



BELGIAN RESEARCH ACTION THROUGH INTERDISCIPLINARY NETWORKS







CONTENTS

INTRODUCTION
1. MARKET SCOPE: FROM THE BELGIAN MARKET TO THE WESTERN EUROPEAN MARKET
1.1. The Belgian rail freight market: limited for a marked analysis
1.2. The geographical market definition: a multi-scale market between European and national markets
1.3. The product market definition: no distinction between products
2. DATA COLLECTION: TOWARDS A NEW EUROPEAN RAIL FREIGHT DATABASE
2.1. Limits of existing rail freight databases
2.2. Framework of the database: operator definition
2.3. Sources for the database
3. RESULTS: CONCENTRATION AND COMPETITION
3.1. Overview of the active operators on the western European market
3.2. The persistence of profit analysis: identifying the strategy of companies by their profit 14
3.3. Competition and consolidation on the European market
4. SCENARIO ANALYSIS: WHICH LIKELIHOOD TO REACH A MONOPOLY OR DUOPOLY ON THE BELGIAN MARKET?
4.1. Scenario analysis: a pessimistic outlook of the Belgian rail freight market
4.2. Industrial organization: is there a natural tendency to a monopoly or duopoly?
4.3. Recommendations: market contestability and multiple scale approach of the
concentration
CONCLUSION
REFERENCES

inter the adult the balance





INTRODUCTION

The objective of this deliverable is to discuss the worst case scenario developed in the WP 1. The worst case scenario starts from a high concentration of the number of operators in the Belgian market from 6 in 2014 to 2 in 2030 (duopoly) and a slow development of the market size in ton-kms (+ 10%). As opposed to this, the two other scenarios (best and medium case, handled in deliverables WP 5.2 and WP 5.4 respectively) are more optimistic in terms of concentration (ten and four respectively) and market development (between + 133% and +64%).

The analysis of the "worst scenario" is based on two questions:

- What is the current situation in terms of players?
- What is the risk of concentration by 2030 in the market?

The present deliverable applies a new framework and tools to test the risk of concentration and slow development in the Belgian rail freight market. It is based on a disaggregate analysis to improve knowledge about the players and their strategies. To give a comprehensive overview of the market and its dynamics, the market scope is extended from the Belgian market to the Western European market.

The organization of this deliverable is as follows. Section 1 gives the market scope extended from the Belgian to the Western-European market. Section 2 proposes a new European rail freight database facing the structural inadequacy of the traditional databases. Section 3 presents the results from a market analysis according to a static and dynamic approach. To finish, section 4 discusses the results highlighting whether reasons exist to reach a high level of concentration (and less competition) in the Western-European market as predicted in the worst scenario.



1. MARKET SCOPE: FROM THE BELGIAN MARKET TO THE WESTERN **EUROPEAN MARKET**

First of all, a market analysis needs to define a relevant market scope. Section 1.1 shows how the national Belgian market is too narrow to provide an extended analysis of the rail freight market. Section 1.2 defines an extended geographic market (Western-European market). Next to the geographical market scope, section 1.3 determines the product market scope.

1.1. The Belgian rail freight market: limited for a marked analysis

The Belgian market is strongly linked to the European market for more than 70% of the rail freight traffic (Eurostat, 2016). This cross-border opening can be explained among others by the location of two of the biggest European ports, Antwerpen and Zeebruges. The latter are connected to three main corridors (North Sea – Mediterranean, Rhine – Alpine, Orient – East Med) of the European TEN-T network (Regulation n°1316/2013). Figure 1 shows the North Sea – Mediterranean corridor in purple, the Rhine – Alpine corridor in orange and the Orient – East Med corridor in red.



FIGURE 1. MAP OF THE TEN-T CORE NETWORK CORRIDORS

SOURCE: REGULATION N°1316/2013 (EU)

With 7.3 billion ton-kms in 2012 (Eurostat, 2016), the market is shared by 12 rail freight operators. All of them are operating in two countries or more and only three have their headquarters in Belgium. One of them is the national incumbent, B Logistics (rebranded to Lineas, April 2017), privatized in 2011.

Considering these facts, a market analysis limited to the national market only would be incomplete. It is obvious that strategies from operators as business transcend the national borders. This assertion is especially right for the port of Antwerp, which is a gate not only for Belgium but mainly for the European market (see figure 2). Consequently, the market scope is extended to the European area, which the next subsection proposes to define.



FIGURE 2. MAIN RAIL FREIGHT CONNECTIONS FROM THE PORT OF ANTWERP TO THE REST OF EUROPE IN 2016



SOURCE: PORT OF ANTWERP, 2016

1.2. The geographical market definition: a multi-scale market between European and national markets

The geographical market definition is one of the key element in a market analysis. Selecting the relevant geographical scope is essential to determine the size of the market and to measure the market power of firms. The method proposed by the literature is similar to the product market definition (Lipczynski et al., 2013). The cross-price elasticity is spatial. The higher the elasticity, the more both places are linked together. In practice, it is difficult to circumscribe the relevant market mainly in the case of the rail freight industry (Mitusch et al., 2014). This deliverable defines the market scope according to the traffic flow approach in figure 3. Mitusch et al. (2014) highlights different market identified by colors for the traffics upper to 300 km. They show that the biggest market in Europe is concentrated around the blue axis on the map (also called "Blue banana") between the North Sea and the North of Italy.





FIGURE 3. RAIL FREIGHT TRAFFIC FLOW IN EUROPE (< 300 KM)



SOURCE: MITUSCH ET AL., 2014

The geographical market scope retained in this study is established in two parts (figure 4):

- Countries on the map without brackets are included in the market analysis, for reasons of homogeneity between markets;
- As some major active operators come from other countries (especially from Poland, Czech Republic and Hungary), the reference market is extended to these countries (between brackets). Thereby, there are two levels of scope: the reference level in terms of volume (broad scope) and the study level for active operators (narrow scope). This distinction is also important to define a limit to the market without excluding major operators and balancing their weight by including their national market.





SOURCE: OWN COMPOSITION



1.3. The product market definition: no distinction between products

The product market definition depends on the level of substitution or complementarity between goods categories by firms. It can be defined by the cross-price elasticity¹ of demand (CED) according to Lipczynski *et al.* (2013).

The rail freight sector can be defined as a multi-product industry (Cantos and Campos, 2005). Services are different according to the customers and products. At the first level, a distinction is made between intermodal traffic (mainly containers) and conventional traffic, i.e. block trains and single wagons (Bozicnik, 2009). Logistics requirements are different according to each level of service. Intermodal traffic needs a high frequency, while conventional traffic needs reliability (just on time). At a second level, a distinction exists according to the nature of the goods transported. Operational rules and rolling stock are totally different if the service is dedicated to chemical products or rubbles for instance.



FIGURE 5. MARKET SEGMENTS OF THE RAIL INDUSTRY

SOURCE : RESEAU FERRE DE FRANCE, 2013

This deliverable considers the rail freight market in its entirety. No distinction is made between the different market segments. Firstly, the database is too aggregated for this level of analysis. Secondly, most operators are active in several segments of the market.

¹ The cross-price elasticity measures the percentage change in price for the first good that occurs in response to a percentage change in price of the second good



2. DATA COLLECTION: TOWARDS A NEW EUROPEAN RAIL FREIGHT DATABASE

Setting up a relevant database is the main challenge for a thorough market analysis. For the rail freight industry, they are sparse or not always well-established. Section 2.1 shows how traditional rail market databases are limited for a market analysis. Section 2.2 provides an answer to the double question concerning the data collection: how to define an active operator and how to characterize it? Section 2.3 is dedicated to the sources used in this study.

