Colombian Railroad Tracks (Km), - (1885-1950) (*)

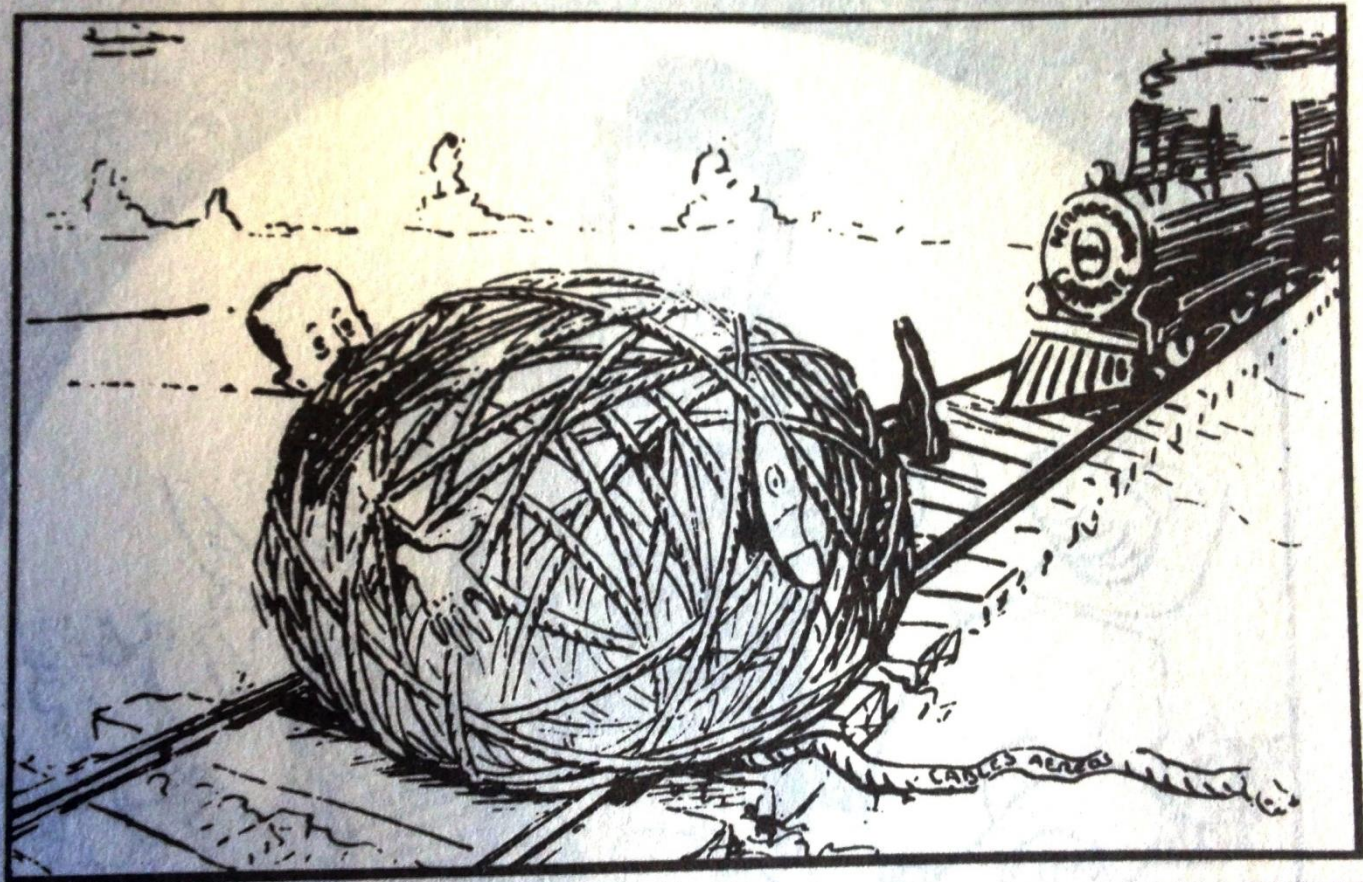


The kms. of railroad tracks augmented from 1,500 km in 1923 to almost 2,600 km in 1929. The main growth in railway length took place between 1925 and 1929.

