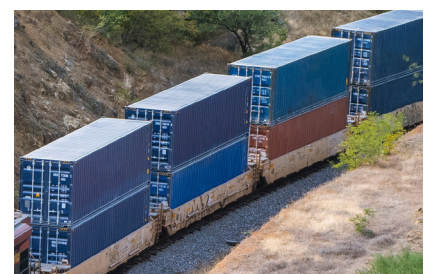




Regulatory Capacity Building

Tools for Analysing
Rail Connectivity



Case-Specific Policy Analysis

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Connectivity



Case-Specific Policy Analysis

The International Transport Forum

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Case-Specific Policy Analysis Reports

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Cite this work as: ITF (2018), "Regulatory Capacity Building: Tools for Analysing Rail Connectivity", OECD Publishing, Paris.

Acknowledgements

The International Transport Forum is grateful to Lou Thompson, lead author of this report, and to the members of the review team that provided expertise on the regulation of North American railways. These were: Stephen O'Connor, Economist at the Federal Railroad Administration, US Department of Transportation; Bill Huneke, Former Director of the Office of Economics, US Surface Transportation Board; John Gray, Senior Vice President for Policy and Economics, Association of American Railroads; Frank Hardesty, Assistant Vice President Policy and Economics, Association of American Railroads; and Jerry Vaughn, Director Interline Services, Railinc. We are grateful also to Russell Pittman, Director of Economic Research, Antitrust Division, US Department of Justice, for external review of the report.

Invaluable assistance was provided by the Instituto Mexicano del Transporte and its Director General, Roberto Aguerrebere, by the Asociación Mexicana de Ferrocarriles and by the following railway concessions: Ferrocarril del Istmo de Tehuantepec, Ferromex, Ferrovalle, Kansas City Southern de Mexico, Kansas City Southern and Linea Coahuila-Durango.

The work was facilitated by a grant from Mexico's Agencia Reguladora del Transporte Ferroviario and we are grateful for the support of the Regulator, Benjamin Aleman Castilla, and his team, including Directors Estanislao Sandoval Bosch, Oscar Arturo Cortés Hidalgo, Francisco Javier Vargas Hernández and Carlos Eugenio Lopez Hernández. The project was led by Stephen Perkins at the International Transport Forum.

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Executive summary

What we did

This report reviews methods adopted in the United States and Canada for determining fairness and efficiency in rail markets and discusses their potential application in Mexico. It specifically examines how waybill and financial data are used in the economic regulation of railways and makes recommendations for establishing a data collection and analysis system suited to the Mexican railways.

Mexico has transformed its loss-making national railway into profitable concessions that have invested in infrastructure and carry growing volumes of freight. Some of the provisions agreed in the concession titles regarding interconnection and competition on specific links have not, however, developed as expected. A new regulatory agency was established in 2016/17 to address this and establish the capacity for the government to intervene effectively where necessary. A top priority for the Agencia Reguladora del Transporte Ferroviario de México (ARTF) is to develop a data collection and analysis system to understand rail markets in relation to issues of competition, efficiency and connectivity.

The report is based on discussions convened for the ARTF with the US Surface Transportation Board (STB), US Department of Transportation's Federal Railroad Administration, Railinc and the Association of American Railroads together with Mexican railway concessionaires and the Mexican Transport Institute.

What we found

ARTF has made good progress in establishing itself despite budgetary constraints that inevitably slowed progress. The priority now is to develop tools to assess the performance of the concessions against their legal commitments and to develop a better understanding of the role of the rail sector in meeting Mexico's transport needs. There are three analytical areas to focus on: improved financial accounting and reporting; acquisition and use of network models to generate traffic flow analyses and O/D matrices; and more systematic collection and analysis of waybill information.

The regulators of the USA and Canada have developed effective analytical tools in each of these areas but there are some significant differences in the Mexican railway system that will require customised tools to be developed. Mexico can also avoid some of the costs of the US regulatory system. US regulation has evolved over a long period, some of the data collected and indicators produced would not be included if the system was designed today but are retained for continuity because much of the analysis undertaken is improved by long time series of data.

The cost structures of Mexican and US railways differ, as infrastructure is owned outright by private railroads in the US but owned by the State in Mexico and conceded under long term contracts. Whilst infrastructure operating and maintenance costs have to be fully covered by railroad tariffs in both countries, and both employ price differentiation to achieve this in the most efficient manner, differences in cost structure imply some difference in the tests of appropriate access charges and abusive tariffs. The benchmarks for efficient prices employed in the US have also been criticised by regulatory and academic experts. The US Congress has yet to be convinced of the value of changing current US practice but the ARTF will need to consider which of the possible alternatives will be most cost effective for Mexico and consistent with the Law on Railway Services.

What we recommend

Favour the use of confidential contracts

An overall increase in the use of confidential contracts would be beneficial to the economy. The advantage for the regulator is that the regulatory effort would be greatly reduced allowing attention to be fully focused on cases where some form of detailed intervention may actually be needed. Confidentiality of contract rates also encourages competition by preventing one concessionaire from simply matching its competitor's published prices. Maximum freight transport tariffs were established when the Mexican railway concessions were let to provide a backstop to prevent abusive tariffs. The railways update these annually to account for inflation but little or no traffic is carried at these rates. About 40 to 50% is carried under confidential contracts, at a substantial discount to these rates and to negotiated service standards. In the US around 80% of freight moves under such contracts and this has been the major factor in recovery of the sector following deregulation in 1981.

Consider the use of arbitration

Even under the best of circumstances it will take time for ARTF to develop the information systems and reporting needed to make fully defensible regulatory decisions when a shipper alleges that a rate is unreasonably high. To address this problem, ARTF should encourage arbitration rather than regulatory determination in rate and service disputes. In Canada, this approach seems to work effectively, especially in forcing the analytical and data burden onto the parties rather than the regulator. Arbitration would be useful in Mexico as an interim approach to be used during the period when ARTF's regulatory information systems are being developed. It is not clear whether Mexican law will permit ARTF to sponsor or require arbitration. ARTF might make a proposal to the Minister for legislation that would support use of arbitration as one method of dealing with rate and service disputes.

Reinforce legal capacity

In cases where a tariff is not covered by a confidential contract and where mediation or arbitration are not available, regulatory intervention may be needed. For such intervention to be effective, ARTF will need sufficient legal capacity to defend its actions in case of challenge in the courts. To support such intervention, it may prove necessary to accord ARTF its own legal identity so that it is not reliant on the general legal services of the Ministry of Transport for this specialised legal capacity.

Develop financial accounting and reporting requirements

ARTF requires access to substantially improved financial and operational data if it is to assess the performance of concession-holders adequately. The data required is of two types: a) financial and operational information produced in a consistent format across all concessions; and b) operational data based on an analysis of waybills. Without this information, the ARTF will only be able to develop limited metrics for productivity and efficiency and will not be able to develop an overall picture of the financial performance of the rail system as a whole. Development of a common template for use by concessionaires in undertaking the required reporting is urgent. It would both reduce the burden on the concessions and improve the quality and consistency of the data that ARTF receives, but will take a number of years to complete.

Consider adapting the standard North American financial reporting form for Mexico

The ARTF should consider using the Rail Form R-1 as the basis for developing a common template. Form R-1 is the primary source of financial and operational data received by the Surface Transportation Board. It is an annual report containing 700 lines of financial and operational data. However, while Rail Form R-1 forms a useful starting point, the ARTF will need to adapt it. Some data collected via the R-1 may be of limited relevance to ARTF, while other relevant data may not be included in the R-1. Secondly, the R-1 follows a format prescribed almost a century ago and has remained little changed over this time and as a result some of the information collected is no longer of significant value. R-1 reporting is based on the STB's Uniform System of Accounts (USOA), which is similar to but not identical to Generally Accepted Accounting Principles (GAAP). The Agency should investigate whether GAAP accounting or USOA should be utilised in conjunction with an R-1 based reporting system. The choice of which accounting system to use should be based on which system provides the degree of accuracy needed for the R-1 while imposing the least burden on concessionaires by avoiding the need to keep separate sets of books for regulatory and financial purposes.

Develop a standard waybill

The Ministry of Transport has used waybill data for some time, to monitor tariffs amongst other purposes, and a key data requirement for ARTF to underpin better regulatory decision-making is to gather and analyse waybill data on a more systematic basis. It will also need to make the results of its analysis public, with commercially sensitive information suitably masked. Waybills are the fundamental document for managing freight traffic, providing data on commodity type, tons loaded, carloads in the shipment, revenue and origin and destination points. Mexican waybills are already included in the North American Carload Waybill Sample, along with those of US and Canadian rail operators, for all international traffic. Thus the capability for Mexican concessions to produce and report waybill data in a format consistent with existing North American practice already exists. Nevertheless, there remain a number of challenges in developing a system for collection of domestic waybill data. Significant differences exist between concession-holders in the nature of the waybills currently generated. A Mexican waybill sample file will have little or no regulatory value until waybills are reported in a consistent format. The ARTF should conduct a survey of the waybill formats currently used by the concessions to get a better picture of their use in managing domestic rail traffic and compatibility between the systems of each concession. The results should facilitate development of a Mexican standard waybill format that can be fed into the overall North American system of waybill collection and analysis. Once a standard format is adopted, ARTF can require each concession to furnish a sample of waybills for quality control and error analysis, with results reported to concessions to underpin format and quality improvement.

Develop a waybill sample data collection and analysis system

Mexico will need to develop a robust data collection and analysis system. Key decisions in this regard include the extent of the sampling to be undertaken and sample stratification; both are important to the statistical robustness of the results. Use or adaptation of the US Carload Waybill Sample (CWS) is an option. Waybills for operators who ship on US tracks are submitted to the Surface Transportation Board, which contracts Railinc to receive and process the data and produce the CWS. This already contains a significant number of Mexican (and Canadian) waybills for traffic that crosses US borders.

Determine the structure of the waybill sample

ARTF should employ experts to develop an initial waybill stratification and sampling system for reporting on domestic traffic. Stratification might differ from Surface Transportation Board practice because the Mexican traffic mix is different and the waybill population is somewhat smaller. It will be necessary to develop an initial approach to get the system into operation and then, if necessary, change the specific sampling rates as appropriate. As the system develops and experience is gained, ARTF may want to process all waybills and not just a sample.

Choose a contractor to process waybills

Once compatible Mexican waybills are available for all Mexican rail traffic, ARTF can consider contracting with Railinc to process these along with US and Canadian waybills. Based on the experience with US waybills, this is likely to face a significant problem in terms of quality control at the outset, but should improve over time. ARTF will need to determine how much it wants to rely on Railinc to process the Mexican domestic information. On the one hand, the North American railways form a single, increasingly integrated system and would benefit from efficient and consistent processing of information for all members, while the fact that Railinc already processes significant Mexican data suggests that it would be able to provide a cost-competitive service. On the other hand, a Mexican equivalent of Railinc could potentially be developed at lower cost, while being more able to focus on specifically Mexican questions and concerns.

Establish a network modelling process to generate traffic flow analyses

ARTF will need to decide which model or models to adopt to exploit waybill data. The location of all stations and junction points on the network will need to be identified and linked to the data entered into the waybills. ARTF will need to develop the capability to produce traffic flow reports for use in system analysis. Flow reports sometimes need to be very specific and may have to be generated in response to very detailed and unpredictable questions under tight deadlines. It is also likely that some analyses will need to be based on confidential data that will have to be reliably safeguarded. This suggests that at least some network flow analysis capability should either be developed in-house or close at hand even if outside consultants are also used.

Introduction

Rail regulators have a challenging role. Their function is to ensure that private property rights accorded under the law governing the rail sector are respected and, where the economic principles underlying the law require interpretation, provide the expertise to establish fair and efficient conditions of service. They act as an arbitrator on occasion between rail sector stakeholders, including other branches of government, and need a degree of independence to carry out this role. Politicians, understandably, expect to exercise control but tend to overlook economic forces and the constraints on freedom of action set out in railway law. They tend to want more influence with less accountability. Shippers always want to pay less but want better service. Railroads usually just want existing arrangements to remain stable and untouched to ensure consistent investment incentives for their long-lived assets. The regulator, in the middle, will inevitably find itself at odds with one or all of the other parties at some point. The regulator's best defence is highly professional decision making based on solid information and a policy of thorough consultation and communication ahead of regulatory decisions (ITF, 2011).

