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On the Economics of the Restructuring of World Railways, with a Focus on Russia*

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Abstract

This lecture, delivered at the Higher School of Economics in 2020, opens with a discussion of the modern history of economists' treatment of network industries: from cost-of-service regulation through incentive regulation to vertical restructuring. This history is then applied to the freight railways sector, followed by a discussion of the current state of the debate on rail restructuring – what we term the European versus the American model, or vertical versus horizontal separation – first generally and then in the Russian Federation. Finally, we seek to derive lessons relevant to Russia from both the empirical literature and the results of recent reform policies implemented in the United States and the European Union.

Keywords: Railways, regulation, economics, competition, Russian Railways (RZhD)

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I'm going to present my views on the economics of the restructuring of world railways, with a special emphasis on the Russian Federation. I'm going to give this very much from my own perspective, not only from my education as a young economist and from some very enjoyable work I did in Russia about 15 years ago as part of an OECD team that consulted with the ministries that were looking at railways restructuring, but also as a long-time industrial organization economist and visiting professor in Moscow and Kyiv.

I want to start back in the 50s and 60s. I was not an economist in the 50s or 60s, but that was the background I learned economics. I think it's fair to say that the 50s and 60s were something of a self-perceived golden era for economists. They thought they understood the macro economy. They thought they had solved the problems of inflation and employment. Those were the golden years, called in French "les trente gloriuses", the "30 glorious years" from the end of the second world war to the beginning of the first world oil crisis (Fourastié, 1979).

The Development of Economic Thinking on the Infrastructure Sectors[2]

Economists also thought they understood what to do about infrastructure sectors of the economy. I learned this in the 70s, in my graduate course on industrial economics, and it was very clear. The infrastructure sectors -- electricity, natural gas, telecoms, railway -- were "natural monopolies". That is, it would be economically inefficient to have competition. For that reason, in order to protect the public from monopoly abuses, they were in most countries owned and operated by the government, or they were privately owned and regulated by state, local, or national government. The latter was certainly the regime in the U.S. and the UK.

They were regulated in a particular way. It was called rate of return regulation or cost of service regulation. They were regulated in the way that every year or every rating period they would total their costs, their labor costs, their material costs, plus the return on capital, provide those to the regulator and the regulator would say, "Okay, you're allowed a rate of return on this capital stock and you're allowed to pay your expenses. So here are the prices you can charge." Everybody knew that that was not an ideal solution. Economists were very fond of saying that the "first best" solution -- and that's redundant, I admit -- the first best solution was marginal cost pricing. But if you have marginal cost pricing in a network industry, you would have to have government subsidies for the network. And that was considered to be politically infeasible or not likely to happen.

So generally, we were struck with a "second best" solution, which is where the unfortunate phrase, "first best", comes from. The second best solution was to have this rate of return or cost of service regulation. That set rates in terms of average, rather than marginal, costs. So marginal costs were calculated, but a markup was allowed on marginal cost to achieve average cost. And this was called "fully allocated cost" pricing, so that the fixed costs of the network were fully allocated across all users added to the marginal cost of service. A broad literature addressed possible methods for improving the efficiency and effectiveness of the system (Kahn, 1970; Noll, 1971).

[2] Kahn, 1970; Kaserman and Mayo, 1995; Decker, 2014.

In the 1970s and 80s, there were some powerful arguments for reform. You might call this a partial friendly takeover of the old regime, and the new tools were called price caps. They came basically from some smart economists in the UK, led by Stephen Littlechild, among others, in many cases economists who were working as regulators (Beesley and Littlechild, 1989).

They understood as we all did that rate of return regulation provided poor incentives for efficient operation of the monopolist, but they said, "We can do better." Littlechild and others came up with an idea called incentive regulation, or what became called "RPI minus X" regulation, and what also became called price caps. And the idea was that the prices of services from the natural monopolies would be allowed to increase every year by the overall rate of inflation RPI (for "Retail Prices Index"), minus a productivity adjustment. And this is something the regulator would impose and say, "Okay, telecom company, you're allowed to raise rates every year by last year's rate of inflation minus, say 2%, 3%." Whatever we think should be the rate of increase in productivity in telecoms.

This was believed to provide public utility enterprises with powerful incentives to behave efficiently, because their prices were set independently of their costs, at least until maybe an adjustment every few years. And if those prices were set, then if the company is operated efficiently and could cut its costs, it would make profits, just as we hope all companies do. On the other hand, if the company is operated inefficiently and has high costs, there would be financial losses. Again, a powerful incentive to behave efficiently. This was considered to be a real revolution in regulation. And it was imposed first in telecoms and then gradually in other sectors like water and energy.

It was only later that an understanding of the weaknesses of these price caps became apparent. The principal weakness was an inability of the regulator to commit (Baron and Besanko, 1987). This first came in the British water sector, as I recall, when the price caps were set and year after year, the prices rose by less than the rate of inflation. So real prices were falling: economists, good job! But the monopolists were so efficient that they started earning high profits. And the local newspapers were full of headlines: "Water company earns 20% profits while your price has increased." And the regulator found that, for political reasons, it could not commit to the price caps. Eventually, it gave in to the pressure and revisited the prices, and it said, "We know we told you we would have these price caps for five years and you could earn money and all these incentives were right. Sorry guys, we couldn't commit. We can't do it. And we're going to cut your rates now, because you've been so successful at lowering your costs." (Bakker, 2001)

In the end, there was actually another bad incentive, which was the opposite, that the government could not commit to letting a regulated natural monopoly, like the power company or the water company, go out of business if it lost money. So there turned out to be a "soft budget constraint", to use Janos Kornai's terminology, despite the plans otherwise (Kornai, 1986). So all in all, there are still price caps and they still have some good incentive properties, but they were not the wonderful solution that we all had hoped for.

Also in the 70s and 80s, there was something closer, I would say, to a hostile takeover of the old regulatory regime, which was a new emphasis on the feasibility of competition and possibly deregulation in some parts of these infrastructure sectors. This was often, though not always,

accompanied by the policy description of "vertical separation" – separating the ownership and control of the newly competitive activities from that of the network – primarily in order to prevent anticompetitive discrimination by the network operator (and in many cases to assure the government's ability to target network subsidies effectively). (Weiss, 1975; Beesley, 1981; Vickers and Yarrow, 1988; Armstrong, *et al.*, 1994; Newbery, 2000)

The British economists were very important in this also, but the first big case was *U.S. v. AT&T*, when the Department of Justice's Antitrust Division broke up the national monopoly telephone company. Why? Because there were technological developments that led to the possibility of competition in long distance. But even with competition in long distance, the private companies providing long distance service still needed access to the regulated "local loop" – the telephones in the homes and businesses originating and terminating the calls. And the regulator found itself unable to prevent the vertically integrated monopoly from discriminating against its competitors. It tried, it gave orders, and AT&T kept saying, "Sorry, we'll try to do better." But finally, the regulator was unable to prevent discrimination in favor of AT&T's own long distance service. And the Antitrust Division stepped in and brought an abuse of dominance case, what we call a monopolization case in the U.S., and broke up AT&T. (Brennan, 1987)

We imposed the first, I think, in the world, great "vertical separation", complete separation of the natural monopoly in order to maintain the network monopoly, but create competition, let's say "upstream", in services. And it gradually became clear, as economists started studying these sectors and as there were technological improvements, that many "natural monopoly" sectors had portions that could become competitive. And since everybody agreed that competition was better than regulation, there became a consensus to open up these, let's call them "upstream" sectors or "services" sectors, to competition, while maintaining regulation of the infrastructure, the network. Again, vertical separation was sometimes, though not always, a part of this new policy prescription (Newbery, 2000; World Bank, 2002).