2.1. Limits of existing rail freight databases

Market analysis needs robust data per operator about the firm size (sales, assets, employment, etc.) to compare and measure the level of concentration. The most common databases for rail freight market data in Europe are UIC and Eurostat.

First, the UIC database is a reference for measuring the efficiency of the main operators on the market. Nevertheless, this database is incomplete for two reasons. One hand, it is limited to its members who are mainly incumbents. On the other hand, recent data are very sparse since the liberalization. Consequently, the UIC database is only interesting to make an econometric test on long time series before 2007, but insufficient to describe the evolution of the freight market since 2007 and taking account the economic crisis.

Secondly, Eurostat gives interesting and frequently updated time series. Unfortunately, these are only at an aggregate level (Europe/countries) and mainly limited to traffic. Data on the market are restricted to the aggregate market share of new operators per country.

Ultimately, existing databases need to be adapted to provide a deep market analysis. At least, the number of active operators per country (a list of operators would be ideal) with key data to assess the firm size for all operators included in the top 20 or 30 (tons-km, tons, turnover, etc.) similar to the US rail freight databases should be published. Indeed, the US database produced by the Association of American Railroads (AAR, 2016) gives extensive data about traffic (weekly traffic by products), turnover, employment, number of competitors, etc. Another example from another sector is the database for the air industry produced by the International Air Transport Association (IATA, 2016). Extensive data and ranking between companies are available for traffic and fleet, employees and financial results.

2.2. Framework of the database: operator definition

Data collection for active rail freight operators raises two questions: what is an active rail freight operator and how to characterize such operator? These questions give the framework to the database developed in this study.

The first question is important to describe the effective rail freight market and to draw up a list of active players. The European Commission defines a "railway undertaking" as "any public or private undertaking licensed [...] to provide services for the transport of goods and/or passengers by rail with a requirement that the undertaking ensures traction" (Article 3, directive 2012/34/EU). According to this definition and knowing that a railway undertaking needs to get a safety certificate from national authorities to operate on the network, a firm can be considered a railway undertaking without safety certificate and any traffic on the network. Firms can make the choice to get the safety certificate on a network without traffic for strategic reasons. To solve this issue, it is considered that an active rail freight operator is an operator that has a railway license, a safety certificate and runs traffic on the





national network where its safety certificate is registered. A list of all active operators on each national network, according to the market scope, is drawn up.

The second question is a logical sequence of the first one: which data to use to characterize the operators? A combination of both quantitative and qualitative data is needed for the research.

About qualitative data, the first step is to determine if the operator is a subsidiary or the headquarters (independent). An operator of which more than 50% of the capital is held by another operator is considered a subsidiary.

The second step defines the geographical scope of the operator: an operator which operates trains in more than one country is considered international. There are two other categories: national (traffic on long distance in one country) and local (traffic on short distance in one country).

The third step defines the product scope of the operator. An operator which operates trains on more than one market segment (automobile and iron) is considered diversified, while it is considered specialized when it operates only on one segment.

Finally, two other types of qualitative data are recorded: the nationality according to the localization of the head office and the date of creation according to the railway license.

About quantitative data, firm size is measured from the turnover $(\mathbf{\xi})$ and freight ton-kms in 2014. The study uses also financial data like the capital cost $(\mathbf{\xi})$, the labour cost $(\mathbf{\xi})$ and the EBITDA $(\mathbf{\xi})$.

2.3. Sources for the database

Facing the lack of data from official databases for railway transport, sources are heterogeneous. Concerning the identification of active operators on each network, data come mainly from national network managers (list of active operators) except for Germany, where own identification and classification had to be done from databases of the Transport Ministry. The newly developed list is limited to data available for as many active players as possible. Concerning the second part of the characterization, data come from the European Amadeus database for turnover (in \in), and from operator websites or annual reports for ton-kms. In general, qualitative data are more comprehensive for all operators, while quantitative data are more limited because of their strategic sensitivity.

Table 1 gives an overview of the main sources per section of the database.

Data	Sources	Time series
Qualitative data (nationality, products, etc.)	Website (operator)	-
Turnover	Amadeus database Annual report (operator)	2006 – 2014
Ton-kms	Annual report (operator) Website (operator)	2007 – 2014
Capital cost	Amadeus database	2006 – 2014
Labour cost	Amadeus database	2006 – 2014
EBITDA	Amadeus database	2006 – 2014

TABLE 1. CRITERION AND SOURCES OF THE DATABASE

SOURCE: OWN COMPOSITION



3. RESULTS: CONCENTRATION AND COMPETITION

Results are presented in three steps. Section 3.1 gives an overview of the market and players. Section 3.2 considers results from the Persistence of Profit (POP) analysis. Section 3.3 discusses the tendency to the consolidation of the sector.

3.1. Overview of the active operators on the western European market

Three steps compose this overview. Sub section 3.1.1 considers the aggregate market and gives the long list of and players. Sub section 3.1.2 provides a ranking of the main players based on their output. Sub section 3.1.3 gives a measure of concentration on the market according to the previously presented indicators.

3.1.1. Main factors on the western-European market

The market scope selected for this study is 348 billion freight ton-kms in 2014 (Eurostat 2016). It represents 83% of the EU-28 market, including Norway and Switzerland. Germany concentrates the biggest share of freight ton-kms (32%).

The analysis of the core European market highlights the existence of 170 independent active operators (no subsidiaries) in 2014 for an aggregate turnover around 15 billion euros. Among them, almost 50% are German and only 26% have international traffic. Most operators operate at a regional or local level (42%). Around 46% of the current active operators started their activities after 2000. Liberalization is one of the main reasons to explain this increase. To finish, around 70% of the operators are active in more than one market segment (diversified). In particular, it confirms that although the rail freight market is segmented in different types of services (conventional, intermodal, etc.), most operators are able to manage this diversity.

Thus, the international market is limited to a restricted number of international operators (26%). Most of them are new operators (56%) while the rest is constituted by the main European incumbents.

3.1.2. The TOP 20 biggest active operators on the market

The top 20 biggest operators (in terms of the turnover in \in) is based on figures available for 54% of the panel. The turnover of each independent active operator takes into account the results of the parent group and subsidiaries. Nationality (localization of the head office) and date of creation are also given in table 2.





