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Railway Mergers and Railway Alliances: Competition Issues and Lessons for Other Network Industries

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**ECONOMIC ANALYSIS GROUP
DISCUSSION PAPER**

**Railway Mergers and Railway Alliances: Competition
Issues and Lessons for Other Network Industries**

By

**Russell Pittman*
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Abstract

Freight railway enterprises in both Europe and North America are in the process of significant restructuring, with EC policy changes dictating new ownership, organization, and cooperation arrangements in Europe and a series of major mergers having already led to highly concentrated regional markets in the U.S. and Canada. Mergers, alliances, and organizational changes may raise important and complex issues regarding the level of competition facing goods shippers, with differing implications depending on the differing institutional contexts. This paper examines the competitive consequences of these developments in Europe and North America and suggests some lessons for other network industries.

Keywords: railway, competition, mergers, alliances

1. Introduction

Railway mergers and alliances have the potential to significantly affect competition under many circumstances. On the one hand, mergers and alliances that increase efficiency, for example through more effective interlining, have allowed rail carriers to better compete with motor carriers for high valued freight cargos. On the other hand, as in other industries, mergers and alliances with actual or potential competitors have the potential to reduce competition and raise prices, with adverse results for shippers and final consumers as well as in broader areas such as road congestion, air pollution, fuel consumption, and global warming. In the rail sector in particular, the nature and magnitude of the effects, along with the lessons for other network industries, depend crucially on the setting in which they take place – especially on the model of rail sector structure and competition chosen by a country’s policymakers. We may focus in particular on two separate models: competition among vertically integrated train and infrastructure enterprises, and competition among independent train operating companies over a monopoly infrastructure. We will focus mostly on freight rather than passenger operations, since the latter are typically subsidized and thus tend to raise different policy issues.

Competition among vertically integrated train and infrastructure enterprises is the rail sector model chosen by policymakers in the geographically large, freight-dominated countries of the Americas – originally by the United States and Canada, more recently by Mexico, Brazil, Chile, and Argentina as well. At the risk of oversimplification, we may further break down this “American model” into a “North American model” – the US and Canada, with an emphasis on origin-destination competition between “parallel” vertically integrated railways – and a “Latin American model” – Mexico, Brazil, Chile, and Argentina, with an emphasis on competition for the business of shippers and customers at particular points served by more than one railway (Pittman, 2004a and 2007b).

Competition among independent train operating companies over a monopoly infrastructure is the model chosen by Brussels for adoption by the members of the European Union. Again at the risk of oversimplification, we may further break down this “above-the-rail competition model” into a complete “vertical separation” model – the prohibition of the network operator from operating its own trains, a policy urged by EU’s

Competition Directorate – and a “third party access model”, with a vertically integrated infrastructure and train company forced to allow access to its infrastructure to competing, non-integrated train operating companies.¹

These models tend to blur a bit, as intermediate solutions such as “accounting separation” are accepted as means of preserving ownership integration while making third party access terms more transparent, and thus (it is hoped) preventing discrimination. The degree to which complete separation of train and infrastructure operations in Europe has actually taken place – as well as the degree to which actual competition among train operating companies has appeared – varies a good deal by country.² “Third party access” tends to be what we observe in countries that have nominally chosen the vertical separation model but have moved only part way toward achieving it – *i.e.*, countries that have taken steps to open up the train sector to competition but have not, or not yet, fully separated the incumbent freight operator from its infrastructure operations.³ Germany may be the most salient example of this – it has instituted “accounting separation” but not yet “ownership separation” of train and track – but Russia is another – though in Russia the competing train operating companies are mostly theoretical only.⁴

The role and impact of mergers and alliances have varied and will vary among these different settings. In North America, the competing parallel vertically integrated freight rail enterprises have merged up to the point that further mergers seem more likely to be of the end-to-end variety – and even these appear problematic from the regulator’s standpoint. On the other hand, end-to-end alliances and cooperation, of various degrees of formality, seem to be flourishing, as the railways attempt to squeeze maximum production from highly utilized infrastructure. In Western Europe there are fears of dominance or even monopoly above the rail as a single, state-owned company continues to make acquisitions, with some likelihood of competitive problems spilling over into Central and Eastern Europe as well; however, to the degree that vertical separation in

¹ More broadly, vertical separation has become something of a reformers’ “default option” for infrastructure sector reforms around the world; see, *e.g.*, Newbery (1999) and Pittman (2007a).

² See, *e.g.*, Gómez-Ibáñez and de Rus (2006), part 1; Molnar (2006); and Pittman, *et al.* (2007).

³ This is consistent with a broader point of Newbery (1999): “Liberalizing entry into a ... utility which remains both vertically integrated and state owned is the least disruptive reform....”

⁴ ECMT (2004); Friebe, *et al.* (2007); Pittman, *et al.* (2007).

particular countries is incomplete, there is a countervailing fear that vertically integrated incumbents will be successful at entrenching their monopoly positions. In general, North American freight carriers seem focused on alliances at this point, while European carriers remain more focused on finding merger partners.

Let us consider these different settings in more detail.

2. The Americas: Competition among Vertically Integrated Railways

Recent decades have seen a massive consolidation of the North American railway system. Canadian railway shipping has remained divided between two transcontinental carriers, the Canadian National (CN) and Canadian Pacific (CP) railways. On the US side, the number of Class I railways has declined over the past 30 years from 41 to five: the Burlington Northern Santa Fe (BNSF) and Union Pacific Southern Pacific (UPSP) in the west, CSX and Norfolk Southern (NS) in the east, and the Kansas City Southern (KCS) in the center. Both horizontal (“parallel”) and vertical (“end-to-end”) mergers were part of this consolidation. Most recently and significantly, the number of major competitors was reduced from four to two in the west, with BN combining with ATSF in 1995 and UP combining with SP in 1996, and from three to two in the east, with CSX and NS carving up the assets of Conrail in 1998.