Applying this Thinking to the Railways

In railways, the United Kingdom and others were very strong on creating competition among train operating companies while maintaining regulation of the monopoly track and signaling. They were strong on creating competition in electricity generation while maintaining the monopolies in long distance transmission and local distribution, and so on in the other sectors. In telecom, this was very important, allowing competition in long distance, then later mobile, internet, and cable TV, while maintaining some regulation of local service. Later, it became applied even to the water sector, in at least limited areas, and this is still a matter of debate right now, especially in the UK and Australia.

Eventually this idea, not only of creating competition, but also of vertically separating the old provider in order to prevent discrimination and foster competition, became the economist's default recommendation (Laffont, 2004). It became very much the World Bank's default recommendation as well (Xu, 2004, 2006).

Now, there were skeptics. There were economists who were considered "dinosaurs" because they apparently just didn't quite understand the newer regime. There were of course industry people who resisted this, and they were just considered apologists for industry: Of course they want to preserve

their monopoly! But they raised questions that even at the time, to some of us, seemed reasonable and in retrospect seem even more reasonable. For example, and most obviously, might there be economies in vertical integration? Might there be such economies in the railway sector, that is, cost savings when the same enterprise owns and operates the tracks and owns and operates the trains? Might there be economies of scale upstream in the service (train operating) sector? If there are economies of scale, for example, in passenger train operation, if you break up the railway sector to create competition, you might end up with an upstream monopolist and a downstream monopolist. Economists will tell you that's an inferior solution, that's a change for the worse. Two monopolies, vertically connected, is worse than one vertically integrated monopoly, worse for everyone (Spengler, 1950).

Might some sectors be different? For example, in electricity it might be important what the generation mix is. Might it be easy to create competition in an economy with a lot of small natural gas generation plants, but hard to create competition in an economy with a lot of large nuclear or coal plants, or combined heating and power plants, which don't shut off easily during the winter?

This is where my World Bank story comes in. I was teaching at the New Economic School. This would have been 2005, my second teaching stint there, when my colleague and friend, Ksenia Yudaeva, got a call from her friend, Kakha Bendukidze. He had been, I think, one of the Russian oligarchs and ended up moving back to his native country, Georgia, to try to encourage free market reforms.

And he called Ksenia and said, "Ksenia, I've got a problem. In a week and a half, a team from the World Bank is going to come to Tbilisi and they're going to tell me to break up my electric power sector. I know that because that's what they tell everyone." He was right about that. "Do you know anybody at the New Economic School who knows something about electricity, who could come spend a weekend sharing information with my reform team?" Ksenia knew that I taught a course on Antitrust and Regulation at the New Economic School, so she asked me. And the two of us went and spent a weekend in Tbilisi, meeting all day Saturday and all day Sunday with, I guess, *Minister* Bendukidze at that point, with his reform team of eager young reformers. (I was there very much as a professor at the New Economic School and not on U.S. government business.) Not telling them what to do, because there's no single right answer necessarily, but just explaining to them what some of the problems have been with vertical separation in the electricity sector. What are the questions they might ask the World Bank team, some issues to resolve.

In railways there was another issue, which I talked about a lot when I was in Russia in the 2000s, which was that in many countries, especially large, freight-dominated countries like the U.S. and Canada, there is competition among vertically integrated railway companies. In other words, competition between railways that serve the same city pairs or that serve common points. We might call this "horizontal separation". It's been always the case in the U.S. and Canada. It was originally the case in the UK. It was originally the case in the Russian Empire in the 19th century, and it was the reform plan chosen by Mexico and, to some extent, Brazil and Argentina in the 1990s.

The State of the Debate in Railways[3]

[3] Pittman, 2007; Finger and Montero, 2020; Pittman, *et al*., 2020.

Let's take a look at the state of the debate in railways. The European Commission has been very strong on pushing complete vertical separation: competition above the rail among independent train operating companies. This originally was urged for both freight and passenger rail. Now it remains an option for passenger rail to some degree, especially internationally, but is more emphasized for freight. Brussels believed this would promote integration of the internal market. It would promote competition, which would result in improved efficiency, and that improved efficiency was a very important part of the EC's drive to increase the railway share of freight hauling in the EU. As an environmental measure, as a green measure, let's improve railways through competition which will increase efficiency, and that will allow railways to seize back some of their freight share from the road.

In the end, Brussels has ended up accepting something less than full vertical separation: what we call "third party access". So accounting separation, organizational separation, something less than complete enterprise separation. So long as the accounts are transparent and separated so that in theory, access discrimination can be prevented. On the other hand, in the Americas, North and South America and Central America, we have almost exclusively horizontal separation. Competition among vertically integrated railway companies that own their track in the U.S. and Canada, or have long-term franchise control of their track in Mexico and Brazil, and can for the most part insist that only their trains run on their tracks. For the most part, they have the complete right to deny other trains access. There are some exceptions.

However, as we have found out very well, each of these two basic solutions has an Achilles heel. In the EU, where vertical separation and grudgingly third party access have been accepted, so there is "competition above the rail" among train operating companies, the most serious weakness has been the unreliability of public funding of infrastructure. Most railways around the world have always been funded by public funds for the most part for the infrastructure. And that's understandable, but it has a classic weakness, which is that railway tracks and signaling last a long time. And every year when the railway comes to the legislature and says, "We need this money, we've got to build some new track, renovate some old track," the legislature says, "Yes, we understand that's really important, but our pensioners need better medicine, or we need to give a tax break to some importers, or some other crucial need this year for funding. We're sorry. We know it's a problem, but the track will last another year."

The result has been bottlenecks, lack of expansion where it's needed, slow and unreliable service in many countries in the EU. It's a very big problem. Throughout the EU, I would say, especially in the East and the Central and Eastern European countries, where freight is very dependent on rail and there are a lot of rail bottlenecks and so a lot of the freight moves on the road. On the other hand, attracting private investment is a strength of the horizontal separation model. I'll get to that more in a moment.

