

Measuring Railway Market Attractiveness: Evidence from Visegrád Countries

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Abstract: This paper analyses the liberalization procedure of the passenger and freight railway transport market in the Visegrád states. The paper applies macro and micro environment analysis to demonstrate the situation of these post-communist countries and introduces the regulatory impact on the railway market supply while concentrating on intra-modal competition. The aim of the paper is to highlight how railway liberalization has changed the shrinking railway market in order to define a strategic policy intervention, with the express purpose of increasing the competitiveness of railway transport and solving efficiency problems. The paper introduces the rate of railway market attractiveness (RAMATE rate) in order to compare the attractiveness of the different railway markets of the European Union for new entrants and the degree of deregulation.

Keywords: railways; market liberalization; market attractiveness; Visegrád States; European Union

1 Introduction

Upon consideration of their common historical past¹ and their geographical and economic comparability, the Czech Republic, the Slovak Republic, Poland and Hungary established the Visegrád Group² in 1991. These post-communist countries made the transition from planned to market economies, which resulted in remarkable economic and social development. However, such progress was not made within the railway industry. Prior to the introduction of the First Railway Package, even EU legislation could not achieve significant results. Since that First Package, however, the railway companies have been reformed; vertical and horizontal separations have begun, and so business activities have been separated

¹ The historical antecedent of the league was the summit of the Hungarian (Charles Robert), the Czech (Luxembourgish John) and the Polish King (III. Calvin) in 1335. The rulers came to an understanding about political and commercial affairs in the then seat of the Hungarian King, the Visegrád Royal Palace.

² The alliance was originally entitled the V3, after the dissolution of Czechoslovakia, the group became the Visegrád Four or V4.

or outsourced. The transition of the railway market, (the reorganization, the open access to infrastructure, the freight and the international passenger transport liberalization), has intensified competition, primarily in the freight market, although the former operators still prevail in this segment. In the V4 domestic passenger railway market, there are only a few new operators, the majority of which are in Poland. Intra-modal competition has been boosted with the permission of cabotage.

Despite these results, as of 2010 the full implementation of the First Package had not been realized in 22 EU states, including the Visegrád Four. There have been failures with the regulatory board, which has not been set up in every country, and/or, is not independent. The main problem is that the infrastructure management companies and their charging functions are dependent upon the owners of the incumbent railway companies. However, the access charge to infrastructure should be the basis of competition and open markets.

Considering the above circumstances as a starting point, in this paper I compare the main indicators of the V4 member countries and summarize the present situation of railway transport in light of liberalization. The paper introduces the rate of railway market attractiveness (the RAMATE rate) in order to compare the attractiveness of the different markets for new entrants and the degree of deregulation. In this spirit, the paper points out the discrepancies of the process and draws conclusions on railway transport planning for policy-makers and infrastructure managers. The scope of my paper is to support the decision of allowing operators to enter into the market.

2 Regulation Framework and a Review of the Literature

Railway transport liberalization started with Directive 91/440/EEC, which required that railway companies separate railway infrastructure from transport services. This was to be achieved initially by accountancy to ensure non-discriminative usage, and by the charging of rail track for EU member states. Thus it allowed new entries into the rail market and therefore induced competition. The aim of the directive was to increase operational efficiency and transparency, in the first instance, especially in the case of subsidies. However, it has not been applied extensively and has had significant results only in the United Kingdom and Germany. While the spread of the directive occurred in these countries, the subsidies of railway services were cut in the V4 and a few non-core business activities were outsourced (see detailed discussion in [20]).

2001/12-13-14/EC was introduced to achieve the overall liberalization targets. These directives are also known as the First Railway Package, which allows

operation through an independent infrastructure management company in the EU network to enhance competition. As a part of the Second Railway Package, Directive 2004/51/EC is valid throughout the whole European network and the liberalization of the freight transport was planned to come into force by 2007. As Eisenkopf and his co-authors [7] point out, the directives are the legal framework of liberalization; but in fact, open markets and intra-modal competition can be achieved only in the long-term.

Monami [33] has identified seven key dimensions (7Ds) of passenger transport liberalization, which enable comparison of the countries with qualitative market features. The 7Ds contain the dependence of the regulatory body, vertical and horizontal integration, the duration of the contracts and the resulting obligations for all market players, the production and revenue risk-sharing among them, the opportunities of the management within the contract and the allocation of subsidies. To determine and compare the degree of passenger and freight railway market opening, Kirchner in cooperation with IBM has developed the more detailed Rail Liberalization Index (LIB Index) in a similar spirit, although it is more market-oriented and does not deal with the allocation of subsidies [24], [25]. The LIB Index contains the LEX and ACCESS sub-indices. The former indicates the legal access barriers to the railway market in the given country; the latter defines the accessible market in particular for external railway undertakings. The COM Index measures the competitive dynamics of railway market share change. These indicators show market liberalization from the point of view of the entering railway undertakings in EU countries together with Norway and Switzerland. These measures apply subjective elements. As compared with LIB and COM indices I would like to introduce a more exact, data-based rate.

Wetzel [45] points out the regulatory reforms and the environmental effects on technical efficiency from 1994 to 2005. According to Wetzel, a high share of electrified lines, freight oriented railways on a less dense network and an independent regulatory body have positive effects on technical efficiency. Also to Wetzel's mind, it is arguable that her results show that access rights for passenger services have negative effects on efficiency.