This process of consolidation came to at least a temporary end at the turn of the 21st century. Faced with the first proposal to form a transcontinental railroad in the US – the proposed end-to-end merger of BNSF with CN – the Surface Transportation Board (STB) first imposed a moratorium on Class I rail mergers (in 2000) and then issued a new merger policy statement (in 2001) that significantly increased the burden of proof on merger applicants to demonstrate that a merger would be procompetitive rather than anticompetitive.⁵ No mergers of Class I railroads have been proposed in the meantime. From a competition standpoint this set of developments is rather remarkable, since it has traditionally been parallel mergers that have raised the most serious competitive concerns, and yet the STB has approved a number of those, while the BNSF/CN

⁵ “Because of the small number of remaining Class I railroads, the fact that rail mergers are no longer needed to address significant excess capacity in the rail industry, and the transitional service problems that have accompanied recent rail mergers, we believe that future merger applicants should bear a heavier burden to show that a major rail combination is consistent with the public interest.” STB, Docket EP_582_1, *Major Rail Consolidation Procedures*, Decision, June 11, 2001, at 9. Kwoka and White (2004) describe these events in greater detail.

combination, which the STB discouraged, would have been mostly end-to-end, a class of merger likely to have a much smaller effect on competition as a general matter.⁶

The academic literature generally suggests that broad railway deregulation in the U.S. – the 4R Act of 1976 and the Staggers Act of 1980 – had strongly positive effects on productivity in the industry, and that mergers had some additional positive effects as well, at least through the mid-1990s.⁷ However, the long-term impacts of the most recent wave of large horizontal mergers are not so clear: the UP/SP combination resulted in dramatic and expensive service problems for shippers in some areas of the country; the trade press reports similar if less dramatic difficulties following the NS and CSX absorption of Conrail;⁸ and the overall positive trend in customer surplus for freight rail shippers found by Ivaldi and McCullough (2005) reaches a peak and turns downward after 1998.⁹ A related literature suggests that the Class I railroads are large enough that they have exhausted available economies of system size and are at or near the point of exhausting economies of density.¹⁰ The evidence is also strong that, for those commodities that cannot economically be shipped by motor carrier or other modes, the presence of competing, vertically integrated railway companies has led to lower prices for shippers.¹¹

⁶ See, for example, the decision of the Surface Transportation Board regarding the division of Conrail between CSX and NS: “With very minor exceptions, the combination ... will be end-to-end and not parallel. It has been our experience that end-to-end restructurings of this kind rarely result in a diminution of competition.” STB, Finance Docket 33388_0, *CSX Corporation, Norfolk Southern Corporation – Control, Conrail Inc.*, Decision, July 23, 1998, at 50.

⁷ Berndt, et al. (1993); Wilson and Bitzen (2003); Ivaldi and McCullough (2005). Chapin and Schmidt (1999) are less positive regarding the effects of mergers.

⁸ According to an official from a shippers’ trade association, “There has been such havoc following all these mergers, with absolutely billions of dollars in lost shipments and other costs incurred by shippers.” Brian Milligan, “Rates keep going up, shippers weather ‘merger fatigue’,” *Purchasing Magazine*, May 4, 2000. See also Rip Watson, “Chemical group slams NS, CSX,” *Journal of Commerce*, July 9, 1999, and John Gallagher, “Unmoved by Merger,” *Traffic World*, November 8, 1999.

⁹ On UP/SP, see especially Kwoka and White (1999). Karikari, et al. (2002) and Breen (2004) attempt to show positive results from the UP/SP merger, but their arguments are not convincing. See, e.g., the discussion before the Antitrust Modernization Commission, http://govinfo.library.unt.edu/amc/commission_hearings/pdf/051205_Regulated_Industries_Transcript_refom.pdf, at 58-61.

¹⁰ The literature on the cost structure of US freight railways is extensive. See, e.g., Wilson (1997), Bitzan (1999 and 2000), Schmidt (2001), Ivaldi and McCullough (2001 and 2008), Bitzan and Keeler (2007), and Christensen Associates (2008).

¹¹ For parallel competition, see Grimm (1985) Winston et al. (1990) Burton (1993) and Schmidt (2001). For competition among railways serving common points – “source competition” – see MacDonald (1987, 1989a, 1989b) and Majure (1996).

Even before the STB moved to its more skeptical stance on mergers – and increasingly since then – U.S. freight railroads have been moving to an increased reliance on alliances in order to improve efficiency, provide better service to shippers, and try to steal traffic from motor carriers (and from each other). Beginning with a typology of strategic alliances suggested by Yoshino and Rangan (1995) and applied to the North American freight rail sector by Natarajan, et al. (2005), we may divide modern North American freight rail alliances into four categories:¹²

- *Make-or-Buy alliances* that involve close cooperation by a single railroad company with an input supplier;
- *Technological alliances* that involve multiple railroad companies in technological cooperation with input suppliers and/or joint industry groups;
- *End-to-End alliances* that focus on joint marketing (and sometimes operations and investments) by end-to-end interchange partners – though we might also apply this label to alliances with trucking companies; and
- *Parallel alliances* that pair railroads that compete with each other as parallel carriers.

The first three categories appear to be the real growth areas, which is probably just as well given the obvious potential for anticompetitive outcomes from the fourth.

In the first category, Natarajan, et al. (2005) include (1) a long-term contract in which CSX employees work under the management of GE Transportation Services for the maintenance and management of CSX's fleet of GE locomotives and (2) CP's contract with Alstom Canada to operate CP's Ogden Shops in Calgary. This type of alliance is one standard outcome in the continuum of the make-or-buy decision, *i.e.* whether to rely on the market for an input or to produce it within the firm.¹³ Long-term contracts such as these between suppliers and customers of an intermediate product typically do not raise serious competitive concerns unless both parties possess market power in their respective markets *and* the contract is a *de facto* or *de jure* exclusive one: if those conditions are met, such contracts may have the effect of denying business to competitors (at either or both levels) and so foreclosing competition. Given the small

¹² We replace the category labels applied by Natarajan, et al. (2005) with our own.

¹³ The classic sources include Coase (1937) and Williamson (1975).

number of Class I railroads serving most regions today and the concentrated nature of many rail supply markets,¹⁴ the first part of the condition may well be met. However, it appears that most of these contracts impose no exclusivity on either side; if that is the case, they seem unlikely to foreclose competition.