(*) Total Railroad Tracks= National + Departmental and Municipal + Private railroads.

Source: Pachón and Ramírez (2006).

UN MINISTRO "ENREDADO"



EL MINISTRO DE OBRAS EN EL DEBATE SOBRE F. C. DEL CARARE

- There were several authors and engineers that in the 1920s and early 1930s believed that part of the investments made in railroads in the twenties wasted.
- Authors such Ortega (1932) and Barnhart (1956) argued that after spending these large amounts of resources the country still was isolated and disconnected.
- They blamed this result mainly to the lack of planning and inability to manage those resources, in most cases because of political pressures, and to the limited technical capacity to carry out the constructions.

“We have given ourselves the luxury of building railroads –and at what price!- only to prove that we are incapable of managing that mysterious instrument of civilization”

“El caos de nuestros FFCC”, El Tiempo, July 24, 1928

- We estimate yearly rates of returns (RR) for railroads built or extended in the 1920's, for the period 1924-1950.
- The main objective is to determine if investments in railways during the 1920s, mainly financed by external debt, were profitable.
- Our contribution is the calculation of the annual rates of returns by railroad lines, both for freight and passengers.

- In addition, our estimations take into consideration that as a result of the Great Depression and the suspension of payments on foreign debt, Colombia ended up paying only a portion of the loans obtained in the 1920's.
- By 1933 the majority of Latin American countries had incurred in debt moratorium, which started at beginning of 1931. The moratorium on foreign debt in Colombia was a lengthy process which lasted from 1931 to 1935.
- The payments for the national debt (installments and interest) were suspended since January 1935, and resumed in 1940, first under an interim agreement, and then permanently. An important benefit of the renegotiations was the reduction in the interest rate.

- Rates of returns (RR) were measured as the ratio between net earnings (income minus expenditures) to cumulative investment for each year. This measure has the advantage that it offers profit figures on an annual basis.

We propose two scenarios:

- In the first one (RR1), we assume no major investments in railroads were made after 1933, and the investment depreciates at an annual rate of 5% after 1933.
- In the second scenario (RR2), since railroad investments were financed with foreign loans and because of the debt moratorium, we subtract the percentage of foreign loans that were never paid.
- Additionally, we reduce the investment in railroads by 15% annually during 1924-1930, and also assume that investment depreciated at an annual rate of 5% after 1933

- Colombia stopped servicing its foreign debt through several decisions taken in the period extending from 1931 to 1935.
- In the 1940s that was renegotiated and as a result the country received a substantial reduction in the outstanding debt and the rates of interest it finally paid when repayment was resumed. Erika Jorgensen and Jeffrey Sachs (1988) have estimated that at net present values Colombia ended up paying 15% less of the foreign debt it had acquired in the 1920s.
- This is why to calculate the rates of return on railroad investment it is necessary to subtract the percent of foreign loans which were never paid.

Colombian Railroads: Rates of Return (RR %)*

Year	RR 1	RR 2
1924	8.8	10.3
1925	7.9	9.3
1926	7.2	8.4
1927	4.7	5.5
1928	4.2	5.0
1929	4.8	5.7
1930	3.9	4.6
1931	3.5	3.5
1932	3.2	3.2
1933	3.2	3.2
1934	3.0	3.0
1935	3.3	3.3
1936	3.7	3.7
1937	4.5	4.5
1938	3.7	3.7
1939	2.8	2.8
1940	2.2	2.2
1941	2.4	2.4
1942	6.3	6.3
1943	10.1	10.1
1944	-1.5	-1.5
1945	-5.6	-5.6
1946	-17.7	-17.7
1947	-23.8	-23.8
1948	-27.8	-27.8
1949	-22.5	-22.5
1950	-28.7	-28.7
Avg. 1920-1949	-0.2	0.1
Avg. 1920-1943	4.7	5.0

- When we consider the debt moratorium in the calculation, the rates of return are slightly higher.
- Railroads were clearly profitable during the period 1924-1943, with the rates of return being larger during the twenties.
- After 1943, most railroads present losses; their rates of returns were always negative.

