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PRESENTATION OF THE RAIL FREIGHT MARKET'S CONCENTRATION WITH RESPECT TO THE GAS MARKET WITH THE HELP OF THE HERFINDAL-HIRSCHMAN INDEX

Purpose. To demonstrate the current level of concentration on the rail freight market and to find a feasible long-term way for its expansion and progress by exploring and comparing it to another industrial branch well ahead on the road of concentration. **Methodology.** To identify an industrial branch being at an appropriate level of concentration, therefore being suitable for the purpose. To adapt the Herfindahl-Hirschman Index (HHI) for measuring the level of concentration of the market. Finally, to make a series of comparisons between the levels of concentrations of the two markets. **Findings.** In terms of concentration of the market, the liberalisation was more successful in the gas sector than in the rail freight sector, in Hungary. Therefore, the Hungarian gas sector is to be abandoned for comparison purposes and another, more suitable should be picked. Figures in the charts and findings of the application of the HH Index demonstrate that the liberalisation process in the energetics sector in Estonia has been most efficient. The methods of the Estonian process may be applicable for reducing the level of concentration on the rail freight market in Hungary. **Originality.** Novelty as far as the application of the Herfindahl-Hirschman Index for the purposes of the investigation is concerned. An innovative approach to analyse the structure of the rail freight market by a test, which has been unique so far in Hungary. **Practical value.** By using a mathematical method, a market suitable for testing can be selected. The results of the analyses can be adopted for the purposes of the rail freight market.

Keywords: rail; gas; market; liberalization; Herfindahl-Hirschman Index; freight

Introduction

In this paper we point out that compared to other sectors ahead with the liberalization, the degree of liberalization of rail freight can be defined. A possible way to this comparison is the application of the Herfindahl-Hirschman Index (hereinafter HHI). The HHI index shows the concentration of the market, the lower the value the more liberalized the particular market is. Our study will show that the liberalization of rail freight cannot be considered satisfactory. To find a solution to this problem, the method to be applied is that we examine the liberalization processes of industries showing similarities to rail freight with other, specific characteristics [14].

We will select an industry based on some of the important features, and examine its process of liberalization to receive guidance in the future on how the liberalization of Hungarian rail freight can be made. In our article we examine the natural gas service among the industries, and we will compare this the rail freight on the basis of the HHI index.

We will introduce the HHI index, its forming's mathematical method, and what consequences can be drawn from it regarding the degree of liberalization. Then we will determine the HHI index of the natural gas industry and the rail freight. Based on this data we will point out the differences and tendencies in numbers and draw conclusions.

The purpose of research. The Hungarian rail freight as well as a number of other services should be liberalized. One reason is that the liberalized market creates the conditions for that the quality, the performance and the low price should mean the competitive edge and not the speculative instruments and the abuse of a dominant market position [1]. This is the interest of the sector as it contributes to development, and also the interest of the consumers as they can enjoy higher value services with more choice besides a better price-performance ratio.

Because of all these reasons the European Union (hereinafter EU) also provides directives for the liberalization to the legislators. These direc-

tives are 91/440/EEC, 95/19/EK, «First Railway Package» (2001), «Second Railway Package» (2004), «Third Railway Package» (2007), «Fourth Railway Package» (2013) [4]. These directives have gradually prescribed the advancing of the liberalization process. The liberalization of Hungarian rail freight has already begun, but not yet complete. The long-term goal of our research is to find a solution to the question of how the liberalization of Hungarian rail freight sector can be continued [10]. For this we chose the method to examine the process of liberalization in other industries which are already ahead of or even been liberalized on an acceptable level [5].

The method. In this paper we deal with that how to select the example industry, which industry should we consider sample to find guidance to the further liberalization of Hungarian rail freight. For this in the first round we should find such industries, which are more similar to rail freight with regard to characteristics. Such common characteristics are, for example, that we talk about a service, which is associated with a physical network, which network is multi-level depending on how large area it covers. If we had found the market with these characteristics, we would have needed to choose the most suitable among them. We also judge this suitability with the degree of liberalization, because only then we can conclude that the choice described above is ahead to the liberalization process, that is, whether we can draw progressive lessons from it? We determined the degree of liberalization by using HHI. In this paper we are moving forward in the above-described steps.

Choosing the appropriate industry. The service sector similarly networked as rail, the other infrastructure sectors, namely drinking water supply, natural gas supply, district heating and electricity services [8]. There is no nationwide network of district heating, but only local, so we can ignore this sector. The remaining three has national and international level as well. Among them the natural gas service has both regional and national, and also international level, so we find this sector suitable for further analysis, which determines the degree of liberalization by using HHI [2].