TABLE 2. TOP 20 ACTIVE OPERATORS ON THE WEST-EUROPEAN MARKET ACCORDING TO TURNOVER IN EURO (2014)

Rank	Company	Turnover (in €)	Nationality	Date of
1	DB Schenker Rail	4.517.000.000	DE	1994
2	Rail Cargo	2,073,100,000	AU	1923
3	SNCF Geodis	1,107,000,000	FR	1937
4	PKP Cargo	999,767,000	PL	1918
5	SBB Cargo	821,240,009	СН	1902
6	GeneeseandWyoming	635,928,658	USA	1995
7	Trenitalia Cargo	623,000,000	IT	1905
8	B Logistics	451,860,473	BE	1926
9	Green Cargo	444,266,000	SE	1856
10	Нирас	392,400,000	СН	1967
11	Europorte	267,000,000	FR	2005
12	RENFE Mercancias	259,800,000	ES	1941
13	CTL Logistics	177,634,046	PL	2003
14	CFL Cargo	153,793,792	LU	1946
15	Cargo Net	147,255,689	NO	1883
16	Lotos Kolej	141,359,734	PL	2002
17	BLS Cargo	138,978,758	СН	1941
18	Verkehrsbetriebe Peine - Salzgitter	115,651,000	DE	1971
19	LKAB Malmtrafik	112,571,000	SE	1903
20	Holding Exploris	94,000,000	LU	2014

SOURCE: OWN COMPOSITION

The top five is led by DB Schenker, whose leadership is strongly established according to the turnover. Nevertheless, Rail Cargo from Austria is at the second place, in spite of the narrowness of the Austrian market. This second place comes from a clear European strategy with the opening of several offices in other countries, mainly in Eastern Europe (Rail cargo Hungary, Czech Republic, etc.), but also from acquisitions of among others the Hungarian rail transporter MAV Cargo (2008) or the German PCT Private Car Train in 2016. This strategy gives a strong market power to Rail Cargo on the market between Western and Eastern Europe. Moreover, with around 40% of freight ton-kms out of its national market, Rail Cargo is the biggest international operator among the top 20. The third place for the French operator, SNCF-Geodis, is not a surprise. Even the company was considered until recently the second rail freight operator just behind DB Schenker. However, the group is facing a severe problem of productivity and adaptation on the French market since 2000 (Bonnafous and Crozet, 2014). It lost around 65% of its traffic on the national market in 13 years (2000-2013) and the result today is supported by its international strategy through the development of Captrain (2010). PKP Cargo is the sign of market integration between Western and Eastern Europe. Its activities are improving through the connection between the Northern-European ports (Antwerp, Rotterdam, Hamburg) and Poland. Nevertheless, an important part of its traffic remains specific to the Polish industry, with coal and lignite as important cargoes. Closing the top five, SBB Cargo is in a situation close to Rail Cargo with a limited national market but in a strategic position in Europe between North and South. The company was launched in 2010 and is operating on the main European corridors, together with Hupac and SBB International to increase its market power on the European market.





With a sixth position, Geneese and Wyoming obtained an interesting result. This company is a newcomer from the USA and acquired the English Freightliner in 2015. Freightliner was in a strategy of development, on the British market, in competition with DB Schenker UK, which bought EWS Railway in 2007, but also in Poland with Freightliner Poland and in The Netherlands with the acquisition of the Dutch ERS Railway in 2013.

Another interesting player is Europorte at the eleventh position. The French group started to operate in 2005 from the Channel tunnel with a strong strategy of external development by acquisition (Veolia Cargo in 2009, GB Railfreight in 2010). It is not only present in the block train market, but also on the market of the single wagon, for instance for traffic of cereals in France (Charlier, 2013).

Finally, in the last position, Holding Exploris is a new alliance (2014), based in Luxembourg, grouping eleven companies, of which six are rail freight operators. Operators are mainly German and Polish (HSL Logistik, Delta Rail and Via Cargo). The other participants are a recruitment company, a maintenance company and three trading companies. The goal is to reach a critical mass and to develop a European network through a flexible organization. Like Geneese and Wyoming and Europorte, this alliance is interesting to follow as a potential business model for other small operators against the majors.

From this top 20, a short comparison to the American market can be made. In the USA, there are seven companies whose turnover is bigger than €400 million in 2014 (called "Class 1"). Applied to the top 20, there are nine equivalent companies. The comparison is obviously limited according to the different market structures, but it can be a first indicator of possible concentration on the Western-European rail freight market.

3.1.3. Loose oligopoly and moderate concentration on the market

The level of concentration is measured by the CR4 and the HHI based on freight ton-kms for a restricted panel of 31 operators in 2014 (Laroche et al, *2017a*). The companies are ranked according to decreasing ton-kms in table 3.





TABLE 3. TOP 20 ACTIVE OPERATORS ON THE WESTERN-EUROPEAN MARKET ACCORDING TO FREIGHT TON-KMS (2014)

Rank	Company	Ton-kms	Market share
1	DB Schenker Rail	109,200,000,000	31,35%
2	Rail Cargo	29,000,000,000	8,33%
3	PKP cargo	28,520,000,000	8,19%
4	SNCF Geodis	28,500,000,000	8,18%
5	Trenitalia cargo	14,694,000,000	4,22%
6	SBB Cargo	12,317,000,000	3,54%
7	Green Cargo	11,100,000,000	3,19%
8	GeneeseandWyoming	11,000,000,000	3,16%
9	RENFE Mercancias	7,556,500,000	2,17%
10	Europorte	5,241,000,000	1,50%
11	B logistics	5,000,000,000	1,44%
12	Rhein Cargo	4,190,000,000	1,20%
13	BLS Cargo	3,492,000,000	1,00%
14	Lotos Kolej	2,374,738,596	0,68%
15	CP Carga	2,114,000,000	0,61%
16	Cargo Net	1,877,000,000	0,54%
17	Rurtalbahn Cargo	1,700,000,000	0,49%
18	CTL Logistics	1,520,900,000	0,44%
19	Direct Rail Services	1,341,000,000	0,39%
20	Verkehrsbetriebe Peine - Salzgitter	1,030,000,000	0,30%

SOURCE: OWN COMPOSITION

The top 10 in ton-kms is similar to the top 10 according to the turnover. The rest is different, mainly because data are less available for freight ton-kms than for turnover.

The first analysis according to the market shares confirms the strong advance of DB Schenker on other players (31%). There is a net difference between the first four operators and the others (market share <10%).

The calculated CR4 is 56%. It shows a risk of overconcentration between the first four operators and highlights the existence of a loose oligopoly. The literature (Shepherd, 1999; Martin, 2002) defines 60% as a threshold step between a loose oligopoly with moderate risks of collusion and a tight oligopoly with high risks of collusion. However, this result hides a strong inequality between the first and the other players in the top 4. In any case, the Western-European market is in the red with a risk of overconcentration and abuse of the dominant position by the leader.

In spite of a risk of overconcentration in the top 4, the Herfindahl – Hirschmann Index (HHI) gives moderate concentration on the market (1,250), as the threshold for high concentration is 1,800. This result is coherent with previous observations. There are few major operators able to operate on the entire market. The result is a risk of overconcentration between them in spite of some outsiders (Geneese and Wyoming, Europorte, etc.). Nevertheless, there are a lot of regional and national operators, and hence moderate concentration on the market.

Finally, the number equivalent can be calculated from the HHI. It is an inverse measure of concentration useful to assess the number of effective competitors on the market (Sys, 2010). The





minimum value occurs when NE = 1 and this corresponds to the case of a dominant firm, while the maximum value is NE = N, corresponding to the case of N equal-sized firms (Lipczynski et al., 2013). Thus, the competition can be analyzed for the first eight operators on the panel according to the result of the equivalent number. This result confirms the relevance of the panel and the analysis.

At this de to be be be be be

However, this analysis is limited by three constraints. Firstly, data are not available for all firms. Only the CR4 and the HHI can be calculated because they only need data from the biggest firms, while other indicators need data for all firms. Secondly, data are limited to the freight ton-kms. Turnover cannot be used because there are no official aggregated data for the industry, while it is possible to have official aggregated data in freight ton-kms. Freight ton-kms are restricted to 31 operators but they represent 81% of the market scope and can be considered representative.

To summarize, the Western-European rail freight market can be evaluated by the analysis of the top 8. The CR4 shows the existence of an oligopoly with a risk of overconcentration between the first four operators, while the HHI shows a moderate concentration in spite of the high number of competitors on the market. There are two market levels: an international level with a concentrated number of players able to operate on different segments of the market and everywhere, and a local/regional level with a high number of players most often specialized in a specific market (niche market, single wagon, etc.). The degree of competition cannot be calculated, but it can be assumed that the degree of competition is high between major operators of international traffic, while it is lower for local/regional operators due to local specificities (niche market, single wagon, etc.).