In the Americas, where we have horizontal separation, we have competition among vertically integrated railways over parallel routes and to and from common points. (In a country restructuring its railway using the horizontal separation model, the degree of the different types of competition created depends on the details of how the system is divided among the new rail enterprises – a matter of careful discussion in the Mexican restructuring experience.) The weakness there has been that every railway

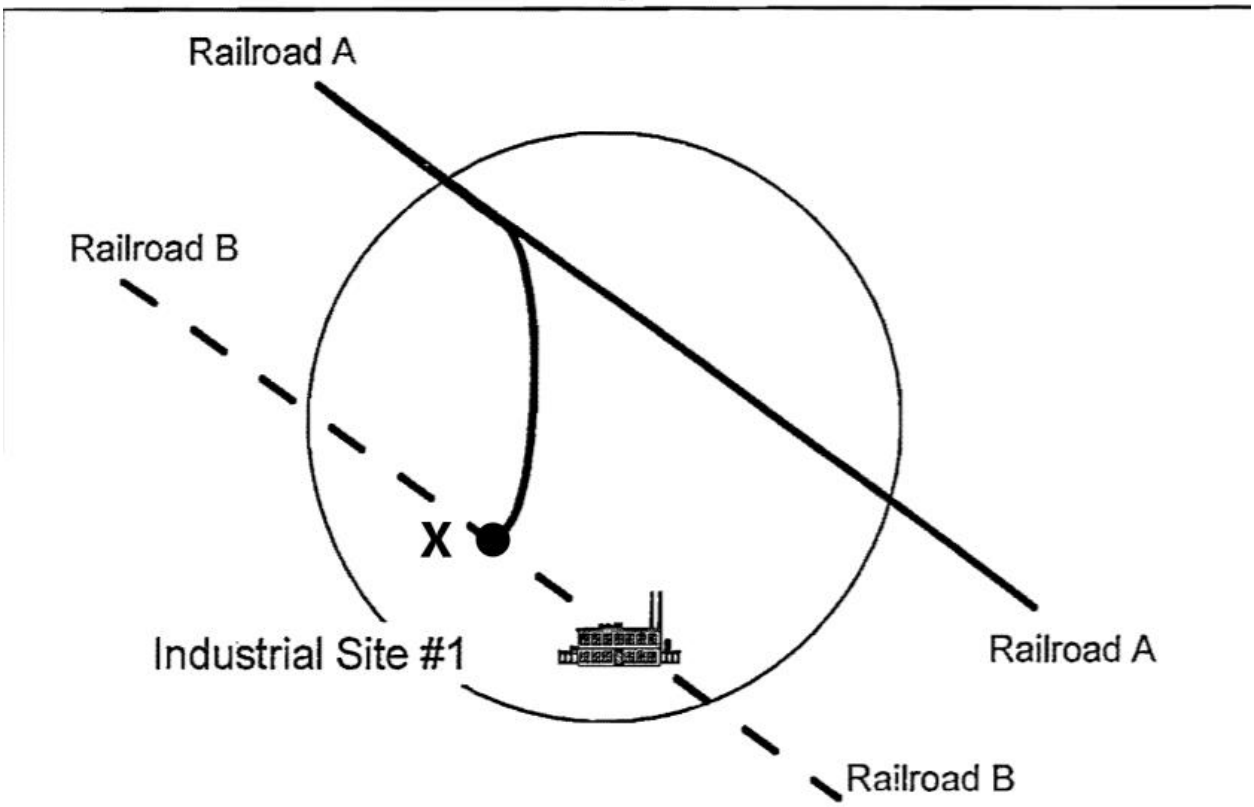
has some degree of regional monopoly power. So there are some shippers who are “captive” -- that's a term of art in U.S. rail regulation -- to a single railway company.

Some shippers maybe can ship their goods by truck or barge to another railway, or to their final destination, but some can't. The latter shippers are “captive” – how do we protect them from monopoly pricing? In the U.S., up to now, there has been a regulatory regime based on the theory of contestability. It has been based on something called the stand-alone-cost test. However, many are dissatisfied with this test. So the US regulator, the Surface Transportation Board, has signaled that it wants to make some changes; we don't know yet what changes the regulator will make (Pittman, 2010; STB, 2019; for a defense of the test, see Mayo and Willig, 2019). In Canada, they have occasionally used final offer arbitration between shippers and railways. More often they use something called mandatory switching, and I'll define that in just a moment.

In Mexico, there's a debate underway right now as to how to protect captive shippers, because they've just set up a freight rail regulator. And they're debating how to implement the law that allows this regulator either to set price ceilings for captive shippers or to have mandatory trackage rights. And I'll explain what that means in a minute. So again, just to be fair, protecting captive shippers is the strength of the vertical separation model, because if anybody can run a train on the tracks, then if I'm a coal shipper and I don't like the rate that Deutsche Bahn offers me, I can buy some locomotives and run my own trains, or I can try to attract some other company, PKP or maybe RZhD in the future, to run trains on the common track and protect me.

Let me explain for those of you who are not deep into American rail regulation what switching and trackage rights are. Please see Figure 1, which is from Grimm and Plaistow (1999).

Figure 1



Shipper has physical access to only one applicant but is in proximity to the other.

Here we have two independent vertically integrated railways, railway A and railway B. On railway B, there is an industrial site. Let's call it a steel plant. There is track between railway A and railway B that is part of railway A. You see that line right in the middle -- it goes between railway A and connects with railway B at X. The mandatory switching rule that is imposed under some circumstances by the Canadian regulator is that if the steel company on railway B doesn't like the rate it gets from railway B, it can insist that railway B carry the goods only to point X and then switch them to railway A, which will offer competing service to a final destination.

Trackage rights are a similar idea, but they operate a little differently. If there are mandatory trackage rights, the steel company can insist that railway A be allowed to run its trains on that short length of railway B's track, between X and the plant, and then get back on its system once it either delivers or picks up the goods. And that is what is used sometimes in the U.S., especially as a merger remedy, and it is one of the two remedies that are being considered in Mexico. In both cases the regulator must control the price and other terms of access if it is to effectively protect the captive shipper.

The Railways Reform Debate in Russia[4]

[4] Akseneko, *et al*., 2001; Dementiev, 2006; Husainov, 2012; Pittman, 2013; Kolik, 2016; Saakyan, 2020.

Let's talk about the railway reform in the Russian Federation – with the immediate caveat that I am speaking to an audience of Russian experts who know far more about this topic than I do.

Starting in the 1990s, after the fall of the Soviet Union, pretty quickly there became serious debates on what to do about the Ministry of Railways. How should we reform this monopoly (if we should)? Not everybody agreed that it should be reformed, but there was a pretty broad consensus, I would say, from my review of the debates at the time.

It seems, again from looking to the past, that everything was "on the table" -- that is, under consideration. They were looking at America, at the U.S. and Canada, at the horizontal separation model. They were looking at the UK's and Sweden's vertical separation model. They were looking at third party access, which is a halfway measure to vertical separation. Everything was being considered.

In the 1990s, and especially in the early 2000s, the World Bank and some European advisers started telling the rest of the world: vertical separation everywhere, including railway. And the Russian Ministry of Railways, the Ministry of Economic Development, the Ministry of Transport, the Ministry of Anti-Monopoly Policy, all were getting visits, getting advice from the Europeans saying, "Vertically separate – that's what you do with a natural monopoly." Railways, electricity, telecoms, but we're talking about railways.

The Russian policymakers from the Ministry of Railways and other Ministries were skeptical. This would be a big experiment. This would be a big change, and it would be a high-stakes roll of the dice. While this debate was going on, the real world struck. The UK had engaged in complete vertical separation of its railway, and there was a bad accident in October 2000, called the Hatfield accident, which killed a number of people, and upon examination, it was found that this accident had resulted from poor maintenance of the track system. And that in turn was blamed on poor communications and poor incentives for this vertically separated track operator. The result was a complete shutdown of the British rail system for a time, then system-wide speed reductions, train cancellations, and finally bankruptcy -- or "administration", as it's called in the UK -- of the infrastructure enterprise Railtrack.