However, Ludvigsen and Osland [31] observe that although railway freight transport has a lot of private entrants, there is a lack of inter-modal competition, primarily because of service quality, which cannot compete with road operators. They find that neither the state-owned national monopolies nor the market are efficient. This inefficiency induces that the road freight transport has remained dominant, despite the fact that it shows more negative externalities. According to their study, intra-modal competition exists within the Visegrád countries only in Poland and in the Czech Republic. Szekely [38] and Hilmola [37] have studied Hungary and Poland and confirmed that the incumbent railway operator of Hungary prevails, albeit in a serious financial crisis. However, the incumbant operator of Poland has already had remarkable results, although the authors have disputed that deregulation and privatization have intensified competition. Since

the appearance of these papers, I have found that intra-modal competition has been intensifying principally in Poland and in the Czech Republic, and although with smaller magnitude, also in Hungary. This is due in great part to the introduction of the Third Railway Package, which outperformed the previous ones. Owing to this, market reforms have taken place overall and international passenger transport has been liberalized since 2010 as the main principle. However, despite these developments, the Third Railway Package has not raised the railway market share, which was originally the main aim of the reforms.

Lang and his co-authors [29] emphasize, while conducting a game-theoretic model of a fully vertically separated, liberalized railway market, that more competitors reduce prices per kilometer, thus improving the performance in terms of train kilometers and social welfare. Mainly ticket revenues based on competitive tendering should be the method of entry, which should fall within regional authorities' cognizance, as suggested by Link [30], while focusing on the regional traffic of railway passenger transport. Alexandersson [1] agrees with competitive tendering, because it can create a competitive environment and develop the market, and thus improve the efficiency of the companies and in turn the services. For the state, it also leads to lower subsidies and a reduction in the need to control services which should be henceforth within the domain of the public sector. Assessing the railway freight liberalization in Poland and Germany, Laisi [28] has confirmed that vertical integration in Poland, and start-up in Sweden, like in other Western European countries, have been the most commonly used entry strategies. The entry strategies, in connection with cultural differences between Eastern and Western Europe are studied by Vágási [43].

Investigating the competition on the freight market, Božičnik [3] points out that liberalization allows financially well-founded, incumbent operators to expand their activities for the European Network. Financially weak ones and small railway undertakings should specialize in market segments, especially niches, or in extreme cases, they could be abolished.

The basis of competition is infrastructure charging, which should be proportional and non-discriminative within the EU. Charge should be internalized externalities and based on marginal social cost; it should vary through different types of trains, time and space, and it should be proportional to usage. There are numerous studies (e.g., [5], [32], [36]) on how to implement the new pricing method, or rather, on how to amend it in practice. This new pricing system should be introduced gradually, at the same time as all transport modes, except in railway transport, which should be postponed for sustainability reasons. The members of the Visegrád Four, with the exception of Hungary, apply higher infrastructure charges for freight transport than they do for passenger services. These higher charges can decrease the competitiveness of rail transportation compared to other modes.

Deregulation of the Eastern European railways is studied by Táncoz and Bessenyei [39], who highlight the lack of national transport strategies. Žižka [46]

compares these Central-European countries to New Zealand, which used to be characterized by low productivity and operational efficiency in its pre-liberalization period as well, and indicates that privatization can increase economic effectiveness considerably. The criteria of the Swedish, German and French models of liberalization are identified by Nash [34] and adopted in this paper.

The previous literature has exhibited liberalization without highlighting the institutional background of the railway reform. My paper introduces the regulatory impacts on the railway market supply while concentrating on intra-modal competition. The scope of my paper is to present a more detailed, country-specific analysis of the reform and the transition of the railway market, focusing within the Central European Region.

3 Methodology and Data Sources

On the one hand, this paper is structured in a deductive way, which is, based on the review of the relevant literature and existing models. On the other hand, I also use some inductive elements, for example, in the frame of data-based, country analysis. In the course of my essentially *ex-post* observation, I conduct the indicators which can characterize liberalization and the attractiveness of the railway markets. My hypothesis can be formulated as: ‘The V4 railway market liberalization has occurred and consequently intra-modal competition has been intensifying; therefore, the V4 markets are attractive for entrants.’

The LIB Index and COM Index of IBM [24], [25] are based on quantitative research, and yet, nevertheless, these indicators apply subjective elements (e.g. “Process duration for obtaining information”). On account of the introduction of EU directives, there are determinants which can almost be constant because little impact has been assigned to them, such as the degree of vertical separation of the incumbent companies, although there are some exceptions to this rule (e.g. Poland). However, it would be useful to take into account the “Status of independence of the incumbent from state”, but there are unfortunately no objective statistics about this. The main difference between IBM’s index and the RAMATE rate is that the LIB and COM indices approach the problem from the railway undertakings point of view, while the RAMATE rate, on the other hand, approaches it in terms of the railway market supply and demand. On the other hand, the supply side constitutes the railway undertakings and their performance belongs to the demand side. One further difference between the RAMATE rate and the IBM Indices is that the RAMATE rate introduces charges of the operations as a new variable, which can be a leading argument in market entry decisions.

Nevertheless, the RAMATE rate uses infrastructure charges as a variable from the ACCESS Index and it also applies the modal split development from the COM Index to present market facilities. To demonstrate how the given market is saturated, the number and market share of external railway undertakings are translated from the COM Index too. However, the RAMATE rate treats the legal background as well as the consequent entry barriers as a constant, although the EU directives have been adopted differently in the member states. The legal interdependence is the limitation of the RAMATE rate, which is taken into consideration in the case studies of the V4.

According to the relevant literature, the variables of the passenger and freight railway market attractiveness were identified (see Tables 2, 3). These determinants are categorized into two groups: the first one defines the infrastructure and its charges, and in doing so, defines the accessibility of the market. The relevant market is characterized by the performance of the railway undertakings and appoints the availability for both the licensed operators and the new entrants. On the grounds of accessibility and availability, Rail Market Attractiveness can be derived by averaging the main ratios: accessibility and availability.

The variables of passenger and freight market accessibility vary in the description of the railway market and the infrastructure access charges from each other. The share of double or more track lines can depend not only on development, but also on geography, despite the fact that this share sets the conditions of the transport.

The main aim of this paper is to provide the most recent detailed picture of the emerging liberalized railway market on the basis of the RAMATE rate. That is why the latest available data are used. For example, the data in the case of valid licenses and freight transport charges refers to 2011.

