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End of the line: Railroads in Chile

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END OF THE LINE: RAILROADS IN CHILE

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End of the line: Railroads in Chile¹

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Abstract

Between 1860 and 1950, railroads in Chile were synonym of modernization, integration, and economic development. By the 1970s railroads were bankrupt and socially discredited, surviving out of government subsidies. By 2000, passenger services had disappeared but private sector freight operations were revitalized after swift reforms. We review the Chilean reforms and experience, focusing on regulation, public sector involvement and political interference, market entry, vertical integration, and externalities. Perhaps uniquely, two different forms of private sector participation in freight operations emerge after reforms: a vertically integrated, privatized railroad and a state-owned, open-access, concession system.

¹ This paper was written for APEC. All remaining errors are mine.

1. INTRODUCTION

Railways played a significant role in social life in Chile for almost a century. Between 1860 and 1950 railroads were an exemplar of modernization, integration and economic development. By 1950, nevertheless, the industry started to decline, unable to compete with more efficient means of transportation (buses and trucks). By the mid 1970s railroads were bankrupt, surviving out of copious government subsidies, and socially discredited. Two decades later, passenger services had almost disappeared (accounting for less than 1% of total traffic). Freight operations, on the contrary, had been privatized and revitalized, and concentrated on small profitable market niches usually in remote areas of the country (Thompson & Angerstein 1997).

This paper reviews the Chilean case and analyzes the current standing and operations of the industry, focusing on the reforms, public sector involvement, regulation, market entry, vertical integration, externalities and political interference. The Chilean economy underwent a massive restructuring in the mid 1970s. It included opening to foreign trade, complete market deregulation, inflation control, macroeconomic stabilization and, most importantly for our study, a complete reallocation of government subsidies. In this economic turnaround, despite the waste and inefficiency associated with the state-owned railroad monopoly, no specific reforms were devised for railroads. Fiscal reforms led to a substantial reduction in subsidies to the sector which, in turn, prompted managers to change operations, eliminate redundancies and inefficiencies, and divest assets to cut financial losses. The government did not consider a transition phase or compensation mechanisms for those affected negatively.

Perhaps uniquely, the Chilean reforms resulted in the coexistence of two different forms of private sector participation in freight operations: (1) privatization

of the entire Northern Railroad, including rolling stock and essential facilities (track, yards and terminals) without open-access clauses; and (2) concessioning freight in the Southern Railroad to private carriers who pay a fee for the use of the track and terminals while sharing these essential facilities with the remains of the state-owned passenger-services company. Both systems have led to substantial increases in transportation volumes, rising labour productivity and declining tariffs. Consumers clearly benefitted from the reforms which are now discussed in more detail. The first step however is a review of the circumstances in which the rail system operates.

2. CHILEAN GEOGRAPHY AND THE DEVELOPMENT OF RAILROADS

To a large extent, the development of railways depends on geography. Since their inception, entrepreneurs and government authorities looked at railroads as means to overcome isolation, improve connectivity, consolidate territorial integration and advance economic development. Historical and political events such as international conflicts have also shaped the development of railroads not only in Chile but also in most countries (see Atack et al. 2009 and references therein for the USA and Thompson & Angerstein 1997 for Chile). This section provides a brief summary of the geographical and historical events leading to the development of the Chilean railroad industry. Readers with more interest in the detail of the reform may move to section 7.3.