Note: $RR = (\text{Income} - \text{Expenditure}) / \text{Cumulative Investment}$. * Includes the following railways: Cundinamarca, Girardot, Pacifico, Caldas, Antioquia, Nordeste, Cúcuta, Cartagena, Nariño, La Dorada, Norte Sec. 1, Norte Sec. 2, Sur, and Tolima. RR1: It is assumed there was no investment after 1933 and the investment depreciates at a rate of 5% annually after 1933. RR2: It is assumed the investment depreciates at a rate of 5% annually after 1933. Additionally, since railroad investment was financed with foreign loans and because of the debt moratorium in 1930, we reduce the investment in railroads by 15% for each year during 1920-1930, inasmuch as only 85% of the debt was eventually repaid. Sources: Anuario General de Estadística de Colombia, several years, and authors' calculations.

Rate of Return for freight and passengers (1924-1950)

Until 1943 freight transportation was far more profitable than passenger transportation, because railroads were more oriented to cargo.

However, since 1944 the magnitude of the decline in the rate of return of freight was much larger than the passenger rate, because the drop in freight rates was higher and faster.

Year	RR freight	RR passenger
1924	7.5%	2.8%
1925	6.7%	2.6%
1926	6.2%	2.2%
1927	4.1%	1.5%
1928	3.7%	1.3%
1929	4.2%	1.5%
1930	3.5%	1.1%
1931	2.7%	0.9%
1932	2.4%	0.8%
1933	2.4%	0.8%
1934	2.2%	0.8%
1935	2.5%	0.9%
1936	2.7%	0.9%
1937	3.3%	1.1%
1938	2.8%	0.9%
1939	2.1%	0.6%
1940	1.6%	0.5%
1941	1.8%	0.6%
1942	4.6%	1.7%
1943	7.5%	2.6%
1944	-1.1%	-0.4%
1945	-4.1%	-1.5%
1946	-13.0%	-4.7%
1947	-17.9%	-5.9%
1948	-21.2%	-6.6%
1949	-17.4%	-5.1%
1950	-24.8%	-4.0%
Avg. 1924-1943	3.7%	1.3%

Note: RR = (Income-Expenditures)/ Cumulative Investment

*Includes the following railways: Cundinamarca, Girardot, Pacífico, Caldas, Antioquia, Nordeste, Cúcuta, Cartagena, Nariño, La Dorada, Norte Sec. 1, Norte Sec. 2, Del Sur y Tolima.

Sources: Anuario General de Estadística de Colombia, several years, Memorias del Ministerio de Obras Públicas, several years, and authors calculations.

- After 1943, most railroads present losses; their rates of returns were always negative, mainly because railroads had to face the competition from parallel roads and because of the negative effects of World War II on the Colombian economy.
- Since the early 1930s the infrastructure policy shifts towards the construction of highways, where the major investments were made.
- Many new roads were built parallel to the railways and so they competed with railways, since highway transportation was faster and more flexible. In addition, highways were more profitable because of the private nature of the operation.
- Thus many railroads subsidized went bankrupt.