Although the basic economic theory for how to regulate railways has been established for a century (Marshall, 1920; Ramsey, 1927; Boiteux, 1956), it is applied through a range of regulatory models that differ substantially between industries and countries. Remedies applied in one sector or jurisdiction can rarely be simply transferred to another context. Adaption to local circumstances is essential.

Professional regulation in the real world is often hindered by a lack of accurate information on which to base interventions that can have a significant impact on businesses and communities. More fundamentally, there is tension between the objective of economic efficiency in transportation (the goal of economists) and the search for fairness or "reasonableness" in political discourse (pursued by politicians and shippers). This conflict or confusion in basic objectives arises in all regulatory regimes. Argument over regulatory outcomes is inevitably flavoured by historical rail development. In Mexico it is influenced by a long history of gradually extending government ownership over the railways in the national strategic interest and then adopting a market-based industry structure in 1995, and concessioning, which is similar to but in some ways significantly different from the structure in the other North American railways with which Mexico is inextricably linked.

A key issue in the development of the recently-established Mexican rail regulatory agency (Agencia Reguladora del Transporte Ferroviario, ARTF) is the need to acquire the information base on which valid and defensible regulatory assessments can be founded. The Agency has taken over statistical reporting on the sector and is strengthening the data collected by the government for regulatory purposes. It is also developing the analytical tools needed to support regulatory decision making. This paper addresses a key set of issues involving the development and reporting of rail traffic (waybill) data in the US and how the lessons from the other North American rail systems can be applied in Mexico.

Regulatory issues and objectives in Mexico's rail sector

Reviews commissioned by the Ministry of Communications and Transport (SCT) from the International Transport Forum at the OECD (ITF, 2014; 2015) examined the performance of the rail system under the final years of management by Ferrocarriles Nacionales de Mexico (FNM) and subsequently after concessioning in the mid-1990s. The studies generally concluded that the concessioning has been successful in improving the efficiency of the rail system and delivering significant benefits to the nation in growing traffic, increased investment and much improved linkages with rest of the North American rail network. At the same time, the studies highlighted a lack of regulatory capacity to oversee the performance of the concessionaires against their commitments and responsibilities under the concession contracts and the Law on Railway Services (SCT, 1995), a lack that establishment of ARTF was designed to overcome. One issue, the inability (or unwillingness) of the concessionaires to agree arrangements for the exercise of trackage rights in the areas specified for such rights in the concession contracts, was a problem from the outset, only partly resolved by an agreement between two of the concessionaires (KCSM and Ferromex) in 2010 that cleared the way for approval of the merger of Ferromex and Ferrosur. Another issue – rate or service protests by a few shippers in specific cases – showed that the regulator lacked the legal and analytical capacity either to determine a “reasonable” rate level or to enforce such a level in the face of a challenge in court. In both cases, the Government faced the problem that proposed solutions could not withstand court challenge at least partly because of a lack of convincing factual foundation.

In addressing this problem, the ITF (2014; 2015) recommended creation of a regulator with the expertise and technical resources necessary and urged the new regulator to focus on development of the information and reporting needed to support fully defensible regulatory decisions.¹ Among other suggestions, the reports focused on the value to the US Surface Transportation Board (STB) of the rail traffic and revenue information available from the US Carload Waybill Sample and the financial and operational information derived from the standardised report (Rail Form R-1), filed annually with the STB by all Class I railroads. Now that the ARTF has been established, it will benefit from a clearer understanding of how these documents are generated and used in the US and how the information can be generated and adapted to Mexican regulatory circumstances.

The ARTF was created in 2016 to oversee the tariffs and service quality of Mexico's rail concessions and, where necessary, take action against abuses or insufficient performance against commitments under their concession contracts. ARTF's key functions are to provide guidelines to regulate tariffs, enforce compliance with concession agreements and oversee maximum tariffs for rail services.

ARTF needs to base its future decisions on improved information and reduce the information asymmetry² between concessions and shippers. Among other functions involved will be:

1. Reviewing the maximum tariffs set under the Law on Railway Services because ARTF is required to ensure that the maximum tariff tables have been adjusted properly for inflation with no individual tariff actually exceeding the maximum limits.
2. Working with the Ministry of Communications and Transport (SCT) in its duty to approve the business plans of the concessions every three years (as required under Article 15 of the Railway regulations [SCT, 2016]) in relation to verifying that promised investments have been made.

3. Establishing conditions for the use of trackage rights mandated in concession titles where concessions fail to reach mutual agreement and reviewing applications for additional trackage rights in circumstances identified by COFECE as lacking effective competition, where “trackage rights” is the term used when one railroad concession acquires the right to run its trains over the tracks of another concession. Trackage rights include the terms and conditions under which such rights are granted. These terms can include charges, commodities, origin and destination locations, and facilities used among other variables.
4. Ensuring safe and efficient operations and adequate investment by the concessions.

The US STB has similar duties and in addition ensures that rail customers are not paying tariffs that are too high or that discriminate between shippers in identical circumstances, and that the concessions are not generating unreasonable profits. Mexico's Law on Railway Services addresses maximum tariffs by requiring the concessions to post maximum rates, maintained in a register by ARTF, which verifies they are not exceeded. In practice all freight moves at rates below these limits. The maximum rates were set over 20 years ago in the context of the break-up of a loss-making nationalised railway and it may be time to review the limits³. Ramsey-Boiteux price discrimination, as employed in Mexico, is the efficient way to distribute costs between shippers under an overall cap on revenues or profits in the sector. ARTF might in the future be set the task of reviewing maximum tariffs in relation to revenue adequacy or concession profits.

Priorities for developing regulatory information in Mexico

To develop effective rail information systems it is important to acknowledge that collecting data is expensive and if not carefully targeted the figures reported may not really help in regulation. It is critical to begin by defining the purpose of the data to be reported so that the regulator has what it needs and does not burden the concessionaires with demands that serve no purpose.

In all countries, the role of rail regulation is determined by the interactions among three factors: industry structure, competition (both intra-modal and intermodal) and ownership/funding. For example, if the rail industry is monolithic and nationalised (India or China), there is little or no scope for separate regulation and direct ministry oversight suffices. If competition from other modes, especially trucking, is ubiquitous, regulation of rail freight service quality, operations and tariffs is largely superfluous. This is the situation in most of the European Union but independent regulators are required here for the narrower task of ensuring equitable access to infrastructure because infrastructure management and train operation have been separated to promote a degree of on-track rail-on-rail competition. In situations where infrastructure is separated from train operations and operators (actual and potential) have equal rights to access the infrastructure, regulation will be different from situations where the infrastructure is owned by the government but let to freight operators in exclusive concessions as in Mexico, Argentina and Brazil. The cost structures of freight train operators in the most EU countries are very different from that of Mexican concession holders that invest in infrastructure as well as rolling stock. Freight operators that are concessions also have different cost structures from operators that own their infrastructure as in the US and Canada. Here all infrastructure costs must be recovered by freight revenues. In Mexico the costs of purchasing the concession, paying annual fees to the government and reinvesting in the network must be covered. In some cases these may approximate to total infrastructure costs in others not but the structure of costs is different. The economic role of the regulator and what can be regulated is different in each of these situations. If the economies of several countries are intertwined, as in the EU and in North America, the influence of a single national regulator may be impacted by the decisions of regulators in neighbouring countries. All of these factors bear on the need for, and uses of, information by ARTF.

The existence of concession agreements means that while some issues are resolved by “regulation” in the US and Canada, in Mexico it will be a matter of commercial contract enforcement as well as the Law on Railway Services, with a different role for the regulator in relation to other civil enforcement authorities.

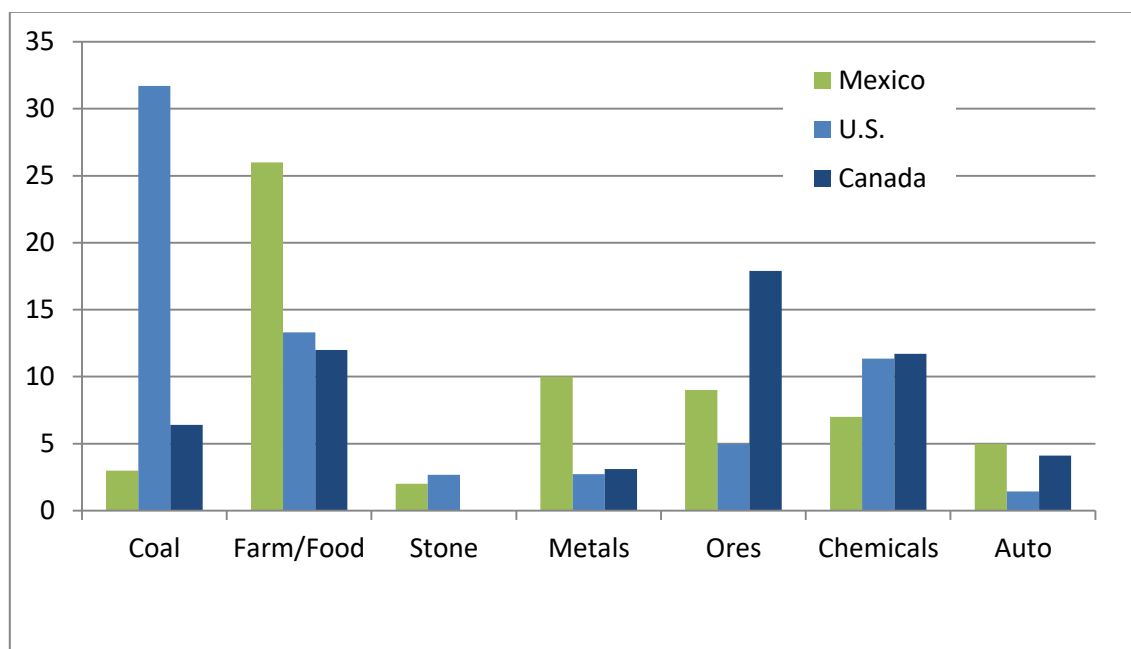
Comparing the structure of costs in the Mexican, US and Canadian rail industry reveals that the ratio of fixed⁴ to variable costs in Mexico may be different from the US and Canada and thus measures of appropriate cost recovery will be different. US and Canadian railroads must attempt to recover all prior and future investment costs (as well as operating costs) from revenues. Mexican concessions will need to recover investment after concessioning (and operating costs) from revenues, but to not have to recover government investment before concessioning. On the other hand, Mexican concessions will have to recover their concession purchase costs from revenues and make investments to replace and improve infrastructure. In the absence of a Mexican equivalent of the US Form R-1, it is not possible to evaluate this difference, but it could be significant.

The difference between the Mexican concessions and the European freight operators is more extreme. Most European freight operators make little or no contribution to the fixed costs of infrastructure, which is paid for by taxpayers and passenger train operations.

Ownership in the US and Canada is almost entirely private whereas the infrastructure in Mexico is still publically owned. As a result, the Mexican Government has a much larger role in supervising the use and condition of the infrastructure: in addition, because the nation owns the infrastructure, the national role in planning future use and in investing in the infrastructure to meet public purposes is accordingly larger. This will be particularly important when changes in the competitive structure of the Mexican system after 2027 are analysed. At the same time the clear objective in concessioning the railways in 1994 was that most investment in rail infrastructure after concessioning would be expected to come from the concession rather than the government, and that the government would receive large payments from the railways for the exclusive concession tendered. These arrangements are subject to contract law that provides the framework within which ARTF exercises its regulatory powers, the 1995 Railway law was amended in 2015, but the basic framework remains in place.