The research is based on international secondary research and on internet databases of statistical offices and railway organizations, such as the CER (Community of European Railway and Infrastructure Companies), the ERADIS (European Railway Agency Database of Interoperability and Safety), the Eurostat, the IBM, the ITF (International Transport Forum), the KSH (Hungarian Central Statistical Office), the UIC (International Union of Railways) and the Rail Market Monitoring Scheme (RMMS), which has been set up by the European Commission.

UIC provides statistics on the main indicators of the countries and also on the operators, which can be used for calculations, such as the network density and the length of the lines relative to the population. The givens of the network can be described with the share of electrified lines and the amount of double or more track lines. To give a reliable picture of the operators' performances, Eurostat statistics are used. These combined with the length of the lines ensure that the intensity of network use can be reckoned. The modal split of railway transport shows the importance of the railway sector in the given country. The change of modal split can foreshadow the potential market too. The GDP per capita in

Purchasing Parity Standard can be obtained also from the Eurostat database, which is appropriate for the comparison of the welfare of the inhabitants.

The infrastructure access charges are given in the network statements of the infrastructure managers, which are aggregated by ITF. These charges are based on different calculation methods. The limitation of the model is that it is unable to take into account additional costs, discounts and penalties (e.g. to achieve punctuality) related to infrastructure, which can arise in different amounts from negligible to significant, as with the application fee of 750 euro in Ireland [21]. The average infrastructure charges are calculated for Intercity and separately for freight trains (960-3000 ton).

Data relating to the operating licenses are available at ERADIS via an online request, except in some cases, such as with the Polish passenger and freight railway undertakings, which should be extracted from the national databases such as the UTK (Urząd Transportu Kolejowego/ Rail Transport Agency) in Polish or from the RMMS report of the European Commission [8] [9] [42]. Although the number of operating railway undertakings is not the same as the number of valid operating licenses, it does show how attractive the legal and the market environment is. Within the framework of the RMMS, the market share of the non-incumbent railway undertakings referring to 2007 and 2009 was studied [9]. The lack of recent statistics indicated that in the case of freight transport, the data of non-incumbent market shares in Slovakia and Sweden refers to 2007 only. In the case of passenger transport in Austria, Italy, Romania and Germany, there are also only data from 2007 available.

The inland passenger transport fares can be found in the on-line timetables of the railway companies, in some cases in their tariff tables, or on request by e-mail. An average passenger route of 50-55 km is considered, because the average passenger transport distance of the EU is 52,4 km, which means, in addition, that the V4 has almost the same, with 53,1 km in 2009 [17]. These tariffs are suitable for comparing the different price levels of the countries, although the diverse discounts are not considered. The tariffs can be different for the same distance in some countries; alternatively, in other countries different criteria are used: for example, the bases of the fares in Denmark are the zones, and in Luxembourg the time of the journey. There are also differences in service quality, such as principally the duration, which can be 30-60 minutes (process), the condition of the trains and the stations (physical evidence) and the crew including the conductor (personnel) during the journey.

The international charges of freight transport are published on the websites of the operators without any discounts or are available on request via e-mail. In the case of Finland, Ireland, Spain, Portugal and the United Kingdom, the charges are based on expert estimates of a forwarder [6], [35]. As an average freight transport, 200 km distance and 25 ton goods are applied, because the average freight rail distance is 227,8 km in the EU and 187,4 km in the V4 countries in 2009 [15].

Although the charges are dependent on a number of factors – the commodity being moved, the volumes and the specific origins, and the destinations – the aim of the paper is only to compare the price levels of the countries, and thus these features are not considered.

In order to collate the RAMATE rate in the EU countries, all of the values are related to the EU averages. The charges are reciprocated, because in terms of the index, the lower values are better, and so they get higher percentages in the rate.

The limitation of the model can be formulated as its sensitivity to outliers. To decrease this effect, the market volume of non-incumbent operators is reckoned as the valid licenses reduced by the incumbent company, multiplied by the market share of non-incumbent operators and divided by 100.

4 Similarities and Dissimilarities of the Main Feature of the Visegrád Four

The aim of the V4 community is to strengthen their previously shared interests in security and defense policies, to hold expert meetings on crisis situations and on economic, environmental, infrastructural, social and cultural issues, and also on public relations. The Visegrád Group cooperates within the EU and forms partnerships primarily with neighboring countries, the EU and NATO [44].

A similar background requires similar tasks and steps from the Visegrád Four, but the main characteristics, which may exhibit differences, should be taken into consideration. We can compare the main indicators of the V4 states in Table 1.

Table 1
The Main Indicators of the V4 [11, 16, 27]

Indicator	Territory	Population	Population density	GDP per capita in PPS	Length of lines	Density of lines
Unit	1000 km ²	million inhabitant	inhabitants per km ²	EU 27=100%	km	km/1000 km ²
EU 27	4 318,2	501,1 ^e	116 ^e	100	214 945	49,8
Czech Republic	78,9	10,5	133,8	82	9 477	120,11
Hungary	93	10	108,1	65	7 892	84,86
Poland	312,7	38,2	122	61	19 764	63,15
Slovak Republic	49	5,4	110,1	73	3 623	73,93

Notes : ^eEstimated value. Data refer to 2009.

Following the breakdown of the communist regimes which governed these states, these countries have been making thorough efforts to link their economies to the developed world. Market reforms have taken place, which exert significant impact on the integration into the global economy [19]. As a result of the transition process, all the V4 states joined the EU in 2004.

These Central European countries are export and industry-oriented. The average growth rate of these economies exceeds the European average. If we consider the GDP per capita based on PPS (Purchasing Power Standards) as the welfare indicator, the Czech Republic is the richest country among the V4, but its value is still below the EU 27 average.