Regional Railroads: Rates of Return (RR %)*

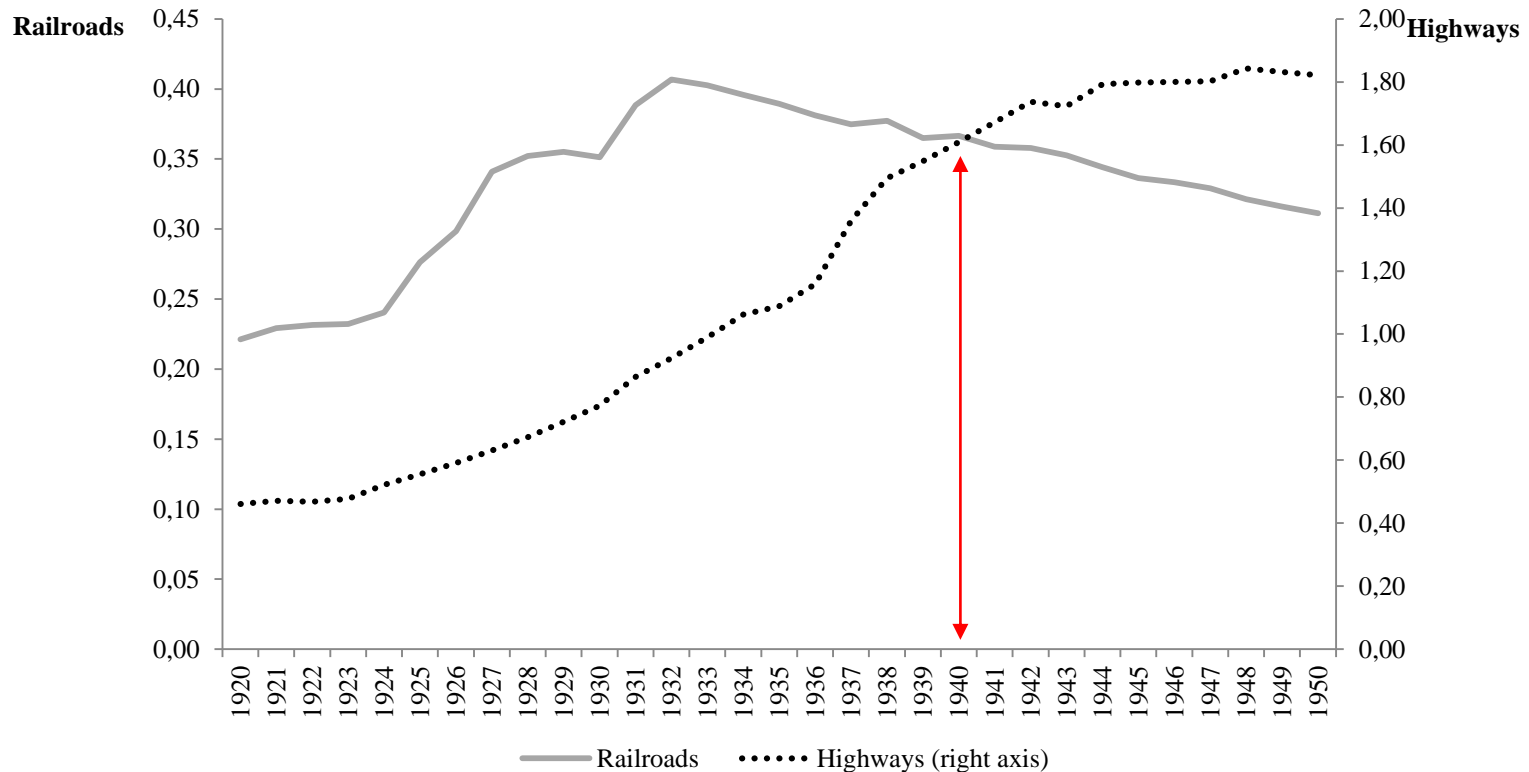
Railroad \ Year	1924	1927	1930	1933	1937	1940	1943	1945	1947	1949	Average ^{1/} 1924-1949	Average ^{1/} 1924-1943
Antioquia	69.4	44.5	31.9	19.4	20.7	24.8	63.5	14.5	37.5	6.3	28.7	33.9
Caldas	21.4	-9.4	6.2	4.2	5.1	3.9	23.9	21.0	-47.5	-77.6	-1.5	8.3
Cartagena	6.6	11.7	-0.4	-5.4	-12.8	-31.6	-62.4	-92.3	-208.9	-243.7	-46.6	-10.4
Norte sec. 1	-1.1	-1.9	-0.0	-0.1	0.1	-2.3	-2.1	-3.3	-2.7	-11.8	-1.8	-0.9
Norte sec. 2	43.2	6.1	0.0	1.7	-0.7	-4.4	0.5	-215.6	-338.1	-456.8	-65.3	5.9
Cúcuta	109.3	22.5	10.9	2.3	0.4	2.8	4.0	5.1	5.1	-1.5	16.5	20.3
Cundinamarca	15.1	19.6	2.8	1.9	0.4	-6.2	8.9	17.1	-2.8	6.8	5.0	5.8
Girardot	10.8	13.6	2.9	5.2	5.4	3.8	16.7	16.1	-5.8	3.8	7.0	7.6
La Dorada	48.4	73.4	44.6	38.8	45.3	15.8	68.4	95.5	83.4	23.7	43.3	51.3
Nariño			-2.9	-1.8	-4.3	-9.5	-14.6	-27.0	-76.4	-109.0	-20.8	-6.3
Nordeste		-31.6	5.2	3.6	7.7	-6.6	7.4	0.7	-55.7	-74.4	-7.3	2.2
Pacífico	3.9	1.1	2.1	2.4	5.3	3.7	9.9	4.8	-11.3	15.1	2.8	3.5
Coef. Variation ^{2/}	1.22	2.23	1.69	1.98	2.43	9.75	3.27	5.59	2.27	1.86		