Competitive conditions in Mexico are quite different from those in the US and Canada. Mexican railways have a significantly smaller role in transport, with only a 25% share of truck and rail tonne-km as compared with 46% in the US and 63% in Canada (ITF data, OECD.Stat). It is a lot less likely that the Mexican concessions would be able to establish unreasonable tariffs facing this scale of competition in all but a very small number of markets. Similarly, the commodity mix in Mexican rail concessions is more heavily reliant on truck-competitive commodities such as farm shipments and not on the kind of long-haul, low-value, bulk shipments like coal and ore that account for a large part of the freight carried in the US and Canada. In other words, there is less need for and less scope for tariff regulation in Mexico because the transportation system already benefits from strong competition in the markets that the Mexican rail concessions serve.

Figure 1. Commodity distribution



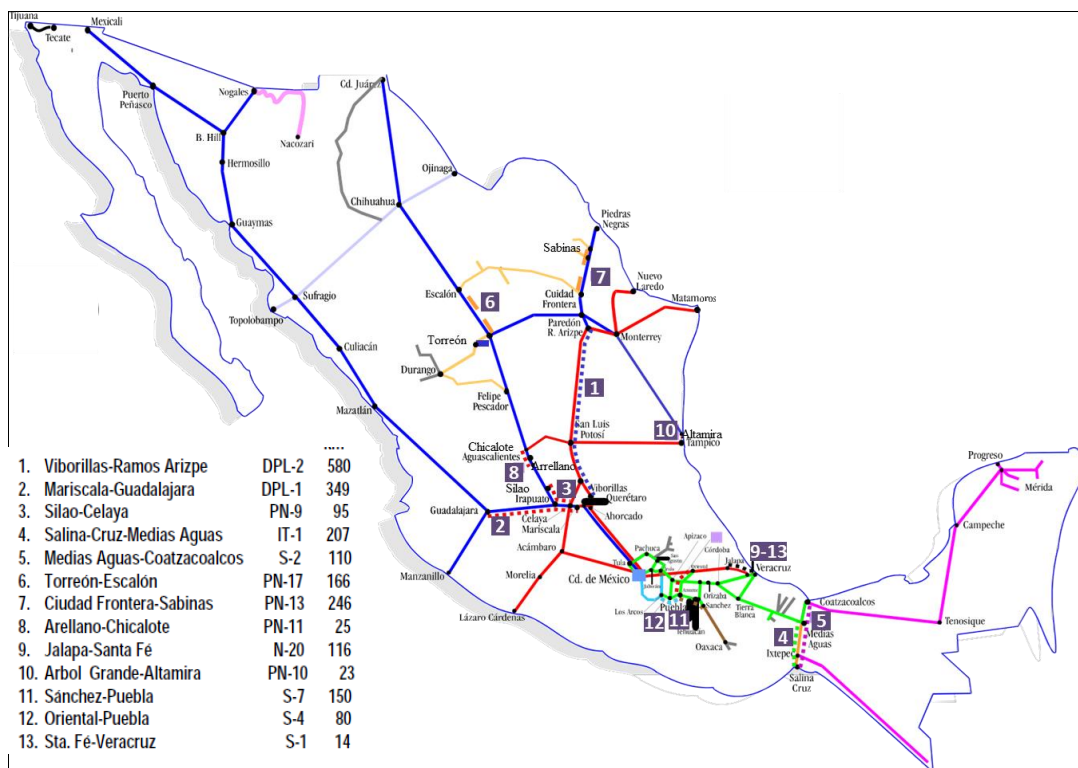
Note: Mexico and US are % of tonnes, Canada is % of carloads; 2017 data for Mexico, 2016 US and Canada.

Source: STB, Statistics of Class I Railroads; RAC, Rail Trends 2017; and ARTF.

It is important to recognise that a primary purpose in planning the structure of the Mexican concessions in the mid-1990s was explicitly to allow enough exclusive territory to increase the purchase value of the concessions. Whereas the US and Canada are able to rely to a significant extent on intra-rail competition via parallel lines and source competition, the Mexican system was originally intended to create at least some degree of single line service in order to increase the value of the concession. The sale of the concessions was designed to generate income from the sale to compensate for the Government’s payments to labour unions to compensate them for the impact of concessioning and thereby reduce the cost of reform to the national budget. The concessions struck a balance, by being structured geographically to provide rail-on-rail competition and access to alternative ports in key markets including Mexico City and Monterrey. The degree of market power was further mitigated by the obligation of the major concessions to negotiate trackage rights access with other concessions to serve specified major markets (Figure 2), but delays in negotiations limited the realisation of competitive benefits.

Regulation in Mexico will inherently be somewhat different than the approach in the US and Canada because of these structural differences and the information requirements for regulation will vary accordingly. One example is the quantitative standards established in the US deregulation of 1981 (entitled the “Staggers Act”) that set a ratio of revenue to “variable cost” of 180% as the threshold at which a tariff may be found unreasonable. Tariffs below 180% are not subject to regulation. The information collected to support this kind of calculation might not have probative value in Mexico except, possibly, as a general indication of pricing behaviour because Mexico currently has no similar standards established in law or regulation.

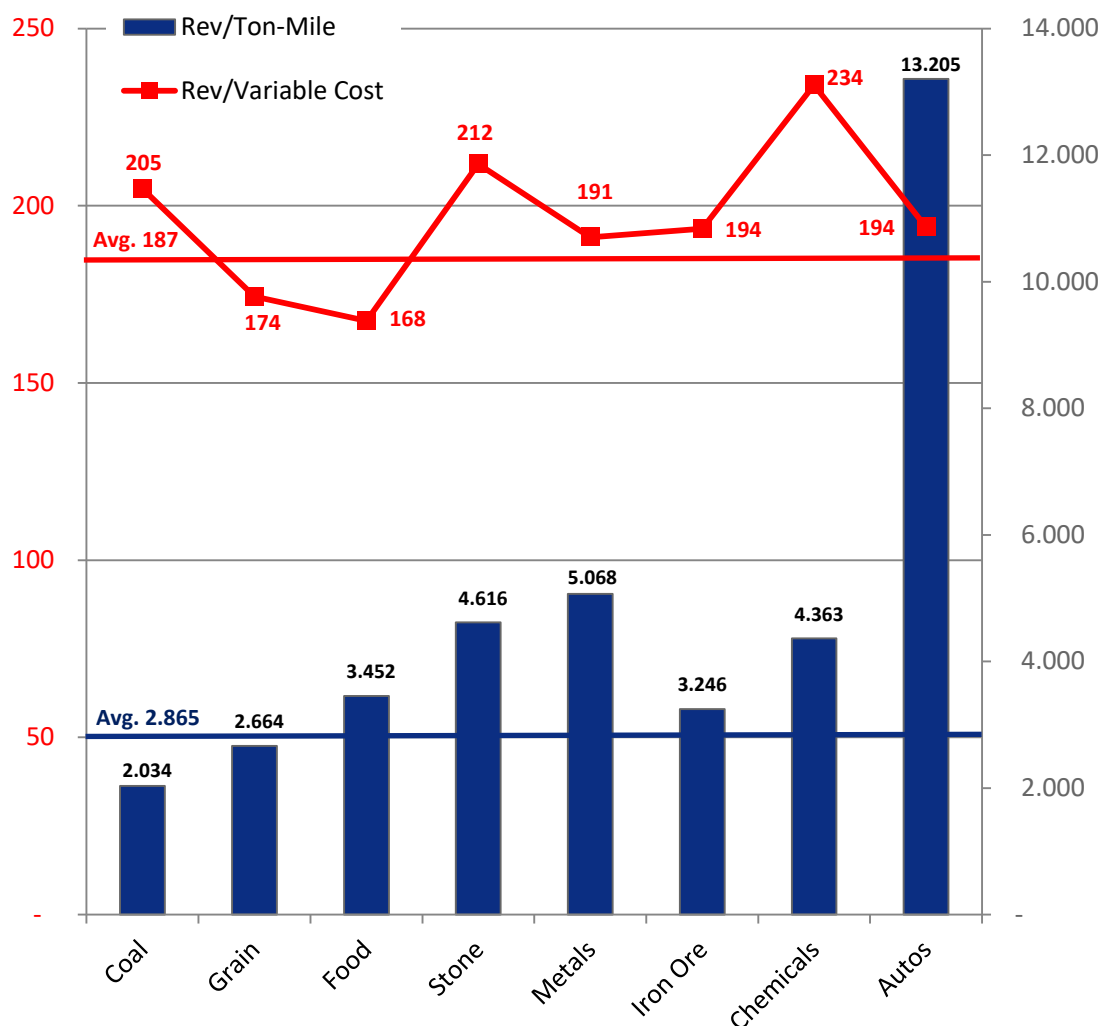
Figure 2. Principal mandatory trackage rights specified in concession titles



Source: SCT.

Figure 3 shows the tariff and revenue/variable cost ratios for a number of major commodity groups in the US in 2016. Although the overall average ratio appears to be slightly above the 180% threshold, the revenues shown are masked to preserve the confidentiality of contract rates (raised upward by a concealed amount as discussed below) so the actual average performance of the system is within the 180% threshold. The impact of masking can be roughly estimated as around 125%: that is, the masked revenues shown are about 25% higher than the actual revenues. Moreover, the impact on some commodities is higher than on others because the degree of contracting varies (see Table 1). This does not affect the overall conclusion that US rail tariffs vary considerably by commodity and the relative profitability also varies by commodity. Some commodities on average are above, or even well above the threshold but still deemed “reasonable” because of the higher value of the cargo or of the services offered. For some commodity groups, such as hazardous goods or munitions, the relation between revenue and calculated variable cost can be very high and still be found “reasonable.” Revenue in US cents/tonne-km alone does not tell the story; revenue must be compared with costs.

Figure 3. US freight railway tariff structure with revenue masked (2016 US cents/tonne-km and ratio in percent)



Source: STB Carload Waybill Sample (2 digit STCC level).

Although ARTF has fewer legally established objective standards than the STB, it actually has more enforcement power through its potential ability to cancel a concession, so decisions that affect the value of a concession will need to be based to the greatest extent possible on objective measurements. There are additional reasons why waybill and financial information will be important to ARTF, though possibly formatted differently than in the US and Canada. Unlike the US and Canada, the competitive structure of the Mexican system will change as the initial periods of exclusivity terminate, around 2027 for the largest concessions. Access will continue to be governed by the concession titles but with greater scope for ARTF to modify trackage rights. Concessions have also been modified at the initiative of the government, including the recent consolidation of the Isthmus de Tehuantepec Railway with the Chiapas-Mayab Concession. The ability of the Government to evaluate changes in system structure will depend on analysis of revenues and commodity flows. The General Directorate for Railways in the SCT is responsible for establishing concessions but decisions will need to be informed by ARTF's analysis of revenues and commodity flows. At the same time, confidentiality of waybill information will be even more of a concern in Mexico than in the US because there are usually only two carriers in each market (each of which, given total information, can determine the competitor's values by subtraction).

US experience with regulation and reporting on waybill, financial and operational data

This section of the report examines the US experience in rail regulation and system planning using waybill data and financial reporting from the perspectives of four organisations: the regulator, the Surface Transportation Board (STB); the Association of American Railroads (AAR), representing railroads; Railinc (a subsidiary corporation of AAR), which undertakes waybill data collection and analysis; and the Federal Railroad Administration (FRA), which deals with the rail issues within the purview of the US Department of Transportation.

Regulation by the Surface Transportation Board

The STB is the economic regulator for the US rail industry.⁵ Rail regulation in the US has a long history dating back to 1887 when the original regulator, the Interstate Commerce Commission (ICC) was founded. The concepts and objectives of the regulator were originally influenced by the “Robber Baron” era in which railroads were seen (not entirely unfairly) as monopolistic and rapacious. The period between 1887 and 1980 was marked by a long series of interventions in which Congress attempted to reach a balance between political pressures from regional interests and powerful shippers and the pressures created by the emergence of trucking and barge competition (often supported by federal investment subsidy). The US rail system eventually ran into severe financial distress and by the early 1970s it had become clear that the regulatory system needed dramatic reform if the railroads were to survive in private hands. As a result, deep regulatory reform was enacted in 1980 (The “Staggers Act”) and subsequently the ICC was abolished and the STB created in its stead on January 1, 1996, pursuant to the ICC Termination Act of 1995 (Gallamore, 2014). Trucking in the US was deregulated in steps in the same period.

