Reforming and Restructuring Ukrzaliznytsia: A Crucial Task for Ukrainian Reformers

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REFORMING AND RESTRUCTURING UKRZALIZNYTSIA: A CRUCIAL TASK FOR UKRAINIAN REFORMERS

Purpose. This article examines options available for Ukraine as the country considers proposals to reform and restructure Ukrzaliznytsia. **Methodology.** The basic restructuring options observed internationally are presented, and the literature concerning their impacts and effectiveness is reviewed. **Findings.** The creation of competition among freight train companies has been found to improve system performance, but the EU policy prescription of complete vertical separation may not be required in order to achieve this. The Americas-style policy of horizontal separation has also been found to improve system performance, and may be more appropriate for a country as large as Ukraine and a railway as dependent on freight operations as Ukrzaliznytsia. **Originality.** Most of the literature on railways restructuring focuses on vertical separation or third party access, while the focus here is on a policy option arguably more appropriate to Ukraine. **Practical value.** Ukraine's economy is dependent on the efficient shipment of bulk commodities such as coal, iron ore, steel, and grains – commodities that travel most economically over long distances by rail. The successful reform and restructuring of Ukrzaliznytsia will be a crucial part of Ukrainian economic reforms going forward.

Keywords: Ukrzaliznytsia, railways, reform, restructuring, vertical separation, horizontal separation, competition, investment.

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Introduction

If the Ukrainian economy is to be successfully restructured going forward, a restructured railway system will have to be part of the picture. Ukraine's economy depends on the production and sale of a number of bulk commodities, including coal, iron ore, steel, and agricultural products, that require shipment by rail in order to reach both domestic and export markets economically.

The Ukrainian Railway – Ukrzaliznytsia, UZ – was formed as a joint stock company in 2015 from what had been six separate regional railways, each with a good deal of autonomy. UZ suffers from aging locomotives and rolling stock as well as a badly depreciated infrastructure that causes traffic bottlenecks at crucial locations. An important first step in creating a viable railway going forward will be to find ways to attract investment into the system. Given competing demands on government resources, the international experience suggests that this will likely have to focus on private sector participation. Attracting private sector participation, in turn, will likely require a restructuring strategy that relies on market forces and competition rather than government decision makers to direct strategy and operations into the future.

In this paper we first discuss in more detail the crucial role that UZ plays in the Ukrainian economy. We follow with a survey of the world experience with railways restructuring: a large number of countries have already undertaken the task of converting aging government-owned monopoly railways into more dynamic and competitive transport enterprises, and their experience in very diverse settings may have important lessons to offer. We then examine the current state of rail reform plans in Ukraine. We conclude with discussions of an alternative path forward that seems most likely to be successful in Ukraine, based on both the experience elsewhere and the country's current situation.

Purpose

The purpose of this article is to examine the options available for Ukraine as the country considers proposals to reform and restructure Ukrzaliznytsia.

Methodology

For this purpose we begin with a more detailed discussion of the crucial role that Uzrzaliznytsia plays in the economy of Ukraine. We follow with a review of the current literature regarding the international experience with railway costs and with different railway reform models.

Ukrainian Railways and the Ukrainian Economy

Ukraine's economy is based on the production of bulk commodities that generally travel most economically by rail -- especially given the relatively poor condition of the country's road and highway system [1, 2, 3, 4]. Ukraine is among the top ten world producers of iron ore, steel, coking coal, wheat, corn, and sunflower oil. Coal (both utility and coking) is the leading commodity carried by rail, making up about a fourth of annual volume; steel, iron ore, and related products make up another quarter; and grains and building materials make up a good portion of the rest. Container traffic has a small but growing presence, especially as transit traffic. A good deal of the freight traffic originates in the east, including coal from the Donbas, iron ore and steel from the Kryvbas, and import and transit traffic from the Russian Federation.