In the second category, Natarajan, et al. (2005) include (1) the “Friction Force” alliance led by Portec Rail that focuses on improving the efficiency of the all-important wheel-rail interface and (2) the cooperative arrangement among the nation’s freight railroads, Amtrak, the Federal Railroad Administration, the Illinois Department of Transportation, and the Association of American Railroads that is seeking to establish interoperability standards regarding positive train control technologies and systems. Alliances such as these that place many competitors in the same room should be able to avoid garden-variety collusion so long as they follow the advice of counsel (in the same way that meetings of trade associations do); standard-setting organizations, like trade associations, are ubiquitous in modern market economies. However, the process of standard setting does have the potential to raise complex competition issues, and partners in a standard-setting organization or alliance must take note that U.S. courts “have found antitrust liability in circumstances involving the manipulation of the standard-setting process or the improper use of the resulting standard to gain competitive advantage over rivals.”¹⁵

The third category, alliances among end-to-end interchange partners, covers a wide continuum of cooperation. At one end are the marketing alliances that exist among an increasing number of such partners, designed to solicit more traffic and improve the shipper’s level of satisfaction with the interline move. (According to some reports, one recent innovation has been the delegation by one partner to the other of price quotation for the entire haul.)¹⁶ Requiring much deeper coordination are operating alliances, in

¹⁴ See, for example, the Competitive Impact Statement in *U.S. v. Amsted Industries*, <http://www.usdoj.gov/atr/cases/f222700/222730.htm>, and *U.S. v. Ivaco*, 704 F. Supp. 1409 (W.D.Mich. 1989).

¹⁵ U.S. Department of Justice and Federal Trade Commission, *Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition* (Washington, DC, April 2007), ch. 2. See also *Allied Tube & Conduit v. Indian Head* (486 U.S. 492 [1988]); *American Society of Mechanical Engineers v. Hydrolevel* (456 U.S. 556 [1982]); and Abbott, et al. (2006). A recent appeals court decision in a high profile standard-setting case is *Rambus Inc. v. FTC*, No. 07-1086 (D.C. Cir. Apr. 22, 2008).

¹⁶ See, e.g., John Gallagher, “Riding a hurricane: building on success of market alliances, Florida East Coast Railway looks to expand I-95 corridor partnerships,” *Traffic World*, April 7, 2003, and John Boyd,

which trains originating on one railway run “preblocked” – that is, without using switching yards or even changing locomotives – deep into the system of the terminating carrier, sometimes all the way to the final destination.¹⁷ And then there are alliances that proceed all the way to joint infrastructure investments in order to improve interchange efficiency, most notably (1) the “Meridian Speedway” project, in which NS invested in improvements in KCS trackage in order to improve its ability to ship to the west coast via either UPSP or BNSF,¹⁸ and (2) the “Patriot Corridor” project, in which Pan Am Railways and NS have applied to the STB for permission to form a joint venture, Pan Am Southern, to which Pan Am would contribute a 155-mile main line track and NS would contribute \$140 million in cash and property to upgrade the line and improve rail service between Albany and Boston.¹⁹

To the degree that these end-to-end interchange alliances among Class I carriers were crafted as exclusive agreements, they could raise competition issues (and the broader “public interest” concerns of the regulator). On the other hand, interchange arrangements themselves are generally efficient and procompetitive. For example, it has been the *lack* of interchange agreements – as well as of private trackage rights agreements – among the three vertically integrated carriers created by the Mexican railways reforms that has been one of the disappointments of that experience (OECD, 2006).

Alliances that include joint infrastructure investments may be especially interesting from a competition standpoint. Such investments are on their face output enhancing and clearly designed to enable speedier and more efficient rail movements to compete freight away from motor carriers and from other railways.²⁰ For those commodities for which

“NS Takes Bold, Short Steps: Innovative plans with regional and short lines could boost rail freight volumes in Northeast,” *Traffic World*, June 2, 2008.

¹⁷ Fred Frailey, “Who’s got the vision? A user’s guide to Western railroading in 2002,” *Trains*, February 2002; “Ground Solution: UP, CSX find a way to make UPS more competitive while taking business away from BNSF,” *Traffic World*, August 18, 2003.

¹⁸ Frank Malone, “KCS in control,” *Railway Age*, May 1, 2004; “Railroad agrees to invest in partnership,” *Virginian-Pilot* (Norfolk, VA), December 3, 2005; Daniel Machalaba, “America’s Railroads Back on Track: New era for rail building,” *Wall Street Journal*, February 17, 2008.

¹⁹ “Pan Am Railways and Norfolk Southern Create the Patriot Corridor to Improve Rail Service and Expand Capacity in New York and New England,” *Science Letter*, May 27, 2008; Eric Anderson, “City’s industry on right track: Mechanicville railyards will see plenty of activity once again with planned \$40M logistics center,” *The Times Union* (Albany, NY), July 9, 2008. The proposal is STB Finance Docket No. 35147 1.

²⁰ See, e.g., Daniel Machalaba, “America working on railroads – America’s Railroads Back on Track – New era for rail building,” *Mobile Register* (Mobile, AL), February 17, 2008, and Anderson, “City’s

motor carriers compete with rail, this is likely the end of the discussion regarding competition. However, for those commodities dependent on rail, the number of carriers offering service is typically very small, and it seems possible that a joint venture that significantly disadvantaged a competitor could be found exclusionary, and thus a violation of regulations or antitrust laws. (This could especially be the case if the competitor were denied access absolutely.) On the one hand, it is difficult to imagine the joint venture partner making the investment if it did not expect favorable access terms to the new infrastructure capacity as a result; on the other, it is not difficult to imagine – especially given the experience in telecoms and elsewhere – a competitor that was not invited to participate complaining of discrimination and demanding access.

In the fourth category, there has been over the years a great deal of joint activity – whether or not formally termed “alliances” – involving railroads that are direct competitors to one another, especially if one includes in this category the terminal railroads created by the railroads serving cities such as Chicago, St. Louis, and Kansas City. More recently, competitors UP and BNSF are part of broader public-private partnerships to expand rail capacity in the ports of Los Angeles and Long Beach and the Chicago metropolitan area.²¹ They are also partners in expanding capacity on a jointly owned line serving the coal fields of the Southern Powder River Basin in Wyoming.²² Boland (2001) reports other examples:

- CN and CP share track to increase traffic on light density lines (eastern Canada) and to increase capacity on high density lines (Fraser Canyon);
- BNSF and UP have implemented joint dispatching over shared track assets in the Gulf Coast area of Texas; and
- NS and CSX have mutual traffic solicitation rights in shared asset areas of the former Conrail system.

Non-cartel agreements among direct competitors are treated under a “rule of reason” standard in U.S. antitrust law, wherein any harm to competition is measured against economic benefits from the agreement, and harm that cannot be removed without losing

industry on right track,” *ibid.* Anderson reports that the Patriot Corridor project “will help [NS] compete directly with CSX Transportation.”