Economic problems in the region have been significant (although Poland, which has a considerable internal market, has suffered the least). Exports and industrial production have plunged sharply; thus unemployment has risen. The Slovak Republic had already achieved the convergence criteria before the recession; therefore, it had the possibility to join the EMU at the beginning of 2009. As a member of the Euro zone, the Slovak Republic has not been directly concerned with the currency movements but a few industries have lost their competitiveness in comparison to the other V4 countries whose rates have weakened (see more detailed [26]). While the V4 countries who manage their own monetary policy could raise their exports, the Slovak Republic could not; thus it has also suffered from the crisis.

After the EU accession, the EU handled the Newly Associated States (NAS) as an entity within the scope of the New Neighborhood Policy, but the EMU enlargement with the Slovak Republic shows that the EU treats the NAS uniquely.

Poland has the largest territory and a considerable internal market requiring more mobility and transportation. Because of that, and its geographical location, transit traffic is not as significant as in the other V4 states. The Czech Republic has the most decentralized, extended railway network with the highest density in the European Union. Poland has the lowest level of line density among the Visegrád states, but it is still above the European average. The only country in the Visegrád states which has an above EU-27 average proportion of electrified and double track lines is Poland.

In these countries, modernization of infrastructure meant that public road transport increased quickly, but the improvement of the railway network fell behind. The main problems are the bad condition of the rail tracks and the related properties, as well as the rolling stock, which altogether induce low service quality. The emerging financial difficulties, due to the severe recession, are further obstacles to the modernization of the industry in the V4 countries.

These problems persist, despite the fact that the aim of the development of railway transport is not only to meet EU regulation purposes, but also to increase competitiveness and efficiency, taking sustainability into account.

4.1 Different Reform Paths of the Visegrád Four

The V4 countries have a history of railway transport that dates back more than 160 years. The development of their industries has also been quite similar. It is still characterized by a fixed, high and dry structure and management. After the

transition of the political regimes, sweeping changes occurred in the economy, but not in the railway industry. The EU accession processes as well as harmonization represent a great leap forward, but the breakthrough has happened due to open access to the railway infrastructure.

On the basis of the Directives, institutional frameworks have been developed and reorganizations have been taking place at the railway companies. The vertically integrated sector had to be divided into business units. Foremost in this, the infrastructure management was separated from operations between 2003-2004 (SŽDC, ŽSR, VPE, PKP PLK). The capacity management companies are actually making profits, excluding ŽSR [4].

The incumbent passenger railway companies have remained state-owned. In the Czech Republic and in Poland the local governments are responsible for regional lines. Arriva-PCC was the first new rail market entrant into the passenger transport market in the V4; it has been transporting around three million people per annum in northern Poland since 2007. The short term goal of Arriva-PCC is to expand further in Poland and in the Czech Republic.

The freight companies (PKP Cargo, ŽSSK Cargo, ČD Cargo, Rail Cargo Hungaria) have started to function independently from the former incumbent companies since 2001-2007. In the V4 countries it can be observed that governments have been seeking to privatize mainly the non-core business activities and, in some cases, the freight operator. The investors are primarily other railway companies, albeit operators that not only have an interest in the market and the necessary experience, but also have access to considerable finances.

The reforms have taken place differently in each country. Nash has identified different reform models [34]. The Slovak Republic followed the Swedish model, which means that the infrastructure manager and also the major railway operator remain state-owned and, in this way, remain subsidized. Nevertheless, all of the responsibilities are separated. Poland has remained vertically integrated and manages its activity within a holding company, akin to the German model. The Czech Republic and Hungary have adopted the French model, and so a separate company is responsible for infrastructure management and charging. These seem to be independent; however, they are bound up with the major incumbent transport company, and so both remain monopolies in the public sector. The problem of this organizational integration whilst remaining dependent upon the state can be formulated in the question: How can free competition be ensured if the major company is favored? Nevertheless, the reforms can allow transparency; that is, it may help in reducing costs. In addition, infrastructure charging ensures competition and the revenue can be used for development.

To increase operational efficiency, several branch lines have been closed in Hungary, the Slovak Republic and in Poland, where for example almost 10,000 km of branch lines have been gradually closed over the past two decades. On average, four percent of railway employees were discharged annually from 1996

to 2009 in the V4 states. As a result, the pay-roll has been cut by more than 40% since 1996 [13], but the number of employees is still above the European Union average in all the examined countries.

As a consequence of these arrangements, the industry has been boosted by the limitation of monopolies and by the permission of intra-modal competition, and in this way by fostering the appearance of new rail market entrants, principally in freight transport.

4.2 The Railway Market Performances of the V4

In all the Visegrád states, mobility has been growing along with the passenger transport market. The railway market share has been decreasing almost in every country for more than 30 years and further decline is round the corner, because the motorization rate of the EU is showing a growing tendency. On the one hand, there is a quantitative reason: the increasing rate of car ownership. On the other hand, there is a qualitative one: the technological development related to travel circumstances, such as the level of service and the flexibility of travel in one mode in comparison to other transport modes.

The railway passenger modal split is the highest (12.3%) in Hungary among the V4 [12]. Although PKP has lost its market share significantly since deregulation, the volume of railway passenger transport has increased in the liberalized Poland (Figure 1). PKP is still one of the biggest railways; its performance was the fifth in the EU in 2009. ČD is the ninth, but it could not reach the EU average. [41]

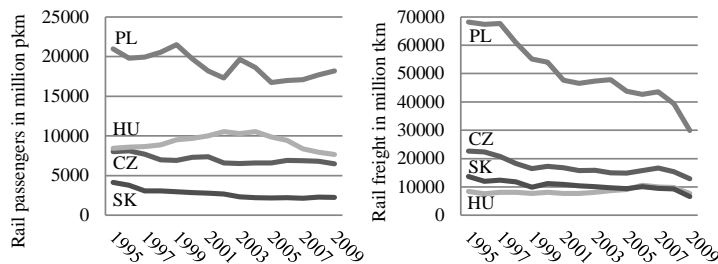


Figure 1

Rail passenger and freight transport in the states of Visegrád in 1995-2009 [22]

In the case of the railway freight modal split there has been a notable decrease, but railway transport still covers 20-24% of the freight market in the V4 countries [12]. Even though PKP Cargo has lost more than half of its market in the last fifteen years, it is still the second biggest cargo operator in the EU, while only DB AG exceeds its performance in 2009 [41].