Note: ^{1/} Average calculated based on yearly information on RR. ^{2/}The coefficient of variations is defined as the standard deviation of the series divided by its mean.

Sources: Anuario General de Estadística de Colombia, several years, Memorias del Ministerio de Obras Públicas, several years, and author's calculations. Note: It is assumed that after 1933 investment depreciates at a rate of 5% annually. Additionally, since railroad investment was financed with foreign loans and because of the debt moratorium in 1930, we reduce the investment in railroads in 15%, as explained in the text.

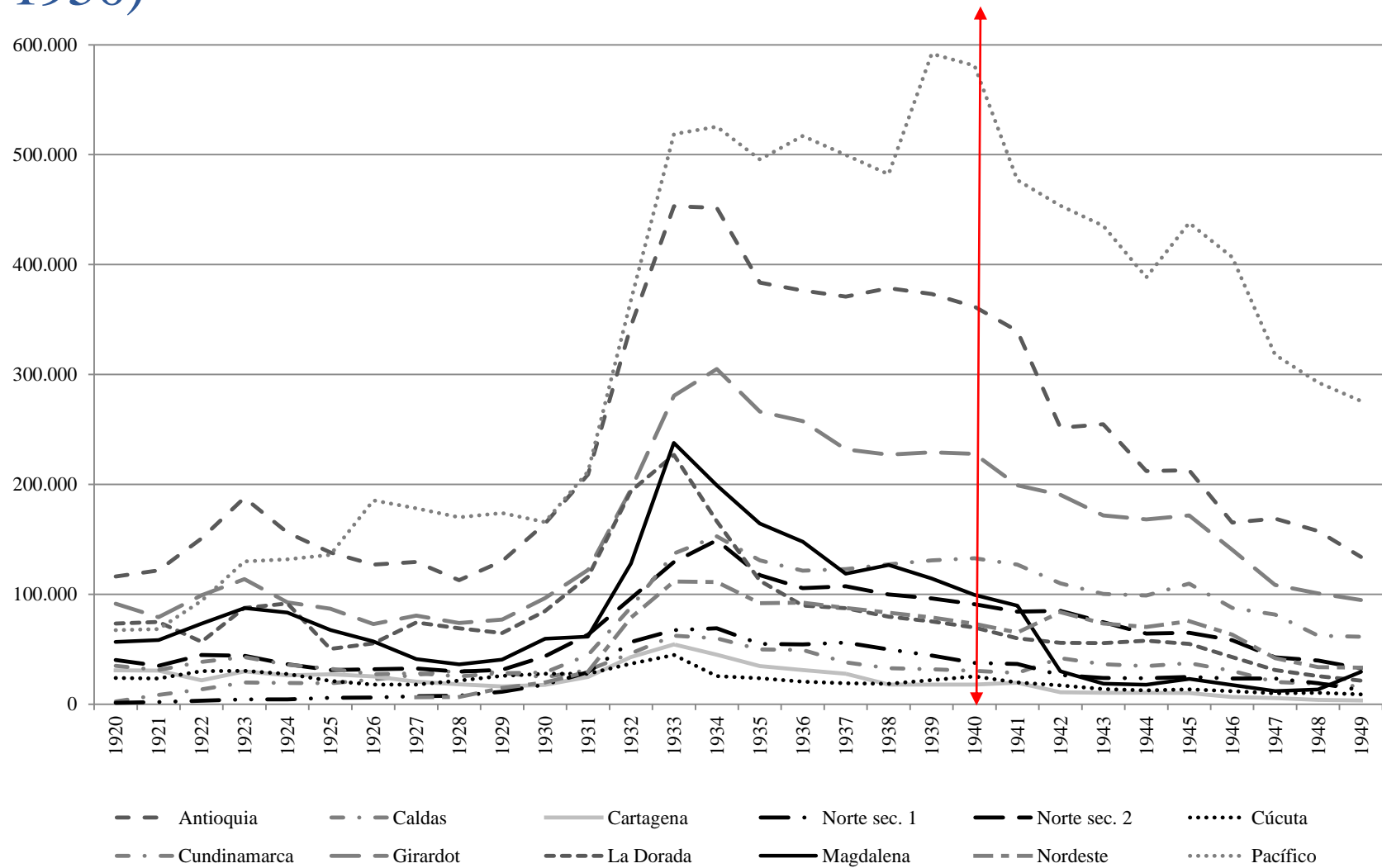
- Railroad lines showed mixed results in terms of profitability. The coefficient of variation indicates a significant dispersion of the rate of return among railroads lines which increased after 1940, when the highest dispersion was observed.