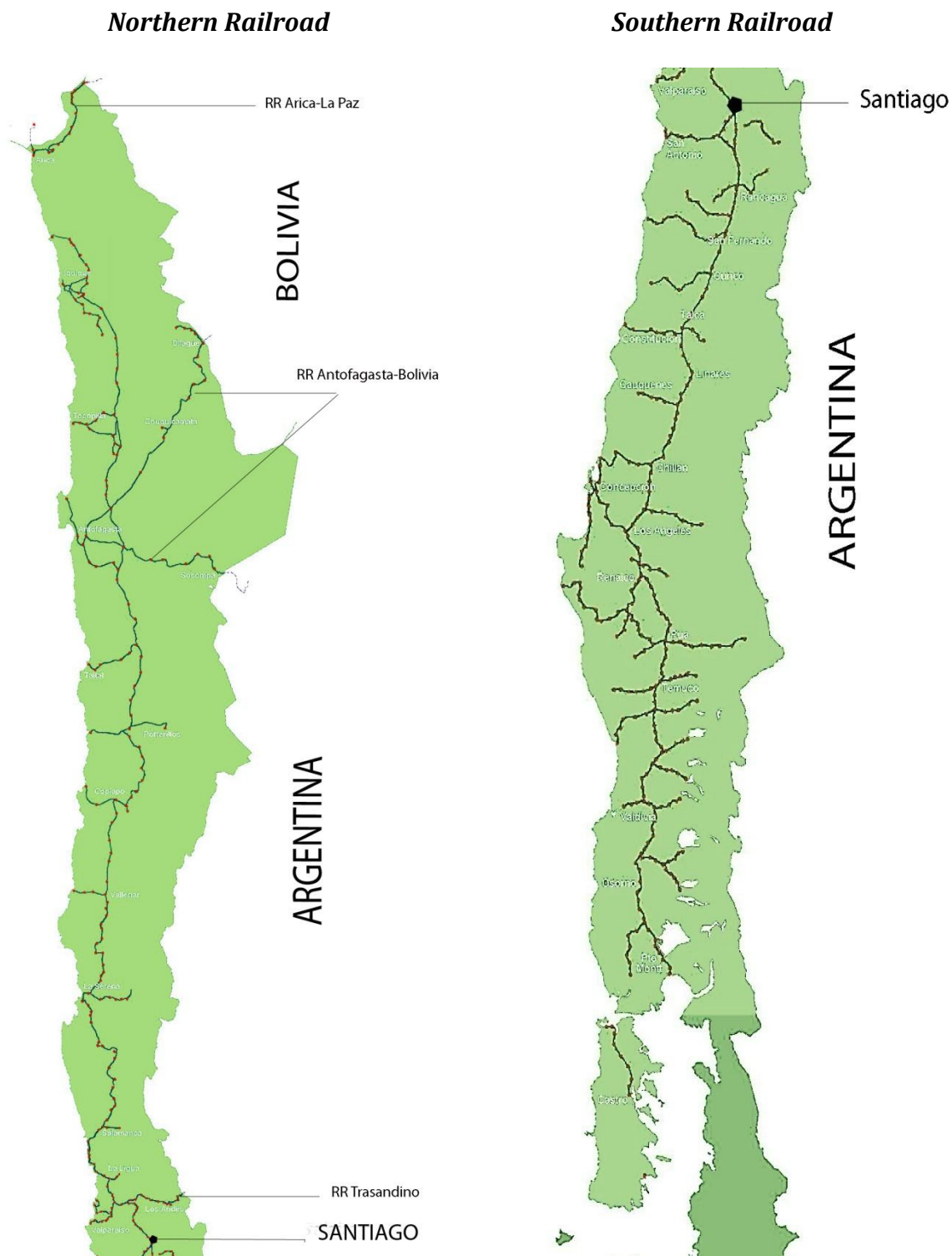
Chile is a long and quite narrow country (4300 km from north to south; and an average width of 180 km), sandwiched between the Pacific Ocean and the Andes Mountains. The northern half of the country is dominated by the Atacama Desert, rich in minerals but scarcely populated. The southern half, in contrast, concentrates most of the population and economic activities (except mining).

In such a peculiar geographical environment, it would have been natural to expect railroads to play a crucial role in economic development and social life. Indeed, one longitudinal railroad track and a number of branches would service most of the population and economic enterprises, providing efficient and cheap transport services to the public and a reasonable profit for investors (Figure 7.1). That was the tenet of railroad managers and the Chilean governments for decades, but history proved otherwise.

Chile's first railroad track was laid in 1851 to transport silver from the mines in the north to the seaport of Caldera. Other tracks mushroomed in following years, but a railway system did not take shape until the 1870s (Alliende 2001). Private initiatives were initially supported with public funds due to the insufficient development of Chilean financial markets and the lack of private capital. Dissatisfied with the slow pace of expansion, the government started to acquire private railroads in the 1880s and embarked on an ambitious investment program to connect all railways. From then on, the industry development was almost exclusively a public sector business.

Between 1870 and 1915 the government completed the Chilean railway system (Table 7.1). Massive investments in the northern railway were justified by the significant territorial expansion after the Nitrate War (1879–84) and were easily financed by taxes on nitrate exports. By 1915 some 3500 km of tracks were laid and interconnected. These tracks were of metric gauge (1 m). The southern railway expanded similarly, laying around 3800 km of track, but of broad gauge (1.676 m). By 1910 a publicly owned railroad linked Chile and Argentina (250 km) using a cogged metric track and reaching altitudes of 3200 m. Finally, by 1913, a publicly owned railroad linked Chile and North Bolivia (500 km) and one private company linked Chile and South Bolivia (c. 1000 km). These were the last investments in rail tracks until the 21st century.