The railway itself is the fourteenth largest in the world in track-km and the sixth most densely operated (as measured by ton-kilometers plus passenger kilometers per track-km). It is a freight-dominant railway, carrying the seventh highest total of ton-km of freight in the world (and not far behind Kazakhstan for sixth place). On the other hand, compared with the railways of other medium to large countries, UZ also carry a large number of passengers -- around twenty percent of traffic, a considerably greater percentage than the Russian and Kazakh railways, for example. The combination of export traffic and transit traffic makes up 59 percent of the freight tonnage [5]; a significant portion of this has been freight originating in Russia and ultimately departing from Ukraine either by rail to the west (especially to Poland, the Slovak Republic, and Hungary) or by sea to the south (especially via greater Odessa).

As noted above, UZ was formed in 2015 from the six regional railways that had survived Ukraine's declaration of independence from the USSR in 1991 , each of which had enjoyed a good deal of autonomy: the Donets Railway, the Lviv Railway, the Odessa Railway, the Southern Railway (Kharkiv), the Southwestern Railway (Kyiv), and the Near-Dnipro Railway (Dnipropetrovsk). (See Map 1.) The Donets, Near-Dnipro, and Odessa had traditionally been the most heavily used and the most important for freight, given their locations centered on coal mining (Donets), iron ore and steel production (Near-Dnipro), and port activities (Odessa). Before the formation of JSC UZ in 2014, both international lenders and local reformers had expressed frustration at the inability of the central government and/or railway administration to impose more effective centralized control on these regional lines.

UZ freight tariffs are set on the same basis that was used when the Ukrainian railways were a part of Soviet Railways: on the old tariff book Tariff 10-01. As in Russia, Tariff 10-01 separates freight tariffs into three broad classes of commodities that may be roughly categorized as raw materials, intermediate goods, and final products:

- Class I commodities include coal, ores, timber, and construction materials such as sand, stone, and concrete.
- Class II includes oil, grain, fertilizers, food, and a broad collection of intermediate goods.
- Class III contains finished chemicals and metals, machinery, and most finished manufactured goods.

Individual tariffs in each category are then determined using a declining scale for distance of haul and adjusting for shipment size and charges for loading and unloading. The overall rationale behind the tariff structure is basically twofold: to encourage long-distance shipments at affordable rates, and to charge for shipping each commodity no more than a target percentage of its delivered price [6, 7].

Like many railways around the world, UZ is required to cross-subsidize loss-making passenger operations from the profits of its freight operations [8]. Also like many railways around the world, this requirement to cross-subsidize passenger operations has made it more difficult for the railway to devote sufficient resources to the maintenance of current equipment and the acquisition of new equipment [9]. Worse, weak corporate governance at UZ has led to a procurement system characterized by low quality inputs purchased at high cost [10]. Even more importantly, large, politically influential shippers pay preferential tariffs that at best cover only direct costs [11, 12]. The result is that the locomotive and rolling stock parks are heavily depreciated and generally in poor operating condition; likewise, the track infrastructure is heavily depreciated and exhibits costly bottlenecks in several regions of the country [13, 14, 15]. A high priority going forward will be a reform plan that is able to attract large flows

of investment into infrastructure, locomotives, and rolling stock [9, 16, 17].

The World Experience with Railways Restructuring

The decades of the 1990's and the 2000's were everywhere periods of neoliberal reform and privatization strategies in general and in the railways sector in particular [18]. As in other infrastructure sectors, railways reforms around the world have tended to focus both on the introduction of private-sector participation and on the possibilities for the creation of competition in the context of what has been traditionally considered a natural monopoly. Also as in other infrastructure sectors, economists around the world have tended to favor the structural separation of going concerns as a sort of default option – as the generally preferred method of restructuring to create competition among users of a network. It has only been recently that much scholarly attention has been paid to the potentially negative cost implications of this policy in industries as diverse as railways, electricity, telecommunications, and water [19, 20, 21, 22].

A great deal of the policy debate regarding railways restructuring has concerned the possible creation of competition among multiple train-operating companies over a monopoly track infrastructure. With this possibility has come the question of whether such competition would be more effective in the presence of complete "vertical separation" between infrastructure and train operations, or whether a less drastic "third party access" regime – under which the incumbent UZ would remain vertically integrated but would be required to provide infrastructure access to independent train-operating companies under regulated terms and conditions – would be sufficient to support the introduction of competition, perhaps accompanied by some kind of "accounting separation" of the incumbent with the creation of an overall holding company. Although Britain's pioneering experience with complete vertical separation is generally considered a cautionary tale, the competition directorate of the European Community continues to push member countries in that direction.