Presentation of Herfindahl-Hirschman Index (HHI). The Herfindahl-Hirschman Index shows how concentrated a particular market is, that is

how well its shares are distributed among the participants [3]. The more even the share of the market participants is, the smaller the HHI is, and in case if less participants have more shares, then the HHI will be higher. Its forming is done by the sum of squares of the market operator's shares:

$$HHI = \sum_{i=1}^n r_i^2,$$

where n – the number of market operators; r_i – the share of i operator.

Its value is between $\frac{1}{n}$ and 1, or it is also usual to substitute r_i with the number value of percentages, then the upper threshold is 10000, this is more expressive.

We distinguish three levels of classification of the markets' concentration based on the HHI:

According to the US classification:

- Non-concentrated market: HHI below 1 500
- Less concentrated market: HHI between 1 500 and 2 500
- Highly concentrated market: HHI above 2 500

According to the Hungarian classification:

- HHI below 1 000 – non-concentrated market
- HHI between 1 000 and 1 800 – less concentrated market

HHI above 1800 – highly concentrated market [12].

Presentation of the calculation and its results. In the following diagrams (see Fig. 1, Fig. 2, Fig. 3, Fig. 4, Fig. 5, Fig. 6, Fig. 7, and Fig. 8) we can see the companies' market share of the natural gas service and the rail freight market. In the following diagrams the letters are the names of the rail freight market actors in Hungary (A, B, C, ...). The figures show the percentage share calculated in freight ton-km basis. After the graphics presenting the certain years, in summary we will illustrate the evolution of HHI in terms of rail freight and natural gas service, in the period from 2010 and 2015.

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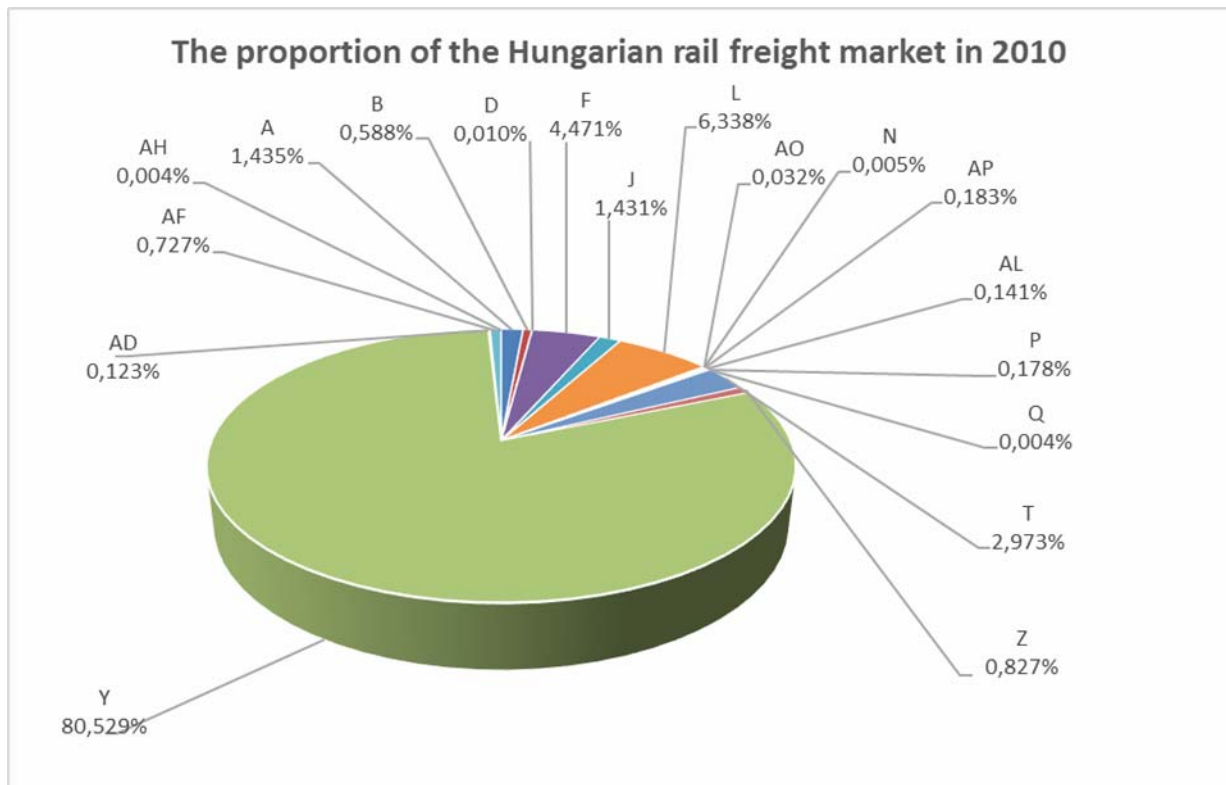


