



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

RAIL HARMONIZATION IN MEXICO AND NORTH AMERICA: IMPLICATIONS FOR AGRICULTURE

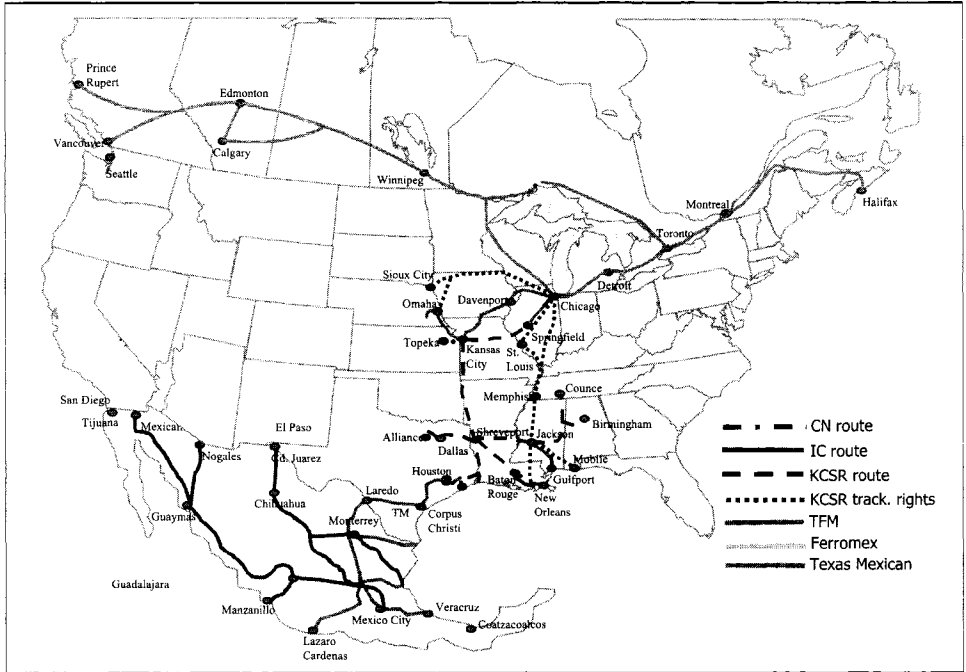
Barry E. Prentice, Wade Derkson and Arnold Maltz

INTRODUCTION

The North American railway landscape has changed significantly and irreversibly in the last few years. A "NAFTA railroad" has emerged with the acquisition of the Illinois Central (IC) by Canadian National (CN) and the subsequent marketing agreement with the Kansas City Southern (KCS). The largest Canadian railway, itself privatized only a few years ago, now offers single-line access to the Mexican market with the privatized *Transportación Ferroviario Mexicano* (TFM).

From a shipper's perspective, the new map of North America increasingly resembles a hyperlinked web page, "with the shipper able to start anywhere and end up in places he or she never imagined." (Possehl, 1998). Few North American shippers would have imagined a railway system that could include the much-maligned Mexican rail links. However, the once disparate parts of the North American rail network have re-emerged under private control with the promise of integrating NAFTA trade, and in particular, the trade of agricultural products.

This paper examines the implications of the Mexican rail concessions for NAFTA trade of agricultural products. Specifically the paper focuses on whether or not privatization, particularly of the rail links in the Northeast (TFM) and the Pacific North (Ferromex), are likely to support overland movement of agricultural products within the three NAFTA signatories. The effect of rail privatization on freight rates is especially important because the geographic flow patterns of low-valued bulky agricultural commodities such as grains are sensitive to transport and logistics costs. In the new market environment, railway costs and demands, and intramodal/intermodal competition will determine freight rates in Mexico.

Figure 1: NAFTA Railroad System, 1999

Source: Authors' calculations.

The potential for change is also significant in non-grain agricultural markets, such as northbound perishables from Sinaloa. Currently Sinaloan winter fresh fruits and vegetables move almost entirely by truck to warehouses at Nogales, Arizona. Privatization of the Pacific-Northern links (Ferromex) should mean greater intermodal opportunities for Mexican shippers. However, this will require both investment in intermodal facilities and equipment, and the willingness of shippers to try the rail intermodal option or, stated another way, marketing the services.