3.2. The persistence of profit analysis: identifying the strategy of companies by their profit

This section gives a dynamic picture of competition on the market through the indicator of POP. It is commonly used in industrial economics to measure the degree of competition and the level of barriers on the market (Mueller, 1977, 1986, 1990; Lipczynski et al., 2013; Sys, 2010, 2013, Laroche et al., 2017b) over time. Moreover, it can be calculated with simple data in comparison to other indicators like the Panzar-Rosse model or the Boone indicator, the data needs of which are most often unachievable for the rail freight market. Sub-section 3.2.1 presents the test panel and sub-section 3.2.2 the results.

3.2.1. The test panel

The panel is composed of 24 active rail freight operators on the European market (see Table 4). They represent in terms of turnover 56% of the market. Only independent active operators are taken into account (no subsidiaries).

Data is collected for turnover (in \in) and EBITDA to calculate the profit rate in the period between 2006 and 2014.

The source is the European database Amadeus, which contains comprehensive information on around 21 million companies across Europe. These are mainly financial and aggregated. The latter can be a drawback for the railway market, where the operators often have different activities integrated in the same company (infrastructure, freight/passengers services). In this way, the panel is formed only by operators whose primary activity is rail freight transport according to the database.

Hence, the lack of data in the time series and the difficulties to identify the different activities of some integrated operators are the two main reasons for the selection of only 24 active rail freight operators on a total of 169 on the Western-European market.





belspc

3.2.2. Results: firm strategies, niche market and dominant position

This section paints a dynamic picture of competition on the market through the persistence of profit (POP) indicator. POP is commonly used in industrial economics to measure the degree of competition and number of barriers on the market over time (Mueller, 1977, 1986, 1990; Lipczynski et al., 2013; Sys, 2010, 2013). Moreover, it can be calculated with simple data in comparison to other indicators like the Panzar-Rosse model or the Boone indicator, the data needs of which are often unachievable for the rail freight market.

Table 5 ranks in descending order the results of the POP analysis according to the short run persistence (λ_i). The results for the industry (average of all firms) show in the short run a good level of competition but persistence of barriers in the long run. Results can be read according to the following table.

Short-term per	Degree of competition	Barriers to entry	
λ_i		_	
1 0	TT' . 1.	N	
$\lambda_i = 0$	No association between $\pi_{i,t-1}^s$ and $\pi_{i,t}^s$	High	NO
	If $\pi_{i,t-1}^s$ is above (below) zero, it is likely that $\pi_{i,t}^s$ will also be above		
$0 < \lambda_i < 1$	(below)	Low	Yes
	Positive association between $\pi_{i,t-1}^s$ and $\pi_{i,t}^s$		
Long-term per	sistence		
$lpha_i$			
Positive			
Negative			
$\pi^{s}_{i,t-1}$			
$\pi^s_{i,t-1} = 0$	Convergence between all firms' profit rates in the long term	High	No/Limited
$\pi^{s}_{i,t-1} eq 0$	No convergence and different profit rates in the long term	Low	Yes

TABLE 4. INTERPRETATION OF PERSISTENCE OF PROFIT

SOURCE: SYS, 2010 BASED ON MUELLER, 1977





TABLE 5. RESULTS FOR POP ANALYSIS BY FIRM BETWEEN 2006 – 2014

Rank	Company	λ_{i}	$lpha_i$	$\pi^s_{i,t-1}$
	Continental rail	0,91801	-0,01229	-0,14984
	Floyd	0,84311	-0,02548	-0,16239
	Magyar	0,58187	0,01970	0,04711
4	PKP Cargo	0,48928	0,01291	0,02528
	Comsa	0,43091	0,04519	0,07942
	Hector Rail	0,38540	0,06339	0,10315
	Inrail	0,34016	-0,08323	-0,12613
2	Rail Cargo	0,29960	-0,05662	-0,08084
6	Geneese&Wyoming	0,22736	0,01922	0,02487
17	BLS Cargo	0,19417	0,002	0,00248
18	Verkehrsbetriebe Peine - Salzgitter	0,18832	0,00572	0,00705
11	Europorte	0,18320	-0,14306	-0,17514
1	DB Schenker	0,14811	-0,00718	-0,00843
10	Hupac	0,13858	0,03281	0,03808
	Rail Traction	0,12600	-0,02599	-0,02973
	Direct Rail	0,11927	0,04394	0,04989
	Mendip Rail	0,01304	-0,048	-0,04863
9	Green Cargo	-0,02705	-0,01222	-0,01190
	RDT13	-0,07839	-0,05368	-0,04978
	Lokomotion	-0,10123	-0,02056	-0,01867
	Crossrail	-0,10799	-0,04417	-0,03987
19	LKAB	-0,18207	0,2951	0,24965
5	SBB Cargo	-0,28508	-0,03918	-0,03049
	Acciona	-0,58215	0,04057	0,02564
	Average	0,17760	0,00037	-0,01163

SOURCE: OWN COMPOSITION

Results in the short run persistence (λ_i)

In the short run, the variable λ_i equals 0.177. It is lower than for the other industries, which are often between 0.4 and 0.5, according to Lipczynski et al. (2013). This is a sign of an erosion of the high profits from one year to another year and the entry of newcomers (Goddard & Wilson, 1996). Moreover, the obtained result is close to that of the container liner shipping industry. Sys (2010) finds a value of λ_i of 0.19775 and concludes on a "relatively low persistence of profit" in comparison to other industries.

Having a look at firm level, the results are strongly heterogeneous with a positive POP for 72% of the operators, varying between 0.91 (Continental rail) and -0.58 (Acciona). However, the biggest operators on the European market, namely DB Schenker (0.14), Rail Cargo (0.29) or PKP Cargo (0.48), have a low to moderate persistence. A low persistence of profit for the biggest operators can be interpreted as a strategy to keep their dominant position (Sys, 2010), while a high persistence of profit for newcomers can be a sign of niche strategy (e.g. companies like Hector Rail, Continental Rail).

In general, the low persistence of profit in the short run shows that there are entries and competition in the market even if many operators are positioned in a niche market.



Results in the long run (α_i)

In the long run, the results are less optimistic with a negative α_i for 54 % of the operators and a low convergence of standardized profit rate between all firms ($\pi_{i,r-1}^s = -0.011$).

The negative persistence of profits can be interpreted as an aggressive strategy due to a high level of competition or a lack of efficiency comparing to the other firms. The firms can try to keep their profit rate just below the norm to challenge other companies. In this way, the biggest operator, DB Schenker, can be ranked in this category. Figure 5 shows how the company changed strategy between 2006 and 2009, with its acquisition of Railion. It depicts the POP of DB Schenker with the average standardized POP of all companies.