Fig. 1. The proportion of the Hungarian rail freight market in 2010
Source: own work (National Transport Authority)

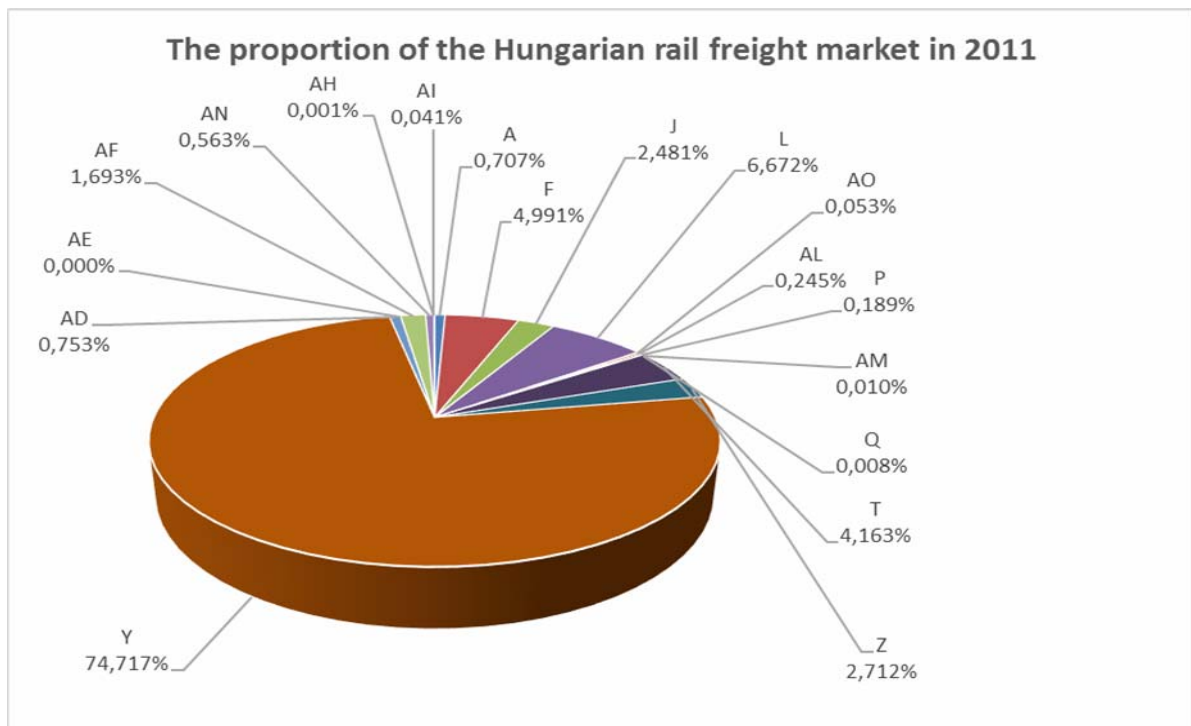


Fig. 2. The proportion of the Hungarian rail freight market in 2011
Source: own work (National Transport Authority)