As an alternative, minority voices in the debate have called for the creation of competition among multiple vertically integrated railway enterprises – a strategy sometimes termed "horizontal separation" to contrast it with "vertical separation" [17, 20]. Under such a strategy, each railway enterprise runs trains on only the infrastructure that it controls, but shippers hope to enjoy either "parallel competition" – competing railway lines serving the same origin-destination pairs, as is common in the United States and Canada – or "geographic competition" – competing railway lines radiating out from common points, as in Mexico and Argentina. Map 2 shows a stylized version of the Mexican railway system as it was restructured in the 1990's, with three vertically integrated companies competing mostly to carry freight in multiple directions between Mexico City and different ports and US gateways.

One notably successful aspect of the implementation of the horizontal separation model has been the attraction of private investments into these rail systems, initially in the form of bids for multi-decade franchise rights, and subsequently in the form of investments in to the infrastructure, locomotives, and rolling stock of the newly created vertically integrated railways. In both Brazil and Mexico, for example, the governments required the controlling rights of each franchise to be held by domestic investors, but encouraged the participation of international investors. Table 1 shows the winning bids for the franchise rights that resulted from the franchising in the two countries and the lengths of the principal railways. I calculate that the ten franchised freight railways average just over 4000 track-km in length, and that the average winning bid was US$95,700 per track-km, in late 1990's US$.

Furthermore, in the fifteen years following the restructuring in Mexico,

private investments into the system totaled over US$6 billion – more than double the amount required and pledged by the consortia that won the [23].

As the railways reform debate has progressed and different options have been pursued in different countries, there come to be greater appreciation of the possibility that different reform strategies might be appropriate in different countries and environments. There has in many cases also come to be a differentiation in the strategic options pursued for freight and passenger operations [24].

Britain is a good example. As mentioned, that country has been one of the pioneers in the creation of competition in railways. Originally the focus was on complete vertical separation and the creation of competition among multiple independent train-operating companies in both the freight and passenger areas. However, eventually it came to be widely believed that in an era of both widespread automobile ownership and discount airlines, passenger rail was dependent on government subsidies simply to survive. In that case on-track passenger rail competition was not sustainable, and the focus of policy moved to the creation of competition for monopoly franchises to control particular regional passenger rail operations in the tradition of Chadwick [25] and Demsetz [26].

On the other hand, on the freight side the introduction of on-track competition has led to vigorous duopoly competition between the old English, Welsh, and Scottish Railway (EWS, now a subsidiary of the German rail freight company DB Schenker) and Freightliner [27]. More generally, around the world, freight-dominant railway systems pay their own way without large-scale government subsidies, and in fact generally earn profits, pay taxes, and cross-subsidize passenger operations.

Empirical efforts to evaluate systematically the outcomes of the recent spate of railways reforms around the world, and especially to isolate the relative performance of different reform models, have been hampered by problems of data availability and quality, the short time period involved since reforms have been implemented, differences among railways sectors in different countries, and the possible endogeneity of reforms – both the reform decision itself and the reform path chosen. The best and most recent studies suggest that most reform efforts have led to improved efficiency, though in addition to possible endogeneity one possible explanation here is simply that increased attention to industry structure and efficiency by itself leads to improvements. Among the more specific findings:

- Where competition has been created among multiple train-operating companies (TOC's) – so-called "above-the-rail" competition – for *passenger* operations, the European experience suggests that generally fares have been reduced and services have improved, but costs have increased, presumably reflecting the sacrifice of firm-level economies of density of operations [27, 28, 29].
- Where competition has been created above-the-rail for *freight*, the European experience has been more conspicuously successful, with incumbents in several countries rapidly losing market share to more nimble entrants [30, 31, 32].
- In general, reforms that have allowed additional TOC's to use the infrastructure have been found to increase operational efficiency as measured by data envelope analysis and stochastic production frontiers [33, 34, 35]. However, it is not at all certain that complete vertical separation is more conducive to the introduction of competition or to increased efficiency than is a third party access model, perhaps structured around accounting separation of the incumbent [33, 36].