²¹ “Five go in search of capacity,” *Railway Gazette International*, August 1, 2004.

²² Union Pacific Railroad, “UP, BNSF Announce Southern Powder River Basin Joint Line \$100 Million Capacity Expansion Plan,” press release, May 8, 2006.

the benefits is accepted if it is outweighed by the benefits.²³ The same is true in most competition regimes around the world.²⁴ Thus railway companies engaging in horizontal alliances such as these must take care that any ancillary agreements that may reduce competition are no more restrictive than absolutely necessary to render the benefits of the alliance achievable. However, it is fair to say that, as with the standard-setting organizations and trade associations discussed earlier, this sort of cooperation among competitors takes place widely and generally without interference from antitrust or regulatory authorities.

3. Europe: Aspirations of Vertical Separation

European Commission policy makers have been seeking to open up the European freight rail business to above-the-rail competition since at least 1991. In that year the Commission issued Directive 91/440, which required incumbent national railways to provide access to their infrastructure for international intermodal (*i.e.*, container) freight carriers under non-discriminatory prices and terms of service. This was followed in 1995 and then 2001 by Directive 95/18 (as amended, Directive 2001/13) ordering the further opening of access to all international freight operators over a number of years, and then by Directive 2001/14 ordering the opening of access to domestic as well as international freight carriers by 2007 (Stehmann and Zellhofer, 2004; Nash, 2006). While none of these directives required complete vertical separation of train operations from infrastructure (*i.e.*, “ownership” separation), the head of DG-Comp stated at the time that he considered such separation necessary if competition was to be effective.²⁵ The main policy objective has been to create smoothly operating cross-border train operators to ease road congestion and reduce air pollution by competing away some of the business of the motor carriers.

The state of actual competition that has followed these directives is something of a mixed bag. On the one hand, there has been some entry by new, non-integrated freight train operating companies, in particular in Poland, Romania, and the U.K.²⁶ Even with

²³ U.S. Department of Justice and Federal Trade Commission, *Antitrust Guidelines for Collaboration among Competitors*, Washington, DC: 2000.

²⁴ See, *e.g.*, Whish (2008).

²⁵ See, *e.g.*, Monti (2002).

²⁶ On Poland and Romania (and other Central and Eastern European countries), see Pittman, *et al.* (2007). On England, see, *e.g.*, Glaister (2006) and Posner (2006 and 2008).

small numbers of entrants, concerns have been expressed that entry will drive prices down to near marginal costs; that entrants (especially shippers integrating into transporting their own products) will take the high margin, “block train” traffic only; and, as a result, the system may deteriorate in the long run; and especially that service to shippers of smaller “wagonload” volumes will be lost to motor carriers.²⁷ This scenario calls attention to the importance of fixed costs of infrastructure in the rail sector and related issues regarding access pricing and price discrimination to which we will turn presently.

On the other hand, concerns have also been expressed that the German incumbent freight carrier, DB Schenker – still connected organizationally with the infrastructure owner and still state owned – may be in the process of precluding the development of above-the-rail freight competition in western Europe, as it (1) has successively purchased NS Cargo (Netherlands), DSB Gods (Denmark), EWS (UK), Transfesa (Spain), and SFM (Italy), (2) owns 45 % of BLS Cargo AG (Switzerland), (3) was rumored to have sought to purchase Green Cargo (Sweden), and (4) is reported now to be considering the acquisition of CTL Logistics (Poland) and Romtrans (Romania).²⁸

Furthermore, if DB Schenker were to acquire a dominant position in a hypothetical market called “above-the-rail freight haulage in western Europe”, such dominance would potentially be strengthened by the company’s past acquisitions of international logistics companies Stinnes AG and BAX Global. These acquisitions increased the company’s offerings not only in European rail freight haulage but also in European motor freight haulage and global sea and air freight.²⁹ DB Schenker would no doubt argue that this widening and deepening of the services it provides are part of the reason for its growth and success in the provision of freight transport, but vertical acquisitions such as these may in principle have the potential – always depending on the

²⁷ See, e.g., Posner (2006 and 2008).

²⁸ “Europe’s private freight operators under siege,” *Railway Gazette International*, 1 July 2007; “Deutsche Bahn could buy Romtrans,” *The Railway Insider* (Bucharest), 21 August 2008; “Deutsche Bahn Is Interested in Acquiring CTL Logistics,” *RZD Partner*, September 4, 2008; and “Railion,” <http://en.wikipedia.org/wiki/Railion>. The dominance of DB Schenker within Germany is discussed by, e.g., Locher (2006).

²⁹ See, for example, Paul Needham, “Logistics is now for railroads,” *JoC Week*, July 15-12, 2002; Paul Page, “BAX Hitches Rail Ride,” *Traffic World*, November 14, 2005; and “BAX’s Global Reach,” *Air Cargo World*, December 2005.

facts of the case involved – to raise concerns among competition law enforcers regarding the possible entrenchment of a dominant position in the primary market of concern. (A recent round table of the OECD’s Joint Transport Research Centre addressed this very topic.)³⁰

A separate and potentially contradictory problem is that many European countries have not imposed full ownership separation on their incumbent, vertically integrated railway enterprises, raising the possibility of continued national level freight monopolists likely surrendering access to international carriers only grudgingly, as opposed to a single dominant Europe-wide carrier.

In fact some argue that these two problems are not contradictory but rather connected. Matthias Raith, former general manager of one independent train operating company, Rail4Chem (Germany), claimed that the incumbent European freight carriers were forming alliances and agreements in order to foreclose new entry, likening them to “elderly boxers embracing one another in the ring because they both know they are at the end of their careers.” Mr. Raith proposed an alliance of small European freight train operating companies that would be designed to promote their ability to compete with entrenched incumbents, and Rail4Chem went on to form such an alliance with COMSA (Spain), fer Polska (Poland), LTE (Austria and Slovak Republic), NordCargo (Italy), viamont (Czech Republic), and most recently VFLI (France).³¹

Since the railways of western Europe are predominantly passenger rather than freight dominated, and since the countries are small relative to the larger countries in the Americas, the econometric results cited earlier for the U.S. system can be applied to Europe only very carefully. Nevertheless the policy goal of greatly increased cross-border train operations – including but not limited to freight – suggests that the results for the U.S. concerning economies of system size (exhausted at relatively low levels) and density (less easily exhausted) may be relevant in the future; they would seem to suggest

³⁰ Integration and Competition between Transport and Logistics Businesses, Paris, 5-6 February 2009, <http://www.internationaltransportforum.org/jtrc/roundtables.html>. See especially the papers by Van de Voorde and Vanelander (2009) and Frémont (2009).