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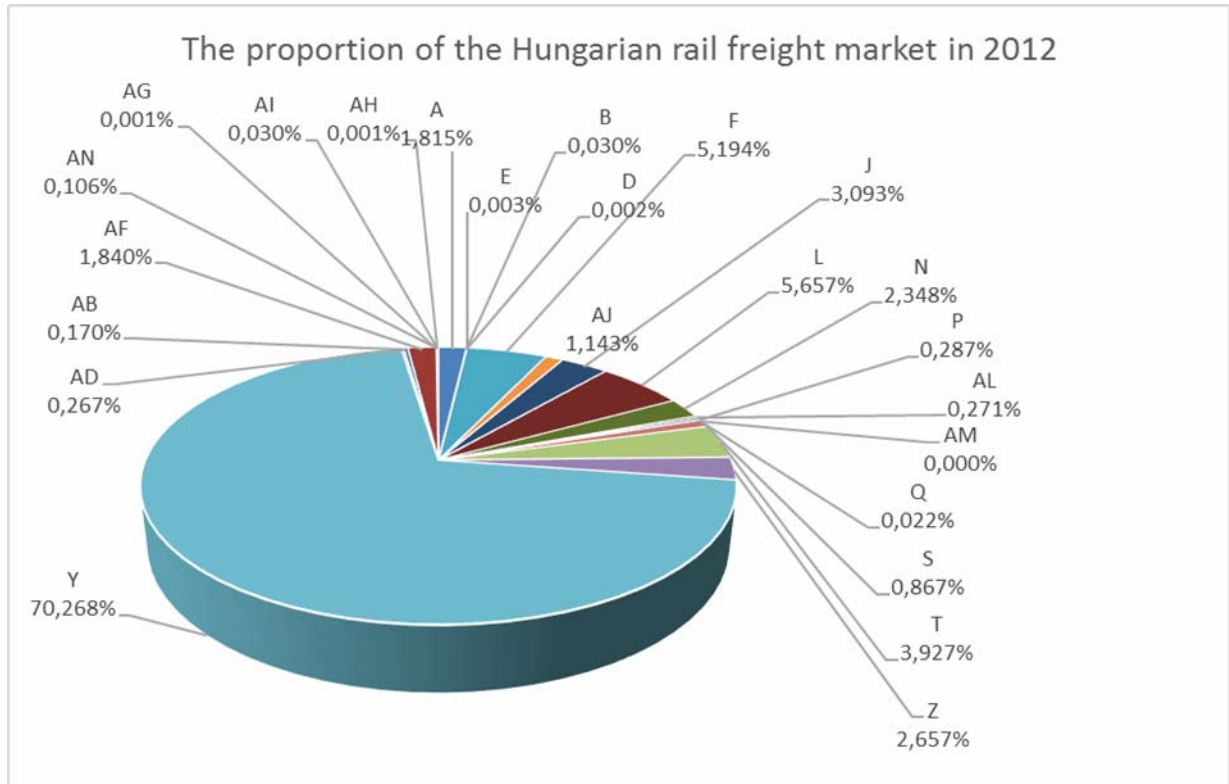


Fig. 3. The proportion of the Hungarian rail freight market in 2012
Source: own work (National Transport Authority)