5 Results

The passenger and freight RAMATE rates are calculated for the EU countries, which help to identify which are the most attractive railway markets and at what degree the liberalization of the Visegrád states is compared to the other EU countries.

According to the data for the EU countries, the railway network density determines the railway modal split and performance. The development of the railway infrastructure, such as the proportion of electrified and double or more track lines, is connected with the development of the country, and further, the railway performance, which is negatively correlated with tariffs. These effects, in part can be construed as due to price elasticity of demand, which is in parallel with Lang research [29], but contrary to that of Bekő [2].

If we analyze accessibility within the V4 (Tables 2, 3), we can draw the conclusion that the supply of the Czech infrastructure covers the country the most extensively, but Poland is better equipped with gauges and electricity, which, together with the lowest access charge for passenger trains, offers a favorable market for new operators. The low endowment of double or more track lines determines the poor position of Hungary, which also causes barriers in traffic flow and the accumulation of delays, and thus leads to customer dissatisfaction. The share of the main international corridors, the Trans-European Transport Network (TEN-T), is low in the Czech Republic, even though it is a transit country, as are the other Central European states.

The modal split of the passenger railway market (Table 2) is the highest in Hungary despite the fact that railway performance is decreasing and that transport fares have almost doubled in the last five years [14]. The most centralized passenger railway market is the Slovakian, although despite that, the performance and the modal split there are also low. The Polish market has created a competitive environment, so it is the most liberalized and attractive. Nevertheless, the fares within the Polish market exceed the EU average.

In the case of freight railway transport (Table 3), the market volume is outstanding in Poland even in comparison with the rest of the EU, which is linked to the size of the internal and external markets. In Hungary the very low infrastructure access charge can encourage market entry, and thus competition. Within the V4, only in the Czech Republic has the railway freight modal split increased in the last decade, which alludes to inter-modal competition and parallel opportunity for new entrants.

According to the results of the RAMATE rate, the hypothesis can be rejected for the freight railway market of Slovakia. The development of the other markets, including the passenger transport of Slovakia, can be attractive for entrants.

Table 2
 Passenger Railway Market Attractiveness Rate [8], [9], [10], [11], [12], [16], [17], [18], [23], [40], [41], [42]

Attributes of the passenger railway market	UK	DK	DE	LU	SE	PL	NL	AT	CZ	BE	FI	HU	SK	FR	RO	ES	IT	LV	EL	BG	EE	SI	PT	LT	IE
Rail lines relative to population	48,1	70,8	75,2	102,0	196,6	94,8	32,0	126,7	166,8	60,9	203,4	142,2	122,5	99,0	91,7	60,1	51,7	152,5	41,5	99,8	126,8	110,6	48,9	96,5	78,9
Network density	118,4	87,9	167,8	188,1	40,1	112,4	137,2	122,6	215,0	208,6	31,1	149,0	131,5	108,9	80,4	52,9	100,1	51,9	34,4	66,5	36,5	107,6	54,9	48,1	48,5
Share of electrified lines	70,6	62,6	125,8	205,1	170,1	129,5	163,7	131,7	63,9	180,8	111,5	77,0	93,7	106,4	79,9	125,5	153,2	29,5	22,3	146,9	30,6	88,2	110,6	14,9	5,8
Share of double or more track lines	211,2	124,5	153,3	145,7	52,0	124,7	196,6	102,0	56,8	222,5	27,6	43,3	80,2	160,4	77,3	92,2	128,1	47,7	58,1	67,0	54,8	76,9	61,0	61,9	74,1
Share of TEN-T railway lines	111,0	79,6	77,4	143,7	87,8	48,3	120,8	87,5	46,6	111,5	110,4	66,7	71,5	76,5	56,5	126,1	104,2	129,9	163,5	104,2	135,9	87,2	119,9	107,2	125,6
Average access charge for Intercity passenger trains	95,0	853,9	50,9	99,8	290,5	233,7	139,0	88,8	168,0	49,7	295,1	120,2	122,5	76,8	89,0	213,9	77,4	57,8	345,5	67,0	132,3	118,5	156,8	48,8	59,9
Accessibility of the passenger railway market	109,0	213,2	108,4	147,4	139,5	123,9	131,6	109,9	119,5	139,0	129,8	99,7	103,6	104,7	79,1	111,8	102,4	78,2	110,9	91,9	86,2	98,2	92,0	62,9	65,5
GDP per capita in PPS	112,0	121,0	116,0	271,0	119,0	61,0	131,0	124,0	82,0	116,0	113,0	65,0	73,0	108,0	46,0	103,0	104,0	52,0	94,0	44,0	64,0	88,0	80,0	55,0	127,0
Modal split of passenger rail transport	93,2	128,8	117,8	58,9	127,4	84,9	132,9	152,1	97,3	98,6	74,0	168,5	89,0	138,4	104,1	75,3	78,1	72,6	17,8	56,2	28,8	39,7	56,2	13,7	46,6
The change of passenger rail modal split among 1995-2008	181,0	136,1	128,9	133,7	162,6	46,9	108,4	145,4	135,9	42,1	117,1	113,2	121,3	63,5	33,6	121,6	15,6	96,9	157,8	77,0	34,6	60,4	67,6	121,1	77,6
Passenger rail performance per capita	131,4	171,4	151,0	107,2	182,5	72,9	151,8	186,9	94,8	149,6	116,7	122,3	64,1	217,5	43,7	77,1	126,5	50,7	22,6	43,1	28,5	58,3	60,8	10,6	58,0
Market volumen of non-incumbent passenger operators	1078,9	117,7	745,4	0,0	128,7	351,9	5,4	35,3	0,1	0,0	0,0	1,8	4,6	0,0	1,3	0,0	2,9	11,3	0,0	0,5	14,1	0,0	0,0	0,0	0,0
Inland full price, second class, single ticket fares for 50-55 km	52,2	50,4	54,0	428,8	66,6	82,5	72,3	58,5	216,6	86,9	126,1	189,7	255,2	69,9	428,8	67,3	162,8	338,5	119,1	293,7	296,4	134,0	142,9	219,5	41,5
Availability of the passenger railway market	274,8	120,9	218,9	166,6	131,1	116,7	100,3	117,0	104,4	82,2	91,1	110,1	101,2	99,5	109,6	74,1	81,7	103,7	68,5	85,7	77,7	63,4	67,9	70,0	58,4
Attractiveness of the passenger railway market	191,9	167,1	163,6	157,0	135,3	120,3	115,9	113,5	112,0	110,6	110,5	104,9	102,4	102,1	94,4	92,9	92,0	90,9	89,7	88,8	82,0	80,8	80,0	66,4	62,0