- The alternative strategy of horizontal separation of freight railways – the creation of multiple competing vertically integrated freight railways – has in several cases succeeded in attracting a great deal of private investment into previously moribund state operated railways and diverted significant levels of traffic from road back to rail, to the benefit of shippers, the broader economy, and the environment [23, 37, 38, 39, 40].
- The vertical separation and third-party access models have mostly been applied in small-to-medium sized countries in Europe where passenger operations dominate the railways business. The horizontal separation model has mostly been applied in larger countries in the Americas where freight operations dominate the railways business – though some smaller Latin American countries have followed this strategy as well, including Colombia, Peru, and Uruguay [20, 39].

Of course any discussion of the restructuring of existing railway enterprises raises the issue of the structure of railway costs. This is an issue that has been much examined in the empirical literature, though there are inevitably differences in results based on samples, assumptions, and techniques. We may summarize the discussion regarding three important aspects of railway cost functions as follows:

- It seems by now well established that there are economies of vertical integration in railways, and thus that complete vertical separation increases transactions costs and operating costs -- though the magnitude of increase is very much in dispute. Vertical separation seems to increase costs more than otherwise a) in rail systems that are very densely operated, and b) in rail systems with a high proportion of freight traffic vis-à-vis passenger [24, 36]. The former likely reflects straightforward advantages of intrafirm rather than intrafirm coordination of operations, while the latter likely reflects the greater track wear caused by heavy freight trains, and the difficulty of getting the interfirm incentives set just right to address that problem [41].
- Economies of scale, *as measured by system size*, seem to be exhausted at relatively moderate scales of operation. Savignat and Nash [42] report a consensus in the literature that only relatively small railways operate at a level of unexhausted economies of system size, and Wilson [43] finds that at the mean of his sample, US class I railways are operating with slight diseconomies of system size. The results of Bitzan [44] suggest a flattening of the cost curve for system size at around 5000 miles, while Chapin and Schmidt [45] also find a flattening of the cost curve, but at about twice that mileage level. More recently, Christensen Associates [46] conclude that all the major U.S. railways are operating in a range of constant returns to scale, and have been for many years. Note that the average size of the concessions granted in Brazil and Mexico was in the 4000-4500 track-km range (Table 1).
- It appears, on the other hand, that economies of scale *as measured by density of operations* persist in more railway settings. Econometric studies have generally found that most existing freight railways are operating at levels where economies of density are not yet exhausted; this is the conclusion of a review of the literature by Savignat and Nash [42] and of studies of US class I

railways by Wilson [43], Ivaldi and McCullough [47], and Bitzan [44]. Only recently has Christensen Associates [46] concluded that the major U.S. railways have likely exhausted all available economies of density, which is consistent with widespread reports of congestion and the difficulty of securing service on the major lines.

Findings

Ukraine by now has a long history of announced plans for restructuring the Ukrainian Railways, but unfortunately very little record of actually implementing changes [48]. Governments introduced detailed reform plans in 2006, then again in 2009, and then again in 2011, with the 2011 plan looking very much like the Russian plan: three stages of reforms, beginning with the creation of a single joint stock company Ukrzaliznytsia and the separation of the operating and regulatory functions of the existing railways, moving through the spin-off of noncore activities, the elimination of the requirement that freight operations cross-subsidize passenger operations, and the freeing of tariffs for goods enjoying a "competitive transport market", and concluding by 2019 with a system of "equal access to the infrastructure facilities for all economic entities". Thus far the creation of JSC UZ has been the only significant result of the reform plans.

Since there were apparently no plans in Ukraine (again as in Russia) to separate control of the incumbent infrastructure from the incumbent locomotives and train operation, the broad plan just described sounded like it might refer to an eventual third party access regime, with independent carriers owning their own locomotives and running their own trains over the UZ infrastructure. In fact, however, in both Ukraine and Russia one stated goal of the reforms was to allow privately owned and operated passenger trains, but not – or at least not mentioned – freight trains [49].