And the Russians said to the Europeans, including the OECD group that I was part of, "Look, the UK economy could get along without its railways for a little while. The Russian economy cannot. This would be a complete economic disaster in Russia. This is just something we are very disinclined to experiment on." I was visiting Russia several times at this point as part of this OECD team. And we were discussing, among other options, vertical separation. I personally was saying that vertical separation is not what I would recommend. I was even back then saying, "Look at how successful horizontal separation has been in the Americas."

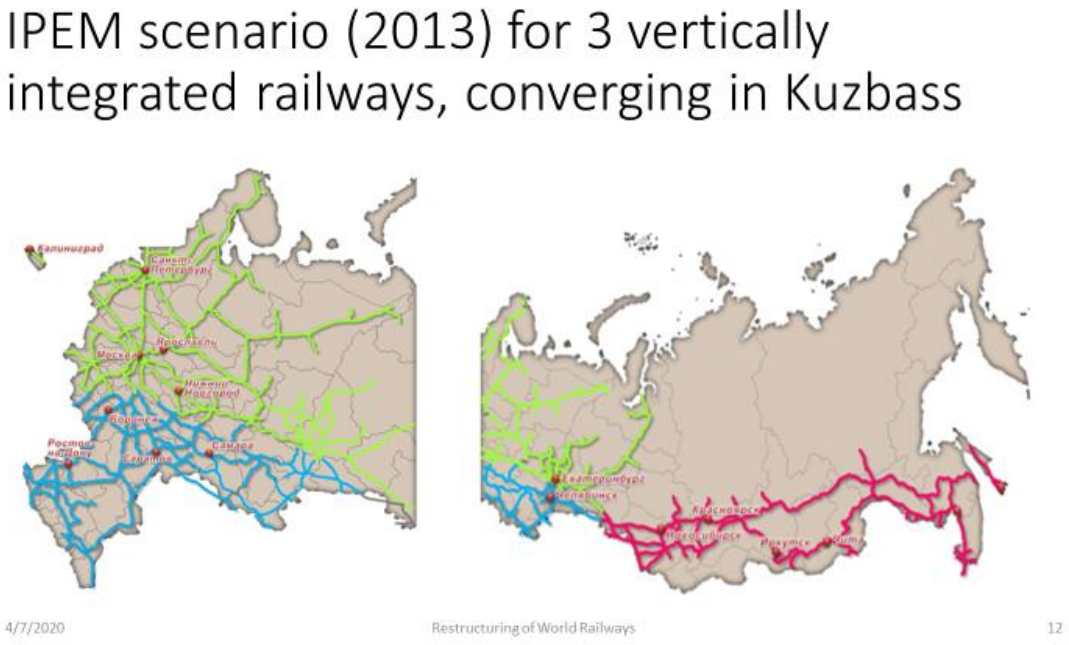
In the end, in the year 2001, the Russian Cabinet approved a three-stage reform plan. Stage one, creating a government owned monopoly called Russian Railways, or RZhD, separating operations from regulation and starting to divest non-core enterprises like hospitals, farms, and schools.
Stage two would have RZhD 1) create some daughter companies -- operating companies, rolling stock owners, and so forth, 2) implement access conditions for independent *operators* -- not *carriers*,

operators, that is, owners of rolling stock or freight forwarders, and 3) very important from the RZhD standpoint, get rid of the required cross subsidies of passenger operations from freight. And then in stage three, competition would be created in freight -- perhaps also in long distance passenger transport, but definitely in freight. And the definition of "competition" was, I would say, deliberately left unclear. But early on, it was explicitly stated that one option would be the creation of competition among vertically integrated independent companies. That language started to leave the official debates after a while, but early on, it was there.

So, as the debate progressed, what kind of competition in freight? Vertical separation, as I said, was considered a nonstarter due to the heavy risks -- it probably was never likely to be accepted in Russia. As RZhD president Vladimir Yakunin said, "Don't cherish these illusions – we'll never have such conditions. But if we separate them anyway and ruin the company, quite a few in the West will applaud us."[5] Horizontal separation was featured in the original debates. It was one option that was urged on Russia by the OECD team that I was a part of (ECMT, 2004). I think it's fair to say that I was considered the principle person pushing this option. And this option was considered seriously, I believe.

In 2013, the Institute for the Study of Natural Monopolies convened a conference, examining the literature on restructuring of railways in general and as applied to RZhD in particular, including the idea of creating three independent, vertically integrated railway enterprises converging in the Kuzbass, since coal shipments are so important to the Russian railway. And since coal travels both east and west from the Kuzbass, Russia could have three railways start there and then go in different directions. Very much the same way that competition was created in Mexico, among three vertically integrated companies that converged in Mexico City. In Mexico City, there was a big section of common track that could be used by all three railways to create competition for any shipper there. And I expect something like that might have been part of a solution under this scenario in Russia, if this plan had been actually implemented. As in Mexico, the focus of the modeled system was on competition to and from this very important common location rather than on creating parallel competition – though some of that could have appeared in Russia as well. Please see Figure 2.

[5] Andrey Guryev, "OAO RZD Voices New Objectives," *RZD-Partner International* 3 (2005), 50-54.



The Institute for the Study of Natural Monopolies studied this option seriously. They concluded, and I could argue with some of their assumptions, that the costs of setting up this system of three vertically integrated companies would not outweigh the benefits. That the costs would be too high, and that the benefits of competition would not be so great. Again, I disagree with some of their analysis, but that was their result.

What seems to be happening in Russia right now -- again, from my viewpoint -- is that RZhD is being pushed by reformers and by shippers into a third party access regime, into allowing not just independent *operators* but also independent *carriers* operate on the system – that is, trains with not only rolling stock but also locomotives owned by firms other than RZhD. RZhD has been resisting this for a long time. It has certainly allowed private ownership of rolling stock. It has certainly encouraged *operators* on the system, but has fought very hard to prevent almost any independent *carriers* onto the system. That's where we stand in Russia as I'm speaking.

Now I want to consider three potentially instructive developments outside the Russian Federation that I think help us to understand railways better. Maybe they can be part of the debates on how to restructure RZhD.

Recent Developments: The Economic and Econometric Literature

The first development has been a real worldwide flowering of empirical economic research on railways and railways reform in the last 30 years. It's a very imperfect literature; empirical economic research is usually very imperfect. There is not a lot of variation in some of the samples; there's endogeneity in

terms of which railways and what kind of reforms; but there are a number of, let's call them "stylized facts" or accepted findings now from the empirical railways literature. [6]

Finding #1 is that there are significant economies of vertical integration in rail, as the Russians told the World Bank and the other international advisors all along. There are real costs in terms of operation, in terms of investment, in terms of coordination, in completely separating the ownership of the trains from the tracks. (Neither Coase [1937] nor Williamson [1975] would be surprised by this result.) The magnitude of these costs of separation is very much in dispute, because there are not that many observations, so there's not that much variation to observe. So let's pick a number and say, 4 or 5% of operating costs. It's almost a random number because the estimates are so widely variant and that doesn't even include disadvantages of investment coordination. But everyone pretty much agrees now that there are economies of vertical integration that are lost with complete vertical separation.