³¹ “Euro View: Can rail see green signal?” *Journal of Commerce*, April 4, 2003; Paul Needham, “Still struggling to rectify that slow train to Europe: Lack of a rail regulator in seven EU states is a major drawback to ensuring discrimination-free access,” *Lloyd’s List*, December 13, 2004; “European alliance formed,” *International Railway Journal*, March 2005; Jan Scherp, “Railway (De-)Regulation in EU Member States and the Future of European Rail,” CESIFO DICE Report, April 2005.

the feasibility of regional train companies, either vertically integrated or not, that would have a tendency to possess market power within their regions but the ability to compete at points of intersection and overlap with other, similar companies.³² (Such “points of intersection” need not be precise, since many commodities are hauled by motor carrier to a railhead in any case. See, *e.g.*, Pittman [1990].) In general, the literature on vertical economies (*i.e.*, economies of scope between train and infrastructure operations) is less consistent, but mild economies are at least suggested.³³

The contradictory problems would seem to raise contradictory implications for the competitive analysis of further mergers and/or alliances. If the problem is the remaining power of an incumbent national carrier like CFR Marfă in Romania, for example, then a purchase by DB Schenker of an independent Romanian train operating company such as Romtrans or of a potential entrant into Romania like CTL would appear to be procompetitive, a way to continue to wrest the market from the incumbent dominant carrier. If, on the other hand – which seems more likely in the long term – the problem is likely future dominance by DB Schenker or another company in a Europe-wide above-the-rail freight market, then a strengthening of a company like CFR Marfă through mergers and/or alliances – or, correspondingly, the proposed merger of the incumbent Czech and Slovak freight carriers and the proposed merger of the incumbent Austrian and Hungarian freight carriers – look like steps to maintain some competitive options.³⁴ And in either case the model pursued by Rail4Chem (now a part of Veolia Cargo) through the European Bulls – the formation of an alliance among smaller freight carriers – is only to be encouraged from a competitive standpoint.

Behind all these considerations is the issue of recovering network costs in a model of vertical separation: the setting of access prices will be crucial.

Finally, in both passenger and freight rail in Europe, one factor dominating much of the conversation is the small share of rail vis-à-vis other modes, mostly motor carriers

³² Savignat and Nash (1999) make a similar suggestion. If these regional “monopolists” remain vertically integrated, this is precisely what I have called above the “Latin American model”.

³³ Bitzan (2000); Ivaldi and McCullough (2001 and 2008); Growitsch and Wetzel (2006); Wills-Johnson (2007). A non-econometric discussion is in Pittman (2005).

³⁴ “CTL Logistics want to enter the Romanian market,” *The Railway Insider* (Bucharest), 14 December 2007; “Czech Republic/Slovakia: Ready to merge rail freight companies,” *RZD Partner*, 26 August 2008; “EU inquiry deadline for Rail Cargo Austria buy of MAV Cargo Sept 29,” *Forbes*, 28 August 2008, citing Thomson Financial News.

for freight but including both air carriers and passenger autos for passenger. (This is more the case in Western Europe than in Eastern Europe, however.) The formation of an alliance among Western European incumbent passenger rail providers, dubbed Railteam, is designed specifically to attract business away from air carriers – through, for example, unified booking, discount fares, and reduced border delays.³⁵ (In the framework introduced earlier in the paper, this is an example of an End-to-End alliance.) If a competition enforcer or regulator defined the product market narrowly as “passenger train service”, such an alliance might be seen as an anticompetitive agreement by the national incumbents not to invade each other’s territories. To the degree that the more appropriate product market definition includes air transport, the small share of rail carriers renders such concerns much less pressing.

Similarly, for goods that may be competitively hauled by motor carrier, the share of rail within Europe is typically quite low, and a potentially anticompetitive agreement among incumbent rail freight carriers would seem to pose little risk of harming shippers. However, for commodities that are (economically) “rail captive”, whether agreements and alliances among national incumbents are innocuous is not as clear. For these commodities the more appropriate product market definition is typically “freight train service”, and the high market shares of incumbents, combined with barriers to entry (*i.e.*, to network access), make such agreements and alliances more likely to raise competitive concerns. As noted above, the same is true for agreements and alliances (and mergers) of incumbent freight rail carriers with companies in vertically related services such as logistics and ocean shipping.

4. Access Prices

As noted above, when competition “above the rail” is created, one crucial issue becomes the financing of maintenance and improvement to the infrastructure. In this regard rail is no different from any other network industry, except that the share of fixed network costs in total delivered costs is probably higher for rail than for any other sector besides water. As with other network industries – telecoms is probably the most studied

³⁵ Aoife White, “European high-speed rail tickets to compete with short-haul airline routes,” *Associated Press Worldstream*, July 2, 2007; “A high-speed revolution: Europe’s railways,” *The Economist*, July 7, 2007.

in this regard – there are real tradeoffs that must be made between encouraging competition and supporting investment.

The principal problem is the traditional one of seeking the most efficient method for the recovery of fixed costs.³⁶ An access charge set at the level of marginal infrastructure cost achieves the most efficient level of usage in the short term, but then the fixed costs must be recovered in some other way, for example through taxation, with the accompanying losses measured by the shadow price of public moneys (especially high in developing countries). An access charge set at the level of full infrastructure cost recovery results in the inefficient turning away of potential users that could pay the marginal cost of their usage but not the “fully allocated” cost. An access charge seeking a second best middle ground through Ramsey prices or two-part tariffs is vulnerable to being labeled “discriminatory” – as of course it is, by definition – and thus challenged by a competition enforcement authority.