THE ROLE OF RAILWAYS IN THE MEXICAN ECONOMY

The history of the Mexican railway closely parallels the overall history of the country. The network was originally financed and built by private interests – mainly foreign – in the 1890s before being ruined by decades of revolution¹, then nationalized and subsequently neglected as a state entity. During WW II the system flourished briefly before deteriorating rapidly in subsequent years. The network has grown by only 0.3 percent since 1950. In this period, the Mexican government served mainly to consolidate the network and is credited with creating a network with sufficient economies of scale (Ferrier and Ibarra, 1998).

¹ It is estimated that almost 50 percent of Mexico's rail infrastructure and equipment was destroyed during the period 1910-17 (Jimenez and Mendosa, 1996).

With the rapid rise of trucking in the 1950s and 1960s, rail's economic role was reduced essentially to carrying cargo that could not move by truck. Despite growing trade volumes and subsidies, the state-owned Ferrocarriles Nacionales de México (FNM) continued to lose market share to trucks, from almost 20 percent in 1980 to just 9 percent in 1996. In terms of the value of freight carried, the railway's market share fell to less than 6 percent by 1996 (Jimenez and Mendoza, 1996). However, the amount of tonnage carried by Mexican railways has increased in recent years. Current estimates put rail's overall market share at around 12 percent. (Table 1).

Table 1: Railway Cargo in Mexico, 1989-1997

1989	1990	1991	1992	1993	1994	1995	1996	1997
(Millions of tonnes)								
53.9	51.0	46.4	48.7	50.4	52.1	52.5	58.8	60.6

Source: SCT

Privatization of FNM became inevitable in the 1990s. The company's operating losses (U.S.\$460 million in 1995), poor productivity, underperforming assets, falling prices and, of course, continuously declining market share to trucks, left the Government of Mexico with few other alternatives. After reviewing the experiences of other countries (for example, New Zealand), the Mexican government decided on segmenting the FNM into three vertically-integrated linehaul concessions, a Mexican City Terminal concession and a number of light density shortlines, along the North American model. The government's concession scenario sought to preserve economies of scale, attract private investment and foster intramodal as well as intermodal competition (Secretaría de Comunicaciones y Transportes, 1995). The Mexican government was motivated by the need to promote private-sector operating efficiencies in the railway industry (Mercer Management Consultants, 1998).

In this spirit, the government took steps to encourage labour productivity. Table 2 presents an account of the downsizing of the FNM labour force. Between 1988 and 1996 the number of employees was halved, with most leaving since 1991. However, the impact on rail costs has taken longer to emerge because of the increase in the number of pensioned employees. Spurred on by the peso crisis of 1994, privatization of Mexico's rail system proceeded faster than the government had originally planned. The Mexican government was originally reticent to proceed with privatization even though the inefficiencies and problems of the FNM had long been recognized, because it was felt that competition with trucking was not feasible on a large scale given inadequate railway-supporting infrastructure. Indeed, rail's inability to compete intermodally was implicitly recognized in the deregulation of the Mexican motor carrier industry in 1989. (Texas-Mexico Transborder Transportation System, 1991). In the end, the Mexican government opted for a rapid transition toward privatization, wishing to avoid the problems experienced in New Zealand, and in the Conrail case in the U.S.² (Ruiz, 1998).

² In New Zealand, privatization took many years, while in the Conrail case the state government invested \$5 billion to restructure it before later selling it for \$3 billion.

Table 2: Evolution of FNM Labor Force, 1988-96

Year	Active Employees	Pensioned Employees
1988	81248	37142
1989	82928	39807
1990	83290	41921
1991	78114	42669
1992	58626	49154
1993	55664	50449
1994	49323	52681
1995	46283	50764
1996	44139	51972

Source: FNM Serie Estadística, 1996

The manner in which the FNM was concessioned into three main lines (along with several shortlines – some of which have yet to be privatized), was designed to ensure strong intramodal competition. At the same time, extensive private sector investment combined with rail economies of scale is expected to improve rail's competitive position versus trucking (Secretaría de Comunicaciones y Transportes, 1995).

For our purposes the two mainlines in the north, the TFM and Ferromex, are of most interest, but the general thrust of the concession program is as follows.