In broad terms, the Staggers Act aimed at removing regulatory oversight of rail tariffs in as many cases as possible. Rail traffic in some agricultural commodities was deregulated as was traffic moving in box cars and all traffic in containers or trailers on flat cars (“COFC/TOFC”). The STB has authority in several areas including mergers between railroad companies, imposition of access rights and the charges associated with those rights when a merger results in reduction of rail-vs-rail competition, construction and abandonment of tracks, and setting of rail tariffs under certain conditions. Beyond these access rights, the STB has authority to examine a tariff only if two conditions are met: the tariff appears to be set at a rate where revenue is greater than 180% of “variable cost” and the rail carrier appears to have some degree of market power (“market dominance”). Establishing whether these requirements are met drives the choice of the data that STB collects to assess revenues and costs and to assess the financial performance of rail companies and of the industry. Waybills and mandated financial reporting provide the foundation of the data STB uses.

Waybills: Contents, quality issues, collection methods and processing

There have been rail “waybills” as long as there have been rail shipments because both the railway and shipper need a basic document defining the conditions of shipment – commodity, weight, revenue billed, and other shipper instructions such as routing. From this the modern electronic document containing a number of other pieces of information emerged. By the late 1800s, the ICC recognised the value of the

data in the waybills for regulatory oversight and began development of a waybill “sample”. The first sample of all commodities appeared in 1939 but the annual process of collecting and reporting the results of the sample began in 1946.

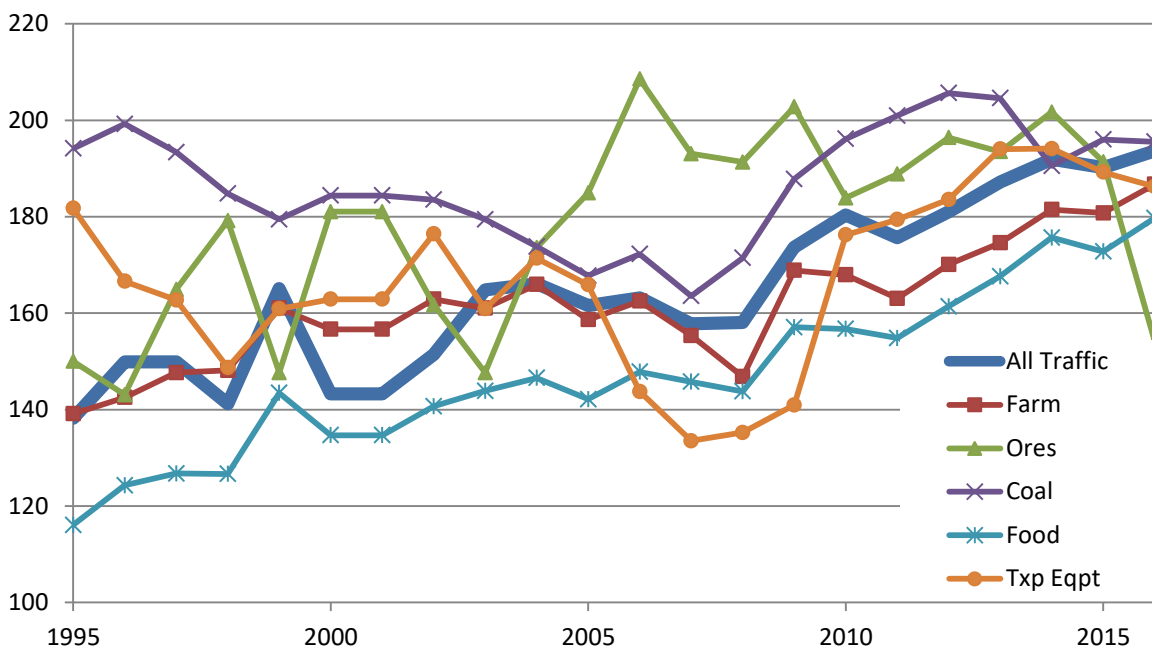
Some form of sampling was necessary from the outset because the waybills were a paper document and processing of the entire set of industry waybills would have been impossibly laborious. The sampling approach has become more sophisticated over time as the uses of the modern Carload Waybill Sample (CWS) have multiplied. The CWS uses a stratified sample in which the sampling rates have been adjusted to permit accurate representation of different types of traffic while still keeping collection and processing efforts to a minimum. For example, typical carload traffic will be sampled at a 3% rate whereas unit train shipments will be sampled at a 50% rate. It has been proposed that some types of traffic (extremely hazardous cargo) might be recorded at a 100% rate for specific purposes, though this proposal has not so far been implemented.

The CWS is developed in three stages. First, the basic waybills are collected and processed. Second, the distance over which the shipment travels is added separately (by Railinc, as discussed below) by entering shipment distance to the origin and destination station locations. This is the basis for measuring tonne-km, which is the fundamental measure of system output used to calculate many productivity measures (average length of haul, output per employee, and output per freight car or locomotive, traffic density, among many others). CWS reports for a period of years also permit evaluation of trends in these productivity measures. Third, the STB applies a costing formula using waybill inputs to calculate a “variable cost” of the shipment that, along with the revenue from the waybill, permits calculation of the regulatory revenue/variable cost ratio. Using costs and revenues together permits analyses of industry profitability as well as trends in rates industry-wide and by individual commodities. As shown in Figure 4, the revenue/variable cost performance of the US Class I railroads has improved steadily since 1995, one of the favourable outcomes of deregulation. As discussed above, revenue masking makes the revenue/variable cost ratios look higher than they actually are, but it does not affect the relationships among commodities and it does not affect the time trends.

The STB then prepares the CWS in three forms: the Public Carload Waybill Sample (CWS), the Confidential CWS without unmasked revenues and the Confidential CWS with unmasked revenues. The terms of contract tariffs, including rates, are confidential by law. In order to keep contract rates confidential, the STB allows the railroads to conceal (“mask”) the actual tariffs by multiplying them by a factor (or factors) known only to the railroad and the STB. As an example, the effect of masking in the CWS was to make industry revenues/ton-mile appear to be about 13% higher than was actually reported in “Statistics of Class I Railroads” (the sum of the industry Form R-1s published by the STB) where revenues cannot be masked. The Public CWS is available on the STB website and is often used for general economic analysis of rail activity. The information is aggregated into broad commodity categories but in this form the revenue information is not accurate because revenues for contract shipments are masked. The overall rule of aggregation is the “rule of three” in which data are reported at a level that includes at least three railroads or three shippers so that one party cannot determine the activity of another by simple subtraction. The Confidential CWS with contract revenues masked has more detailed information at the individual shipment level, but actual revenues remain concealed. This form of the CWS is used by many government agencies to analyse rail traffic flows and productivity measures but is not useful for rate regulation by the STB. The Confidential CWS with unmasked revenues is restricted to the STB and Government agencies with a need for information about actual rail revenues at the CWS level of detail. In addition, it is used in regulatory proceedings for specific rate cases and may be made available to academics and researchers if the data set is held confidential and if data in the output studies are

published in an aggregated form. Individual railroads can receive unmasked revenue data only for their own shipments. Users are required to sign a strict confidentiality agreement.

Figure 4. Revenue/variable costs Ratios, US Class I railroads, masked Revenues (%)



Source: US STB Carload Waybill Sample.

How does the STB use waybill data in the Carload Waybill Sample?

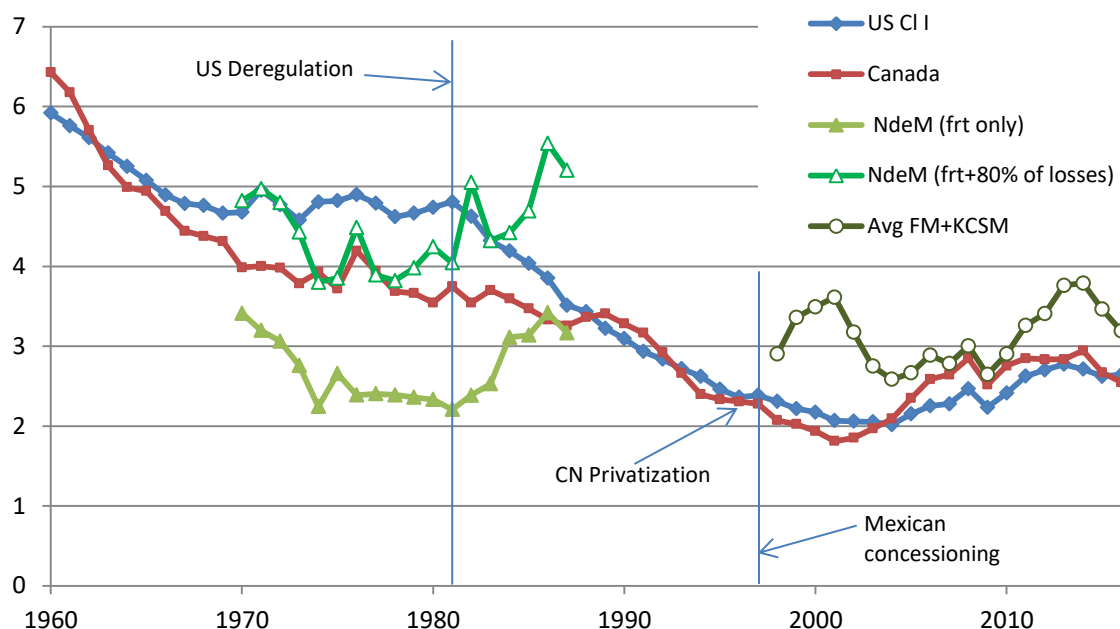
The STB uses waybill data as a tool to monitor industry financial health and trends, particularly for rate analysis and productivity measures. Rate analysis can include trends in revenue/tonne-km for the industry and for individual commodities at various levels of detail. This can also yield measures of pricing behaviour, especially if rates appear to be increasing faster than general cost levels or if rates on particular commodities appear to be outpacing cost changes. The STB's rate analyses are prepared annually but are not always published because they can be politically sensitive.

STB's rate analyses showed that the average freight tariff in US cents/ton-mile decreased sharply after deregulation in 1980 through to about 2000 after which levels increased from 2005 through 2012 and then have been essentially stable since. While these increases are partly attributable to the fact that both railways and trucking were experiencing capacity problems during the period, critics also charge that the reversal of the trend of declining tariffs was the result of the STB's approval of two "mega-mergers" in the 1990's, as well as the US government's decision to divide Conrail among its two competitors; the result was and is broadly duopoly service in both the western and eastern US. Significantly, average costs/ton-mile fell even faster than revenues after deregulation, so net income increased significantly, which meant that the revenue/variable cost ratio increased even though the average revenue fell sharply.

The US Congress and STB have commissioned several comprehensive studies of tariff and productivity trends since deregulation, including from Christensen Associates (2008 and 2010) and there have been independent studies by the Government Accountability Office (GAO) in 2006 and 2016, and the National

Academy of Sciences in 2015 (TRB, 2015). All of the reports were based significantly on information taken from the CWS files for a number of years, including confidential data and estimated costs. The overall assessment has been that shippers, railroads and the national economy all benefitted from deregulation but that some individual shippers may have faced a lack of competition, especially as a result of railroad mergers that happened after deregulation. They also conclude that rapid traffic growth may have led to capacity problems that, in turn, led to tariff increases. With that said, the studies also have shown that deregulation rescued the industry from a state of virtual bankruptcy in the 1970s. The rail industry’s argument that imposed tariff reductions (“rate relief”) for any specific shipper or set of shippers would be the first step down a slippery slope to re-regulation and a return to pre-Staggers industry stagnation has been so far successful in preventing major regulatory changes. This argument is broadly consistent with the finding in the Christensen study that, if the railways use Ramsey pricing and the regulator imposes a binding overall revenue or profit ceiling, rate relief for any specific shipper will inevitably result in increased prices for some other shippers.