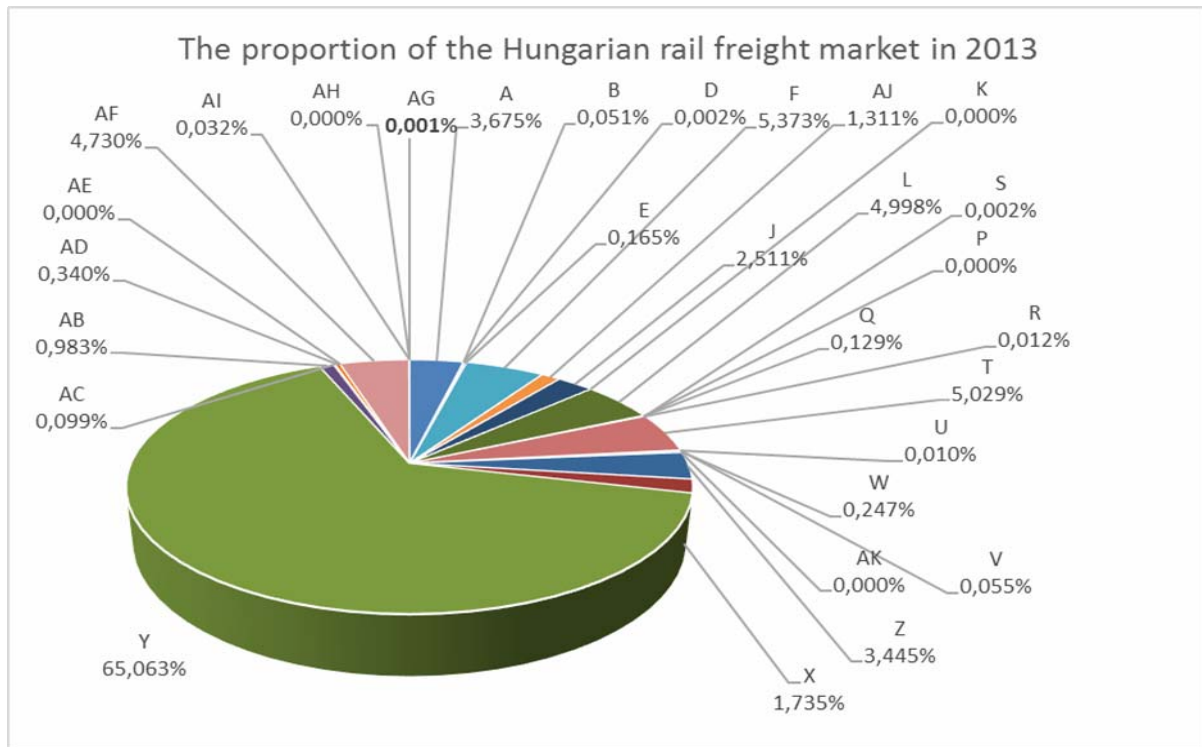


Fig. 4. The proportion of the Hungarian rail freight market in 2013
Source: own work (National Transport Authority)

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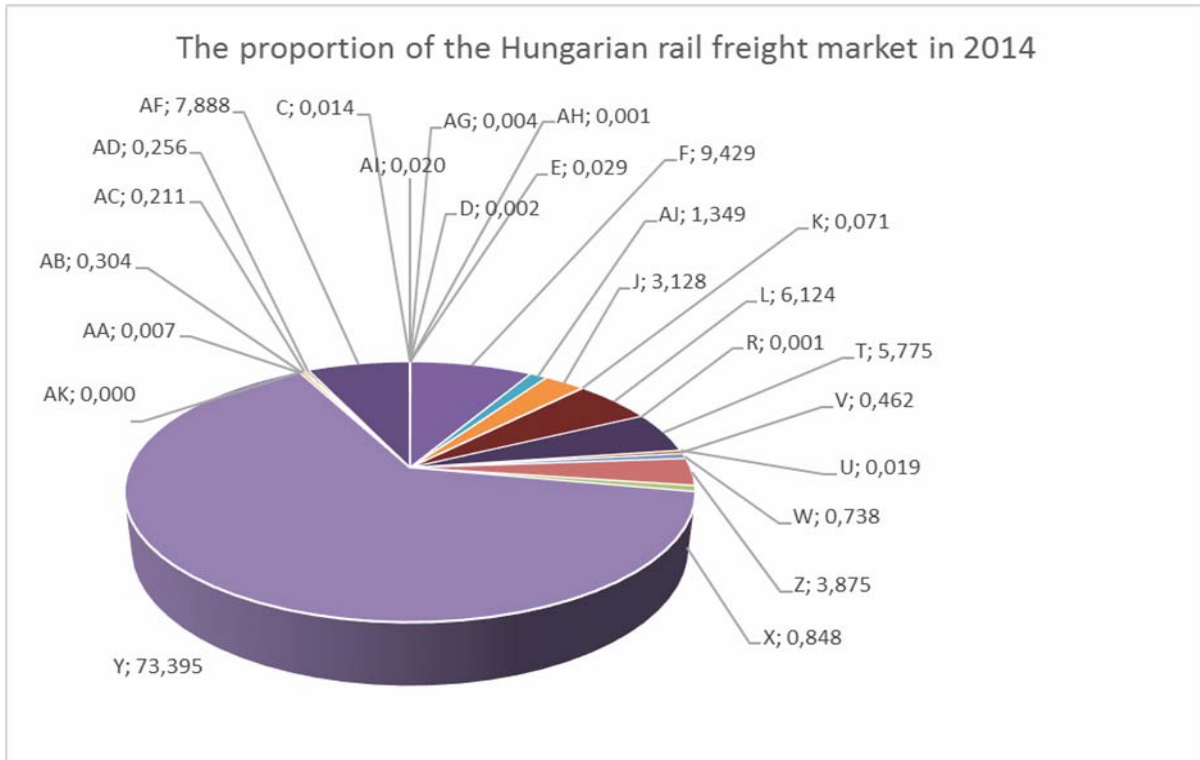


Fig. 5. The proportion of the Hungarian rail freight market in 2014
Source: own work (National Transport Authority)