FIGURE 6. POP FOR DB SCHENKER AND EUROPORTE BETWEEN 2006 - 2014

SOURCE: OWN COMPOSITION

The vertical axis of figure 5 refers to the percentage of difference between the average profit for all firms during the year and the company; while the horizontal axis corresponds with the difference from the previous year. From figure 5, it is clear both companies employ different strategies. The incumbent, DB Schenker, shifted from a positive POP (first quadrant) to a negative POP and remained just below the norm (third quadrant). Its POP was 5% higher than the rest of the industry in 2006 and lower than 2% in 2014. Sys (2010) found that the main operators on the containership market used a similar strategy to maintain their market shares in the face of competition. Europorte, on the other hand, is a newcomer. Europorte entered the market between France and the UK in 2005 through the





Channel Tunnel. Its POP was negative between 2006 and 2014 because of an aggressive strategy to increase its market share, resulting in high losses to enter the market. Europorte bought part of Veolia Cargo in 2009 and GB Railfreight in 2010 in order to achieve a critical mass. Negotiations are currently in progress between Europorte and Hector Rail (Swedish group) to sell the latter GB Railfreight.

In sum, this section demonstrates the existence of competition on the European rail freight market. Nevertheless, some aspects require further analysis, such as:

- The heterogeneity of companies' strategies for maintaining high profit in the short term (λ_i > 0);
- The trend towards a movement of consolidation on the market because of the negative persistence of profit in the long term ($\alpha_i < 0$);
- Imperfect long-term convergence among companies as a sign of remaining barriers ($\pi_{i,t-1}^s \neq 0$).

3.3. Competition and consolidation on the European market

This last section discuss the dynamics of the market in terms of competition and consolidation strategies. Sub-section 3.3.1 is dedicated to a further analysis of the POP results, while sub-section 3.3.2 describes the movement of consolidation on the market.

3.3.1. Heterogeneous paths in pop and strategies: diferentiation

A combined analysis allows us to consider firms' paths over time. The results are summarized in table 5. We included 24 operators, in line with the panel used for the POP analysis, and classified them according to their POP path. For example, an operator whose persistence of profit was below the norm in 2006 and above the norm in 2014 was classified in the quadrant "persistence of profit BELOW the norm towards ABOVE".

Furthermore, the operators were characterized by a number of key factors, such as date of creation, which allowed us to separate the incumbents from newcomers; type of activity, to determine their market; acquisition strategy; average C/L ratio (between 2007 and 2014); and finally, ton-kms, where possible, to gain an idea of the size of the company.



TABLE 6. SYNTHESIS OF POP EVOLUTION COMPARED TO THE NORM AND THE AVERAGE C/L RATIO FOR EACH FIRM BETWEEN 2006 AND 2014

Persistence of profit ABOVE the norm towards BELOW				Persistence of pro	fit ABOVE	the norm					
Name	Country	Creation	Activity	Acquisition	Ton-kms (2014)	Name	Country	Creation	Activity	Acquisition	Ton-kms (2014)
Green Cargo	SE	1856	Diverse	PostNord	11 000 000 000	LKAB	SE	1903	Iron	-	-
DB Schenker	DE	1994	Diverse	Multiple	109 000 000 000	BLS Cargo	СН	1941	Diverse	-	3 492 000 000
Floyd	HU	2004	Diverse	-	-	Hupac	СН	1967	Combined	-	-
						Direct rail Service	UK	1995	Nuclear	-	1 341 000 000
						Freightliner	UK	1995	Diverse	ERS Railway	11 000 000 000
						Magyar	HU	2003	Diverse	-	500 000 000
						Hector Rail	SE	2004	Diverse	-	-
						Continental	ES	2007	Diverse	-	-
Persistence of	f profit BE	LOW the I	norm			Persistence of pro	fit BELOW	the norm	towards A	BOVE	
Name	Country	Creation	Activity	Acquisition	Ton-kms (2014)	Name	Country	Creation	Activity	Acquisition	Ton-kms (2014)
RDT 13	FR	1920	Diverse	-	-	SBB Cargo	CH	1902	Diverse	-	12 317 000 000
Rail Cargo	AU	1923	Diverse	Multiple	29 000 000 000	PKP Cargo	PL	1918	Diverse	-	28 520 000 000
Mendip Rail	UK	1993	Granulate	-	-	VPS	DE	1971	Diverse	-	1 030 000 000
Crossrail	BE	2000	Combined	DLC	-	Comsa	ES	2007	Diverse	-	1 023 000 000
Lokomotion	DE	2000	Diverse	-	-						
Rail Traction	IT	2001	Combined	-	-						
Europorte	FR	2005	Diverse	Multiple	5 241 000 000						
Acciona Rail	ES	2007	Heavy	-	-						
Inrail	IT	2009	Diverse	-	-						

SOURCE: OWN COMPOSITION

The results allow making three general comments. First, analysing the distribution of companies by date of creation shows that newcomers are often below the norm and incumbents often above the norm. There are some exceptions, such as Continental and Hector Rail among the newcomers or DB Schenker and Rail Cargo among the incumbents. This finding can be related to the fact that several of the operators are subsidiaries of national, state-owned companies and, as such, might benefit from hidden cross-subsidy or sharing of overheads. Secondly, most companies which made an acquisition after 2006 have a POP below the norm, except for Freightliner, which bought ERS Railway in 2013. Finally, no differences were found based on type of activity (diverse/specialised) and insufficient data was available to identify any differences on the basis of company size.

From these observations, the following paths for operators can be identified:

- A POP below the norm and low/moderate economies of scale are signs of a competitive market in which products are standardised and the market is open. For incumbents, like Rail Cargo and DB Schenker, a POP below the norm may indicate price moderation and acquisitions intended to increase their market power. For newcomers, however, this situation reflects the difficulties of establishing their business model on the rail freight market (Crossrail, Inrail). Competition is intense, both with incumbents and with other modes of transport, and compels them to identify means of reducing the cost of their asset basis towards leasing, external maintenance or standardisation of their rolling stock (low-cost model).
- At the opposite end of the scale, operators with a POP above the norm are mostly positioned in niche markets, according to their moderate/high economies of scale. This is obvious for incumbents like BLS Cargo, LKAB and Hupac, as well as for newcomers like Hector Rail and Continental. They are active in markets with specific localisations (BLS Cargo), specific products (Hupac, Hector Rail, Continental) or both (LKAB).

To summarise, the results show that competition is active on the rail freight market, despite the nonevidence of effects of liberalisation at aggregate level described in Section 2.2. Operators develop strategies for differentiation (product/localisation) or low-cost models to increase their advantage or





their market power. Nevertheless, when faced with the opening of the European market and the entry of newcomers, firms inevitably need to address the question of market consolidation.

3.3.2. Maturity and consolidation on the European market

The results of the POP analysis show that more than 50% of the firms in our panel have a negative POP in the long term (lower than the average of all firms). This can be interpreted as a sign of future market concentration through a consolidation movement.

It is possible to anticipate this movement to some extent, because more than 50% of the active operators on the Western European market started to operate after 1990. Figure 6 shows the period of creation for operators active on the Western European market in 2014. Obviously, operators from the last decade are over-represented because only entries on the market and successful operation until 2014 are taken into account. However, Figure 6 distinguishes among three periods. It starts with a first period (1850-1940) of active competition in Europe and a process of concentration around certain national operators, which eventually became the national monopolies and are now the incumbents. A second period begins after World War II and can be considered the Golden Age of monopolies in Europe: from 1950 to 1990. The third period sees the renewal of rail freight competition under the influence of the European Commission and certain countries such as Sweden, the UK and Germany from 1990 to 2014. The pinnacle of creation seems to have been reached in the decade 2000-2010 following European liberalization and the economic crisis. The rhythm of creation has been decreasing since 2010, with an average of 4.5 newcomers per year compared to 6.7 between 2000 and 2010.