EU Directive 2001/14 essentially calls for marginal cost access pricing for rail – charges must be based on “costs directly incurred as a result of operating the train service” – with a broad interpretation of marginal cost that includes reservation and scarcity charges, environmental costs, and volume-related savings (Nash, 2005 and 2006). However, mark-ups above marginal cost are permitted where necessary for financial reasons, and where such mark-ups are non-discriminatory. Nash believes that the latter requirement probably rules out two-part tariffs – consistent with the reaction of the Bundeskartellamt to such a proposal by DB – but may possibly permit Ramsey pricing.³⁷

Perhaps a bit surprisingly, the issue of access prices turns out to be a relative weakness of the “above-the-rail competition” model. Nash (2005) and Matthews, et al. (2008) note the inability of an infrastructure operator to have complete knowledge of the cargo or cargos being hauled by all trains, while BTRE (2003) reports that in practice attempts by infrastructure operators to discriminate in access charging among a small number of train operating companies has led to rent dissipation through bargaining,

³⁶ I have discussed this in the context of railways in Pittman (2004b).

³⁷ Matthews, *et al.* (2008) provides a thorough discussion of the state of the debate and analysis in the European Union. The DB access pricing episode is discussed in Dagmar Haase, “New Train Path Pricing System at Deutsche Bahn,” DB Netz, n.d. See also Pittman (2004b).

regulatory challenges, and litigation. Based on the more successful North American experience setting shipping charges rather than access charges, it appears that it is easier for a vertically integrated railways company to discriminate among large numbers of shippers than for a vertically separated rail infrastructure company to discriminate among a smaller number of train operating companies.³⁸

What is the relevance of this issue for the question of mergers and alliances among railways companies? Many such agreements – in any of the policy contexts discussed here – will involve voluntary arrangements for the use of one company’s track infrastructure by another company’s trains. One would normally presume that the two companies involved in such an agreement would negotiate an efficient pricing regime. A problem in the experience with the American model – in Mexico in particular – has been a fear by the companies that any terms that they agree on for private, voluntary track sharing arrangements will be adopted by the regulator and the courts and imposed for mandated track sharing arrangements. This has been one reported reason for the paucity of such voluntary agreements. Another problem has been observed in Canada, where the two principal railways have statutory access to some of each other’s “captive shippers”, and both railways seem satisfied to pursue a “live and let live” policy rather than starting a battle for each other’s captive shippers (Ouellet, 2000).

Clearly the ability of the government to set the right access prices is a crucial component of any regime of mandatory access, whether under the American model (when and if trackage rights are imposed in a merger settlement, for example, or to protect competition in other situations) or under either variant of the above-the-rail model. As pointed out by both Matthews, *et al.* (2008) and Thompson (2008), the fact that there is little agreement as to what the right access prices are even conceptually, much less empirically, makes this issue especially difficult.

A further problem in Europe – particularly in the context of the policy of encouraging cross-border freight and passenger train operations – has been the lack of harmonization of national access pricing regimes. The EU Directive discussed above provides principles for access price setting but does not impose uniformity, and in practice the regimes differ a great deal by country (Nash, 2005; Thompson, 2008). This

³⁸ See also Bouf (2002).

is not the only factor discouraging cross-border operations; differences in other terms of access are a factor, and anticompetitive behavior has been charged as well.³⁹ But certainly the multiplicity of access pricing regimes has played a part. This is a bit ironic since most of the western European rail systems are passenger- rather than freight-dominated, so that some would argue that freight operations should have to contribute little to fixed charges in any case.

Thompson (2008) proposes collaboration among country-level infrastructure managers in Europe “to see if the same simple [access] regimes could be implemented for freight on the major freight corridors EU-wide,” in order to “make international freight flows much easier for competing operators to plan and manage.” This sort of End-to-End cooperation intended to smooth and advance joint rail freight hauls would seem likely to be viewed as benign by competition law enforcers.

5. Lessons for Other Network Industries?

What lessons may we derive from the experience in railways for competition issues regarding mergers and alliances in other network industries?

I would argue first that the potential for competition among vertically integrated providers has been undervalued in policy debates, both as a restructuring model on its own and as a factor in understanding mergers and alliances. This option has taken a poor second place to vertical separation in the worldwide debate among economists regarding restructuring of the infrastructure sectors broadly – or a poor third to vertical separation and third party access. However, this option has many virtues – not least the (self-evident) one of maintaining whatever economies of vertical integration are available (Pittman, 2007a). The experience of Latin American railways restructuring and the importance of “source competition” for rail shippers in the U.S. and Canada have made it quite clear that there are circumstances in which competition may be created without having to break up going concerns.

It seems conceivable that restructuring along these lines has at least some potential in both the electricity and water sectors. (In Australia there is already some discussion of competition for traditional water purification plants from future

³⁹ See, e.g., Italian Competition Authority, Case 1681, “Rail Traction Company/Rete Ferroviaria italiana-Ferrovie dello stato,” 18 January 2007, Provvedimento no. 17327, Avvio istruttoria, Bollettino no. 33/2007.

desalinization plants, and there seems no obvious reason why the latter could not be owned and operated jointly with distribution pipes.) Correspondingly, it is important for competition authorities and regulators to be alert to the possibility that mergers or alliances between providers in adjacent territories – vertically integrated or not – may harm actual or potential competition at points of intersection. If one railway or long-distance electricity transmission line or gas pipeline or water pipe serves Brussels, or comes close to Brussels, from the southwest, and another serves it or comes close from the southeast or northeast, the two may be able to compete with each other to provide the service to Brussels, and a merger or alliance that appears to be of the relatively innocuous end-to-end variety could eliminate the only competition available.

A second lesson may be that firms are sophisticated players in the regulatory and competition law processes, and they may behave strategically – in particular, they may choose not to behave competitively to earn short term profits if they fear that the result will be a less profitable future. This has apparently been the case both in Canada – where shippers captive to CN or CP have a statutory right to competitive service from the other under some circumstances, but where neither of these railroad companies has often provided the cooperation necessary – and in Mexico – where the three vertically integrated incumbents have eschewed voluntary track-sharing agreements, apparently out of a fear that the terms of such agreements would be used by regulators under less voluntary conditions. (Some would argue that this problem has characterized the US local telecommunications sector under the Telecommunications Act of 1996 as well, as reflected in the background facts in the U.S. Supreme Court’s recent *Twombly*⁴⁰ decision.) This may be an important consideration in any infrastructure sector when considering competitive or regulatory remedies that rely for their competitive outcomes on market entry by other large firms – especially given the increasing concentration of the set of worldwide players in each sector (Benitez and Estache, 2005).