Figure 1: Main railroads in Chile.



By 1915 the main companies (Ferrocarril del Norte and Ferrocarril del Sur) were consolidated in one firm called EFE. It has been argued that there was never a railway system because the two railroads remained disconnected by their differences not only in track gauge but also in market and development strategies. Later, this tacit separation would play a decisive role in the shape of the reforms.

Table 1 Main railroads in Chile.

Name of company	Length (km)	Track Gauge (m)	Completed in	Current Operational Status
Ferrocarril del Sur	1254	1.676	1913	Passengers: operated by public firm Freight: private sector concessions
Ferrocarril del Norte	1867	1.000	1915	Passengers: discontinued in 1975 Freight: privatized in 1997
Ferrocarril Antofagasta-Bolivia	700	1.000	1888	Privately owned Transports freight and passengers
Ferrocarril Transandino	250	1.000	1910	Closed since 1984
Ferrocarril Arica-La Paz	204	1.435	1913	Privatized in 1996 Bankrupt and closed since 2005
Ferrocarril Potrerillos	155	1000	1928	Privately owned by mining operation (freight only)
Ferrocarril Tocopilla	124	1.067	1890	Privately owned by mining operation (freight only)
Ferrocarril de Huasco	100	1.000	1892	Privately owned by mining operation (freight only)
Ferrocarril de Romeral	38	1.000	1913	Privately owned by mining operation (freight only)

Source: Elaborated from work of Thompson & Angerstein (1997)

A report by the EFE directors notes the history of challenges of managing a state-owned firm, including political interference, severe financial mismanagement, lack of maintenance of tracks, buildings and rolling stock, the low quality human capital of its labour force and disregard for customer satisfaction (EFE, 2009). In contrast, the only private railroad with significant operations (Antofagasta–Bolivia) remained profitable and expanded its operations, despite continuous political turmoil between the two countries.

By the 1950s EFE began to feel the very strong competition from trucks and buses as a result of the extension of roads and paving. Continuous financial losses throughout the 1960s and to the mid 1970s led to a significant decline in quality service and massive injections of public funds to maintain operations. At the peak of its popularity in the 1950s EFE transported around 35% on average of the various markets in which it operated, freight and passenger. However, by the mid 1970s, the market shares in both freight and passenger transport were in single digits. Declining market share markets contributed to rising financial losses of the railway.

Table 2: Traffic Operations by EFE.

	1960	1970	1980	1990	2000	2008
Passengers (millions)	26.4	21.1	9.4	8.8	9.5	10.0
Passenger*km (millions)	1,906	2,338	1,425	1,077	737	759
Freight (million tons)	13.0	19.0	16.7	19.1	22.0	27.2
Freight*km (millions)	1,952	2,532	1,942	2,804	3,134	4,292

Source: Based on *Anuarios de Transporte y Comunicaciones, Instituto Nacional de Estadísticas de Chile*.

3. REFORMS IN CHILE'S RAILROAD INDUSTRY

As in most countries, the reforms to the Chilean railroad industry were not devised as a sector program but stemmed from macroeconomic and fiscal reforms initiated in the mid 1970s. As discussed in Thompson et al. (2001), a series of economic crises removed the governments' ability to pay for losses in the railway. Railway reforms in Chile, however, predate those in Latin America, Africa and Europe by two decades. The economy-wide reform process included a vast array of measures aimed at deregulating the economy, achieving effective vertical and horizontal disintegration, opening all sectors to foreign competition and foreign investment, allowing and encouraging private sector initiatives and restricting public sector activities to subsidiary initiatives (poverty alleviation, control of externalities, human capital formation and the like) (Larraín & Vergara 2000).

A significant goal of the Chilean reforms was the elimination of socially unjustified subsidies. In this context the state-owned railroad monopoly was targeted for major restructuring. This did not include a transition phase or an adjustment plan. A second general goal of the reforms was to improve efficiency but in the case of the railroad, given the scale of the financial losses, efficiency was a secondary target (Thompson 2001).

As a result of the fiscal reforms, all direct subsidies were eliminated, leading to the closure of a substantial number of branchlines and layoffs of personnel (from 15 000 workers in 1978 to 7000 in 1981). Concurrently, the government deregulated the interurban passenger transport market and opened up imports of trucks and cars, thus increasing competition for EFE in both markets.