FIGURE 7: PERIOD OF CREATION OF OPERATORS ACTIVE ON THE WESTERN EUROPEAN RAIL FREIGHT MARKET IN 2014

SOURCE: OWN COMPOSITION

Viewed in this way, the majority of rail freight operators are new and a movement of consolidation on the market seems inevitable. In fact, we might say that it has already begun, given the series of acquisitions made since 2000 by incumbents or newcomers and an alliance formed among small operators. Three examples will be addressed. The former case is the acquisition strategy used by DB Schenker, which bought the Dutch incumbent (NS Cargo) in 2000, the Danish incumbent (DSB Gods) in 2001 and the British leader (EWS Railway) in 2007. DB Schenker has also become a shareholder of several companies, such as Transfesa (2007) and BLS Cargo (2008). In 2014, the group held a 30% share of the Western European market and had a significant, dominant position. The second example is Europorte, which began to operate through the Channel Tunnel (France) in 2005. It bought the French newcomer Veolia Cargo France in 2009 and the British newcomer GB Railfreight in 2010. By



2014, Europorte had climbed from zero to the 11th position in terms of turnover, surpassing both RENFE Mercancias and CFL Cargo.

The third and final example is Holding Exploris, an alliance between eleven firms. Six of these firms are rail freight operators, three are trading companies, one is a recruitment company and another one is a maintenance company. This alliance, founded in 2014, could become an alternative model for small operators to compete with the big players. Thus, market consolidation is already a fact and raises important questions about the level of concentration.





belspc

4. SCENARIO ANALYSIS: WHICH LIKELIHOOD TO REACH A MONOPOLY OR DUOPOLY ON THE BELGIAN MARKET?

This last section discusses the likelihood to reach the situation of high concentration and low competition on the Belgian market, as described by the worst scenario. Section 4.1 interprets the scenario according to the current situation on the European market as presented in part 3. Section 4.2 calculates the economies of scale in the rail freight industry to assess the structural risk of overconcentration. To finish, section 4.3 highlights the necessity to consider different market scales in case of concentration to implement the best solutions.

4.1. Scenario analysis: a pessimistic outlook of the Belgian rail freight market

The worst scenario is based on the assumption that the improvement for road transportation by 2030 will be better and faster than for rail. Table 6 shows that it is right for the different parameters of the scenario. From an environmental point of view, the reduction in terms of emissions and energy consumption should be faster for road than for rail. It can be due to the strict regulation applied by the European Commission (Euro norm 4/5/6) and mainly to the necessity for the road industry to reduce cost in terms of energy. From an economic and social point of view, the operational costs increase by 20% for rail while they decrease by 10% for road. This divergence digs the gap of competitiveness between road and rail. To finish, the scenario makes the assumption of a low public regulation in terms of taxes with the absence of extra taxes for road transportation.

The result is a low increase for rail transportation in terms of volume (+10%) and a loose in terms of competitiveness in comparison to the other transportation modes. Consequently, the attractiveness of the rail industry is degraded and the scenario forecasts an overconcentration of the players on the national market around one or two big players. This scenario has been validated by the sector during the WP 1. Also, it is in line with the study from Gevaers et al. (2015) who highlights for the Belgian market a risk of over concentration by 2030.

PARAMETERS	MODE	S1 – BEST	S2 – WORST
Transport orginal	Rail	-40%	-10%
Transport emissions	Road	-20%	-40%
Enorgy consumption	Rail	-20%	-10%
Energy consumption	Road	-10%	-30%
Infrastructure and maintenance	Rail	-20%	+10%
costs	Road	-10%	+10%
	Rail	-30%	-10%
Noise exposure	Road	-30%	-40%
Operational secto	Rail	-30%	+20%
Operational costs	Road	-10%	-10%
Independent operators	10	2	
Rail ton-kms	+133%	+10%	
Road taxes	+20%	0%	

TABLE 7. SYNTHESIS OF THE WORST SCENARIO IN COMPARISON TO THE BEST SCENARIO BY 2030

SOURCE: OWN COMPOSITION

To continue, it is interesting to compare the outlooks of the scenario to the current situation. A first finding is the difference between the best scenario, analyzed in Deliverable 5.2, and the worst scenario from the reality. The best scenario could be qualified as 'optimistic' with the question of how to reach the ambitious target to improve rail, while the worst scenario can be qualified as





'pessimistic' or 'realistic', considering that road has a structural advantage on rail in terms of flexibility, costs and interoperability.

This approach is closed to the report published by the European Court of Auditors (2016) on the rail freight sector. The report describes an industry limited by the persistence of strong and costly barriers on the European market. The average speed for the international rail freight traffic is 18km/h, there are still deep differences between national rules and the quality of infrastructures is often poor by lack of investments (ECA, 2016).

Linked to the worst scenario, these findings can justify the bad results for rail by 2030 and make that scenario realistic.

Last, the overview of the market share held by each national incumbent confirms the realism of the scenario. Figure 7 shows that in 2014, most operators are in a situation of dominant position with an average market of 70%. Nevertheless, there are some strong differences between for instance Sweden or Great Britain on the one hand, where the incumbent hold less than 50% of the market, and Belgium or Portugal on the other hand, where the incumbents hold more than 80%.



FIGURE 8. AGGREGATE MARKET OF NEW OPERATORS IN EACH EUROPEAN COUNTRY

SOURCE: EUROSTAT, 2016

Sweden and the UK can be distinguished from the others by a higher percentage of market share for newcomers (> 50%). This situation is explained by their active competition policy on the market during the last 20 years (rationalization and privatization). Nevertheless, data available for the UK show a duopoly between the incumbent (EWS Railway), bought by DB Schenker in 2007, and the Freightliner group, bought by Geneese and Wyoming in 2015. This duopoly is reducing since 2007 with the development of GB Railfreight since 2010 (bought by Europorte). The latter's market share increased from 4% in 2007 to 13% in 2014, while DB Schenker lost market share (from 58% in 2007 to 47% in 2014) and Freightliner kept a stable position in the market (34% in both years).

To conclude, the European market remains concentrated at a national level and it can be a source of perception bias in the European analysis. Considering this statement, one question is remains: is there a natural tendency to the monopoly in the rail industry? The answer follows in the next section.



4.2. Industrial organization: is there a natural tendency to a monopoly or duopoly?

A monopoly or duopoly can be due to large sunk costs for the players and high economies of scale. In this section, the economies of scale are calculated through the capital-labor ratio for a panel of railway undertakings between 2007 and 2014. Sub-section 4.2.1 is dedicated to the test panel, after which results are presented in sub-section 4.2.2.

4.2.1. The test panel

The data was collected from the European database Amadeus, providing time series per firm for the 2007-2014 period.

The data panel is limited to 34 active operators on the European rail freight market. Operators are split in two groups in table 7: incumbents and newcomers according to the date of liberalization on their national market. The panel represents €7.9 billion of turnover, representing 53% of the total turnover for the industry (€15 billion).