Railroads per capita vs. Highways per capita in Colombia, 1920-1950



Source: Pachón, A. and Ramírez, M. T. (2006)

Colombian Railroads: Total Revenue (constant prices \$ 1950)



Sources: Colombian Ministry of Public Works Memoirs, several years.

- All railroads had a significant drop in their output since the late thirties, as a result of a significant reduction in freight and passenger rates established by the government's regulation of railway fares.

Private Rates of Return of European Railroads (1871-1913) (percentage)

Rate of Return of selected countries and years (Percentage)

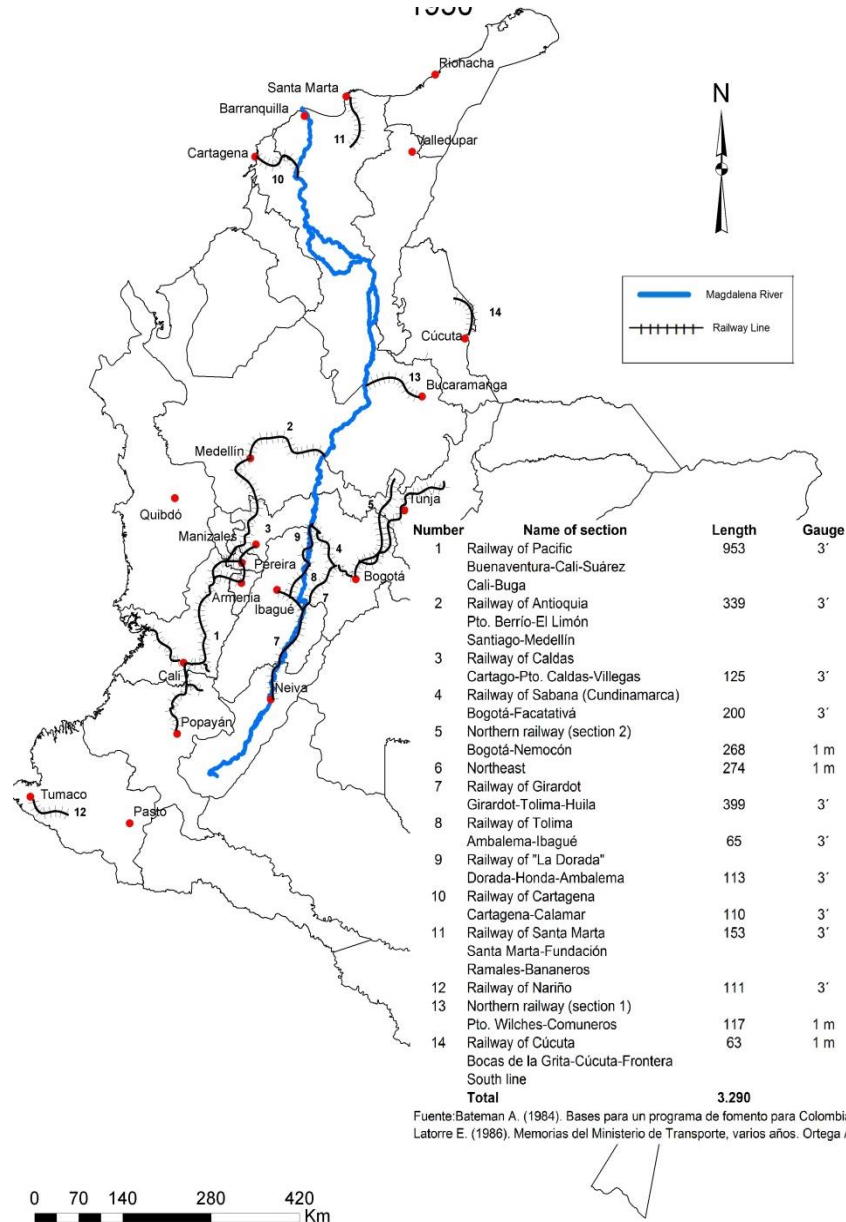
Country	1855	1871/1875	1891/1895	1911/1913
Germany		5.49	4.9	5.98
Spain (only North)		4.19	4.53	6.53
France		4.76	3.60	3.68
Italy			1.66	1.34
Norway		2.60	1.70	2.17
United Kingdom		4.57	3.80	3.61
Sweden		4.57	3.52	3.82
Switzerland		3.45	3.59	4.41
United States:				
Michigan Southern	7.5			
Michigan Central	8.20			
Terre Haute and Richmond	12.2			
Cleveland, Columbus & Cincinnati	15.9			
Brazil:				
Central do Brazil	6.39	5.85	1.10	-3.45
San Paulo Railway		7.46	4.20	11.66
Paulista Railroad		9.50	12.44	11.08

Source: for the European countries see Herranz Loncán, A. (2008); for Brazil see Summerhill, W. (1995) and for United States see Fishlow, A. (1965).

Railroads in 1950

The development of railroads was located in three main regions: the coffee region, the Bogota-Cundinamarca zone, and the Valle del Cauca region. Unlike the early constructions, the expansions of the twenties intended to interconnect cities and their surroundings.

By 1950 the country still did not have the transportation infrastructure required for its economic development, the density of the railway and road network was still very low.