All this changed in 2015, as the Infrastructure Ministry under Andriy Pyvovarsky introduced legislation, enacted by the Rada, that would "corporatize" but not "privatize" JSC UZ while allowing entry into the market by independent train operating companies carrying either passengers or freight. UZ as the infrastructure operator would be required to provide non-discriminatory access to the infrastructure under a regulated set of tariffs, which would be monitored and regulated by a National Commission on Transport Regulation. That new commission would also regulate some passenger and freight tariffs, but others would be freed. An infrastructure maintenance and investment fund would be created through a specified component of both shipper tariffs and access charges.

In other words, Ukraine has taken the first steps toward emulating the European rail restructuring model of third-party access (though not full vertical separation) regimes for both passenger and freight, with UZ continuing to operate its own trains in competition with independent TOC's.

This reform model clearly has the potential to stimulate significant improvements vis-à-vis the UZ status quo. As noted above, third-party, independent *freight* TOC's have offered quite effective competition to incumbent, vertically integrated TOC's in a number of European countries -- beginning in the east in Poland and Romania, but gradually moving west, especially as German incumbent DB and French incumbent SNCF have begun offering services in other countries. Particularly in Eastern Europe, some of the new TOC's entering into freight service have been large shippers of bulk freight integrating backward into transport operations in order to create alternatives for shipping both their inputs and their outputs. The result has been new investments not only in rolling stock but also in locomotives, as well as increased options and improved service for shippers, thus strongly supporting economic growth.

It seems likely that a number of large Ukrainian shippers would be candidates for backward vertical integration into TOC's in order to improve the quality of their own logistics (or to obtain better service from UZ by threatening to do so), including the agribusinesses Kernel and Nibulon and coal miner and electricity generator DTEK. Similarly, based on their past and current strategies, one would expect not only Germany's DB and France's SNCF but also Poland's PKP and, in a hoped-for peaceful future, Russia's RZhD to be interested in extending their train operations into Ukraine, if given the opportunity.

The appearance of independent *passenger* TOC's seems less likely, though certainly not impossible. As noted above, in most countries passenger rail services would not survive without subsidies from either governments or freight operations, so the likelihood of the entry of a second passenger TOC into the market to offer competition to a (presumably government-subsidized) UZ passenger TOC seems not high. An exception might be at the high end of the market; in Russia, for example, two high quality TOC's have entered the popular Moscow-St. Petersburg market to offer high end service at unregulated rates [50, 51].

What about resources for investment into the infrastructure? This is where the international experience with the third party access reform model has been less conspicuously successful. As noted above, the Ukrainian plan calls for the formation and segregation of an investment fund that would be financed through a specified component of both shipper tariffs and access charges. If this mechanism works as intended, it could solve the common problem of the difficulty of funding state-owned railway infrastructure. However, based on worldwide experience, one may justifiably harbor doubts that both UZ management and the government will be able to show the discipline to use such a (potentially) large pot of funds for their intended purposes only [9, 20].

A sober prediction may be that the current Ukrainian reform plan may be quite successful in encouraging private investment in rolling stock and locomotives and in creating competition for freight railroad haulage and perhaps even passenger railroad service, but ultimately a disappointment in encouraging and protecting the infrastructure investments required for the successful operation of a modern, heavily used freight railway. Since, as noted at the beginning of this paper, this issue is likely to be a crucial one for the future effectiveness of UZ in contributing to Ukrainian economic reform and growth, this may be a serious drawback to the adoption of this reform model in Ukraine.

And this in turn may argue for consideration of an alternative reform plan: a Mexican-style division of the entire UZ enterprise into two or three independent, vertically integrated railway companies, competing for the business of shippers mostly at points commonly served but perhaps over some parallel lines as well. This option has been seriously discussed, though so far rejected, as a reform plan for RZhD in Russia [52], and it would appear to hold a number of attractions for Ukraine as well – though a number of complications as well. Map 3 shows one published version of a Russian scenario.

The main advantages of such a plan are straightforward to list: the creation of competition for shippers, the maintaining of economies of vertical integration, and the likely willingness of private investors to offer significant bids for long-term franchise fees and, upon winning a franchise, to invest significant amounts into the maintenance and upgrading of their new railway infrastructures. As noted above, for the 10 railways franchised in the late 1990's in Brazil and Mexico, the winning bid was almost US$100,000 per track-km. The International Transport Forum calculates that just under 50 percent of the substantial investments made by the two largest Mexican concessionaires between 2007 and 2012 were allocated to track infrastructure – about US$1 billion total over that six-year period [53].