Finding #2: There are also economies of system size. No one is saying that you should break up a small country's railway system into five competing railways so that Adam Smith can be pleased. At some point, it becomes too costly. Again, there's a lot of debate as to how big the system needs to be to achieve economies of system size, but something like 10,000 kilometers might be a reasonable measure. All of the U.S. "class one" freight rail companies are likely operating in a regime of constant returns to system size. The smaller Mexican railways, which are more in the range of 10,000 kilometers, are all probably at a point where they've exhausted economies of system size.

Finding #3: There are significant economies of density. But again, these are exhausted at some observed levels. According to the best estimates, all the U.S. major freight railways are operating in regions of constant returns to density. And it's worth pointing out that the U.S. system's density of operations is below that of Russia. It's also below that of China and India. It is very likely that the Russian, Chinese, and Indian systems are operating at points past the maximum returns to density.

The fourth empirical result is that *above-the-rail competition* has increased system efficiency, at least for freight. In passenger operations, there's more debate. In freight, it appears that competition among train operating companies has increased efficiency to the benefit of shippers. However, it's important to emphasize, and my Russian friends should be probably nodding their heads here, that there is no good evidence that vertical separation outperforms third party access in this dimension. It appears, from very imperfect econometric estimation, that you can get increased efficiency from allowing independent carriers on the track without forcing full vertical separation.

And finally: *Horizontal* separation is what has attracted huge levels of private investment into the railway systems. I personally believe that if the railways of Russia, of Europe, anywhere, are going to take back freight from the roads, they're going to need a lot of investment. And governments have not been reliable sources of this investment. So railways need to figure out ways to attract private investment. One way, not the only way, is to divide the system into vertically integrated companies,

[6] I will not seek to provide a complete literature review, but see, for example, STB, 2008; van de Velde, et al., 2012; and Mizutani and Uranishi, 2013.

competing with each other, and to sell the franchise rights to private consortium. This is what was done in Mexico and Brazil, and the bids for the franchise rights, just the bids, averaged 100,000 U.S. dollars per track kilometer in the late 1990's. Money going straight into the government treasury. After that, these consortia started investing their own money in the systems. This form of reorganization has its weaknesses, but it certainly has been successful in attracting private investment into the infrastructure.

Recent Developments: U.S. Rail Regulation and the Staggers Act[7]

I want to talk now about two other developments that I think are useful to understand, again, in the realm of modern railway policy. One has been the success of the Staggers Act of 1980 in the U.S. The background of this is that U.S. railways were always privately owned and vertically integrated -- as they were, as I said, in the UK and the Russian Empire for a long time. And there were always multiple railroads historically serving parallel routes and serving common points. But in the early days, in the 19th century especially, there were many, many railways competing with each other.

In those days, the public and the government in the US were concerned about what was called ruinous competition -- that with high fixed costs and low variable costs, these vertically integrated companies would compete prices down below remunerative returns and the industry would be ruined. Conversely, many freight shippers who were captive to rail -- and many were captive before the development of the interstate highways in the U.S. -- worried about monopolistic abuses. The result was that the entire system was heavily regulated starting in 1889 with the creation of the Interstate Commerce Commission, which as far as I know was the world's first independent regulatory commission.

So the ICC, the Interstate Commerce Commission, regulated rates, all rates, and the rates were cost-based. So, as I said, they provided poor incentives for efficiency. There was "value of service pricing", as I believe there is in Russia now, so that more expensive goods contributed more to the fixed costs of the railway, which is the opposite of Ramsey pricing. Unfortunately that's exactly the way to drive those expensive goods onto the road instead of the rail: because more expensive goods tend to have good transport options other than rail, their demand for rail is relatively elastic – meaning that according to Ramsey pricing principles they should face lower rather than higher mark-ups over rail transport costs (Baumol and Bradford, 1970). The ICC allowed some collective rate making -- that is, the railways could sometimes collude on what prices to charge, subject to regulatory approval. The railways could not abandon routes easily: even if they were losing money, the regulator would force them to continue service. And they could not abandon passenger services: even if they were losing money, the regulator would force them to continue service.

As a result of decades of such regulation, the US railways gradually stagnated and lost business, especially in the face of increased competition from motor carriers. Rail's share of freight was falling. The tracks were in terrible condition. The rolling stock was in terrible condition. The railway companies themselves began going bankrupt. Shippers were becoming worried about their continuing ability to get rail service. Then over the course of 10 years, from 1970 to 1980, Congress enacted some very beneficial legislation. Starting in 1970, they freed the railways from the requirement to provide passenger service.

[7] Gallamore and Meyer, 2014; Mayo and Sappington, 2016; Pittman, 2020.

They created Amtrak, which would be a government owned passenger operator, but it would use mostly the infrastructure of the freight railroads. So in most of the country, except for some the Northeast, Amtrak operates on the track of the freight railroads, and these are required to give access to Amtrak at marginal cost. They are not happy about that. They are required to do.

The Staggers Act of 1980 freed most freight rates from regulation. It allowed for long-term contracts between railroads and shippers, where there could be quantity guarantees, there could be price guarantees. It allowed much easier route abandonment, with many abandoned routes taken over by small local operators who operated much more cheaply and without union requirements and therefore smaller labor forces. The result of the rate deregulation and contracting was a good deal of second degree and third degree price discrimination. And there is continued protection for captive shippers -- as I mentioned, that is under debate, but captive shippers remain protected right now by the stand-alone-cost test. There are continuous debates as to how to both strengthen and streamline that protection.

Figure 3 is a chart that the railways love to show you. This is what happened to the freight railways in the U.S. after Staggers. Productivity shot up, volume shot up, rates went down. And revenues went down for a while and then started going back up. So this is pretty much by anyone's measure a success story. In particular, when we look at what happened to rail's share of freight, in Figurer 4, we see that from 1930 to 1980, rail's share of intercity freight-ton miles dramatically fall, from over 70% to between 30 and 40%. Figure 5 shows that share rising after Staggers, nowhere near to what it was before, but it has been trending back up. And that is, I would argue, a real achievement of U.S. rail deregulation -- not complete deregulation, but significant deregulation.