Table 3
Freight Railway Market Attractiveness Rate [6], [8], [9], [10], [12], [15], [16], [23], [27], [35], [40], [42]

Attributes of the freight railway market	DE	SE	UK	LV	BE	LU	PL	EL	EE	AT	DK	NL	FR	HU	LT	IT	SI	CZ	RO	PT	ES	SK	BG	FI	IE
Network density	167,8	40,1	118,4	51,9	208,6	188,1	112,4	34,4	36,5	122,6	87,9	137,2	108,9	149,0	48,1	100,1	107,6	215,0	80,4	54,9	52,9	131,5	66,5	31,1	48,5
Share of electrified lines	125,8	170,1	70,6	29,5	180,8	205,1	129,5	22,3	30,6	131,7	62,6	163,7	106,4	77,0	14,9	153,2	88,2	63,9	79,9	110,6	125,5	93,7	146,9	111,5	5,8
Share of double or more track lines	153,3	52,0	211,2	47,7	222,5	145,7	124,7	58,1	54,8	102,0	124,5	196,6	160,4	43,3	61,9	128,1	76,9	56,8	77,3	61,0	92,2	80,2	67,0	27,6	74,1
Share of TEN-T railway lines	77,4	87,8	111,0	129,9	111,5	143,7	48,3	163,5	135,9	87,5	79,6	120,8	76,5	66,7	107,2	104,2	87,2	46,6	56,5	119,9	126,1	71,5	104,2	110,4	125,6
Average access charge for 960-3000 ton freight trains	158,0	586,0	67,5	63,6	253,2	167,2	62,0	643,1	44,0	107,2	426,5	106,7	213,8	274,9	36,9	173,6	220,5	64,1	106,5	276,8	200,0	45,3	52,2	94,5	111,5
Accessibility of the freight railway market	136,5	187,2	115,8	64,5	195,3	170,0	95,4	184,3	60,4	110,2	156,2	145,0	133,2	122,2	53,8	131,8	116,1	89,3	80,1	124,6	119,4	84,4	87,4	75,0	73,1
Modal split of freight rail transport	106,2	190,5	67,1	354,7	76,7	11,7	98,6	11,2	267,8	185,0	46,7	24,9	80,8	104,7	203,8	45,7	81,3	112,3	98,6	29,0	17,3	99,6	60,5	122,5	3,0
The change of freight rail modal split among 1994-2009	54,5	123,4	233,6	22,5	35,9	247,3	45,3	101,7	100,2	149,1	138,9	115,6	157,8	95,8	78,9	86,1	54,6	147,5	50,6	95,9	118,1	67,3	61,8	8,3	109,1
Intensity of network use	132,9	108,6	61,2	464,3	83,3	34,0	102,7	14,4	299,2	143,6	37,3	90,3	44,5	46,0	314,4	49,0	107,2	62,7	48,1	35,8	23,4	89,8	35,4	70,1	1,9
Market volumen of non-incumbent freight operators	1047,0	121,4	333,4	8,8	7,6	0,0	363,9	0,0	91,2	25,6	11,3	69,1	12,0	68,4	0,0	17,7	1,9	74,4	204,1	0,7	8,0	3,5	29,9	0,0	0,0
International freight charges for 200 km, 25 ton	76,5	129,0	79,8	108,8	83,7	83,7	121,1	122,2	108,8	89,4	117,3	83,7	78,3	99,4	108,8	116,3	130,2	91,5	113,5	93,6	93,6	115,8	116,3	114,0	92,1
Availability of the freight railway market	283,4	134,6	155,0	191,8	57,4	75,3	146,3	49,9	173,4	118,5	70,3	76,7	74,7	82,9	141,2	63,0	75,0	97,7	103,0	51,0	52,1	75,2	60,8	63,0	41,2
Attractiveness of the freight railway market	209,9	160,9	135,4	128,2	126,4	122,6	120,8	117,1	116,9	114,4	113,3	110,9	103,9	102,5	97,5	97,4	95,6	93,5	91,5	87,8	85,7	79,8	74,1	69,0	57,2

Concluding Remarks – The Situation of the Visegrád Railways

The legal framework of liberalization was provided by the EU directives, but there have been different realization schemes. The convergence of these directions can be defined as the following: firstly, the establishment of regulatory bodies, which has occurred in the examined countries. Secondly, the actual functioning of these bodies, such as can be observed in congestion charging, which has discrepancies everywhere. From that point onwards, there are continuous efficiency problems and operators have had to contend with financial difficulties.

Policy makers should firstly ensure that infrastructure management companies are more independent, in order to then ensure real competition and discourage the dominance of incumbent operators. These remnants of former communist policy are also the main feature of the market in freight transport. The railway freight market was opened earlier, and thus there have already been more new participants and the competition is sharp-edged; however, the volume of goods transport has been decreasing. This pertains to Poland, which ranks among the most attractive markets in the V4, and also in the EU. Nevertheless, inter-modal competition has appeared only in the Czech Republic.