In order to cut subsidies, the government also forced EFE to downsize operations. The Northern Railroad ceased all operations in 1975, its tracks as well as

its rolling stock abandoned or sold to local private operators (see below). The Argentina–Chile Transandino Railroad ceased operations in 1984, the track was abandoned and covered by snow and mountain landslides. The publicly owned Chile–Bolivia Railroad remained in operation largely as a result of the provisions of the Peace Agreement after the Nitrate War, but it reduced activities to a minimum until it was privatized in 1997. By 2005 the Bolivian private company that acquired the railroad was bankrupt and its operations closed. The Southern Railroad continued to operate, but the government had to impose branch closures, layoffs, reduce frequencies to re-gain financial balance.

Despite the sizable government intervention, EFE did not become operationally profitable. The main longitudinal track of the Southern Railroad remained operative, yet financial and operative losses put continuous pressures on EFE and required further restructuring. More pressure came in the 1990s from the successful highway concession program that improved substantially the quality and availability of paved roads, thereby reducing costs for trucks and buses. Between 1988 and 1990 EFE sold the remains of the Northern Railroad that had been closed for around 15 years to a public holding that subsequently restructured the company and privatized it in 1996. Other EFE assets such as yards, buildings, crossings and even the ‘fiscal track’ (the land on which the railroad tracks are laid) were divested in order to raise funds for continuing operations. In spite of the adjustment, EFE would still require major support: for example, in 1994 it transported around 9 million passengers (less than 10% of total interurban traffic) and 17 million tons of freight, earning around USD39 million. Total costs, however, reached around USD80 million of which the payroll amounted to USD42 million. The USD51 million deficit was subsidized by the government.

Studies undertaken by the government and EFE in the early 1990s concluded that (1) a major legal restructuring of EFE was needed; (2) the freight business was

profitable if properly managed by private-sector carriers; and (3) passenger services were not profitable but could be provided at a social benefit by a restructured EFE.

The legal restructuring of EFE was required in order to increase its capabilities to undertake new business, reinforce internal control and professionalize its management. In 1993 the government passed a new legal charter for EFE allowing for vertical and horizontal disintegration. The separation of freight and passenger activities was completed when EFE created a separate company – Ferrocarriles del Pacífico (FEPASA) – to handle its freight operations. In 1995 FEPASA was privatized to a joint venture of Chilean and foreign investors; EFE retained a participation of 18%. According to the concession contract, FEPASA has the right to carry for 20 years, accessing and using EFE tracks for which it has to pay fixed and variable tolls. FEPASA, nevertheless, does not hold exclusivity in access to the tracks. A second private carrier – TRANSAP – also signed contracts with EFE and started freight operations in 2001. In 2009 these two private carriers transported around 11 million tons (equivalent to 3.6% of the total freight transport in southern Chile), in what has become a small yet profitable market. EFE had previously complained of unfair competition from trucks on the grounds that road tolls were too low to cover their marginal cost. The success of FEPASA and TRANSAP indicates the effect may be small.

The second major restructuring of EFE was the creation in 1995 of several subsidiaries to serve the passenger market according to those segments of the railroad system where it was deemed to be socially justified. Only one of these new companies has succeeded financially, while the others required sizable subsidies to operate. The company maintained passenger services at a loss for social and political reasons. Competition from buses dwarfed its market share; in 2008 only 9 million passengers were served by EFE, less than 1% of the total of passengers transported in southern Chile.

The third change to EFE's structure was to allow its current operations to be managed as a private company while the government retained the control of major investment plans. In principle, EFE was to inform the government on current operations but was required to obtain approval for capital investments. In practice the company operated as an unregulated unit due to loopholes in the 1993 law, while negotiating directly with the presidency for capital appropriations. The management of the company improved steadily over time, but political interference continued to be an issue.

In 2005–08 EFE embarked in a USD1 billion investment project to re-start passenger services in southern Chile with new and refurbished rolling stock, improved building and terminals, and upgraded tracks. Contrary to Chile's tradition, the government did not undertake the mandatory social evaluation of the project. The project proved to be a complete failure: no new services were implemented, the refurbished rolling stock did not operate, and new buildings and terminals await their opening. There are several ongoing legal inquiries to determine responsibilities.

EFE's financial position has deteriorated markedly. Operational losses amounted to around USD65 million a year (2009), or roughly USD3 per passenger. The losses are expected to increase to around USD100 million for years to come as a result of debt service. A World Bank study has found that EFE is losing money in every single business undertaking (World Bank 2007).