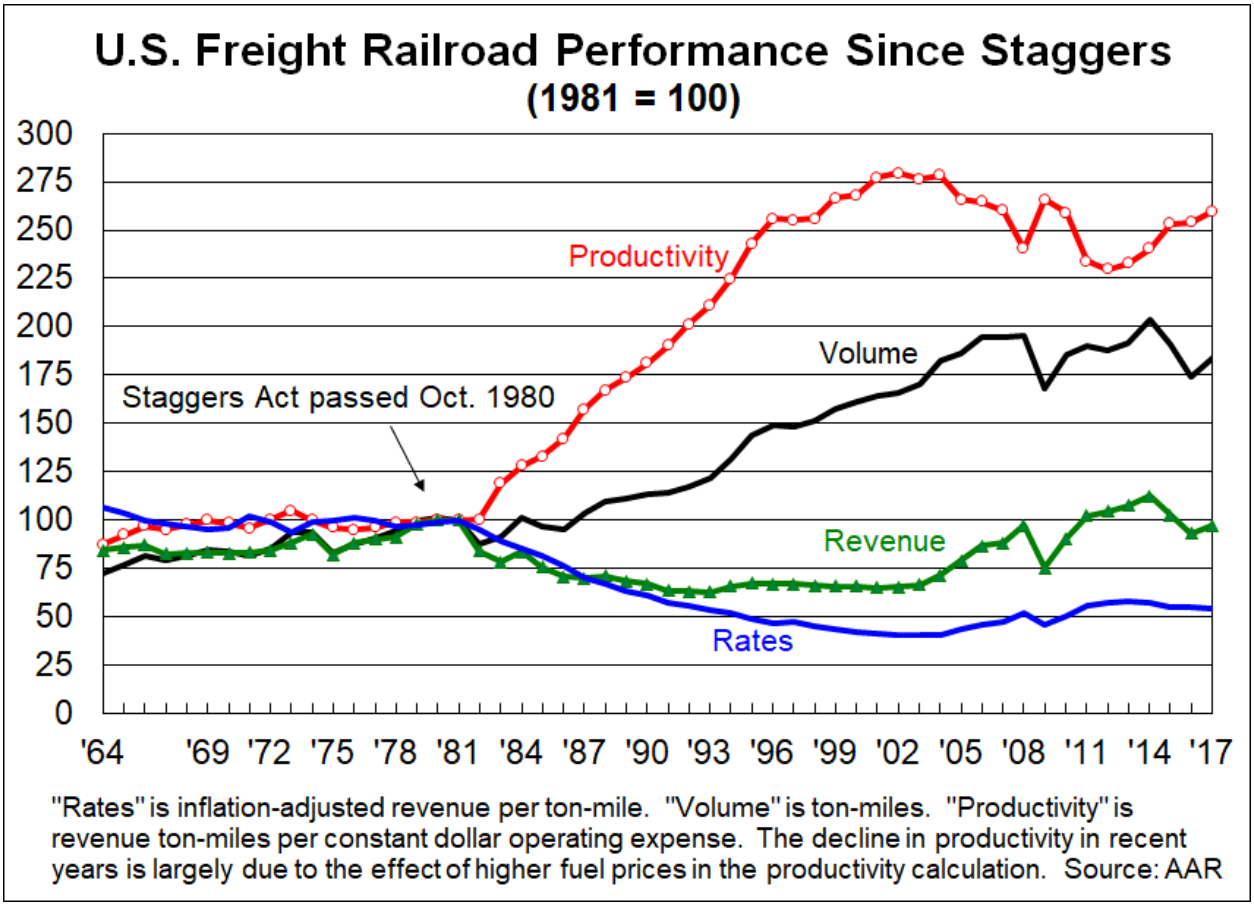


Figure 3. The Impact of the Staggers Act.

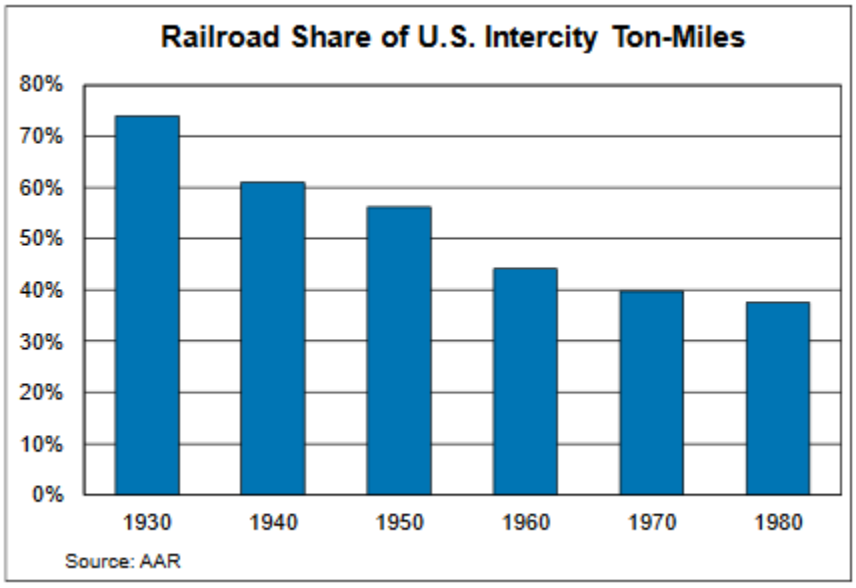


Figure 4. Rail's declining share of US freight transport, 1930-80.

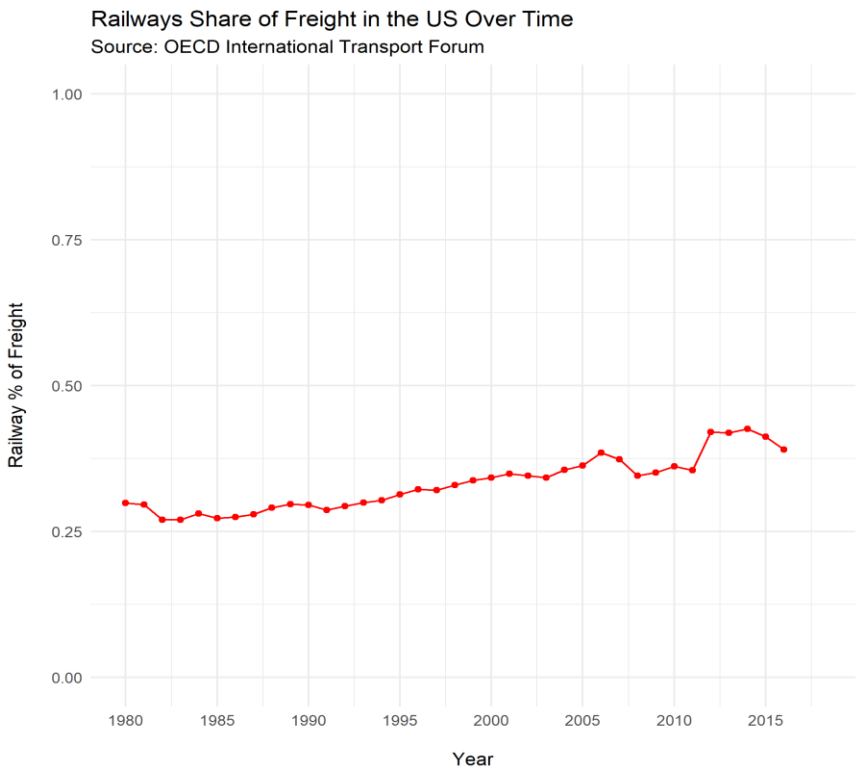


Figure 5. Rail's recovering share of US freight transport, 1980-2016.

Recent Developments: EC Railways Policy[8]

Let's look at development three, which is what's happened in the EU from 1991 to 2017. (Again I emphasize that I am reflecting my personal perspective and experience, and that other participants in this conference may know much more than I on this topic.) The EU, and the EC itself, have generally aimed at creating above-the-rail competition for both freight and passenger operations. The first railway package in 1991 required accounting separation of operations from infrastructure and access to domestic infrastructure for international train operators. Railway package two, in 2004, required open access for freight train operating companies, both domestic and international. In this period, by the way, DG-Comp, that is the EC Directorate General in charge of competition, was pushing very hard, not just for above-the-rail competition, but for complete vertical separation. Mario Monti was the big voice behind this. Package number three required open access for international passenger operating companies, including "cabotage", which is where international train operating companies were allowed to pick up passengers and deliver them within the same country, which hadn't been required by package two. And then finally, package four required liberalization of domestic passenger service and improved cross border interoperability. So in many EC countries now, not a large number, but in some EC countries, there is above the rail competition between passenger operators, especially for high speed rail.