Finally, a more optimistic lesson: it is not *always* true, but certainly it is *often* true that customers in network industries have many options that may protect them from monopolistic behavior by otherwise “monopolistic” service providers. Regarding rail freight, the most obvious protection is provided by other transport modes; motor carriers

⁴⁰ *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544 (2007)

can for many commodities – especially non-bulk commodities – provide more competition than rail carriers can handle, and water carriers can in many cases provide similar competition for shippers of bulk commodities. Shippers in “American model” countries may be protected by source competition even if they lack parallel competition, while shippers in “above-the-rails competition” countries may begin operating their own trains if they think they are paying too much to their incumbent supplier. Of course these factors are sector specific, but arguably the technological convergence between telecommunications and cable television providers moves in the direction of providing a similar example.⁴¹

This goes to the heart of competition issues in network industries, and it may be a good point with which to close. Network industries are almost by definition industries with significant fixed costs that must be somehow recovered if the network is to be built in the first place and then maintained and improved. This means that we should be satisfied with a market structure far short of perfect competition, with the accompanying prices competed down close to marginal costs; a not unrelated point is that efficient usage of the network may involve some kind of price discrimination, charged either by the network operator as an access price or by an integrated service provider. Marginal cost pricing in a network industry is a recipe for long term disaster – or, as Posner (2006) summarizes, “Open Access advocates should be very careful what they ask for because they just might get it.”

⁴¹ For one discussion, see U.S. Department of Justice (2007).

References

Abbott, Alden F., Suzanne Michel, and Armando Irizarry, "The right balance of competition policy and intellectual property law: a Federal Trade Commission perspective," in Philip Marsden, ed., *Handbook of Research in Trans-Atlantic Antitrust*, Cheltenham, UK: Edward Elgar, 2006.

Benitez, Daniel, and Antonio Estache, "How concentrated are global infrastructure markets?", *Review of Network Economics* 4 (2005), 220-242.

Berndt, Ernst, Ann Friedlaender, Judy Chiang, and Christopher Velluro, "Mergers, Deregulation, and Cost Savings in the US Rail Industry," *Journal of Productivity Analysis* 4 (1993), 127-144.

Bitzan, John D., "The Structure of Railroad Costs and the Benefits/Costs of Mergers," *Research in Transportation Economics* 5 (1999), 1-52.

_____, "Railroad Cost Conditions – Implications for Policy," unpublished paper, Upper Great Plains Transportation Institute, North Dakota State University, May 10, 2000.

_____, and Theodore E. Keeler, "Economies of Density and Regulatory Change in the U.S. Railroad Freight Industry," *Journal of Law and Economics* 50 (2007), 157-179.

Boland, Kells, "Railway Competition and Continental Consolidation," in *2001: A Transportation Odyssey*, 36th conference proceedings, Canadian Transportation Research Forum, 2001, 748-760.

Bouf, Dominique, "Open access, vertical separation and infrastructure charging systems (railroads and railways)," *Global Business and Economics Review* (2002), 310-321.

Breen, Denis A., "The Union Pacific/Southern Pacific Rail Merger: A Retrospective on Merger Benefits," *Review of Network Economics* 3 (2004), 283-322.

BTRE, *Rail Infrastructure Pricing: Principles and Practice*, Report 109, Bureau of Transport and Regional Economics, Department of Transport and Regional Services, Australia.

Burton, M., "Railroad Deregulation, Carrier Behavior, and Shipper Response: A Disaggregated Analysis," *Journal of Regulatory Economics* 5 (1993), 417-434.

CER, *Competition in Europe's rail freight market*, Brussels: Community of European Railway and Infrastructure Companies (CER), 2006.

Chapin, Alison, and Stephen Schmidt, "Do Mergers Improve Efficiency? Evidence from Deregulated Rail Freight," *Journal of Transport Economics and Policy* 33 (1999), 147-162.

Christensen Associates, *A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition*, prepared for the Surface Transportation Board, November 2008.

Coase, Ronald, "The Nature of the Firm," *Economica* n.s. 4 (1937); reprinted in Kenneth Boulding and George Stigler, eds., *A.E.A. Readings in Price Theory*, Chicago: Irwin, 1952, and in Coase, *The Firm, the Market, and the Law*, Chicago: University of Chicago Press, 1988.

ECMT, *Regulatory Reform of Railways in Russia*, Paris: European Conference of Ministers of Transport, 2004.

Frémont, Antoine, “Empirical Evidence for Integration and Disintegration of Maritime Shipping, Port and Logistics Activities,” unpublished paper, INRETS (French National Institute for Transport and Safety Research), 2009.

Friebel, Guido, Sergei Guriev, Russell Pittman, Elizaveta Shevyakhova, and Anna Tomová, “Railroad Restructuring in Russia and Central and Eastern Europe: One Solution for All Problems?” *Transport Reviews* 27 (2007), 251-271.

Glaister, Stephen, “Britain: Competition undermined by politics,” in Gómez-Ibáñez and de Rus (2006).

Gómez-Ibáñez, José, and Ginés de Rus, eds., *Competition in the Railway Industry: An International Comparative Analysis*, Cheltenham, UK: Edward Elgar, 2006.

Grimm, Curtis, “Horizontal Competitive Effects in Railroad Mergers,” *Research in Transportation Economics* 2 (1985), 27-53.

Growitsch, Christian, and Heike Wetzel, “Economies of Scope in European Railways: An Efficiency Analysis,” Working Paper Series in Economics, no. 29, University of Lüneburg, July 2006.

Ivaldi, Marc, and Gerard McCullough, “Density and Integration Effects on Class I U.S. Freight Railroads,” *Journal of Regulatory Economics* 19 (2001), 161-182.

_____, and _____, “Welfare Tradeoffs in U.S. Rail Mergers,” Institut d’Économie Industrielle (IDEI), Toulouse, IDEI Working Papers 344, March 2005.

_____, and _____, “Subadditivity Tests for Network Separation with an Application to U.S. Railroads,” *Review of Network Economics* 7 (2008), 159-171.

Karakari, John, Stephen Brown, and Mehrzad Nadji, “The Union Pacific/Southern Pacific Railroads Merger: Effect of Trackage Rights on Rates,” *Journal of Regulatory Economics* 22 (2002), 271-285.

Kwoka, John E., Jr., and Lawrence J. White, “Manifest Destiny? The Union Pacific and Southern Pacific Railroad Merger,” in Kwoka and White, eds., *The Antitrust Revolution: Economics, Competition, and Policy* (4th), Oxford: OUP, 2004, pp. 27-51.