4. REGULATION AND PERFORMANCE OF CHILE'S RAILROAD INDUSTRY

This section reviews the rationale for government regulation in railroads and discusses the extent to which reforms and current regulations in Chile follow such rationale and how this, in turn, affects the performance of the Chilean industry.

4.1 The rationale for regulation in railroads

The fundamental rationale for government regulation in railroads is that infrastructure is almost inevitably a natural monopoly and is characterized by indivisibilities and economies of scale and scope (ECMT 2005). Regulation becomes crucial when network industries are vertically separated and competition is introduced. There are, however, particular characteristics of railways in Chile that would affect regulation. Whilst there is a desire to promote competition – as means of promoting cost-minimization/productive efficiency and of fostering innovation and traffic growth – there is still a dominant state-owned operator and owner of the track, EFE. Therefore, the regulator's role in promoting competition is particularly important, not only in preventing monopoly exploitation but also in facilitating non-discriminatory access to the infrastructure. In practice this means not only regulating charges and access conditions but also the process of timetabling and the allocation of paths, and possibly access to other essential facilities such as depots and terminals.

A further crucial point about rail, which tends to make it different to most other regulated utilities, is that there is a *prima facie* case for subsidy in terms of economies of scale within the sector and in terms of the failure to charge appropriately on competing modes. For these and for other political reasons, European governments have typically intervened heavily in rail industry decisions,

particularly in the passenger sector. However, there remain debates as to how much to subsidize the industry and whether to channel the subsidy into the infrastructure or the operations. In this situation, an essential role of the regulator may be to protect private entrants from arbitrary decisions by the government. For instance, in regards to the level of finance it will provide to the infrastructure manager and, therefore, the capacity and quality of the infrastructure over which the private operators run. This can create potential conflicts between the regulator and the government.

In considering the arguments for regulating the access charges of the rail industry, there are three roles that a regulator might perform: (1) preventing the monopoly infrastructure manager from exploiting their market power to the detriment of the public interest; (2) facilitating non-discriminatory access to the infrastructure, in particular where the infrastructure manager is linked with one or more of the train operators; and (3) protecting the train operators from arbitrary decisions by the government regarding the level of finance it will provide to the infrastructure manager.

4.2 Railroad regulation in Chile

There is no railroad regulation in Chile beyond general security and environmental restrictions in the legal codes that apply to the transport sector (CITRA 2008). Until 1993 EFE – and implicitly the entire sector – operated under the 1931 Railway Transportation Law, even when most of its provisions only pertained to state-owned railways and were obsolete or in direct opposition to other more modern regulatory provisions. For example, the 1931 Law granted EFE the monopoly of railroad operations in Chile and restricted asset divestiture. In spite of this, EFE has privatized a substantial share of its activities, including all of the Northern Railroad. As mentioned, in 1993 EFE was given a new charter which changed its rights and

obligations, but *de facto* the private and public sector continues to operate according to the 1931 Law. This law is a slightly amended version of the 1925 Law. Among other peculiar provisions it requires transporting mail for free, free transporting of rolling stock from universities and granting free passes for authorities.

Likewise, there is no regulatory body in charge of railroad operations, nor an agency responsible for the strategic, long-term planning for the industry. Formally, the Ministry of Transport and Telecommunications is the industry authority (LIBRA 2007). In practice it has never issued any significant regulation and its strategic planning comprises only a few, largely descriptive and irrelevant studies.

An historical explanation for the absence of regulation and regulatory agencies is the prevailing opinion that the state-owned monopoly would not require a regulatory body and that any regulation could be better channelled and implemented directly by EFE. In fact, over the years EFE has passed a series of internal regulations for its operations that became the norm for the few private-use railroads servicing mines and seaports in the north. However, this does not justify the lack of regulation after reforms and particularly after recent privatizations.

The 1993 Charter Act for EFE gave the company the capacity to undertake new businesses, divest assets, form joint ventures and disintegrate its operations vertically and horizontally. This, in practical terms, corresponds to a major change in regulation for the sector and certainly affected the operation of the entire industry.

The fact that this structural change was based in and affected mainly the public-sector indicates the nature of its limitations and the difficulties it poses for enacting much needed sector regulations (see below). In particular, the changes in the regulations channelled via the incumbent company used *ad hoc* procedures which increased regulatory risks and opened space for lobbying and capture.