Northeast Railway. The “crown jewel” of the Mexican system was won by the consortium of TMM (37.7 percent), KCS (37 percent), FNM (the Mexican government, 24.5 percent) and Grupo Servia, TMM's parent company (0.8 percent). The winning bid of U.S.\$1.4 billion represented 7.7 times current revenue, a vote of confidence for rail's enormous potential in a growing Mexican market. Seventy percent of TFM's revenues are linked to foreign trade and, while accounting for only 19 percent of total track, the TFM carries more than 40 percent of Mexico's rail cargo (FNM, 1996). About 20 percent of the TFM's total traffic of almost 600,000 carloads in 1996 was agricultural products (FNM Series Estadísticas, 1996). Nevertheless, as Table 3 shows, TFM has made little headway in improving its share of the northbound business through Laredo.

Ferrocarril Mexicano (Ferromex). After failing in its bid for the Northeast concession, Union Pacific joined with the mining company Grupo México to purchase 100 percent of the FNM's remaining northern and Pacific lines for U.S. \$527 million.³ In contrast to the Northeast line, almost 70 percent of Ferromex's traffic is domestic. Historically its biggest traffic segment has been minerals, but agricultural products (in particular, corn) constituted 25 percent of its 550,000 carloads in 1996 (FNM, 1996) and is currently the driving force. The other big growth opportunity for Ferromex is intermodal traffic in the Hermosilla-Nogales and Eagle Pass/Piedras Negras-Salttillo corridors (See Table 3). Ferromex is investing in

³ UP recently doubled its stake in Ferromex to 26 percent from 13 percent.

containers and expanding service in both lanes, improving its terminal in Guadalajara and planning an intermodal terminal outside Mexico City to supplement the Pantaco facility (Vantuono, 1998).

Table 3: Weight and Value of Exports from Mexico through Laredo and Nogales

	Laredo				Nogales			
	Truck		Rail		Truck		Rail	
	Kg	US \$	Kg	US \$	Kg	US \$	Kg	US \$
Jan '96	344.6	857	174.3	676	254.2	290	50.2	124
Feb '96	377.3	923	168.4	677	276.9	321	47.4	122
Mar '96	388.4	955	184.6	720	311.6	341	54.3	112
Apr '96	411.8	985	176.9	688	300.8	413	50.4	90
May'96	428.8	1,100	180.9	753	167	323	54.3	133
Jun '96	387.2	1,050	220.7	767	166.9	259	47.9	154
Total	2338.1	5870	1105.8	4281	1477.4	1947	304.5	735
Jan '98	454.1	1,250	168.9	550	265.1	434	53.7	95
Feb '98	675.1	2,150	164.3	585	265.6	403	37.2	48
Mar '98	522	1,687	217	764	330	492	67.9	181
Apr '98	518	1,525	168	552	331	445	75	167
May'98	520	1537	205	661	264	415	79.7	171
Jun '98	532	1640	204	622	198	430	85	152
Total	3221.2	9,789	1127.2	3734	1653.7	2619	398.5	814

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, www.bts.gov/transborder/prod.html, monthly file D11.

Southeastern Railway (FerroSur). The third main line privatization, FerroSur, was completed at the end of 1998. FerroSur is owned by a holding company made up of a construction company (Grupo Tribasa) and a bank (Banco Imbursa).⁴ FerroSur operates the 900-mile main trunk lines to the ports of Veracruz and Coatzacoalcos. These ports have had the largest share of grain imports and account for significant volumes of coffee, banana and other tropical food exports. Service reliability and equipment shortages have handicapped grain movements by rail from these ports (Prentice and Guzman, *TRF*, 1994). Of the 350,000 containers handled by the Port of Veracruz, trucks deliver 99 percent. (Vantuono, 1998).

Shortline. Some rail segments were considered too critical and others too doubtful to become part of the three main concessions. A terminal railway to serve interchange functions at Mexico City was concessioned separately as the Terminal Ferroviario del Valle de México (TFVM). The rail link across the Isthmus of Tehuantepec was not included in the FerroSur concession because of the long held vision of a high-speed Atlantic-Pacific container corridor. The future of the 500-mile link between Coatzacoalcos and Metida is yet to be decided. This route to the Yucatan has some of the weakest rail infrastructure and traffic volumes in Mexico.