[8] Pittman, *et al*., 2020.

The rationales for these packages have been community integration, increased efficiency, and increased competitiveness of rail with other modes. They were sold from the beginning as green policies, as environmental policies, as ways to improve railway efficiency in order to attract freight from the motor carriers to railways. And one could say this policy has been very successful in some ways. If you look at the 2016 measure in Figure 6, which is the latest one, you see that in a number of EC countries, some in the East, some in the West, the share of non-incumbents in freight train kilometers has been increasing almost across the board, and it's pretty high in some of these countries. In that sense, the policy has been a success and shippers are happy about it.

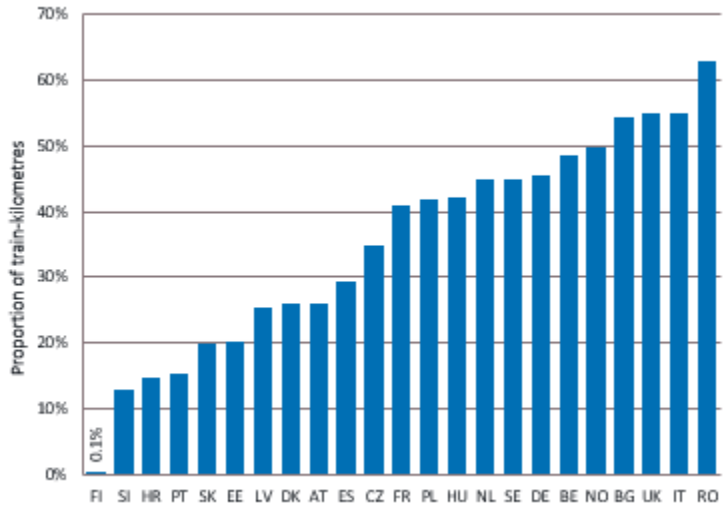


Figure 6. Share of non-incumbents to total freight ton-kilometers, EU countries, 2016. Source: EC (2019).

On the other hand, on its stated rationale of reversing the loss of traffic from rail to motor carriers, this policy has not succeeded. The share of freight by ton-miles for rail in the EU has continued to fall. In Figure 7, you see the share of the 28 current member countries. The share has continued to fall despite

the increase in above-the-rail competition.

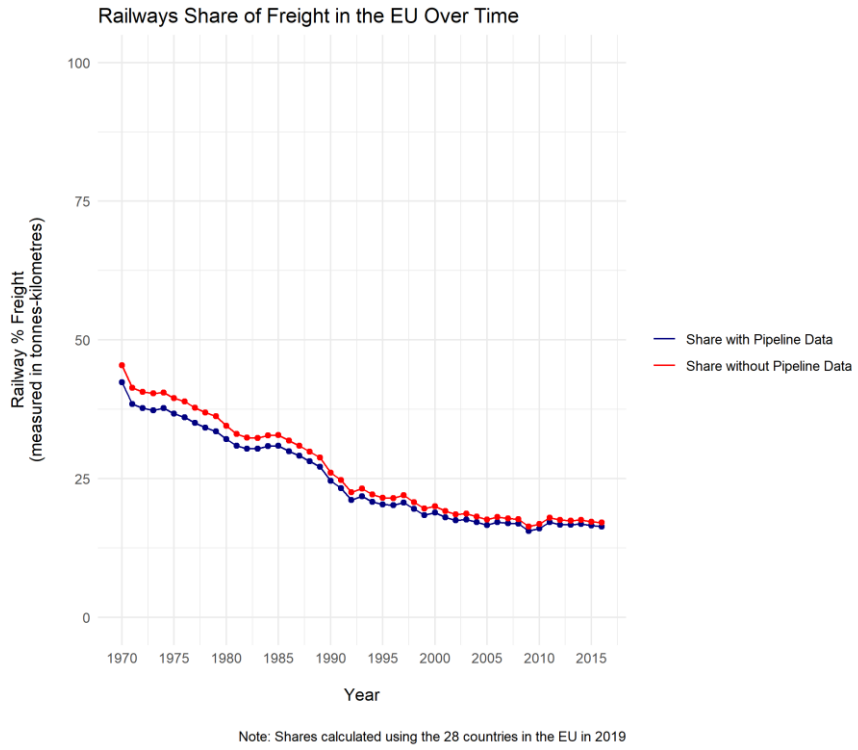


Figure 7. Source: OECD International Transport Forum.

Now, of course there are big differences between the U.S. and the EU. The U.S., Canada, and Mexico are mostly freight systems. Western Europe, especially, is mostly passengers. The East is more freight. The commodity mixes are different. Of course, in the bigger countries, you have more long-haul. You don't have interoperability problems across U.S. states or Canadian provinces. You don't have investment coordination problems. You don't have coordination problems with access prices for shipments across different borders. But I think it's useful to focus on one strength of the U.S., which is the source of funds for investment. The EU continues to rely on public funds for infrastructure investment in railways. And in many EU countries, there remain serious bottlenecks at crucial points, with complaints that for political reasons some subsidies still go to road rather than rail, despite the stated efforts to get freight off the roads and onto the rails.

Funding the Investments Required for Railways

If you look at Figure 8, you really see that only four EC countries, the UK, France, Germany, and Italy, have shown a real willingness to spend government funds on rail infrastructure. The others are much below them.

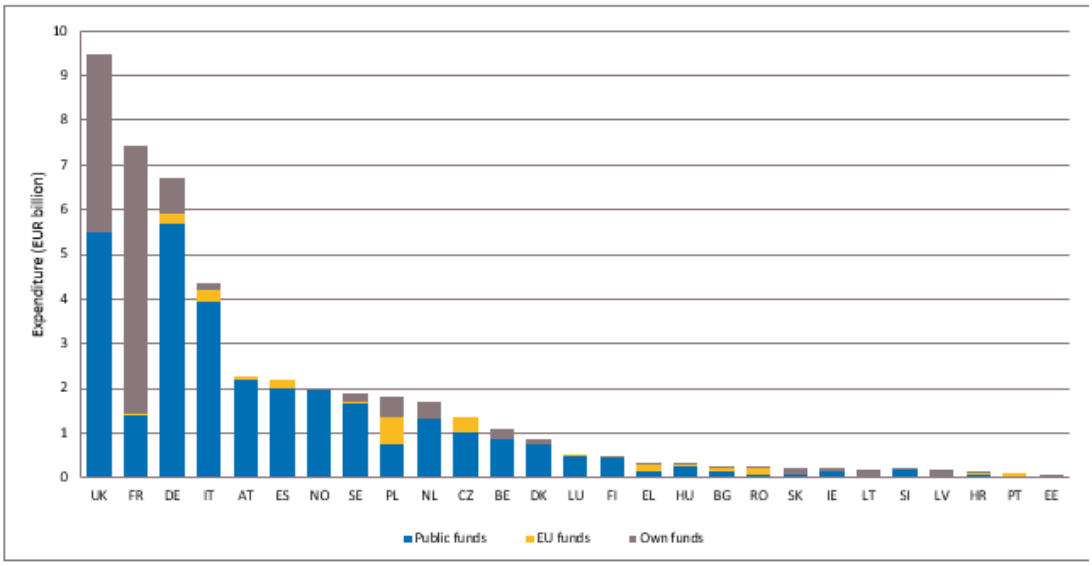


Figure 8. Expenditure on rail infrastructure from all sources, EU, 2016. Source: EC (2019).