4.3 Unregulated privatization

Consider first the case of the Northern Railroad. In a competitive bid in 1995 FERRONOR acquired the complete railroad, i.e., tracks, rolling stock, fiscal land, buildings, terminals and other facilities. According to Chilean law, the bidding process did not discriminate between domestic and foreign firms, nor did it require licensing, quotas or any restriction on the participation of the private sector in the railroad industry. Nine companies participated in the auction of the Northern Railroad, including foreign companies (such as Spanish RENFE, American Railroad Development Corporation and British RAILTEX), large size Chilean companies (CAP and CSV) and consortia formed for the sole purposes of participating in the auction. FERRONOR was owned initially by Chile's APCO (45%) and USA's Rail America (55%): APCO purchased Rail America's share in 2001.

As a result of the privatization, the Northern Railroad now operates as an unregulated, vertically integrated enterprise. The privatization process considered no provisions for preventing the infrastructure monopoly from exploiting their market power or for facilitating non-discriminatory access to essential facilities (i.e., the track), although the government required the winning company to undertake the maintenance of the entire track.

Since privatization FERRONOR concentrated its operations in a few segments of the market, eliminating small volume loads and general cargo, and focusing only on large operations (e.g., minerals and sulphuric acid) and long-term contracts. As noted by Thompson (1999), private-sector railway managers were not interested in carrying freight at rates equal to or below their marginal costs, and they expected all the traffic transported to at least help to finance fixed costs. Therefore, although the volumes transported have more than tripled with privatization, some types of freight ceased to be transported by rail.

Table 3 provides information of the performance of FERRONOR after privatization. There is evidence that the social benefits after privatization may have been increased substantially. It can be seen that freight transport increased markedly for two years after privatization, indicating that the privatized firm was able to restructure production towards more efficient use of resources. This is also indicated by the increase in physical labour productivity: transport in tons*km per worker increased by around 200%. However, four years after privatization physical labour productivity and transport volumes had not grown, while revenues continued to rise. This would indicate a restructuring of operations towards more profitable segments of the market because tariff charges reduced after privatization by around 36% (Thompson et al. 2001).

A key, but largely unexplored, issue whether forcing FERRONOR to grant access to its essential facilities would change market conditions for entry and efficiency. A mostly descriptive study by LIBRA (2007) indicates that entry in the short run is unlikely for several reasons, even if full access were granted. Firstly, the market for large volumes and long-term contracts is restricted to current mining operations and is unlikely to expand significantly in the future. Secondly, competition from trucks in general freight is intense and benefits from the absence of tolls on roads and lax environmental regulations. Thirdly, the rail track beyond what is being used (17% total) is in poor condition and would require substantial investment to yield the high-quality/low-cost services required for trains to compete effectively with trucks.

Table 3: FERRONOR's operations after privatization.

	1997	1998	1999	2000
Freight transported (,000 tons)	1,300	3,900	5,900	6,300
Total revenue (USD m)	7.9	15.3	21.0	23.7
Expenditures (USD m)	6.3	10.6	15.3	17.7
Productivity I (revenue per worker USD)	35,300	63,000	77,800	82,000
Productivity II (m ton*km/worker)	0.84	2.11	2.57	2.57

Source: Elaborated from The World Bank Railways Database

In addition, FERRONOR allows other carriers to use the track, charging an unregulated toll that is directly negotiated between the parties. In principle, the ownership of an essential facility such as the track would indicate that FERRONOR could exercise monopoly power. However, the consumers are large mining operations with substantial resources and the ability of making credible threats to the company. This may have counterbalanced the potential market power of FERRONOR, but certainly a regulated price could benefit small consumers unable to negotiate on equal footing with the company. But there have been no complaints to the Antitrust Commission against FERRONOR.

4.5 Regulated concessions

Consider, in contrast, the divestment of freight in the Southern Railroad. As indicated, EFE divested its freight operations by first creating a subsidiary FEPASA and then auctioning its concession to the private sector in 1995. Three companies bid for the 51% of FEPASA: Consorcio del Pacífico S.A., Compañía de Transportes Ferroviarios S.A. and Cruz Blanca S.A. The last named won with an offer of around

USD30 million. The remaining 49% of the property was to remain in the hands of EFE (which expected annual dividends of around USD15 million), but it later sold an additional 30% of its participation to IFC and Latin American railway investors. A second private carrier – TRANSAP – entered the market in 2001. Concessions consist of non-exclusive 20-year contracts that allow free entry of carriers to facilities and require the payment of fixed and variable tariffs for the use of the infrastructure. The track remained in the hands of the state and, consequently, EFE is required to provide maintenance for the tracks and facilities as well as the path and to schedule services.