⁴ Canadian Pacific Railways had contemplated the purchase of Ferrosur but pulled out at the last minute.

MEXICO'S RAILROADS AND EXPORT TRADE

Of particular interest is how much of Mexico's rail traffic is tied to foreign trade. Table 3 shows the northbound shipments received at the U.S. border through Laredo and Nogales. These two ports were chosen because of their well-documented role in agricultural trade. Some interesting observations can be made. First, it appears that rail traffic is gaining some ground through Nogales. The first six months of 1998 shows a 30 percent tonnage increase over the similar 1996 period. There is considerable seasonality, as expected. On the other hand, rail tonnage through Laredo did not grow between 1996 and 1998, although truck traffic increased considerably. One explanation for this difference is that TFM has experienced greater-than-anticipated growth in the domestic market (Vantuono, 1998).

As expected, the unit value of rail exports decreased between 1996 and 1998, suggesting that rail is penetrating lower valued agricultural shipping markets. It should be noted, however, that rail unit values are higher than truck at both ports, probably reflecting the huge share controlled by the automotive assembly factories.

OVERALL RAIL MARKET SHARE

At between 10 and 12 percent, Mexican rail's overall market share is significantly lower than in the United States and Canada where the corresponding figure is 35-40 percent (WESTAC, 1997). In the case of Mexico, however, it has been noted that rail only competes directly with trucking for only 250 million tonnes of the approximately 500 million tonnes moved overland in Mexico due to the railways's more limited geographic reach. This was tested in a model developed by Rico et al (1995). The authors estimate that 50-60 percent of the amount of freight *currently moving by truck* (i.e. 450 million tonnes) could *potentially move by rail* (based on a network size of that in 1995), or almost 200 million additional tonnes. A modal shift on that order would bring the Mexican rail industry more in line with its North American counterparts in terms of market share. However, this is unlikely. A more pragmatic estimate suggests that rail has good opportunities to increase its total tonnage carried to 125 million tonnes by 2003, or 25 percent of the total market share (Rico et al, 1996).

The FNM's main limitations were neither track and other rail infrastructure,⁵ nor rail tariffs. However, the Secretaría de Comunicaciones y Transportes (SCT) determined that the FNM's distance-based tariff structure made the railway uncompetitive and unprofitable in many markets (Prentice and Guzman, 1994).

The cross subsidy implicit in FNM rates creates a bias towards marine shipments of grain. The Port of Veracruz is only 424 (rail) kms. from Mexico City, while Laredo, Texas is approximately 1,200 kms. away. The 424 km. route from Veracruz climbs over 10,000 feet, and entails many tight curves and steep grades.

⁵ In fact, track conditions were better than most imagined. See "The Great Railway Sale," *U.S./Mexico Business*, November, 1997.

Unit trains on this route are restricted to 36 cars. In contrast, the route from Laredo has more gradual grades and long sections of straight track that permit 90 car trains (these trains may be broken in sections of 45 cars out of Monterrey where steep grades are encountered). If FNM rates were based on true costs, grain movements across the U.S.-Mexico border would be much more competitive with the gulf ports. (Prentice and Guzman, 1994: 821)

In an Origin-Destination analysis for 118 city pairs, comparing tonnage, distances, tariffs and transit times for both rail and truck, Rico et al conclude that tariff structures between the two modes "played a relatively small role in determining the overall market share, compared to time of service." (Rico et al, 1995). In the Mexico City-Nuevo Laredo corridor, for example, rail's transit times were 67 hours in 1994 compared to just 20 hours for truck. This time difference helps explain trucking's near-dominance even in Mexico's long haul markets. Perhaps more important, but less quantifiable, are the myriad of issues related to overall service quality that made shippers loathe to try the FNM.

Service times have improved dramatically since the TFM took over the northeast line. According to a recent article in *Railway Age*, the same Mexico City-Nuevo Laredo move is down to less than 50 hours and operators are targeting a 33 hour journey once improvements to the northeast line are completed (Vantuono, 1998). Moreover, TFM-owned back-order cars have dropped from 40 percent to 20 percent. The year-end goal is 6 percent from combined foreign and domestic back-order cars (Vantuono, 1998). New management of the Mexican rail lines is also moving to improve service. For instance, the catenary of the 156-mile Queretaro-Mexico City "electrified" railway is being removed to accommodate double-stacks and tri-level auto-racks. Similarly, the electric locomotives inherited from the FNM are being traded in or stored. A new Sanchez rail yard is being constructed 11 miles south of Nuevo Laredo to handle all customs clearance. This will eliminate stopping on the Tex-Mex Rio Grande bridge and double the bridge capacity to 40 trains per day (Vantuono, 1998). However, the results in Table 3 suggest that winning back northbound traffic will likely take time, even with these improvements.