On the other hand, if you look at the U.S., Figure 9 is I think pretty remarkable. The U.S. freight railways every year spend billions of dollars of their own money in infrastructure and equipment.

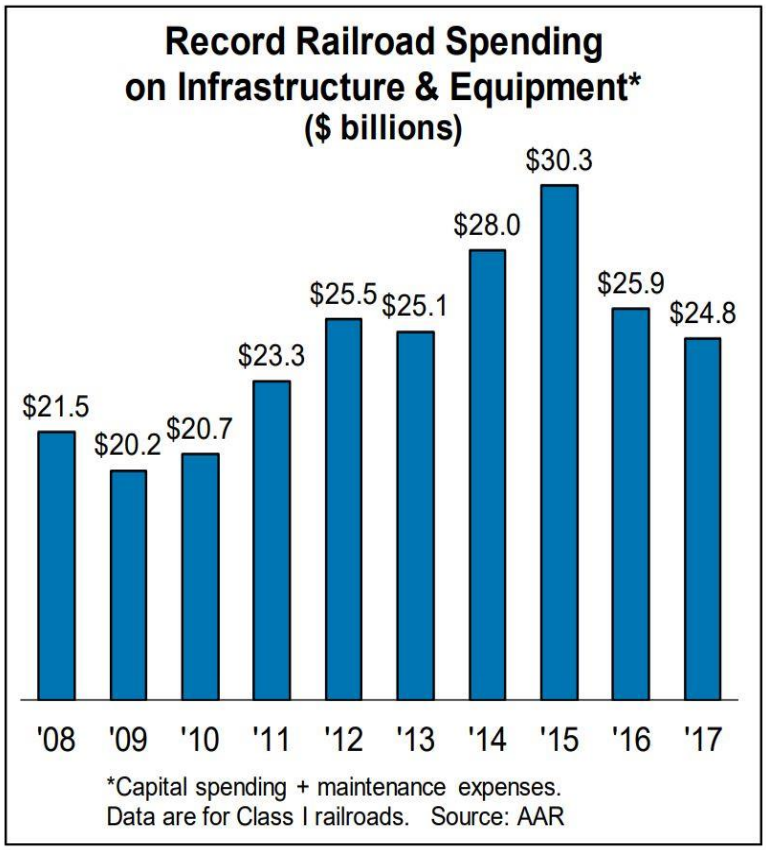


Figure 9.

There is some government funding of infrastructure to address particular issues, like the congestion around Chicago, maybe the country's most important rail hub. But by far, most investment in the U.S. freight railways is by the companies themselves. The companies are profitable; they earn money; and they spend money on their infrastructure. It's been a real success story.

The same is true in Canada. Same in Mexico, where, as I mentioned, the three major private railway consortia bid large amounts of private money for the franchise rights and then when they had the franchise rights invested in the system. And in Mexico, that's just been a complete transformation. Something like pre-Staggers and post-Staggers in the U.S. In Mexico, before the 1990s, the freight railway ate up tax money for subsidies, for a system that didn't work. Now, it gives tax money to the government. It pays for its own infrastructure, and shippers ship on the railroads.

Finally, if you look at information on capital markets around the world, there is just so much private equity money looking for profitable investments. "Private capital overhang", it's sometimes called; in the private equity sector this is known as "dry powder". We've got this "ammunition" sitting here, and we don't know what to use it on.

If you could figure out in Russia or in the EU or in China, ways for private investment to earn a return on railway infrastructure, that money would come in, and it might be invested by Deutsche Bahn, it might be invested by Berkshire Hathaway, which bought a U.S. railway. There are a lot of companies and private equity funds and hedge funds. And if the returns were there, they are looking for places to spend their money.

Let's close this discussion with a look at the state of the world as we meet today. EC policy has not changed since 1991 for the most part. It encourages independent train operating companies. As a result, independent train operating companies have increased their share, but rail's share of freight continues to decline, as it had been before 1990.

In the U.S., private vertically integrated freight railway companies are successful and profitable. There is sort of a cloud on the horizon. The ICC and its successor agency, the Surface Transportation Board, have allowed some mergers among these vertically integrated railways that were competing with each other. And arguably as a result, rates have stopped falling and started increasing. The shippers allege that the two remaining freight railways in most of the West and the two main freight railways in most of the East don't compete aggressively for each other's customers. And there is a continued debate on how to protect captive shippers.

In Mexico, something similar happened (Perkins, 2016). The competition agency tried to block a merger of two of the three freight railway companies. The companies appealed to the courts, and the competition agency lost in the courts. So there is also basically a "duopoly" in the Mexican freight rail sector, very much like in the U.S. west and the U.S. east. Also as in the US, shippers allege that the duopolies are not competing with each other very hard. There is a new law that allows a new regulator to control rates or to order trackage rights or both to shippers facing a dominant railway. And the new regulator is considering its options. And, as I was in Russia, I've been part of an OECD group that has been talking to the Mexicans about the world experience as they try to set up a new regulatory regime.

In China, there has been some private funding for joint venture of freight railways between particular origins and destinations, but the broad system itself is unreformed (Yin-nor, 2020). I don't think there are serious reform debates going on right now as there were maybe 10 years ago. The most interesting current developments regarding the railways and China concern the dramatic expansion of international rail freight traffic along the southern and northern corridors of the "Belt and Road Initiative", in particular the now regular China-Europe freight traffic.[9]

In India, another unreformed state-owned monopoly has been seeking private investment, especially for what they call the "dedicated freight corridors". Again, the broad system is more efficient than it used to be, but it is also basically an unreformed monopoly (Kumar and Mehrotra, 2009; Gangwar, 2020).

It should be quite interesting to follow competitive developments in international railways in the next few years. It may be that Russia will be the location for the next round of significant changes – or not. As Niels Bohr, Samuel Goldwyn, Yogi Berra, and an ancient Danish proverb have all been credited with pointing out, "It's difficult to make predictions – especially about the future."

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[9] Li, *et al*., 2019; Asserre, *et al*., 2020; Wang, *et al*., 2020; Shibasaki, *et al*., 2021. The trade press coverage of this phenomenon is vast and ongoing. See, for example, Shi Huilin, "How Does the China-Europe Express urge Russia to implement a package of reconstruction plans" (in Chinese), RailFreight.cn, October 1, 2020, https://www.railfreight.cn/%e4%b8%ad%e6%ac%a7%e7%8f%ad%e5%88%97/2020/10/01/%e4%b8%ad%e6%ac%a7%e7%8f%ad%e5%88%97%e5%a6%82%e4%bd%95%e4%bf%83%e4%bd%bf%e4%bf%84%e7%bd%97%e6%96%af%e5%ae%9e%e6%96%bd%e4%b8%80%e6%8f%bd%e5%ad%90%e6%94%b9%e5%bb%ba%e8%ae%a1%e5%88%92/ ; Jailu Zhang, "Full to Europe, empty to China; if the container returns at all," RailFreight.com, October 23, 2020, https://www.railfreight.com/specials/2020/10/23/full-to-europe-empty-to-china-if-the-container-returns-at-all/.

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