Figure 5. Average rail freight tariffs (2012 US cents/tonne-km)



Notes: Actual tariffs, not masked;

Ferrocarriles Nacionales de Mexico (FNM) was composed of three railways: Nacionales de Mexico (NdeM), Chihuahua al Pacifico (Chepe) and Ferrocarril del Pacifico (FdElP). The data reported here is for NdeM only but representative of FNM given the small scale of FdElP and Chepe operations.

Source: Data based on AAR “Railroad Facts” and research on FNM prior to concessioning.

Following deregulation, shippers began to protest that individual rate cases argued before the STB had become so expensive to prepare that only the largest shippers could afford them. Deregulation was intended to reduce the regulatory burden, and for most traffic it was successful, but a limited number of cases required very detailed cost and traffic analysis that could only be conducted with costly expert assistance. An example of the complexity is “stand alone” costing in which the shipper and/or the railroad estimate what it would cost if the railroad existed solely for the movement of the traffic in

question and the STB considers the submissions in a stand-alone proceeding. This type of cost estimate requires expert assistance well beyond the normal tariff dispute arguments.⁶ Small shippers were squeezed out and felt that railroads were not being restrained either through competition or regulation. In response, the STB developed a simplified methodology based on waybill data using three simplified benchmarks based on revenue/variable cost ratio, revenue adequacy and rates for comparable traffic in order to judge whether the rate in question is unusually high (“an outlier”). This simplified approach has not found much application or success thus far in the US. Such an approach might have some value in Mexico, but would first require the development of uniform regulatory costing and accounting systems to determine variable cost, and would require benchmarks not as yet provided in Mexican law.

Although the US network is comprised mostly of separate railroad companies that own and operate networks that integrate infrastructure with operations, on 28% of that infrastructure a second railroad company (the “tenant”) is permitted to run trains on a portion of the track owned by the integrated firm (the “landlord”). This is because there are many instances where the trains of one railroad company operate with “trackage rights” on the infrastructure of another, either through voluntary bilateral agreements or as a result of regulatory orders, the latter especially to preserve competition following a merger. The proportion of the network voluntarily opened for use under trackage rights has increased over the last two decades in response to growing congestion on some routes. In cases where Amtrak is also a tenant (Amtrak is a tenant on approximately 38 000 km of the US freight network), Amtrak pays an access fee based on a negotiated estimate of “avoidable cost” where Amtrak pays the costs that would be avoided if it did not operate on the line. In this case, avoidable cost can include capital investment as needed and any maintenance increment associated with the higher quality track that passenger trains require.

There are a number of US “joint terminal companies” (for example, the Kansas City Terminal Railway) similar to Ferrovial in Mexico. Freight railways own these terminal companies jointly, want neutral access and are willing to pay their share of the total terminal company costs. Generally, since the users are also the owners, these companies have relatively simple schedules of access that are the same for all users and they strive to provide equal service for all owners.

In current US practice, these trackage rights arrangements are usually tailored carefully to specific conditions of commodity, shipper, location, and volume, among many other possible factors. Almost all of the freight/freight access charges on these freight lines are negotiated between the owner and tenant and are not subject to STB regulation. Such arrangements are sometimes temporary, allowing a railroad to maintain train service despite infrastructure problems or repairs. When railroads negotiate access charges, they are usually as much concerned with how much revenue they might lose as a result of allowing a competitor to access their customers as they are with the added costs of more traffic, so an access charge will certainly have a revenue loss component as well as a cost component. In practice, though, many access charge agreements are reciprocal where each railroad tries to gain as much access from the other carrier as it grants so that both are better off, and the revenue flows may be nearly or actually equal.

Regulatory involvement in trackage rights

The US regulator imposes access charges in the context of mergers and offers of financial assistance (OFA), which is a proposal from an interested party (often government) to provide a subsidy to maintain rail service rather than having a rail line abandoned. An OFA is either an offer to purchase a line proposed for abandonment at a price agreed to with the abandoning carrier or set by the STB, or an offer to subsidise operation of the line for up to one year. All or virtually all OFAs are for purchase of

lines, not to subsidise the line's continued operation. Merger applicants negotiate with various interested parties to find an array of trackage rights that the regulator will deem sufficient to allay concerns about a reduction of competition. In this case, if the regulatory agency finds the proposals insufficient and imposes a scheme that the merger applicants find too onerous, the applicants can withdraw their application. In an abandonment or OFA, the goal is to maintain service. These are situations where the health of the service provider is a paramount concern.

STB precedents for trackage rights fees start with the Compensation Hearings,⁷ a situation that evolved from the Union Pacific-Missouri Pacific-Western Pacific merger and the trackage rights imposed by the ICC in that merger. The STB (and the ICC before it) holds that trackage rights fees have three components:

- Variable cost: These are the incremental costs imposed on the landlord/incumbent railroad from the entrant's use of the open access facilities. Examples include switching costs and train operations.⁸
- Maintenance and operating expenses: Although similar to variable costs, these are costs imposed on the landlord/incumbent that are not directly attributable. Examples include property taxes and track maintenance.
- Interest rental component: This represents a return on the landlord/incumbent's capital invested in the line.

The first two components (i.e. variable cost and maintenance and operating expense) have not been controversial, but the interest rental component has been a source of considerable controversy and litigation. Indeed, the ICC/STB has offered five different methods for calculating this cost component.⁹

This litigation and analysis has not considered the costs or revenue loss imposed on other parts of the rail network. The existing rules only provide for the incumbent to receive a fee for the specific track at issue and neglect to include any profit the railroad might have earned for the rest of its system on the traffic now captured by the entrant.

The US regulatory regime for the protection of "captive shippers" is currently subject to an STB rulemaking procedure. In July 2011 the National Industrial Traffic (NIT) League petitioned the STB for a rulemaking with a new proposal for mandatory "switching" – a requirement that under some circumstances the railroad directly serving a shipper "switch" the traffic to an alternative railroad at the closest point of interchange rather than carrying the long haul itself. In a July 2016 ruling, STB declined to adopt NIT League's proposal. The STB recognised that the rail industry had changed since ICC's captive-shipper-protection rules were put in place, but the agency believed it was better to enact a more limited, case-by-case approach. Instead of adopting the NIT League proposal, the STB initiated a rulemaking and continues to solicit comments.¹⁰

Rulemaking is an important STB function. A rulemaking can begin with a petition from an outside party, or the STB can begin on its own initiative. STB can reject an outside petition and not commence a rulemaking. For example, STB chose to reject an AAR petition for the adoption of replacement costs in revenue adequacy. A less common method is Congressional directive, where Congress can direct the STB to conduct a rulemaking, which was the case with the recent rulemaking to streamline the standalone cost (SAC) proceedings.

If the STB is not ready to issue a proposed rule, it can issue an Advanced Notice of Proposed Rulemaking (ANPR). It can then conduct hearings or accept pleadings so that it has enough information to formulate

a rule. Typically, STB will solicit two rounds of pleadings in this process. STB is currently in the ANPR stage in its effort to improve SAC methodology.

If the STB has enough confidence in its information, it can issue a proposed rule. Typically, it will then receive two rounds of comments. After reviewing the comments, it can issue the rule, revise the rule and take more comments, or withdraw the rule. The rulemaking process can take one to two years or longer.

The role of Railinc in waybill management and processing in the US

Railinc is a wholly owned subsidiary of the AAR. Railinc is the railroad industry's primary resource for information technology and information services linking the individual railroads into a fully integrated, interoperating network. Railinc supports business processes and provides business intelligence that helps railroads and rail equipment owners increase productivity, achieve operational efficiencies and keep assets moving. Railinc is the industry's largest and most accurate source for real-time interline rail data. In particular, Railinc is the basic source for location and management of railroad rolling stock and Railinc processes the North American rail waybills under contract to the STB. The North American waybills include waybills from traffic to and from Mexico, so Railinc already provides some waybill services to KCSM and Ferromex who are full members of the AAR.

Waybills began as a relatively simple paper document. Today they are initially produced in an electronic file of 237 bytes. The waybill prepared by the railroads and submitted to Railinc contains 32 fields of information, including: waybill number; number of carloads; equipment ID; intermodal service codes; commodity; weight of the shipment; revenue; type of move (water or truck substitution for rail); trans-border flag (indicator); contract tariff flag; and routing information (connecting railroads, junctions, etc.). Railinc receives waybill reports from the seven Class I railroads monthly and from 48 smaller railroads quarterly. The total sample consists of approximately 650 000 waybills reporting on total system traffic of 29 million carloads totalling 1.45 billion tonnes and generating USD 70 billion in revenue.

Railinc's work proceeds in stages:

- Railroads prepare the basic 237-byte file for each shipment and submit the collected files to Railinc.
- The total population of traffic is sampled according to stratification rules promulgated by STB. Some railroads do their own sampling before submitting their data to Railinc; other railroads allow Railinc to do the sampling for them.
- Railinc performs detailed error processing on the files received. If errors are found it is the responsibility of the railroad to correct them and return the corrected files to Railinc. Railinc's experience has identified about 75 typical errors to be corrected but new types of errors are not uncommon. Error identification and correction can consume a lot of time and effort because it is hard to automate completely.
- Railinc uses the "clean" files to create a 432-byte file for each shipment by adding detailed information about the freight car (owner, lessee, capacity, tare weight, length, width, height and AAR equipment type). The data is taken from the Universal Machine Language Equipment Register (now called the "Umler file"), which has data about all North American freight cars.
- The 432-byte file is delivered to the STB monthly and quarterly and is used by the US Government agencies for general reporting on industry activity.

- Once annually, the 432-byte file is expanded to a 900-byte file that includes the distance of the shipments. Distance is generated from a number of data sources (Centralized Station Master, STCC codes, Mark Register, Junction Master, Standard Point Location Code (SPLC) and Umler). The distance calculation captures data from trip, route and pattern matching software, in addition to event data (car and train location in real time).
- The annual files are delivered to the STB and FRA along with Railinc's assessment of any potential questions or concerns about the validity of the files.
- The STB takes the annual files and applies the STB's costing formula.
- STB then returns the files to Railinc, which creates a version of the 237-byte file that becomes the Public Use Waybill Sample (PUWS). Revenue entries in the PUWS are masked, and other areas are masked or aggregated where necessary to conceal potentially confidential information. Costs are not included in the PUWS.
- The PUWS is returned to STB for public use along with documentation.

The STB retains the Confidential Waybill Samples that have masked and unmasked revenues.

Use of waybill and financial data by the Federal Railroad Administration

The Federal Railroad Administration (FRA) is housed within the US Department of Transportation (DOT) and primarily focuses on regulating railroad safety. The safety role involves working with the industry to establish standards for rolling stock and equipment design and maintenance and then inspecting track, rolling stock and operating practices to ensure that the safety standards are being met. FRA has approximately 600 employees carrying out such safety inspections.

The FRA also has a role within the DOT for regional and national network planning. This role is reinforced by a program of grants and loans to the industry to improve efficiency and safety. In support of its safety and economic missions, the FRA has a significant research and development function aimed at identifying and promoting critical technologies. These have included automatic car identification, grade crossing technology, track and equipment testing and Positive Train Control.

FRA also oversees the Amtrak budget annually and works with Amtrak and the states to promote rail passenger service. FRA partners with STB in producing the CWS and has access to the data at all levels of confidentiality. FRA has a number of uses for the waybill data, including traffic predictions for safety analysis, national policy and planning within the DOT, analysing and predicting the movement of hazardous materials, analysing cross-border traffic (Mexico and Canada) and modelling train movements and traffic flows using network models.