“The Colombian topography is so unique because of its abruptness that superficial transports constitute a maximum economic problem”

Lauchlin Currie (1950), World Bank Mission.

IV. Conclusions



Conclusions

- Until 1920 advances in surface transport were very limited because of the ruggedness of the terrain and the lack of exports development.
- During the twenties an unprecedented amount of foreign capital arrived in the country. This allowed the government to invest large sums of money in transportation infrastructure.
- Overall railroads were profitable until 1943, with the rate of return being larger during the twenties.

Conclusions

- Profitability was increased because the foreign debt which financed railroad construction was renegotiated downwards in the 1940's.
- Despite the large investment, since the early forties most railroads ceased to be profitable.
- By 1930 the construction of highways was given priority. The new roads competed with the railroads, reducing their profitability. As a result many railroads were dismantled.



Thanks

Density of the railway network

(kms. of railways per 1,000 km² of surface)

Country	1900 c.a	1920	1930
United Kingdom	130.85	142.29	142.96
Germany	95.56	122.77	124.12
France	81.02	99.76	115.73
Italy	55.28	66.69	71.42
Average Europe	57.78	64.79	71.51
Portugal	23.38	35.25	36.75
Spain	26.17	30.94	33.07
Greece	16.34	18.87	21.09
Argentina	6.03	12.69	13.66
Chile	5.76	10.86	11.82
Brazil	1.80	3.35	3.81
Ecuador	0.14	2.07	2.35
Peru	1.40	1.65	2.24
Colombia	0.51	1.18	2.29

Source: for Europe: Herranz, A. (2008), for Latin America:
<http://moxlad.fcs.edu.uy/en/databaseaccess.html> and authors elaboration.