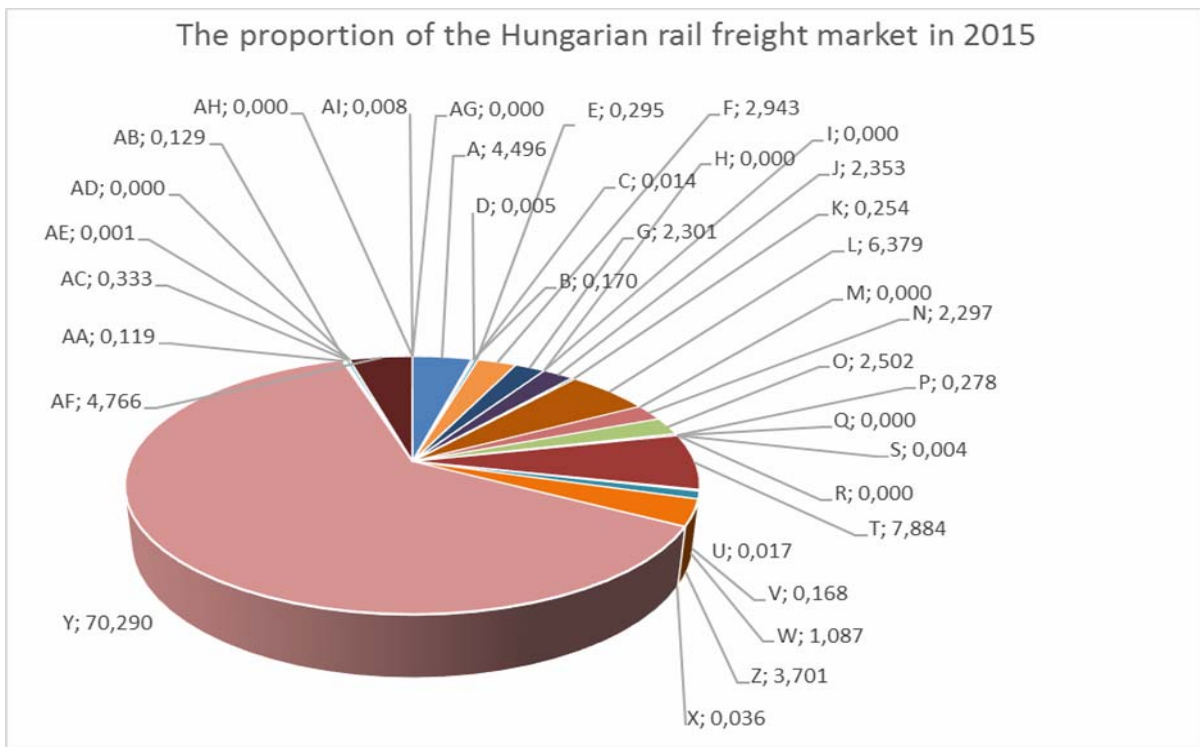


Fig. 6. The proportion of the Hungarian rail freight market in 2015
Source: own work (National Transport Authority)

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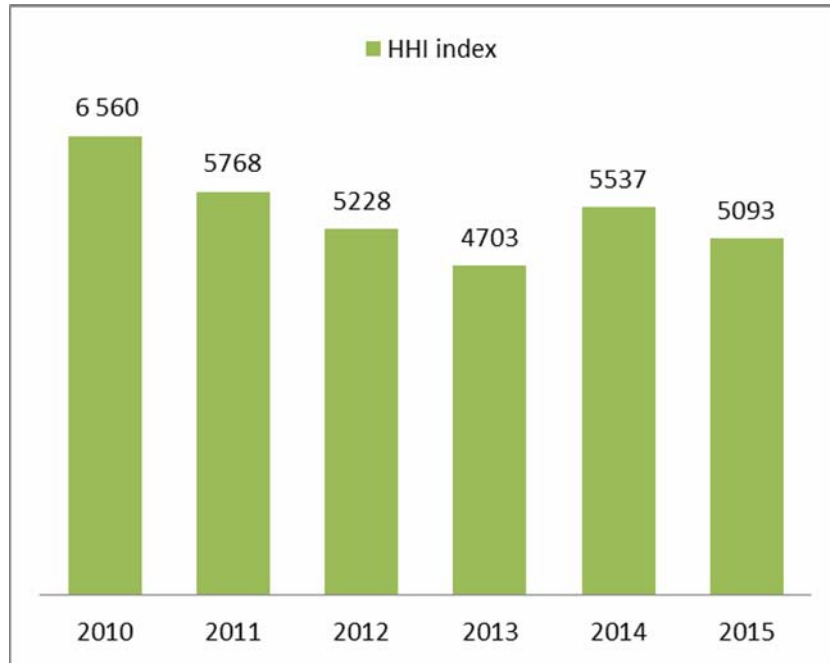


Fig. 7. The HHI indexes of the Hungarian rail freight from 2010 to 2015 broken down by years
Source: own work (National Transport Authority)