Following the trend in railroad reforms in several countries, EFE concessions provided some elements of vertical disintegration and attempted to generate competition among carriers. As noted by Pietrantonio and Pelkmans (2004), vertical separation helps identify the true cost of running the railway and the eventual subsidy needed to allow safe and reliable infrastructure. Removing and preventing cross-subsidisation, in turn, creates fair conditions for potential entrants. Ideally, too, vertical separation helps reduce the asymmetries of information in the railway business, which is traditionally prone to hide cost structures and discourage performance.

Thompson et al. (2001) have calculated that FEPASA tariffs are around 40% lower than those prevailing before privatization, thus indicating a substantial benefit to consumers. Nevertheless, it should be acknowledged that both private carriers in the Southern Railroad have operated in the same manner as FERRONOR in the Northern Railroad, i.e., by exploiting market niches rather than providing a full range of services to the general public. They have concentrated their business on the transport of bulk commodities in large volumes (paper pulp, iron ore etc.) and not in general freight, where competition from trucks is intense. This would indicate that the freight operations have benefitted mostly from better management, but not

necessarily by improving efficiency to the point of being competitive with trucks beyond their current level.

Table 4 presents data on the performance of FEPASA. The effects of the change in management can be seen: although traffic volumes did not increase in the initial years after privatization, revenue and traffic per worker increased markedly. This slow beginning was the result of numerous problems relating to labour and line rehabilitation. It was only after a decade of operations that traffic and revenue per worker expanded markedly, indicating the long-run development of the market. Note FEPASA's relatively low profit levels.

Table 4: FEPASA's operations after concessioning.

	1995	1997	1999	2001	2009
Freight transported (,000 tons)	4,333	3,981	4,810	5,395	7,100
Total revenue (USD m)	29.9	28.9	29.7	32.4	56.5
Expenditures (USD m)	26.0	24.8	32.2	32.4	53.0
Productivity I (revenue per worker USD)	57,700	68,800	68,000	64,800	114,342
Productivity II (m ton*km/worker)	1.52	1.73	2.31	2.61	2.69

Source: Elaborated from The World Bank Railways Database and FEPASA

The contract signed by FEPASA included the payment of a fixed fee to EFE for track maintenance and path and scheduling services. The subsequent entry of TRANSAP to the market indicates that this fixed payment was relatively low and did not deter entry. TRANSAP's entry was motivated by a change in sanitary and environmental regulations that prohibited truck transport of sulphuric acid through urban areas, thus leading a major mining operation to transfer the service to the private railway. In time, TRANSAP operations began to diversify which suggests that

long-term contracts may be an important requirement to start operations as they guarantee the amortization and recovery of fixed costs (typically in rolling stock and reputation) and lower risk.

Determining the fixed and variable fees is controversial. As noted by Pietrantonio and Pelkmans (2004) for the OECD, the adoption of marginal cost pricing is problematic on economic grounds. The drawbacks include arbitrary cost allocation rules in the presence of large economies of scope and relatively large common costs, a non-optimal incentive system and, possibly, anti-competitive effects of two-part tariffs. EFE has complained of unfair competition from trucks as road tolls are too low to cover their marginal social cost and that this, in turn, artificially lowers the demand for rail transport of freight. It has asked for a permanent subsidy of around USD0.1 per ton*km transported.

Concession contracts are usually subject to renegotiation. In the Chilean case legal disputes arose with regards to EFE's inability to upgrade (and even maintain) the quality of tracks as required by the original contracts. There have been, however, no complaints about the fixed and variable tolls that private carriers must pay for the use of the essential facility (tracks and other facilities).

4.6 Remnants of the past

EFE continues operating the passenger service despite incurring in heavy losses (USD65 million in 2009). The market share in interurban transport continues to shrink and the quality of services is low in terms of comfort and frequency. Accidents are relatively frequent (at a rate 10 times higher than that in the USA) and costly: LIBRA (2008) estimated the social cost of accidents at around USD16 million in 2007 only.

The continuing losses of EFE indicate that the original purpose of the reforms, namely to avoid fiscal costs, has not been met and that subsidies continue to drain public resources. Moreover, such losses negatively affect EFE's ability to raise funds for other important tasks such as the maintenance of the track and facilities and the much-needed upgrading of several railway components that have become bottlenecks for the operations of the system. These include expanding single to double tracks to eliminate traffic bottlenecks, improving communication systems etc.