The passenger railway markets of the V4 would be quite attractive, but the legal environment does not allow market entry, such as the attempt of Arriva in the Czech Republic. Some other national passenger railway operators would also be takeover targets, but they are state protected, which is the case even in aviation. There is a strong need for external fund allocation, thus expansions could continue in the form of franchise and mergers such as Rail Cargo Austria privatizing MÁV Cargo or DB Schenker in turn taking over PCC Rail SA. This would also be a solution for the passenger service, which is suffering from a lack of funding. The new organizational framework could renew thinking and also renew the actual mechanisms of the companies, which should lead to enhanced effectiveness, competitiveness and consumer benefits, thus increasing modal split.

From the supplier point of view, private capital inflows, modernization and increased operational efficiency are the main benefits of deregulation. Looking at the situation from the point of view of demand, there is a significant advantage in having the possibility to choose among operators, and in particular, the improving service quality that these new operators provide.

Only a further coherent strategy can lead to full liberalization. In line with sustainable development and also the EU's aspiration, without such liberalization, the decline in demand of rail track usage cannot be stemmed, and moreover, effective and competitive national and international markets will not be nurtured.

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References

- [1] Alexandersson, G.: Rail Privatization and Competitive Tendering in Europe, *Built Environment*, Vol. 35, No. 1, 2009, pp. 43-58
- [2] Bekő, J.: Some Evidence on Elasticities of Demand for Services of Public Railway Passenger Transportation in Slovenia, *Eastern European Economics*, Vol. 42, No. 2, 2004, pp. 63-85
- [3] Božičnik, S.: Opening the Market in the Rail Freight Sector, *Built Environment*, Vol. 35, No. 1, 2009, pp. 87-106
- [4] CER [Community of European Railway and Infrastructure Companies]: Annual Reports, Brussels (2003-2010) available at: <http://www.cer.be/publications/annual-reports>
- [5] Crozet, Y.: European Railway Infrastructure: Towards a Convergence of Infrastructure Charging? *International Journal of Transport Management*, Vol. 1, No. 2, 2004, pp. 5-15
- [6] Deutsche Bahn: Internationale Tarife, Finden Sie Ihren Tarif. BENELUX, CIS, France, 2011, available at: http://www.rail.dbschenker.de/site/logistics/rail/raildeutschland/de/service/internationale__tarife/tarifsuche/tarife__suche.html
- [7] Eisenkopf, A. et. al.: The Liberalisation of Rail Transport in the EU, *Intereconomics*, Vol. 41, No. 6, 2006, pp. 292-313
- [8] ERADIS [European Railway Agency Database of Interoperability and Safety]: Licences database, 2010, available at: http://pdb.era.europa.eu/safety_docs/licences/default.aspx
- [9] European Commission: Communication from the Commission to the Council and the European Parliament on monitoring development of the rail market, Brussels, 18.12.2009. SEC(2009) 1687, pp. 89-93, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2009:1687:FIN:EN:DOC>
- [10] European Union: Decision No 661/2010/EU of the European Parliament and of the Council of 7 July 2010 on Union guidelines for the development of the trans-European transport network, *Official Journal of the European Union*, Luxembourg, 2010
- [11] Eurostat: Demographic balance and crude rates, available at: http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=demo_gind&lang=en; Population density, available at: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&plugin=1&language=en&pcode=tps00003>; GDP per capita in PPS, available at: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsieb010>; Employment in principal railway enterprises, by type of activity, 2011, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rail_ec_emplo_a&lang=e

- http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=en&product=sdi_tr&root=sdi_tr/sdi_tr/sdi_tr_gro/sdi_tr1100
- [12] Eurostat: Modal split of passenger transport, available at: <http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdtr210&language=en>; Modal split of freight transport, 2011, available at: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdtr220>
- [13] Eurostat: Employment in principal railway enterprises, by type of activity, http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=en&product=sdi_tr&root=sdi_tr/sdi_tr/sdi_tr_gro/sdi_tr1100 2011, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rail_ec_emplo_a&lang=e
- [14] Eurostat: HICP-annual average indices for transport prices; Passenger transport by railway, 2011, available at: <http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdtr310&language=en>
- [15] Eurostat: Railway transport - Goods transported, by type of transport (1000t, million tkm), 2011, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rail_go_typeall&lang=en
- [16] Eurostat: Length of tracks, 2011, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rail_if_tracks&lang=en
- [17] Eurostat: Railway transport - Total annual passenger transport (1000 pass., million pkm), 2011, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?wai=true&dataset=rail_pa_total
- [18] EVERIS: Study on regulatory options on further market opening in rail passenger transport, 2010, available at: http://ec.europa.eu/transport/rail/studies/doc/2010_09_09_study_on_regulatory_options_on_further_market_opening_in_rail_passenger_transport.pdf
- [19] Feinberg, R.M. and M. Meurs.: Market Reform, Infrastructure and Exchange Rate Passthrough in Central and Eastern Europe, Post-Communist Economies, Vol. 17, No. 1, 2005, pp. 21-32
- [20] Hunya, G.: Transport and Telecommunications Infrastructure in Transition, Communist Economies & Economic Transformation, Vol. 7, No. 3, 1995, pp. 369-384
- [21] Irish Rail: Iarnród Éireann/Irish Rail Access Charging System & Performance Regime, 2011, p. 4, available at: [http://www.irishrail.ie/networkAccess/pdf/IETrackAccessChargingPerformance\[1\]RegimeforPublication-24Feb11.pdf](http://www.irishrail.ie/networkAccess/pdf/IETrackAccessChargingPerformance[1]RegimeforPublication-24Feb11.pdf)