AGRICULTURAL TRANSPORT WITHIN NAFTA

Agriculture is the most sensitive sector of Mexico's economy when it comes to NAFTA. Mexico has reduced tariffs and non-tariff barriers to agricultural trade, but the use of contingency measures (primarily anti-dumping) has increased and mandatory standards (labelling and marking requirements) are more enforced. NAFTA does not account for some of the changes that have taken place in agricultural markets, particularly between Mexico and the United States. Disputes have occurred over sugar, grains (corn), and fruits and vegetables (apples and tomatoes).

Essentially two overland agricultural markets are affected by Mexican rail privatization. One is southbound grain shipments, which have mainly entered Mexico through the Laredo/Nuevo Laredo gateway. The other is winter vegetables

and fruits from Sinaloa that enter the United States predominately through Nogales (Klindworth and Martinsen, 1995). These two markets are addressed individually below, although weight data are only available on northbound traffic.

Grain Transport To Mexico

Mexico is an unique export market for grains because of the many transport options available to shippers (Klindworth and Martinsen, 1995). Grain transport is also a good example of how transportation problems impact upon agricultural markets across borders. When faced with severe rail delays caused by the UP crisis in the spring of 1998⁶, soybean crushers in the United States were forced to trim production and raise prices.

Mexican agriculture has fared poorly under NAFTA. Consequently, Mexico has become an important importer of U.S. grains and oilseeds in the 1990s (principally corn, sorghum, wheat and soybeans), almost half of which enter via overland crossings on the U.S./Mexico border. The main gateway, by far, is Laredo. Historically, U.S. railroads transported grains originating in the United States to the border where they were transferred to the FNM for distribution to Mexican markets, mainly in the center and south of the country.

Recent developments in the Mexican grain handling and storage system also impact upon trade flows. In recent years Mexico embarked on a gradual process of privatization of the grain storage system and reduced price support (indirect subsidies) to the agriculture sector. Aserca, the government institution that provides funds and technical support for agricultural marketing, cut funding by 66 percent in 1998.

Mexico has privatized two-thirds of its national grain warehouse company, ANDSA, which comprised about 70 percent of the country's total warehouse space. Previously used to store mainly grain, the new businesses are integrating logistics, transportation, marketing and financial services. This development is expected to impact favorably on grain prices as well as transportation rates and services (Cardenas, 1998). For example, the construction firm ICA paid 621 million pesos for 100 percent of southern warehouse group, Alsur, and plans to develop better transport/logistics between Veracruz and Mexico City, while using its Ferromex rail concession to bring grain to Alsur facilities (El Financiero Weekly International, February, 1998). The latter is a good example of the kind of integrated approach to grain handling and transportation that was previously lacking in Mexico, and which still remains a problem. In many cases the system as a whole is caught in the intractable position where the railways need better grain handling facilities, while the grain warehouses need better transportation (rail) services (Cardenas, 1998).

⁶ In March 1998 UP was forced to embargo all southbound shipments to Mexico because of a year's worth of backlog of over 5,500 cars stretching from Laredo to Kansas City. The embargo most seriously affected bulk grains and other low-valued commodities; auto parts and containerized freight still moved, albeit more slowly.

A recent study suggests that privatization and subsequent improvement of Mexico's railways will increase U. S. overland grain exports to Mexico by 3 million tonnes. Three quarters of this volume will move through the Laredo gateway and onto the TFM system. The anticipated volume increases reflect the significant reductions in transportation costs under private operations and the concomitant increase in intermodal competition which will keep rates only modestly above variable costs (Fellin and Fuller, 1998). For this to happen, however, TFM must move more northbound traffic. Otherwise the cost of moving empty cars back to Laredo may mean that the rates envisioned above will not even cover variable costs. In comparing pre-and post- privatization scenarios, Fellin and Fuller calculate that the difference in rates from the U.S. border to Central Mexico will fall from approximately \$24-\$27/tonne to \$19/tonne.