EFE's Board of Directors have acknowledged that, from a social point of view, only two of its passenger services (Metrotren and Merval) are justifiable since financial losses are less than the estimated social value of the positive externalities derived from its operations (EFE 2009). The obvious reform to passenger services should be the closing of operations that are not socially justifiable and concentrating on those that are. The government, however, has been reluctant to undertake these measures and to bear the likely later political costs of closing down services. Decisions have been made in the opposite direction. In 2003 EFE embarked on a USD1 billion investment project to re-start passenger services as noted above. Likewise, despite a negative social evaluation of the project, a suburban train system was launched in 2005 in Concepción with an implicit subsidy of USD0.41 per km/passenger.

This indicates the value of isolating the management of EFE from political pressures. Currently, the Chilean president directly appoints EFE's chairman and board thus adding the appearance of political considerations to the nomination and encouraging interest groups (e.g., regional authorities) to press for subsidized services. Measures aimed at higher levels of transparency, accountability and independence from political contingencies are an indispensable component of any successful reform proposal.

In addition, it would be advisable to separate passenger services from the track operations. EFE's Board has proposed creating a separate company to manage the railroad infrastructure, probably as a first step for further privatization (EFE 2009). Independent observers have also suggested that subsidiaries should be created for the existing passenger services in order to make costs and resource allocation transparent. Alternatively, separating costs would provide sufficient information to undertake appropriate policy reforms, avoiding the coordination problems of having separate companies. Asmild et al. (2005) found that in 23 OECD economies there was a clear positive effect on operating efficiencies of the cost transparency following from accounting separation. But whether there is an additional benefit through complete separation or whether the potential coordination problems outweigh the benefits remains unanswered.

5. Summary

For almost a century, railroads in Chile were an exemplar of modernization, integration and economic development. By the 1970s railroads were both bankrupt, surviving on government subsidies. Reforms initiated in the 1990s managed to revitalize freight transport by transferring operations to the private sector, but passenger services virtually disappeared.

The process of this reform of the freight industry provides examples of different types of reform: (1) unregulated vertically integrated privatization; and (2) a regulated, vertically disintegrated concession with state control of the essential facilities. Neither of these reforms was designed to optimize the working of the industry, nor do they fit in an integrated transport regulated system. They stem from the government's desire to cut financial losses and to avoid political damage in running a bankrupt system. Reforms were made to a large extent on an *ad hoc* basis.

Nevertheless, they complied with the standard Chilean norm of divesting publicly held assets using competitive, non-discriminatory and largely transparent bidding processes.

Both reformed sectors achieved significant efficiency and welfare gains and, in this sense, reforms have improved the industry operations. Nevertheless, at the starting point was quite low, making it easier to achieve such gains. The question remains of whether alternative divestiture procedures would have achieved better results.

In particular, the privatization of the vertically integrated Northern Railroad without provisions for the open access to essential facilities such as the track, yards and terminals raises the question of potential market power on the part of the incumbent. Declining tariffs and absence of complaints indicates that potential monopoly power may have been counterbalanced by the large economic size of the mining operations that are the main customers of the railroad.

In contrast, freight concessions in the Southern Railroad using long-term contracts seem to have bridged the open-access issue successfully, but have not been able to provide an effective solution to managing the essential facility by the state incumbent. While usage fees may provide for maintenance and system improvements, resources have been used to cover losses in passenger transport, a segment of the industry with no competitive advantages and apparently destined to disappear in the long run.

Reforms were dictated by fiscal balance reasons rather than aiming at improving the working of the railroad industry for consumers or with a strategic vision of the future needs of the transport sector. Consequently, reforms fell short of

providing a new, more efficient regulatory framework for the industry, in particular with regards to regulation in several areas. Four issues remain:

- Firstly, reforms reduced but did not stop losses of the incumbent public firm in passenger transport. Subsidies continue to drain public resources.
- Secondly, such losses negatively affect EFE's ability to undertake important tasks such as the maintenance of the track and facilities and the much-needed upgrading of those components that have become bottlenecks for the operations of the system.
- Thirdly, the reforms did not provide for an adequate institutional setting capable of isolating the management of EFE from political pressures. Likewise it did not increase transparency.
- Fourthly, the absence of a transport authority capable of integrating externalities, security considerations and environmental issues unnecessarily complicates the operation of railroads.

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