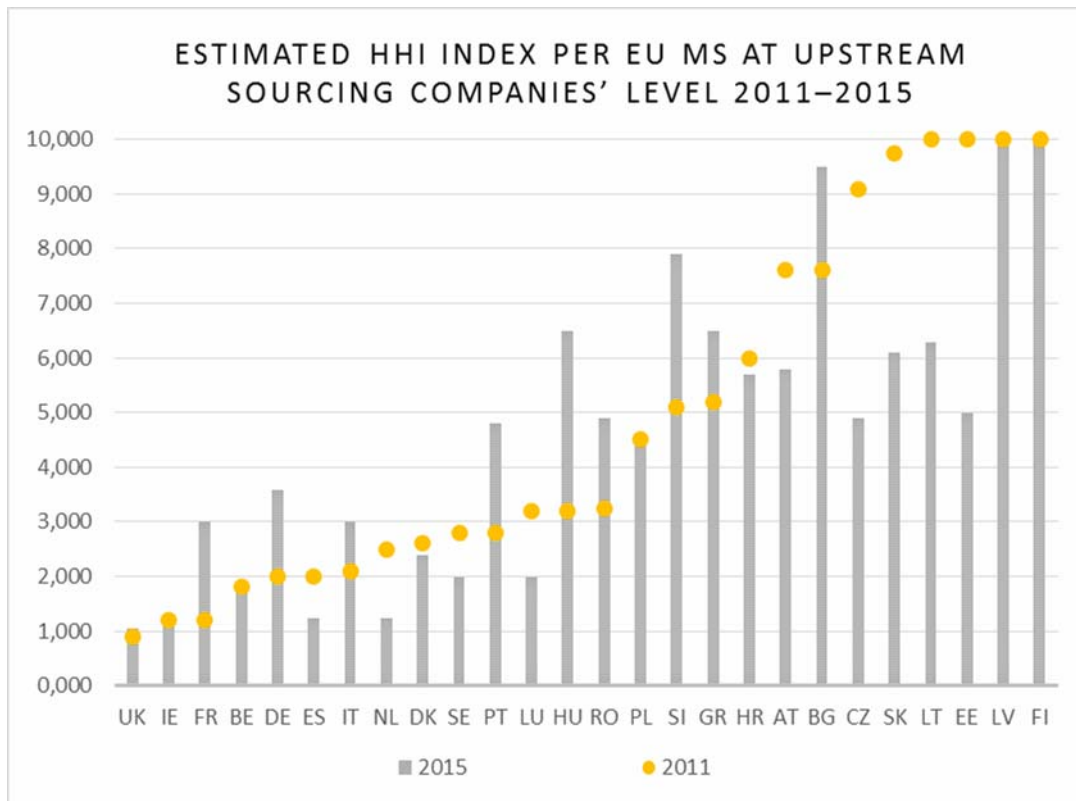


Fig. 8. The HHI index of the European countries' gas trade and market in 2011 and in 2015
Source: ACER calculations based on Eurostat and Eurostat Comext, BP Statistical Report, Frontier Consultancy desktop research for GTM 2014 and NRAs data. (See annex 1 for methodology clarification)

Rail freight. The HHI index of rail freight fluctuated between 4500 and 7000 in the period from 2010 to 2015 (Chart 1-6), showed a clear decrease until 2013 and then began to rise (Chart 5). With these HHI indexes, unfortunately, the rail freight market is in the «highly concentrated» category. This is because the share of one of the market operators is overwhelming, this company's share affected the tendencies the most. From this it is visible that the circle of market operators has steadily expanded, this has not significantly improved the concentration of the market since new entrants hold only a small share of the market. The liberalization process is not satisfactory, the market competition's conditions of fair, quality and performance based, serving the interest of the consumers in the long run are not met.

Natural gas service. From Chart 9 can be concluded that Hungary had the largest increase in market concentration from all EU Member States [13]. In Estonia, however, it shows that it came back nearly 50% from the highest concentration [6]. This is because of the good differentiation, the choice of good product range and good economic decisions [9, 15].

Conclusions

All these show that the liberalization of Hungarian rail freight still intends to continue. The structure of the market is required to be homogenized to comply with European Union directives and to make possible the development of a healthy market competition bearing in mind the interest of consumers. As a result of our research we can see that the liberalization efforts have not been sufficiently successful in the natural gas supply market [7]. By taking into account this and the previous considerations, it can be said that it is not worthwhile examine how the liberalization of this industry has been implemented in Hungary. Instead, we must seek for another, more suitable example of industry hereinafter. Or further studies would be necessary in the energy liberalization of Estonia, because as the above figure shows, Estonia could reduce its market concentration very well. As another direction of our research, we will examine the gas industry market and position of Estonia.