Perishables Trade And Logistics

The poor state of Mexican highways (or the high cost of Mexico's toll roads) ought to constitute a "window of opportunity" for rail to compete for northbound perishables from the Pacific North regions (mainly Sinaloa) via Nogales but hinges on the ability of the railways to offer a viable intermodal service option (Beilock et al, 1995). This is a large challenge for the new Mexican concessions, particularly Ferromex. It should be noted that in the United States rail's market share (in terms of ton-miles) of perishables was only 4.2 percent in 1993 and is obviously a difficult market (USDA, 1998).

The vast majority of Sinaloan agricultural produce is transported by truck to U.S. border states and beyond through Nogales (Tables 2, 3). In the past, the Nogales gateway was preferred as an efficient handoff point to U.S. rail system (UP/SP). Notwithstanding the problems with UP in 1997/98, one would expect that Nogales should continue to be a preferred option for shippers. And, in fact, there already has been an increase in rail traffic through the Nogales gateway (Table 3).

During the 1980s significant volumes of Sinaloan winter vegetables were shipped to Nogales via trailers on flat cars (TOFC). However, FNM's inability to deliver consistent quality service and poor maintenance of equipment brought an end to the TOFC service. This intermodal service could be using doublestack containers instead of trailers (Beilock et al, 1995). Ferromex recently claimed to handle 6,000 containers per year but has the lofty goal of moving as many as 30,000 by the end of 1999 (Vantuono, 1998). Such volumes of northbound perishables would contribute significantly to easing the north-south freight imbalance that exists in Mexico. The trade lane imbalances particularly hurt the rail industry's cost structure compared to trucking, because of the charges for repositioning empty units (Rico et al, 1995).

At this point there is little evidence of increased rail involvement in fresh fruits and vegetables. Over 99 percent of all Mexican fruits and vegetables (TSUSA Classifications 07 and 08) continue to arrive at Nogales by truck (Table 4). Even if one assumes that the Ferromex container traffic is counted as "truck" in U.S. customs

data, rail's share is quite small. Assuming an average weight of 20,000 kg per container or truckload, the data are consistent with over 240,000 trailers/containers per year moving perishables into the U.S. Ferronex's indicated share at that point might be 10 percent, if Vantuono's assumptions are consistent with our own.

Clearly, there is potential for increased rail share in the northbound fruit and vegetable traffic. But greater movement of perishables by rail requires improvements in intermodal terminals and equipment. These and other infrastructure/investment issues are treated below.

Table 4: Weight of Fruits/Vegetables Imported from Mexico (Million kg)

	Truck	Rail	Total	% Rail
Jan '96	352.0	13.5	365.5	
Feb '96	385.1	0.9	386.0	
Mar '96	485.9	1.1	487.0	
Apr '96	491.0	1.0	492.0	
May '96	299.3	0.9	300.2	
Jun '96	229.3	0.3	229.7	
Total '96	2242.7	17.7	2260.4	0.78
Jan '98	371.0	0.1	371.0	
Feb '98	381.9	0.1	382.0	
Mar '98	504.3	0.0	504.3	
Apr '98	497.1	0.0	497.1	
May '98	388.7	0.2	388.9	
Jun '98	332.7	0.2	332.8	
Total '98	2475.7	0.5	2476.1	0.02

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, www.bts.gov/transborder/prod.html, monthly file D9.

INTERMODAL INFRASTRUCTURE

The link between investment and economic liberalization is apparent in the rail sector. Without substantial infrastructure investment in intermodal and multitmodal transportation, the competitiveness of Mexican production will be limited in the more competitive trading conditions associated with NAFTA. In the short term, the new rail concessionaires are focused on capturing market share from trucks, but intermodal partnerships are an obvious future necessity. Among the capital improvements made by the TFM and Ferronex are the following:

- TFM has committed investments of U.S.\$ 1 billion. To date most of the improvements have been in railroad cars, rather than track, although TFM has already adopted Conrail tracking standards. In addition, longer siding, turnout panels and curves have been introduced, meaning that the old problem of trains having to back-up to the nearest station in order to pass each other, has been addressed (*El Financiero Weekly International*, May 1998).