FRA's focus is different from the STB. FRA does not deal with individual rate cases, traffic disputes, issues of revenue adequacy or mergers. Instead, FRA looks at rail in the context of the national transportation network and uses traffic flows to identify bottlenecks and concentrations of hazardous materials traffic, particularly using the network flow model. This model in conjunction with waybill information can be used to produce network maps showing total traffic density (tonnes) for the US network and for traffic in Mexico and Canada that moves at any time over the US network.

Because the CWS has detailed commodity information, this flow map can be adapted to show any type of traffic: for example, the flow of intermodal container traffic (Figure 6) or showing only traffic that

crosses the Mexican border. Note that the flows are geographically distorted in places by the model used, reflecting the origins and destinations recorded rather than the actual routes taken (e.g. the large flows depicted looping south from Vancouver to Seattle before heading east to Chicago actually take a more direct, more northerly route on the Canadian Pacific Railway).

Figure 6. Total North American intermodal traffic using US Network



Source: US DOT Federal Railroad Administration.

Flow maps could also show hazardous cargo, flows into and out of major ports, and so on. In fact, with use of the CWS and the network model, the US DOT has far more information about freight flows by rail than it does by truck or barge.

The FRA network model is based on latitude and longitude station locations and a GIS overlay, and already includes the Mexican and Canadian networks to the extent that they carry traffic that also moves in the US. As noted, Railinc already processes waybills for rail traffic that crosses the US border. The Mexican Institute of Transport (IMT) has also apparently developed a Mexican network model that can use Mexican waybills to handle domestic traffic as well as international traffic. This suggests that much of the network flow modelling capability that ARTF wants to develop already exists in various formats and that the challenge will be to pull the traffic data and the network models together into an integrated and consistent format.

Use of rail waybill data by the Association of American Railroads

Founded in 1934, the Association of American Railroads (AAR) is the world's leading private sector railroad policy, research, standard setting and technology organisation. It focuses on the safety and productivity of the US freight rail industry. AAR full members include the major freight railroads in the United States, Canada and Mexico, as well as Amtrak. AAR Railroad Affiliate and Associate Members include non-Class I and commuter railroads, rail supply companies, engineering firms, signal and communications firms, and rail car owners. The AAR serves as an industry forum for discussion of transportation policy issues and often presents the industry positions to the DOT and the Congress. AAR also has a significant program for informing the general public of the contribution of railroads to the national economy. AAR performs a number of services to the industry including economic analysis and reporting on industry trends and management of the CWS through its subsidiary, Railinc. AAR is also a major user of waybill information in its publications such as "Railroad Facts," an industry yearbook of financial and performance indices.¹¹ "Railroad Facts" includes a profile of its US Class I members as well as Canadian Pacific (CP), Canadian National (CN), Ferromex and KCSM.

AAR's industry reporting is not based solely on the CWS and data derived from it, such as the "Quarterly Commodity Statistics" report. Other reports, such as the Form R-1s (financial and operational data) and operating data furnished by Railinc are also important. AAR uses the data for a broad range of purposes:

- Analysing regulatory issues facing the industry. These include estimates of output and productivity and studies of traffic flows (agricultural commodities and boxcar traffic) that are not subject to regulation.
- Analysing traffic that moves between and among railroads to assess, for example, impacts on competition resulting from access agreements or mergers.
- Compiling traffic flows within and among states to assist state legislatures in understanding the role of railroads within each state.
- Identifying possible capacity issues in traffic flows over specific lines for the FRA and STB.
- Reporting to government agencies, such as the Energy Information Agency, on the flows of energy producing commodities, principally coal and crude oil.
- Assessing the impact on railroads and the industry of regulatory proposals from STB or FRA.
- Assisting the FRA in identifying and analysing the potential impact of flows of hazardous materials.
- Developing econometric models that identify the role of rail in the overall national economy and show the linkages between rail indicators and other indicators of economic activity.
- Understanding the elasticity of demand for rail versus truck service and understanding the cross elasticities of demand among rail service and pricing and related economic sectors. A related issue is evaluating the impact of truck weight and size restrictions on rail demand. These studies required access to unmasked revenues as discussed below.
- Understanding how rail freight cars are utilised and identifying ways in which to improve productivity, including analysis of hazardous materials flows.
- Using the CWS to identify and implement improvements in supporting data sources such as station location information files.

- Developing measures of risk and exposure for hazardous material shipments.
- Conducting benefit/cost studies to support industry positions on transportation policy.

AAR and Railinc must be especially careful to maintain confidentiality of the waybill and other operational information as required by STB rules, partly because individual members do not want to reveal their information to other members and partly because of the potential anti-trust implications if it might appear that members are sharing the information supplied to AAR or Railinc to collude on pricing. In some cases where unmasked revenue was used, the AAR has employed an outside consultant to manage the analysis and report back in a way that did not reveal the underlying confidential information. There are clear implications from the US experience for ARTF's management of confidentiality issues with a Mexican waybill sample.

In practice, AAR's reporting is based heavily on information sources other than the CWS because much of the AAR's analysis is related to operational rather than regulatory questions. It seems likely that the waybill information content would be different if it were prepared only for AAR's use, with more emphasis on production data and less emphasis on pricing or revenue data.

AAR's Economics Department also works closely with Railinc for a number of real-time reports and analyses since Railinc is a central source of waybill and operating data for the industry. Examples of joint products include actions to restrict or embargo usage of specific routes if capacity limits are being reached or if there are maintenance problems that would restrict flows and planning and tracking of specific shipments where the commodity or service is sensitive (shipment of military or strategic materials). These reports are based on the CWS data, but are also rooted in the real-time data on car location and routings that are held by Railinc.

As a part of this data, AAR also uses the "Bill of Lading" information that is developed in conjunction with the waybill for a particular shipment. The Bill of Lading is the railroad company's companion to the waybill. The Bill of Lading tells how the car or shipment will actually be handled by the railroad, including the actual routing and handling schedule. One interesting point is that actual routing may not be the same as shown on the waybill: the waybill routing is used to calculate the division of revenues among the carriers involved whereas the Bill of Lading specifies the actual routing for operational purposes.

Development of data reporting and analysis in Mexico

As discussed above a distinct feature of the Mexican concessioning process was the attempt to design the concession territories in a way that assigned a significant amount of exclusivity to each concession in order to increase the price paid while at the same time identifying trackage rights that were very specific as to trackage, commodities, customers, etc., in an attempt to reduce market and pricing power in a limited number of major markets where excessive profits could be generated. Negotiating access charges in Mexico in the areas designated under the concession agreements turned out to be difficult because each concession is concerned with recovering its concession price and other fixed costs and they must protect their markets in order to do this. Negotiations were also hindered by the fact that the concessions (and regulators) were only beginning to collect the kind of knowledge of their markets that would permit them to assess the potential value or cost of the trackage right under discussion.

There is a high likelihood that increased competitive access cannot be negotiated without one or both of the major concessions being a net loser. If ARTF is asked to impose an access charge, it will have to take the issue of market, income and concession value loss as well as the additional avoidable cost imposed on the concession currently holding the trackage rights fully into account. Similar information requirements – the specifics will depend on the methodology ultimately chosen -- will face the agency if it is asked to impose a rate ceiling on particular movements. Facing these kinds of challenge, it is critical that ARTF have the kind of information needed to evaluate the impact of potential decisions.

Waybill formats in the Mexican context

Mexico is starting the process of developing domestic waybill information and ARTF will therefore be able to tailor waybill information to specific Mexican needs without totally adopting the North American format. At the same time, because there is considerable interchange of traffic with the US and Canada, it seems unlikely that Mexico would want to change the basic North American file structure, though it may not be necessary to enter data into all the fields of the standard US file and it is possible that a smaller Mexican format could be used as long as it is easily converted by computer to the North American format for international traffic.

Because the Mexican rail network is less complex (fewer alternative routes) than the US system, it may be possible for the railways to add distance directly in the waybill rather than adding distance later, as Railinc does in the US. However, the regulator would have to specify whether this “regulatory distance” is via the shortest potential connection or by the actual route taken and the larger the sample collected the greater would be the burden imposed on the railways. There has been discussion in the US of adding origin and destination time stamps to waybills in order to measure service quality, but this has yet to be implemented. It could be considered in Mexico at some stage. The Agency would need to investigate the feasibility, complexity and burden on the concessionaires of doing this. The more information added to the waybill, the greater the amount of data the Agency will need to review in any sample waybills collected, and the greater the potential for errors to occur that will have to be identified and corrected.

Stratification and sampling rates in Mexico may well need to be different than in the US. The commodity mix in Mexico may dictate different sampling rates by commodity, particularly if the percentage of multicar shipments or unit trains is different. Computing technology continues to advance and the ability

to process waybills is now much greater than before. ARTF will need to reach a balance between cost of collection and processing versus accuracy of the sample it collects. Where this balance should be is not obvious. It is possible that the entire waybill population could be processed, but the cost of waybill preparation by the concessions and the manual error correction effort entailed by a large waybill volume argue in favour of sampling, at least while the system is being established.

One critical requirement will be co-operation from the railway concessions. US and Canadian Class I railways generate waybill data routinely because they use and share waybill data as an essential part of their operations and it is in their interest that waybills be complete and accurate. Smaller US railroads (terminating less than 4 500 carloads annually) are exempted from providing waybills because they would find the cost burdensome. ARTF may want to consider similar treatment of the smaller Mexican concessions, especially if they only exchange limited amounts of traffic with the rest of the system. With that said, full and complete co-operation from the larger concessions will be essential to a successful development of a Mexican version of the CWS.

Traffic costing models for Mexican traffic

The STB developed a model (the Uniform Rail Costing System [URCS]) for estimating the variable cost of rail shipments because the Staggers Act established the ratio of revenue to variable cost as a regulatory standard. The academic econometric community has been critical of URCS, as reflected in the report of the Transportation Research Board (TRB, 2015) "...URCS is neither an economically meaningful nor a reliable tool for making regulatory determinations about eligibility to pursue rate relief. Furthermore, the deficiencies of URCS cannot be overcome by revising it. No allocation of common costs can produce an economically valid measure of the variable cost of a shipment."¹² Nevertheless, the US Congress has continued to require the STB to use measurements of variable cost in assessing rate reasonableness and the industry accepts use of variable cost as an approximation and a place to start analysing rates.

Mexico's need for a traffic costing model will depend on the way it will be used. Since there is no legally established revenue/variable cost standard, a legally probative model is not needed in any case. Instead, a Mexican model might be developed to be used primarily as an indicator of trends of financial performance at the concession and industry level and not necessarily as a measure of individual rate pricing or access charging behaviour.

Waybill status in existing Mexican concessions

The current waybill system in Mexico differs from the US in a number of ways:

- KCSM uses standard international waybills for its international operations and similar documentation for domestic freight movements.
- Ferromex collects and reports its operations data by train operation and cannot easily match car-level data with data at the train level. Ferromex would prefer that waybills be sampled in order to reduce the costs of compliance with waybill information collection requirements. They might also want to add data to the standard form to include taxpayer ID for billing purposes. Ferromex has to convert its internal waybill data into the standard format for international traffic: the conversion is done by computer for those waybills involved.
- Línea Coahuila-Durango has the basic waybill data in electronic format. It does not add distance.

- Ferrocarril del Istmo de Tehuantepec (FIT) handles around 15 000 carloads annually for other carriers and, as of 2018, is an operator as well. All of their records are on paper and they use the Ferromex formats that are transferred to an Excel format as needed. Their waybills are in the form of a “service order” that includes most of the information in a basic waybill. They do not anticipate problems adapting to a modified system.
- Ferrovalle is a terminal company providing access to its owners. Most of its traffic would be reported by the operators though there is a small amount of traffic that originates on Ferrovalle and would be reported by them.
- All of the concessions argued that reporting requirements should be held to the minimum needed by ARTF for its functions in order to reduce the collection and management burden imposed on the concessions.

Conclusions

The first overall conclusion is that the Mexican experience with rail freight concessioning has been very positive. The Mexican concessions are among the most efficient freight carriers in the world and average rail freight tariffs are fully in line with US and Canadian tariffs for comparable traffic. Investment in the system has increased as initially expected, service has improved, and shipper complaints have been limited to specific cases where rates have been protested. There is little evidence of any need for significant near-term restructuring of the industry or of large scale intervention by the ARTF.