List of incumbents	Country	Year	List of newcomers	Country	Year
BLS Cargo	СН	1941	Compagnia Ferroviari	IT	2009
CFL Cargo	LU	1946	Comsa	ES	2008
CP Carga	PT	1951	Continental Rail	ES	2007
DB Schenker	DE	1994	Crossrail	CH/BE	2000
Green Cargo	SE	1856	Direct Rail Service	UK	1995
Нирас	СН	1967	Europorte	FR	2005
Rail Cargo	AU	1923	Floyd	HU	2004
RBH Logistics	DE	1913	Hector Rail	SE	2004
RDT 13	FR	1920	Inrail	IT	2009
SBB Cargo	СН	1902	ISC	IT	2009
Verkehrsbetriebe Peine -	DE	1971	Logitren	ES	2008
Salzgitter	DE	1910	Lokomotion	DE	2000
Wanne-Herner Eisenbahn und	UK	1995	Magyar Magánvasút	HU	2003
Hafen			Mendip Rail	UK	1993
Freightliner (Geneese & Wyoming)			Pressnitztalbahn	DE	2000
			Rail Traction Company	IT	2001
			Railtraxx	BE	2009
			Rushrail	SE	2010
			Takargo	PT	2006
			Traccion Rail	ES	2008
			Wiener Lokalbahnen Cargo	AU	2007

TABLE 8. PANEL OF ACTIVE OPERATORS FOR C/L RATIO

Source: Own composition

It is completed by a test panel of 6 Belgian firms proposed by Meersman et al. (2011) to give markers as high ratio (Luminus, BASF), moderate ratio (Arcelor Mittal, Coca Cola) and low ratio (Cordeel Temse, Aviapartner).

4.2.2. Results: moderate economies of scale and persistence of barriers

The level of economies of scale is a good indicator to know more about the barriers and the sunk cost to entry on a market.



Figure 8 shows that the rail freight industry is close to an industry with moderate economies of scale according to the test panel (between 0.2 and 0.4). Due to their larger size and to the composition of their assets, incumbents have higher economies of scale in comparison to newcomers.



FIGURE 9. AVERAGE RATIO CAPITAL COST ON LABOR COST FOR THE RAIL FREIGHT INDUSTRY

SOURCE: OWN COMPOSITION

From a market point of view, most incumbents own their rolling stock and supply the maintenance, while newcomers use leasing and outsource the maintenance to reduce fixed costs. Nevertheless, an inflexion in the curve for incumbents in 2007 suggests that they are moving towards a rationalization of their productive model for more flexibility.

The market for leasing of rolling stock has strongly evolved during the last decade in Europe with an increase of the fleet by a transfer from incumbents to new companies specialized in the management of wagons and locomotives fleets (Vierth, 2011; Woodburn, 2014). Rail Cargo created in 2000 a leasing company to manage its fleet of wagons and locomotives (Rail Cargo Wagon). Maintenance is also provided, and in 2015, more than 30,000 wagons were managed by the company. The same process has been followed by SNCF-Geodis, which became shareholder at 100% in 2010 of the leasing company Ermewa (45,000 wagons and 320 locomotives), or DB Schenker with a renting service for professionals. Furthermore, the equipment industry is also involved in this new market with renting and maintenance as proposed by Siemens, which opened a new service center for locomotives in Munich in 2015, or Alstom, which offers contracts for maintenance.

Thus, the market moved from an internalized and opaque management to an outsourced and contractual management of assets for more flexibility and, consequently, better opportunities for newcomers to enter the market.

From a network point of view, the remaining of major barriers can explain the persistence of moderate economies of scale. One of the biggest barriers for international traffic is the lack of interoperability between networks (Vierth, 2011; Guihéry & Laroche, 2013; Crozet et al., 2014; Troch et al., 2015). In spite of the different Railway Packages from the European Commission, which tried to give common frameworks to allocate capacity or manage the infrastructure, rules and practices remain in fact diverse on each market, where network managers are considered a natural monopoly. In this way, there are different languages, signaling systems or electric voltage on the same corridors. This is a direct cause of over-cost for railway operators in terms of rolling stock and maintenance (complex locomotives) in addition to the worst reliability of travel time because of the high number of different actors to manage traffic and slots.





Consequently, if the market is evolving with new services and leasing, the incompleteness of the single European network can be a strong barrier to the development of the market and its competitiveness in comparison to road.

To conclude on the C/L ratio, results exclude a priori all possibilities to reach an overconcentration on the market in coherence with the POP analysis. Economies of scale are moderate and appear to be stable over the time period. Consequently, they are no reasons to reach a duopoly or a monopoly on the European market except if barriers (and sunk costs) are increasing. The latter can result from an incompleteness of the single network (failure of European governance) or abuses from an operator in dominant position; hence, the necessity to have a European regulation for network and market.

4.3. Recommendations: market contestability and multiple scale approach of the concentration

A paradox has been highlighted in the previous sections. The level of concentration on the European market is low/moderate because of an adequate number of competitors but it is still high on most national markets. Consequently, two questions are raised in this last section. The difference between the national and the European market should be considered as a failure of the market? How to interpret it?

Concerning the first question, the theory of market contestability (Baumol et al., 1982; Tye, 1990) says that it is not a problem to have a high concentration on a market if barriers to entry/exit are low. The risk for the dominant player to see a new player enter on the market is enough to push it toward performance and efficiency. In the case of the rail freight market, the theory can be relevant in so far the liberalization of the market and the existence of an adequate number of operators on the European market ensure contestability and competition. Nevertheless, the regulator has to be watchful concerning the goodwill of each national States to increase the contestability of their market and not reverse.

The interpretation of this fact needs to distinguish among different situations of concentration. There are at least two scenarios:

- Case 1: there is a duopoly or monopoly on the European market;
- Case 2: there is an adequate number of players on the European market but a high degree of concentration on the national market or a part of the European market.

Each case cannot be solved by the same actors and levers. Table 8 proposes a synthesis of the different action levels, authorities and levers involved in each situation.

Two cases	Concentration on the EU market	Concentration only on the Belgian market		
Action level	European problem	Belgian problem		
Problem	Industry attractiveness	Market attractiveness		
Goal	Reduce barriers	s to entry (contestability)		
Authority	European Commission	Federal State		
Authority	European Railway Agency	Regulatory agency		
	Competition policy	Competition policy		
Levers	Harmonisation/Standardisation	Infrastructure quality/pricing		
	Corridor policy	Investments (corridors)		
Tools	European observatory of the rail freight market			

TABLE 9. READING FOR SCENARIOS





SOURCE: OWN COMPOSITION

The concentration on the EU market is a global problem for the industry, which exceeds the national markets. It could be due to a lack of attractiveness from the industry and a political acquaintance in so far section 4.2 showed that there are no economic reasons to reach a monopoly or duopoly. The main authorities involved at this level would be the European Commission (EC) for the economic regulation and the European Railway Agency (ERA) for the technical regulation. The levers for the EC are the competition policy to avoid excessive mergers and the corridor policy to drive the investments on the European network. The levers from the ERA are mainly concentrated into the interoperability policy through the technical standardization and harmonization of the different rules inherited from the national networks.

As opposed to this, when concentration is identified on the national market only, it is possible to assume that it is a national problem, which has to be solved by the national authorities under control of the European authorities. The absence of competitors on a specific market can originate from a lack of attractiveness of the network or from national rules in favor of the national incumbent. In the former case, the national state can improve the network by a better management by the infrastructure manager and investments to enhance quality and pricing for access. In the latter case, the independent regulatory agency has to promote competition and control the application of the European guidelines at the national level.

Finally, in the both cases, it is important to know the market and to have enough data to control the degree of competition. Consequently, the creation of a dedicated observatory with extended databases for the European rail freight market could be an interesting tool to improve knowledge of the market and identify better its failures like the risks of dominant position or the bad willingness of some states to harmonize their rules mainly to protect their national incumbent.

In sum, it is important to highlight that there are no economic reasons to assume a monopoly or duopoly to materialize on the Belgian market, except if there would be a loss of attractiveness from the national market or a strong concentration at the European level. Nevertheless, the results from POP analysis and the theory of the contestable market show that the most important is not the effective number of players on a market but the degree of opening of the market and the degree of competition between the players, even if some of them are operating alone on specific markets.