The most important points for originating traffic on UZ are the coal mining areas around Donetsk in the east and the iron ore and steel making areas around Dnipropetrovsk and Kryvyi Rih in the center-east. The port area around Odessa both originates and terminates a good deal of Black Sea freight. Generally, the heaviest freight flows go (or have gone until recently) directly between the Russian border, through the Donbas and the Kryvbas, and either to the Odessa port area in the south, to Kyiv in the center north, or to the western border crossings with Hungary, the Slovak Republic, and Poland.

Thus in the same way that both published scenarios for horizontal separation in the Russian railways begin with the notion of geographic competition based on multiple railways serving the coal-producing Kuzbas from different directions [52, 54], a promising basis for horizontal competition in the Ukrainian railways in a hoped-for peaceful future could be the creation of an east-facing railway connecting shippers originating coal, iron ore, and/or steel products with border crossings of the Russian Federation. RZhD would likely be one of several bidders for the franchise rights for this "Eastern Ukrainian Railway".

At the western termination points of this Eastern Ukrainian Railway, the track infrastructure serving multiple shippers could be jointly controlled – as it is in Mexico – by the railway companies competing to carry freight in both directions as well as either the regional or federal government and/or the most important shippers themselves. From those points at the western termination of the Eastern Ukrainian Railway, either one or two additional railway enterprises could be created. The map below adds two independent railways heading west from the coal and steel regions, with shippers at Kharkiv enjoying geographic competition from three railways heading in three different directions, shippers at Kyiv, Odessa, and points in the Donbas and Kryvbas served by two railways, and both eastern and western borders served as well by two railways. Both large domestic shippers and foreign railway companies like Deutsche Bahn, PKP, and SNCF are potential bidders for the long-term franchise rights to such railways [55].

Obviously, however, much more work would have to be done to actually craft three (for example) potentially coherent railway enterprises from the overall national network.

Originality and Practical Value

For now, at least, Ukraine labors under the significant burden of active hostilities in its eastern region at the same time as politicians, activists, and analysts work to create and implement economic reforms that would successfully create a dynamic and productive market economy. At a time when even the overall outlines of the future Ukrainian economy are uncertain, the railways are not at the top of many lists for attention. Yet Ukraine's economy of resource extraction, heavy industry, and agriculture promises to be dependent the existence of a reliable railway system for quite a long time, and a successful effort to get railway reforms right would be an important step in that direction.

To date, the European experience with vertical separation and third-party access regimes has appeared to enjoy considerably greater influence in the Ukrainian railways reform debates (and the Russian, and the Kazakh) than has the North and South American experience with horizontal separation. This is probably unfortunate, since the size of the country as well as the dominance of freight in its railway operations arguably makes the latter experience more directly applicable, and more likely to be adaptable in a straightforward manner to the Ukrainian context. In particular, if the country continues along the basic path of the European railways reform agenda, it is likely to achieve the same results: increased private investment in rolling stock, but continued dependence on the unreliable state

budget for funding for both locomotives and infrastructure.

I have argued here that the North and South American experience suggests that a country like Ukraine could use the horizontal separation strategy to carve two or three independent, vertically integrated freight railways from the existing system, railways of a size that has been shown to be viable in Brazil and Mexico, and that in a hoped-for peaceful future, international investors would likely be willing to bid large amounts for control rights to railway franchises so created as well as to then spend large amounts of their own capital to upgrade the competing regional railways. I have argued that the principal advantages of such a reform strategy are the creation of rail competition at multiple locations, the preservation of economies of vertical integration, and the likely elimination of the need for the Ukrainian railways to remain in the lengthy queue for government resources to upgrade and maintain the rolling stock, locomotives, and infrastructure.

Whether such a scenario is in fact the optimal path for the Ukrainian railways going forward is a question that clearly merits much deeper examination. The stakes at issue suggest that a simple decision to follow the previously adopted Russian-style reform plan may lock out the potential for much more promising options, and for a more dynamic and vibrant railway to support Ukrainian economic growth.

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