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ПРЕЗЕНТАЦІЯ КОНЦЕНТРАЦІЇ ВАНТАЖНОГО ЗАЛІЗНИЧНОГО РИНКУ ЩОДО ГАЗОВОГО РИНКУ ЗА ДОПОМОГОЮ ІНДЕКСУ ХЕРФІНДАЛЯ-ХІРШМАНА

Мета. Дана стаття має за мету продемонструвати поточний рівень концентрації ринку залізничних вантажних перевезень та знайти доцільний постійний спосіб його розширення і просування, досліджуючи й порівнюючи його з іншими промисловими галузями, які досягли значних успіхів на шляху до концентрації ринку. **Методика.** У роботі необхідно: 1) визначити промислову галузь, що знаходиться на відповідному рівні концентрації, і, отже, придатну для цієї мети; 2) адаптувати індекс концентрації Херфіндаля-Хіршмана (ІХХ) для вимірювання рівня концентрації ринку; 3) зробити, нарешті, ряд порівнянь рівнів концентрацій двох ринків. **Результати.** З точки зору концентрації ринку в Угорщині лібералізація була більш успішною в газовій галузі, ніж в галузі залізничних вантажних перевезень. Тому угорську газову галузь слід виключити з порівняння та вибрати іншу, більш відповідну. Цифри, наведені в таблицях, і результати застосування ІХХ свідчать про те, що процес лібералізації у галузі енергетики Естонії був найбільш ефективним. Для зниження рівня концентрації на ринку вантажних залізничних перевезень в Угорщині можуть бути застосовані методи лібералізації Естонії. **Наукова новизна.** У статті вперше розглядається застосування індексу Херфіндаля-Хіршмана для мети дослідження. Використовується інноваційний підхід до аналізу структури ринку залізничних вантажних перевезень за допомогою тесту, який досі був унікальним для Угорщини. **Практична значимість.** З використанням математичного методу можна вибрати відповідний для тестуван-

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ня ринок. Результати аналізів можуть використовуватися для цілей ринку залізничних вантажних перевезень.

Ключові слова: залізниця; газ; ринок; лібералізація; індекс Херфіндаля-Хіршмана; вантажоперевезення

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ПРЕЗЕНТАЦИЯ КОНЦЕНТРАЦИИ ГРУЗОВОГО ЖЕЛЕЗНОДОРОЖНОГО РЫНКА В ОТНОШЕНИИ ГАЗОВОГО РЫНКА С ПОМОЩЬЮ ИНДЕКСА ХЕРФИНДАЛЯ-ХИРШМАНА

Цель. Данная статья имеет своей целью продемонстрировать текущий уровень концентрации рынка железнодорожных грузовых перевозок и найти целесообразный постоянный способ его расширения и продвижения, исследуя и сравнивая его с другими промышленными отраслями, которые достигли значительных успехов на пути к концентрации рынка. **Методика.** В работе необходимо: 1) определить промышленную отрасль, находящуюся на соответствующем уровне концентрации, и, следовательно, пригодную для этой цели; 2) адаптировать индекс концентрации Херфиндаля-Хиршмана (ИХХ) для измерения уровня концентрации рынка; 3) сделать, наконец, ряд сравнений уровней концентрации двух рынков. **Результаты.** С точки зрения концентрации рынка в Венгрии либерализация была более успешной в газовой отрасли, чем в отрасли железнодорожных грузовых перевозок. Поэтому венгерскую газовую отрасль следует исключить из сравнения и выбрать другую, более подходящую. Цифры, приведенные в таблицах, и результаты применения ИХХ свидетельствуют о том, что процесс либерализации в отрасли энергетики Эстонии был наиболее эффективным. Для снижения уровня концентрации на рынке грузовых железнодорожных перевозок в Венгрии могут быть применены методы либерализации Эстонии. **Научная новизна.** В статье впервые рассматривается применение индекса Херфиндаля-Хиршмана для целей исследования. Используется инновационный подход к анализу структуры рынка железнодорожных грузовых перевозок с помощью теста, который до сих пор был уникальным для Венгрии. **Практическая значимость.** С использованием математического метода можно выбрать подходящий для тестирования рынок. Результаты анализов могут использоваться для целей рынка железнодорожных грузовых перевозок.

Ключевые слова: железная дорога; газ; рынок; либерализация; индекс Херфиндаля-Хиршмана; грузоперевозки

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