Locher, Lilo, “The Impact of Merger Control on Competition in the Railway Sector,” unpublished paper, September 2006.

MacDonald, James M., “Railroad Deregulation, Innovation, and Competition: Effect of the Staggers Act on Grain Transportation,” *Journal of Law and Economics* 32 (1987), 63-96.

_____, “Competition and Rail Rates for the Shipment of Corn, Soybeans, and Wheat,” *RAND Journal of Economics* 18 (1989a), 151-163.

_____, “Concentration and Railroad Pricing,” in Leonard W. Weiss, ed., *Concentration and Price*, Cambridge, MA: MIT Press.

Majure, W. Robert, Verified Statement on behalf of the U.S. Department of Justice before the Surface Transportation Board, Finance Docket No. 32670, concerning the proposed merger of the Union Pacific and Southern Pacific Railroads, 1996.

Matthews, Bryan, Chris Nash, and Jan-Eric Nilsson, “Pricing reforms in the rail sector,” Sixth Framework Programme, IMPRINT-NET, Implementing pricing reforms in Transport – Networking, October 2008.

Molnar, Eva, “Rail freight prospects in Central and Eastern Europe,” in CER (2006).

Monti, Mario, “Effective competition in the railway sector: A big challenge,” speech given at the annual meeting of the UNIFE, Bruxelles, 21 May 2002, available at <http://europa.eu.int>.

Natarajan, Balu, Chandler Duncan, and David Simpson, “Strategic Innovations in North American Railroad Management,” *Transportation Research Record: Journal of the Transportation Research Board* 1924 (2005), 146-152.

Nash, Chris, “Rail Infrastructure Charges in Europe,” *Journal of Transport Economics and Policy* 39 (2005), 259-278.

_____, “Europe: Alternative models for restructuring,” in Gómez-Ibáñez and de Rus (2006).

Newbery, David M., *Privatization, Restructuring, and Regulation of Network Utilities*, London: MIT Press, 1999.

OECD, “Structural Reform in the Rail Industry,” *OECD Journal of Competition Law and Policy* 8 (2006), 67-175.

Ouellet, David, “The Canadian Railway System – A Regulatory Attempt to Encourage Competition in a Rail Duopoly,” presented at the Seminar on Railway Reform, Restructuring and Competition, OECD and Russian Ministry for Antimonopoly Policy, Moscow, December 2000.

Pittman, Russell, “Railroads and Competition: The Santa Fe/Southern Pacific Merger Proposal,” *Journal of Industrial Economics* 39 (1990), 25-46.

_____, “Chinese Railway Reform and Competition: Lessons from the Experience in Other Countries,” *Journal of Transport Economics and Policy* 38 (2004a), 309-332.

_____, “Russian railways reform and the problem of non-discriminatory access to infrastructure,” *Annals of Public and Cooperative Economics* 75 (2004b), 167-192.

_____, “Structural separation to create competition? The case of freight railways,” *Review of Network Economics* 4 (2005), 181-196.

_____, “Make or buy on the Russian railway? Coase, Williamson, and Tsar Nicholas II,” *Economic Change and Restructuring* 40 (2007a), 207-221.

_____, “Options for Restructuring the State-Owned Monopoly Railway,” in Wayne Talley and Scott Dennis, eds., *Railroad Economics* (Research in Transportation Economics, vol. 16), Elsevier, 2007b.

_____, Oana Diaconu, Emanuel Šip, Anna Tomová, and Jerzy Wronka, “Competition in Freight Railways: ‘Above-the-Rail’ Operators in Central Europe and Russia,” *Journal of Competition Law and Economics* 3 (2007), 673-687.

Posner, Henry, III, “Open Access – from theory to reality,” speech given to the Lexington Group in Transportation History, Cedar Rapids, October 12, 2006, available at http://www.rrdc.com/speech_oa_lexington_10_2006_print.pdf.

_____, “Rail Freight in the USA: Lessons for Continental Europe,” CER Essay Series, Community of European Railway and Infrastructure Companies, January 2008, available at http://www.rrdc.com/Essay_CER_01_2008_print.pdf.

Savignat, M.G., and Nash, C., “The Case for Rail Reform in Europe – Evidence from Studies of Production Characteristics of the Rail Industry,” *International Journal of Transport Economics* 36 (1999), 201-217.

Schmidt, Stephen, “Market structure and market outcomes in deregulated rail freight markets,” *International Journal of Industrial Organization* 19 (2001), 99-131.

Stehmann, Oliver, and Georg Zellhofer, “Dominant Rail Undertakings under European Competition Policy,” *European Law Journal* 10 (2004), 327-353.

Thompson, Louis S., “Railway Access Charges in the EU: Current Status and Developments Since 2004,” report prepared for the International Transport Forum and OECD, December 2008.

U.S. Department of Justice, *Voice, Video and Broadband: The changing Competitive Landscape and Its Impact on Consumers*, report from the Antitrust Division symposium on telecommunications, 2007.

Van de Voorde, Eddy, and Thierry Vanelander, “Market Power and Vertical and Horizontal Integration in the Maritime Shipping and Port Industry,” unpublished paper, University of Antwerp, 2009.

Williamson, Oliver, *Markets and Hierarchies – Analysis and Implications: A Study in the Economics of Internal Organization*, New York: Free Press, 1975.

Wills-Johnson, Nick, “Separability and Subadditivity in Australian Railways,” Working Paper Series, Planning and Transport Research Centre, Curtin University of Technology, January 2007.

Wilson, Wesley, “Cost Savings and Productivity in the Railroad Industry,” *Journal of Regulatory Economics* 11 (1997), 21-40.

_____, and John Bitzan, “Industry Costs and Consolidation: Efficiency Gains and Mergers in the Railroad Industry,” unpublished paper, MPC Report No. 03-145, June 2003.

Whish, Richard, *Competition Law*, 6th ed., Oxford, UK: Oxford University Press, 2008.

Winston, Clifford, Thomas M. Corsi, Curtis M. Grimm, and Carol A. Evans, *The Economic Effects of Surface Freight Deregulation*, Washington: The Brookings Institution, 1990.

Yoshina, M.Y., and U.S. Rangan, *Strategic Alliances: An Entrepreneurial Approach to Globalization*, Boston: Harvard, 1995.