- Ferromex has been less ambitious in its capital spending than TFM, committing \$130 million of a five year spending plan of \$500 million on capital improvements, mostly for motive power and car overhauls (Vantuono, 1998).

NORTH AMERICAN INTEGRATION AND STANDARDS

The new operators of the Mexican concessions will need to be fully compliant with the American Association of Railroads (AAR) and Federal Railroad Administration (FRA) rules before true North American rail integration can occur (Vantuono, 1998). Toward that end the following developments have taken place in Mexico:

- The Mexican government is establishing a similar entity to the FRA (currently railroad standards are the responsibility of SCT).
- As of June 1, 1998 the TFM is a full car-hire participant with U.S. carriers, ensuring protection for private car owners and for other railway's equipment.
- TFM is upgrading cars (gondolas and flat cars) to FRA specifications, but is 50 percent behind schedule as a result of growth in the domestic market.
- The three mainline concessionaires are in the process of creating a trade association equivalent to the AAR, which should positively affect car-hire rules and interchange/billing practices.
- TFM has recently finalized agreements with five U.S. railroad companies, including UP, BNSF and the Texas Mexican Railway, to facilitate cargo transfer arrangements between the United States and Mexico.

CANADIAN- MEXICAN AGRICULTURAL TRADE

Given the distances involved and climatic differences, Canada and Mexico should be logical partners in agricultural trade that can be carried by rail. Canada is a protein-rich country with a single harvest period, while Mexico has a large deficit in livestock and grain products, but an abundance of tropical and temperate horticultural produce that can be supplied year round. The advances in refrigerated containers and double-stack trains will ultimately see regular two-way trade north and south. At the moment, however, not even storable grains have moved in large quantities between Canada and Mexico by rail.

Political and commercial barriers to trade impede progress as much as the inability of the connecting rail lines to get their house in order. Canada is beginning to emerge from an over-regulated grain industry that encouraged/forced grain to move to Canadian ports for marine transport. Opening up the grain industry to competition and the CN-IC-KCS/TFM rail linkage could initiate the first tentative

steps toward north/south unit trains of Canadian grain to Mexico. A far more likely scenario however, is the so-called "knock-on" trade, whereby U.S. grain will likely move south to Mexico in increasing quantities, and Canadian grain will move south to back fill U.S. domestic demand.

Double-stacked "orange-blossom specials" from Mexico may seem fanciful at this time. Shippers are still suspicious of the reliability of reefer boxes on double-stack trains, and U.S. phytosanitary barriers to Mexican produce are unlikely to be overcome quickly. Meanwhile the political power of Florida tomato growers stands as a monument to "rent seeking" activity that has slowed the progress of NAFTA trade.

In addition to agricultural commodities, general freight commodities which are suitable for containerization and carriage by a wide range of intermodal options, are most likely to experience enhanced exports to Mexico. With the changes to the North American transportation landscape this means new opportunities for intermodal transport and possible new intermodal route offerings. One recent study finds that transit times for intermodal options from some Canada-Mexico O-D pairs are only 1.5 - 3 days longer than the fastest possible driving time with, of course, significantly lower transport costs (Bookbinder and Fox, 1998).

SUMMARY AND CONCLUSIONS

Privatization will almost certainly improve the competitive position of Mexican railroads vis-à-vis trucks. Since the FNM had already made some progress in labour productivity and substantial investment is expected in both the TFM and Ferromex systems, costs and service should continue to improve. 1998 export data indicate an increase in northbound rail share at Nogales, but not at Laredo. However, commodity level data suggest that rail is not carrying more fruits and vegetables through Nogales, which is puzzling. Perhaps other agricultural exports are being routed through Nogales, or perhaps the increase in Nogales rail traffic is not agricultural in nature.

The limited data available suggest that rail has an enormous opportunity because of its relatively small share of the freight market and its rapidly improving capabilities. Presumably, one of the best possibilities is increased fruit and vegetable export traffic. As noted above, there is still considerable skepticism about the reliability of rail transportation for perishable items. Judging by the data in Table 4, neither TFM nor Ferromex has turned the skepticism around in any major fashion. Once that is done, it appears that huge amounts of traffic are available to a properly-run Ferromex or TFM.