A second overall conclusion is that ARTF has made good progress in establishing itself and in defining the role it should play. It is fully headed in the right direction. At the same time, there is a clear need for the ARTF to improve its ability to assess the performance of the concessions against their legal commitments and to develop a better understanding of the role of the rail sector in meeting Mexico's transport needs. There is no doubt that this can be done. The recommendations below should not be seen as criticisms; they reflect the typical adjustments required in a system that is developing the way it should, especially because there is no exact model to follow.

There are four areas where the effectiveness of the ARTF can be improved: analysis of waybill information; improved financial accounting and reporting; acquisition and use of network models to generate traffic flow analyses and O/D matrices; and increasing use of confidential contracts and effective use of mediation or arbitration to settle tariff disputes.

Analysis of waybill information

Rail waybills are fundamental documents for the management of freight traffic by the railways and an invaluable source of data for reporting on and evaluating rail system performance. They are a standardised document issued by the railroad carrier giving details of the shipment of a consignment of goods. The US waybill contains information on commodity type, tonnes loaded, carloads in the shipment, revenue,¹³ origin and destination points, shipper instructions as to routing, and many other pieces of information related to the shipment (waybill number, date, car initials, car number, etc.).¹⁴ The railroads involved also use bills of lading that incorporate this information and contain the internal instructions for handling the shipment.

Waybills are produced by all the North American Class I railroads, including the Canadian carriers and the Mexican concessions, for shipments over track in the US and are submitted to the STB for processing. The STB contracts with Railinc to receive the waybills, conduct quality assessments (and return them to the railroads for any correction required), sample them (if they have not already been sampled by the railroad) and produce the Carload Waybill Sample.

Several aspects of the Carload Waybill Sample are significant in the Mexican context. First, reporting is based on a sample of the waybills and not on complete coverage of all traffic. Sampling was initially employed because waybills were paper documents and analysing millions of paper documents would not have been feasible. Sampling has been retained because, given appropriate stratification of the underlying population, results can be expanded to represent the overall system output within a usable range of uncertainty.

Second, the waybill sample already contains a significant number of Mexican (and Canadian) waybills.¹⁵ This means that the capability for Mexican concessions to produce and report waybill data in a format consistent with existing North American practice already exists: remaining issues relate to uniformity, quality and scale, not underlying capability.

The existing North American waybill analysis system is based on a well-established set of relationships among the producers and users of the waybill information and the Mexican system is at least partly connected to this system. The issue is how to extend waybill production in a consistent format and suitable quality to all Mexican rail traffic and to all of the Mexican concessions. One of the advantages of connection to the North American rail network is that the concessions are to various degrees already familiar with the system of waybills and operational data and financial reporting employed by the North American Class I railroads. KCSM bases all of its waybills on the US standard. Ferromex retains some of the pre-existing FNM reporting systems for domestic traffic but uses the US standard waybill for international traffic. The smaller concessions have much less detailed reporting systems.

Mexico needs to develop a system for collection and use of domestic waybill data, but this may not be easy for a number of reasons. Although KCSM uses the standard North American waybill format as a routine part of operations, Ferromex appears to be using a system that must be manually converted into a compatible format for the international traffic waybills that are reported to Railinc for processing. The smaller concessions do not appear to be producing or reporting in a compatible format and, more broadly, the status of waybill information for purely domestic Mexican traffic is not clear, either as to format or quality. A Mexican waybill sample file will have little or no regulatory value until waybills are reported in a consistent format, and consistency with the existing North American standard is clearly important to avoid duplication of effort and confusion of formats.

The ARTF can take a number of steps to initiate the process of standardised reporting:

- Conduct a survey of the actual waybill formats in use by the concessions to get a better picture of the actual situation both for use of waybills in management and compatibility among systems.
- Based on the results of the survey, develop and implement a Mexican waybill format that can be fed into the overall North American system of waybills. This format might not contain all of the information used in the North American waybill, but it should be consistent in machine readable format for the information it does contain. There may need to be some iteration of the format over time, and depending on the capabilities of the individual concessions to develop the data, but a robust data set should be established at the outset to avoid any unnecessary reprogramming. As in the US and Canada, it is possible that some of the smaller concessions might not need to furnish the complete set of data. A critical concern in developing the format will be to ensure that information contained in confidential contracts is protected.
- Require each concession to furnish to ARTF a stated number of example waybills (500 to 1 000) that can be subjected to quality control and error analysis. Results can be fed back to the concessions for initial use in improving waybill format and quality. The experience of KCSM and Ferromex in furnishing waybills for Railinc use should be valuable in developing the common format and in initial quality control.
- Employ experts to develop an initial approach to waybill stratification and sampling for use in Mexican waybill reporting. Because the Mexican traffic mix is different, and the waybill population is somewhat smaller, stratification might differ from STB practice.¹⁶ It will be necessary to develop an initial approach to get the system into operation and then, if necessary,

change the specific sampling rates as appropriate. As the system develops and experience is gained, it is possible that ARTF might want to process all waybills and not just a sample.

- When compatible Mexican waybills covering all Mexican rail traffic are available, ARTF can consider contracting with Railinc to process the Mexican waybills along with their processing of the North American waybills. This could result in a report to ARTF containing a waybill “sample” for total Mexican rail traffic similar to the report prepared on US traffic for the STB. Based on the experience with US waybills, this is likely to face a significant quality control problem at the outset, but it should improve over time (as is the case in the US – not all mistakes can be prevented and new mistakes are always occurring).
- ARTF will clearly face the issue of how much it wants to rely on Railinc to process the Mexican domestic information. On the one hand, the North American railways form a single, increasingly integrated system and would benefit from efficient and consistent processing of information for all members. Ferromex and KCSM are members of the AAR and thus already have interactions with Railinc. In addition, since Railinc receives the extremely detailed information needed for management of rail car movements and a real-time event file that details actual operating movements, the data needed for accurate calculation of trip distance (and thus of tonne-km generated) can be exploited by them. Railinc already has detailed information about station locations and network distances for at least some of the Mexican networks. Because Railinc could do the Mexican processing as an add-on to current work, it seems likely that their costs would be competitive and the result, a common database for all North American railroads, would reduce overall costs and facilitate interactions. On the other hand, it is possible that a Mexican equivalent of Railinc can be developed that would be less costly than Railinc and more able to focus on specifically Mexican regulatory and national security requirements, questions, and concerns. It is also possible that ARTF will want to develop the capability to add shipment distance to the waybill data as Railinc does in the US.
- As with the STB’s use of the Waybill Sample, ARTF will want to formulate different versions depending on purpose of access and need to maintain confidentiality. Since Mexico has fewer railroads and much of the system is exclusive to one carrier, confidentiality issues are an even more critical factor than in the US. The forms in which data is recorded in the Waybill Sample may need to be adapted to Mexican conditions to preserve commercial confidentiality.

Improved financial accounting and reporting

A significant conclusion is that waybill data is only part of the information that ARTF will need if it is to assess the performance of the concessions adequately. The other fundamental tool will be production of financial and operational information in a consistent format across the entire set of concessions. Without this information, the ARTF will only be able to develop limited measures of productivity and efficiency and will not be able to develop an overall picture of the financial performance of the rail system as a whole.

The STB depends on a number of reporting documents, but a primary source of data on the finances and operations of the railroads is the Rail Form R-1. The Form R-1 is an annual report containing over 700 lines of financial and operational data including income statements and balance sheets, physical data (km of track, freight cars, locomotives, labour force) costs by many different operational categories, commodity movements (tonnes, carloads and revenue) and operational data (fuel consumption, etc.). The format was prescribed by the regulator many years ago, and has been published in virtually the

same format for nearly 100 years. Because the R-1 (and its predecessor, Rail Form A) evolved along with the industry, the Form R-1 contains information that is no longer particularly useful and it reports in a structure that might be improved if there were no need for historical consistency. Even recognising these problems, the Form R-1 for each Class I railroad and the compilation of the Form R-1s in the annual “Statistics of Class I Railroads” is critical to the STB’s assessments of the performance of individual railroads and the industry as a whole.

ARTF needs to develop a comparable source of clearly defined and consistently prepared financial, physical and operating statistics for the Mexican concessions fully as much as it needs to develop the waybill data. Development of a “common template” would both reduce the burden on the concessions and improve the quality of the data that ARTF receives. Lack of such a system in Mexico probably results from the fact that the legacy systems inherited from FNM were originally developed to support public reporting requirements and not for effective management of a commercial business, and from the differences between Mexican accounting standards and international accounting standards (or US GAAP). It is not clear whether the accounting systems of the individual concessions are consistent with or in full conformity with any common set of accounting requirements. ARTF will be severely hampered until it establishes a common template for financial reporting, so ARTF may wish to act to bring the various systems into conformity with appropriate accounting standards and with each other.

The full value of a successful reform will not emerge until a time-series of five to ten years of reporting is available because some uses, such as development of the coefficients used in traffic costing models, are not reliable until they can be based on several years of performance.

The financial and operating data system will take a number of years to complete and the full scope is hard to define at the outset. The R-1 format could serve as a starting point, at least partly because the larger concessions are already familiar with the format and information required, but it could be modified to meet Mexican regulatory requirements and to eliminate information that may be useful in the US but is not particularly useful in the Mexican regulatory context. A few initial steps could be useful:

- ARTF could begin by working with the R-1 format of definitions used for data entries and make an initial assessment of the available information which it could use. ARTF could consider how this information could be combined with or replace existing reporting in order to reduce the overall burden on the concessions.
- ARTF could convene a meeting with the concessions and their accounting firms to get their reaction to the accounting conformity and cost issues involved in producing the information to be requested. Reasonable compromises may well be needed between the existing format and the cost imposed on the concessions to meet a specific new format. ARTF will need to determine the purpose of the information and how ARTF might use it in any actual proceedings they are likely to conduct. As stressed in the discussions with stakeholders, data should only be collected if there is a defined use, and the degree of detail and precision should be suited to the actual use. ARTF will also need to reach a balance between initially asking for anything that “might” eventually be useful and potentially overburdening the concessions with reporting requirements, versus the risk of initially omitting information that proves necessary and having to modify the format in the future, which might meet resistance. With all of this acknowledged, it should be clear that accurate and complete financial and operational information is critical to the ARTF mission and the only way this can ultimately be implemented is through ARTF review and promulgation.

- Along with the development of the common template, ARTF can initiate a review of the rail traffic costing systems in use in the US and plan for development of a Mexican approach once the data become available. Traffic costing systems in the US serve two functions, internal rail company costing estimation for use in pricing decisions and use by STB in comparing tariffs with the revenue to variable cost ratio of 180% established in regulatory law as the level below which STB has no mandate to intervene in published tariffs. Internal railroad traffic costing systems vary greatly among railroads and usually have the objective of determining a level below which a tariff should not be offered: above that level, the tariff is solely determined by market conditions. STB use of the 180% guideline is understood to be approximate and there is continuing debate among economists on the validity and use of STB's URCS system and the URCS-based variable costs, even though the data needed to make a calculation of variable cost does exist (for the most part). In Mexico no such standard has been established so regulatory use of traffic costing models might focus more broadly on relative "profitability"¹⁷ of various types of traffic and on trends in revenues and profitability, in which case great precision will not be needed.
- ARTF will need to identify the set of financial and productivity indicators it will use in assessing and reporting on the performance of the concessions. At least some of these indicators already exist in current financial reporting processes and will need to be included in the revised reporting systems.

Acquisition and use of network models to generate traffic flow analyses and O/D matrices

Network models have a number of uses in analysing system performance and outputs, not only by the railroads but also by regulators and the ministry responsible for analysing the performance of the rail system within the broader transport network. Mexico will also need rail network modelling capability to ascertain if any additional trackage rights might produce significant net efficiency gains as the 20 periods of exclusivity in the concession titles expire.