-
- [22] ITF [International Transport Forum]: Data download, 2011, available at: <http://www.internationaltransportforum.org/shorttermtrends/Output.aspx>
- [23] Jost, F.: Results of the 2010 RMMS survey (European Commission, DG MOVE D2, Vienna), 2010, pp. 7-8. available at: http://www.unece.org/trans/doc/2010/sc2/pres64_Item_10_DG_MOVE_RMMS_24_2010Questionnaires_results.pdf
- [24] Kirchner, C., IBM: Rail Liberalisation Index Market opening: comparison of the rail markets of the Member States of the European Union, Switzerland and Norway, IBM Global Business Services, Brussels, October 2007
- [25] Kirchner, C., IBM: Rail Liberalisation Index Market opening: comparison of the rail markets of the Member States of the European Union, Switzerland and Norway, IBM Global Business Services, Brussels, 20. April 2011
- [26] Komorníková, M., Komorník, J.: A Copula-based Approach to the Analysis of the Returns of Exchange Rates to EUR of the Visegrád Countries, *Acta Polytechnica Hungarica*, Vol. 7, No. 3, 2010, pp. 79-91
- [27] KSH [Hungarian Central Statistical Office]: 7.1. Terület, népesség. 2008 [7.1. Territory, population. 2008], 2011, available at: http://portal.ksh.hu/pls/ksh/docs/hun/xstadat/xstadat_eves/i_int001.html
- [28] Laisi, M.: Market Entry Strategies and Confronted Barriers on Liberalized Railway, Freight Markets in Sweden and Poland. Finnish Rail Administration, Traffic System Department, Helsinki, A 11/2009
- [29] Lang, M., Laperrouza, M., Finger, M.: The Effects of Increased Competition in a Vertically Separated Railway Market, Working Paper Series, Institute for Strategy and Business Economics, University of Zurich, September, No. 131 2010
- [30] Link, H. Rail Infrastructure Charging and On-Track Competition in Germany, *International Journal of Transport Management*, Vol. 1, No. 2, 2004, pp. 17-27
- [31] Ludvigsen, J. and Osland, O.: Liberalisation of Rail Freight Markets in the Old and New EU-Member States, *European Journal of Transport and Infrastructure Research*, Vol. 9, No. 1, 2009, pp. 31-45
- [32] Matthews, B. and Nash, C. Implementing Pricing Reform in Transport – Effective Use of Research on Pricing in Europe, 2004, available at: http://www.imprint-eu.org/public/Deliverables/final_report.pdf
- [33] Monami, E.: European Passenger Rail Reforms: a Comparative Assessment of the Emerging Models, *Transport Reviews*, Vol. 20, No. 1, 2000, pp. 91-112

- [34] Nash, C.: Passenger Railway Reform in the Last 20 Years – European experience reconsidered, *Research in Transportation Economics*, Vol. 22, No. 1, 2008, pp. 61-70
- [35] Rail Cargo: Nemzetközi köteléki, Austria, Germany, Czech Republic, Hungary, Slovakia, Slovenia, Poland, Romania, available at: <http://www.railcargo.hu/hu/szervizszolgaltatasok/dijszabasok/nemzetkozi-koteleki.html> Besondere Beförderungsbedingungen mit Preisen und Konditionen für den Polnisch – Italienischen Eisenbahngüterverkehr für Wagenladungen, Poland, Italy, 2011, pp. 31, 43, available at: http://www.railcargo.at/de/Kundenservice/Tarife/Cargo/Tarife_2010/PIGT_8430_2010.pdf
- [36] Ricci, A. and Enei, R.: IMPRINT-NET Implementing Pricing Reforms in Transport – Networking, Coordination, Action, 2008, available at: http://www.imprint-net.org/scripts/doc8ZJezhaUZReWA/191/Imprint-Net_Final_Report.pdf
- [37] Szekely, B. and Hilmola, O-P: Analysis from the Liberalisation Process of Swiss, Japanese, Polish and Hungarian Railways, in *Proceedings of Hilmola, O-P. (ed. , Third Research Meeting Held at Kouvola – Value Adding Role of Logistics in Northern Europe*, Lappeenranta University of Technology, Skövde, Sweden, May 2007, pp. 171-205
- [38] Szekely, B.: Liberalisation of the Railway Industry in Europe: Toward a Sustainable System through Process View, *International Journal of Sustainable Economy*, Vol. 1, No. 2, 2009, pp. 167-185
- [39] Tánzos, K. and Bessenyei, Gy.: East European Rail: the State of the Network, *Built Environment*, Vol. 35, No. 1, 2009, pp. 136-148
- [40] Thomson, L. S. Charges of the Use of Rail Infrastructure, Railway Access charges in the EU: Current Status and Developments Since 2004, *ITF, OECD*, Table 5, 2008, pp. 47-48
- [41] UIC [International Union of Railways]. Operators' traffic, 2011, available at: <http://www.uic.org/spip.php?article1348>
- [42] UTK [Urząd Transportu Kolejowego/ Rail Transport Agency]: Licencjonowanie, 2011, available at: http://www.utk.gov.pl/portal/pl/27/245/WYKAZ_LICENCJONOWANYCH_PRZEWOZNIKOW_KOLEJOWYCH.html
- [43] Vágási, M.: International Market Entry Strategies and their Impacts on Marketing in Central Europe, *Periodica Polytechnica*, Vol. 6, No. 1, 1998, pp. 55-65
- [44] Visegrád Group: Contents of Visegrad Cooperation 1999 Prime Ministers' Summit, Bratislava, 14 May 1999, available at: <http://www.visegradgroup.eu/main.php?folderID=830&articleID=3937&ctag=articlelist&iid=1>

- [45] Wetzel, H.: European Railway Deregulation: The influence of Regulatory and Environmental Conditions on Efficiency, Working Paper Series in Economics, University of Lüneburg, Institute of Economics, No. 86, 2008, available at: http://www.leuphana.de/fileadmin/user_upload/Forschungseinrichtungen/ifvwl/WorkingPapers/wp_86_Upload.pdf
- [46] Žižka, M.: Transformation of Railways - Experiences from Abroad (Transformace Železnic – Zahraniční zkušenosti), *Ekonomie + Management*, Vol. 5, No. 2, 2002