As for grains, U. S. overland grain exports to Mexico will jump by an estimated 3 million tonnes in coming years, reflecting Mexico's growing import dependency - even for corn - something many would have thought inconceivable. Three quarters of this grain will move through the Laredo gateway and onto the TFM system. The anticipated volume increases also reflect the significant reductions in

transportation costs expected under private operations; growing intermodal competition should keep freight rates only modestly above variable costs (Fellin and Fuller, 1998). For this to happen, however, TFM must move more northbound traffic. Otherwise the cost of moving empty cars back to Laredo may mean that the rates envisioned above will not even cover variable costs.

REFERENCES

- Beilock, R., R. Clemmons, J. Dunn, and B. Prentice. 1995. *Logistics and Perishables Trade Between the United States and Mexico*. University of Florida: Institute of Food and Agricultural Sciences.
- Bookbinder, James H., and Neil S. Fox. 1998. "Intermodal Routing of Canada-Mexico Shipments under NAFTA." *Logistics and Transportation Review*. 34(4). pp. 289-303.
- Cardenas, L. 1998. "Hacia un sistema integral de almacenamiento de granos." *El Mercado de Valores*. 7. pp. 22-26.
- Fellin, L., and S. Fuller. 1998. "Effects of Privatizing Mexico's Railroad System on U.S./Mexico Overland Grain/Oilseed Trade". *Journal of the Transportation Research Forum*. 37(1). pp. 46-58.
- Ferrier, G., J. y Ibarra. 1998. "La eficiencia de los ferrocarriles mexicanos, 1945-1985". *Comercio Exterior*. 48(9). pp. 721-729.
- Ferrocarriles Nacionales de México. *Serie Estadística 1996*.
- Jimenez, J. and A. Mendoza. 1996. *Evaluación económica de mejoras a la infraestructura del sistema nacional ferroviario*. Publicación Técnica No. 82. Instituto Mexicano del Transporte. Sanfandila, Qro.
- Klindworth, K., and Arne Martinsen. 1995. *Shipping U.S. Grain to Mexico*. U.S. Department of Agriculture.
- Mercer Management Consulting Inc. 1998. *Myths and Realities of Rail Access and Competitiveness Issues*. Railway Association of Canada. October.
- Possehl, Suzanne. 1998. "Canadian Rail Carriers Forge New Links," *Shipping Digest*. May 18.
- Prentice, Barry E. 1997. "North American Grain Transportation and NAFTA". *World Grain*. Sosland Companies Inc. Vol. 15, No. 6, July. pp. 6-12. Kansas City, MO.
- Prentice, Barry E. and Herman Guzman. 1994. "Rail Transport of Canadian Grain to Mexico: Some Implications of NAFTA". *Transportation Research Forum*. Proceedings Issue, Volume 1: 36th Annual Meeting. pp. 263-275.

- Rico A., A. Mendoza, E. Mayoral, and E. Jimenez. 1995. *Un analisis de reparto modal de carga entre carretera y ferrocarril*. Technical Publication No. 76. Instituto Mexicano del Transporte. Sanfandila, Qro.
- Rico A., A. Mendoza, and M. de Alba. 1996. *Oportunidad de intermodalismo carretera-ferrocarril*. Technical Publication No. 95, Instituto Mexicano del Transporte. Sanfandila, Qro.
- Ruiz, Sergio A. 1998. "Ferromex y la modernizacion del servicio ferroviario." *El Mercado de Valores*. Vol. 6, (June), pp. 30-36.
- Secretaría de Comunicaciones y Transportes. 1995. *Plan de Desarrollo del Sector Comunicaciones y Transportes, 1995-2000*.
- Texas-Mexico Transborder Transportation System. 1991. University of Texas at Austin: Lyndon B. Johnson School of Public Affairs, Policy Research Project Report.
- USDA. 1998. *Agricultural Transportation Challenges for the 21st Century*. Report prepared for the National Agricultural Transportation Summit, July 27. Kansas City, MO.
- Vantuono, William C. 1998. "A Railroad Renaissance South of the Border". *Railway Age*. October, pp. 31-49.
- Vantuono, William C. 1995. "Mexico's Railroads Prepare to go Private". *Railway Age*. November, pp. 37-56.
- WESTAC. 1997. "Railway Structure Models". *Discussion Paper*. December.