Investment per Railroad: 1924-1933

(Stock, millions of USD)

Railroad	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Cundinamarca	1.01	1.24	1.32	1.33	1.33	2.02	3.28	4.54	6.66	7.90
Girardot	7.72	7.91	8.58	9.12	10.97	11.40	11.42	11.42	11.58	13.74
Nordeste		0.31	0.49	0.68	1.19	1.69	1.86	4.55	4.61	5.47
Cúcuta			0.19	0.97	1.66	1.94	1.98	2.01	2.01	2.39
Pacífico	24.93	28.81	34.08	37.65	44.42	44.93	45.00	46.62	51.55	62.49
Caldas	0.74	0.75	1.30	1.31	1.31	1.32	1.32	1.32	1.34	1.59
Antioquia	2.16	2.17	4.47	4.50	6.13	6.71	6.91	7.03	7.13	8.91
Cartagena	0.72	0.72	0.72	0.73	0.73	0.73	0.73	0.73	0.75	0.88
Nariño	0.03	0.32	0.92	1.81	2.66	3.21	3.39	3.39	3.44	4.08
La Dorada	1.11	1.12	1.12	1.13	1.13	1.14	1.14	1.14	1.16	1.38
Norte Sec. 1	3.01	5.40	9.06	11.89	12.62	12.76	12.78	12.78	12.97	15.37
Norte Sec. 2			0.86	2.67	5.26	6.33	6.34	6.34	6.43	7.63
Tolima	4.29	4.96	6.04	7.07	7.06	7.14	7.15	7.25	7.25	8.60
Sur	1.34	3.03	5.40	9.13	11.87	12.76	12.78	12.78	12.97	15.37
Total	47.05	56.76	74.57	90.00	108.32	114.09	116.07	121.78	129.86	155.79

Sources: Memorias del Ministro de Obras Públicas de Colombia (1923-1940), *El Tiempo*, August 14, 1930, and Anales de Ingeniería (1934).

Investment per Railroad: 1924-1933 (% of total investment)

Railroad	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Cundinamarca	2.14	2.19	1.78	1.48	1.23	1.77	2.82	3.73	5.13	5.07
Girardot	16.41	13.94	11.51	10.13	10.12	9.99	9.84	9.38	8.92	8.82
Nordeste		0.55	0.65	0.75	1.09	1.48	1.60	3.73	3.55	3.51
Cúcuta			0.26	1.07	1.53	1.70	1.71	1.63	1.55	1.53
Pacífico	52.98	50.78	45.70	41.83	41.01	39.38	38.77	38.28	39.70	40.11
Caldas	1.58	1.32	1.74	1.45	1.21	1.16	1.14	1.09	1.03	1.02
Antioquia	4.58	3.83	5.99	5.00	5.66	5.88	5.95	5.77	5.49	5.72
Cartagena	1.52	1.27	0.97	0.81	0.67	0.64	0.63	0.60	0.57	0.57
Nariño	0.07	0.56	1.24	2.01	2.46	2.82	2.92	2.78	2.65	2.62
La Dorada	2.37	1.98	1.51	1.26	1.04	1.00	0.99	0.94	0.89	0.88
Norte Sec. 1	6.39	9.51	12.15	13.22	11.65	11.18	11.01	10.49	9.98	9.87
Norte Sec. 2			1.16	2.97	4.86	5.55	5.46	5.21	4.95	4.90
Tolima	9.11	8.75	8.10	7.86	6.51	6.25	6.16	5.87	5.58	5.52
Sur	2.85	5.34	7.24	10.14	10.96	11.18	11.01	10.49	9.98	9.87
Total	100	100	100	100	100	100	100	100	100	100

Sources: authors' elaboration based on Table 3a.