Models already exist for traffic flows over the Mexican (and the entire North American system). The FRA (and Railinc) can currently display the flows of commodities in Mexico for international waybill-based traffic that originates or terminates in Mexico. IMT has also developed a Mexican network model that displays Mexican rail traffic flows and generates origin/destination matrices for various purposes. The next step for ARTF will be to decide which model or models to adopt and develop given new waybill data collection capabilities. Several steps are clearly needed:

- The location of all stations and junction points on the network will need to be identified and linked to the data entered into the waybills. The Railinc model already has such information in relation to international traffic, but this may need to be expanded to include all domestic origins and destinations. The quality of the existing information may also need to be improved. This is also true of other existing models such as the network model employed by FRA and the IMT model. This is not difficult but it can be laborious.
- ARTF will need to develop the capability, either in-house, or in a suitable Mexican source such as IMT, or at Railinc, to produce traffic flow reports for use in system analysis. Flow reports sometimes need to be very specific and may have to be generated in response to very detailed and unpredictable questions under tight deadlines. It is also likely that some analyses will need

to be based on confidential data that will have to be reliably safeguarded. This suggests that at least some network flow analysis capability should either be developed in-house or close at hand even if outside consultants are also used.

Increasing use of confidential contracts and mediation or arbitration to settle tariff disputes

The discussions above make it clear that even under the best of circumstances it will take time for ARTF to develop the information systems and reporting needed to make fully defensible regulatory decisions when a shipper alleges that a rate is unreasonably high. Fortunately, there are ways around this problem.

In the US, the Staggers Act made it fully legal for railroads and shippers to sign confidential contracts for carriage, rather than depend on rigidly determined, published tariffs. Such contracts may include a wide range of features important to shipper or railroad, including volume guarantees, investment commitments to permit use of specialised rolling stock or loading/unloading facilities, multi-year commitments, or service quality guarantees, among many other possibilities. Under the Staggers Act provisions, such contracts are considered to be voluntary agreements between railroad and shipper and the provisions are not subject to regulatory review. The actual revenues from contract shipments are concealed in the waybill data and can only be unmasked under very restrictive conditions. As Table 1 shows, rail tonnage under confidential contracts has increased rapidly from around 9% in 1990 to nearly 80% in 2013, which strongly underlines the preference of both railroads and shippers for the flexibility confidential contracting offers under competitive market conditions.

Table 1. The role of contract tariffs: Proportion of rail traffic travelling under contract tariffs (%)

	1990			2000			2013		
	Tonnes	Ton-km	Masked revenue	Tonnes	Ton-km	Masked revenue	Tonnes	Ton-km	Masked revenue
Farm products	3.6	2.7	3.1	23.9	21.5	26.2	32.5	31.2	35.1
Metallic ores	11.4	14.1	17.1	5.3	17.6	19.8	98.5	95.8	96.1
Coal products	13.5	11.8	14.9	54.0	50.2	59.1	90.8	94.5	93.2
Crude petroleum	n.a.	n.a.	n.a.	58.1	54.6	55.8	86.3	89.0	89.2
Non-metallic minerals	5.5	6.9	9.0	55.9	59.1	63.0	69.3	63.4	67.1
Food products	6.9	5.6	7.7	52.1	54.4	61.2	51.7	52.6	59.3
Wood products	1.6	2.2	2.5	48.1	53.7	59.1	57.3	49.4	56.9
Pulp and paper products	1.9	1.7	2.1	56.2	55.6	61.5	86.4	86.8	88.8
Chemical products	5.3	6.1	6.4	36.1	37.4	42.7	81.1	78.2	82.9
Petroleum products	14.3	9.3	11.6	25.6	29.6	33.9	72.1	67.9	71.0
Stone and glass products	3.6	3.0	3.7	52.5	46.7	50.9	69.4	63.4	70.2
Metal products	24.1	11.6	19.4	64.4	60.0	66.0	77.3	70.3	76.6
Automobiles	7.7	5.1	6.9	71.8	72.5	79.8	84.9	89.9	92.3
Intermodal	1.0	1.4	1.1	63.5	56.1	59.9	97.5	98.7	98.6
Scrap	16.5	11.0	15.8	53.2	53.8	58.1	72.2	72.2	72.9
All other	1.5	1.2	1.7	49.4	49.1	55.5	92.8	94.0	93.1
Total	9.3	7.1	8.2	49.0	48.2	56.6	79.5	79.6	81.5

Source: US STB Carload Waybill Sample.

The advantage for the regulator is that the regulatory effort is greatly reduced and attention can be fully focused on cases where some form of detailed intervention may actually be needed. In addition to contract carriage, shipments of some agricultural goods like fresh fruits and vegetables, box cars, and TOFC/COFC, and all shipments in box cars were exempted from any tariff regulation by the Staggers Act, because of the intensity of competition from truck and barge transport. Thus only about 15% of traffic on the US rail network is even potentially subject to tariff regulation and much of that 15% is traveling at rates well below 180% of variable cost.

In Mexico, under the terms of the concession contracts, the concessions are required to issue a table of maximum tariffs based on commodity category, distance and handling costs. The tables were established at the time of concessioning at levels that would never actually be imposed (or require regulation) and the concessions are free to offer discounted rates well below the maximum levels. These maximum tariffs are adjusted to accord with inflation, among other factors, and the ARTF bears the responsibility for ensuring that actual tariffs fall below these maximums.

Mexican law underlines the freedom of concessions to negotiate tariffs with shippers and allows confidential contracts like those in the US and Canada. Essentially all traffic moves at a discount to the published maximum tariffs (not publicly reported but estimated at 40 to 50% depending on circumstances of the shipment). The concessions estimate that about half of their traffic moves under confidential contracts. The percentage under contract almost certainly varies among the concessions and it may depend on factors such as commodity mix, typical shipment size, shipper size, ability to make long-term commitments, marketing strategy, etc., that will always differ among concessions and

between Mexican markets and those in the US and Canada. Acknowledging the differences, there are several things ARTF can do that would permit focusing ARTF's resources where they are most needed.

- Clarify the conditions under which confidential contract tariffs are legal and encourage concessions and shippers to engage in contracting. This is not an issue of directing behaviour but rather of encouraging it where appropriate through clearer information. ARTF does have the right to access contract terms, so it can inform itself of the types of contract being used even if it cannot influence them directly.
- An earlier ITF report (ITF, 2015) recommended that ARTF should encourage arbitration rather than regulatory determination in rate and service disputes. This is the Canadian approach and it seems to work effectively, especially in forcing the analytical and data burden onto the parties rather than the regulator. In the Canadian context, most of the work is done by the parties and the role of the regulator/arbitrator is to choose the more reasonable offer if the parties are unable to agree or compromise. Aside from reducing the burden on the regulator, this approach also addresses the issue of information asymmetry.¹⁸ Parties unable or unwilling to support their arguments by verifiable data tend to lose the argument. Arbitration might be useful in Mexico as an interim approach during the period when ARTF's regulatory information systems are being developed. In fact, the US National Academy of Sciences report (TRB, 2015) recommends increased use of mediation and arbitration in the US as a way to avoid the problems with the use of URCS and the STB's revenue/variable cost standard. It is not clear whether Mexican law will permit ARTF to sponsor or require arbitration. One initiative ARTF may consider is to offer legislation that would support use of arbitration as a method of dealing with rate of service disputes.

Potential role of the Mexican Association of Railroads

The AAR plays a significant role in the US system of reporting on system activity and formulating public policy positions that the industry can hold in common. ARTF and the concessions may want to examine the role that the Mexican Association of Railroads (AMF) might play in the future as the role of ARTF grows.

Notes

- 1 ITF (2014), Recommendations p 34 and Executive Summary paragraph 8; ITF (2015), Recommendations p 6 and 36.
- 2 “Information asymmetry” refers to the fact that the operators typically know a lot more about their costs and revenues than do their users or the regulator. This leads to situations in which neither a user nor the regulator can mount an effective challenge to operator behavior.
- 3 It is possible, however, that the table of maximum tariffs may have played a role in establishing the value of the concessions and the contributions made to government. Changing the table may impact on the current value of the concession and thus may require compensation if required by Mexican law.
- 4 Most infrastructure costs do not vary significantly with changes in traffic, at least in the short and medium term, and are considered fixed for purposes of cost analysis. Operating costs, such as energy or labour, are directly related to traffic volume and are thus considered variable.
- 5 Rail safety inspection and regulation in the US is managed by the FRA. Transportation accident investigation is managed by the National Transportation Safety Board (NTSB) though FRA often participates in rail accident investigations.
- 6 In the most recent such case, Consumers Energy Company v. CSX Transportation, STB Docket No. NOR 42142, both STB board members voiced their displeasure with the ever increasing burdens and demands of stand-alone-cost cases, one noting the debates over “details of the imaginary restrooms needed for the imaginary crew for the imaginary railroad” (p. 74). See also Pittman (2010) and TRB (2015).
- 7 St. Louis Southwestern Trackage Rights Over Missouri Pacific —Kansas City (1984); St. Louis Southwestern —Trackage Rights Over Missouri Pacific Railroad Company (1987); St. Louis Southwestern Trackage Rights Over Missouri Pacific (1989); St. Louis Southwestern Trackage Rights Over Missouri Pacific Railroad Company (1991).
- 8 Arkansas and Missouri Railroad Co. v. Missouri Pacific (1990) p. 623.
- 9 Dardenelle and Russellville Railroad Co. — Trackage Rights Compensation — Arkansas Midland Railroad Co. (1995); Arkansas and Missouri Railroad Co. v. Missouri Pacific (1990); Arkansas and Missouri Railroad Co. v. Missouri Pacific (1990); Arkansas and Missouri Railroad Co. v. Missouri Pacific (1992).
- 10 STB, Ex Parte 711 sub 1, (July 27, 2016).
- 11 “Railroad Facts” is an annual handbook of rail statistics now published by the AAR. It has been published in essentially the same format since 1924 and is primarily based on a compilation of the Rail Form R-1 reports. See AAR 2018.
- 12 See TRB (2015), Box 5-1, page 191.
- 13 If the shipment is under a confidential contract, the stated revenue is disguised (“masked”) and is not accurate, in order to preserve confidentiality in public reports. The waybill will contain an indicator that the shipment is under a contract tariff. Only the STB and the railroad involved know the actual revenue.
- 14 See Railinc (2018) for a detailed description of the US rail freight waybill.
- 15 See Railinc (2018), p 4-6.
- 16 The STB sampling procedures are discussed in detail on the STB website: https://www.stb.gov/stb/indU.S.try/econ_waybill.html
- 17 What is actually being measured is the contribution that revenue from a particular movement is making over and above costs that vary with the traffic in question. The STB formula is aimed at estimating cost in the “medium term” and includes some but not all fixed costs and investment. Railroad models focus more in short-term cost variability unless a long-term contract is under negotiation. Given the extreme complexity of cost estimation, the STB costs are mostly useful as a broad indication of whether or not a particular rate is above or below the 180% standard.

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- NOTE: Key references can also be found at: <https://www.dropbox.com/sh/wq9183f278p31nw/AAAULh-w7vA-f17f0V-8dA5Za?dl=0>

Regulatory Capacity Building

Tools for Analysing Rail Connectivity

This report reviews methods adopted in the United States and Canada for determining fairness and efficiency in rail markets and discusses their potential application in Mexico. It specifically examines how waybill and financial data are used in the economic regulation of railways and makes recommendations for establishing a data collection and analysis system suited to the Mexican railway system.

Mexico has transformed its loss-making national railway into profitable concessions that have invested in infrastructure and carry growing volumes of freight. Some of the provisions agreed in the concession titles regarding interconnection and competition on specific links have not, however, developed as expected. A new regulatory agency was established in 2016/17 to address this and establish the capacity for the government to intervene effectively where necessary. A top priority for the Agencia Reguladora del Transporte Ferroviario de México is to develop a data collection and analysis system to understand rail markets in relation to issues of potential abusive pricing and reasonable conditions of access.