CONCLUSION

The analysis of the competition on the European rail freight market shows active competition between firms. The demonstration and results transcend the classical analysis because of the application of new indicators for the rail freight market like the Persistence of Profit (POP) and the ratio capital cost on labor cost (C/L).

Those give positive signs of increasing competition and attractiveness on the market in spite of the non-evident impact of liberalization at an aggregate level. Operators develop strategies of differentiation and new business models based on new services such as leasing, outsourced maintenance or drivers, etc. This is an important lever to reduce sunk costs and increase the attractiveness of the market. In this way, the strong increase of the number of newcomers after the European liberalization shows that there is a market for rail freight where it is possible to make business in spite of intra-modal competition, road competition or the imperfect European single market.

Nevertheless, the indicators cannot conceal the persistence of barriers and drawbacks for the rail freight market. First of all, the ratio of capital cost on labour cost confirms the existence of barriers, which increase the price for newcomers to enter the market. Secondly, the POP analysis shows imperfect competition on the market due to an imperfect single market (barriers and segmented market). Finally, the discussion highlights a risk of concentration around a tight oligopoly and a dominant operator at the head. Hence, the future for the rail freight market seems dark and the narrow size of the European market (€15 billion) compared to the needs in financial and political investments to complete the single market does not call for optimism.

To conclude, the results show that, in spite of efforts from the European Commission and the European Railway Agency (ERA) to harmonize rules and support technical interoperability, there is a persistence of barriers and of fragmentation on the single network. Consequences are over-costs for operators and barriers to entry between different national networks. In this way, the corridor policy (TEN-T) is a first step, but the control of the performance of network managers at European level and the harmonization of practices between them seems to be a long way with strong cultural and organizational barriers.

Applied to the worst case scenario, these conclusions highlight a risk of overconcentration on the market and slow increasing of the volume mainly because of persistence of barriers (reduction of market size and potential market) and lack of market monitoring to control alliances and mergers (dominant positions).

Some recommendations can be drawn:

- A first recommendation is related to the degree of concentration. If the degree is high, there is a risk of dominant market position and abuse. The regulator has to be careful about the degree of contestability of the market;
- A second recommendation is related to the market scope of the concentration. If the degree of concentration is high only on the national market, the actors and levers would be different from a high degree of concentration on the European market;
- A third recommendation would be to improve our knowledge of the European rail freight market. A solution can be the creation of an European observatory for the rail freight market. It could stand next to ERA.





REFERENCES

Association of American Railroads (2016) A short history of U.S. freight railroads, Association of American Railroads, Washington.

Baumol, W., Panzar, J., Willig, R. (1982), Contestable market and the theory of industry structure, Harcourt Brace Jovanovich, New York.

Bonnafous, A. and Crozet, Y. (2014), « Les indicateurs de performance du système ferroviaire français », discussion paper, International transport forum (2014-24).

Bozicnik, S., 2009. Opening the market in the rail freight sector. Built environment, 35(1), 87-106.

Cantos, P., Campos, J., 2005. Recent changes in the global rail industry: evaluating the new regulatory instruments. European Transport, 29, 22-45.

Charlier, L. (2013), « La question de l'avenir des lignes capillaires au travers de l'expérience de Bourgogne Fret Services et de ses actionnaires », La lettre ferroviaire, No. 99, pp. 13-14.

Cowie, J. (2010) "Productivity and performance in the British rail freight industry since privatization", Paper presented at the 12th World Conference on Transport Research (WCTR), Lisbon, 11-15 July 2010.

Crozet, Y., Haucap, J., Pagel, B., Musso, A., Van de Voorde, E., Vanelslander, T., Woodburn, A. (2014), "Development of rail freight in Europe: what regulation can and cannot do?", Discussion paper, Centre on regulation in Europe.

European Commission (2012), "Directive 2012/34/EU of the European parliament and of the council of 21 November 2012 establishing a single European railway area (recast)", Official journal of the European Union, 2012/34/EU, L 343/32.

European Commission (2013), "Regulation (EU) No 1316/2013 of the European parliament and of the council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010", Official journal of the European Union, No 1316/2013, L. 348/129.

European Commission (2004) "Council regulation No 139/2004 of 20 January 2004 on the control of concentrations between undertakings", Official journal of the European Union, 139/2004, L24/1.

European Court of Auditors (2016), Rail freight transport in the EU: still not on the right track, Publications Office of the European Union, n°8, Luxembourg.

Eurostat (2016), EU transport in figures: Statistical pocketbook, Publications Office of the European Union, Luxembourg.

Gevaers, R., Maes, J., Van de Voorde, E., Vanelslander, T. (2015) "Incumbents and new entrants in European rail freight", in Finger M. & Messulam P., Edward Elgar Publishing (ed) Rail economics, Policy and Regulation in Europe.

Goddard, J.A., Wilson, J.O.S. (1996) "Persistence of profits for UK manufacturing and service sector firms", The Service Industries Journal, 16(2), pp. 105-117.





Guihery, L. and Laroche, F. (2013), "European Rail Traffic Management System (ERTMS): Supporting competition on the European rail network?", Research in Transportation Business and Management, Vol. 6, pp. 81-87.

IATA (2016) Air passenger market analysis: a bright start to 2016 for air passenger traffic, International Air Transport Association, Montréal.

Laroche F., C. Sys, T. Vanelslander, E. Van de Voorde (2017a). Does competition on the European rail freight market move towards an oligopoly?, International Journal of Transport Economics, forthcoming.

Laroche F., C. Sys, T. Vanelslander, E. Van de Voorde (2017b). Imperfect competition in a network industry: The case of the European rail freight market. Transport Policy, 58, 53-61.

Laroche, F., Sys, C., Troch, F., Vanelslander, T. (2016) "Which regulation for which rail freight market structure in Europe? The Belgium case study". Paper presented at the 4th Research Seminar on railway Policy, Karlsruhe, 11 March 2016.

Lipczynski, J., Wilson, J., Goddard, J. (2013), Industrial organization: competition, strategy and policy, Pearson, 4th edition.

Martin, S. (2002), Industrial economics, economic analysis and public policy, Blackwell publishing company, Oxford.

Meersman, H., Pauwels, T., Struyf, E., Van de Voorde, E., Vanelslander, T. (2011) "Ground handling in a changing market. The case of Brussels Airport", Research in Transportation Business & Management, 1 (1), pp. 128-135.

Mitusch, K., Liedtke, G., Guihery, L., Bälz, D. (2014), "The structure of freight flows in Europe and its implications for EU railway freight policy", working paper, Karlsruher Institut für Technologie.

Mueller, D.C. (1977) "The persistence of profits above the norm", Economica, 44, pp. 369-380.

Mueller, D.C. (1986) Profits in the Long Run. Cambridge: Cambridge University Press.

Mueller, D.C. (1990) The Dynamics of Company Profits: an International Comparison Cambridge: Cambridge University Press.

Shepherd, W. (1999), The economics of industrial organization, Waveland Press, Illinois.

Sys, C. (2010), Inside the box: assessing the competitive conditions, the concentration and the market structure of the container liner shipping industry, Doctoral dissertation, Ghent University and University of Antwerp, Belgium.

Sys, C. (2013) "Persistence of profits in the container liner shipping industry", in Edward Eldgar Publishing (ed) Smart transport networks: market structure, sustainability and decision making, Cheltenham.

Troch, F., Sys, C., Vanelslander, T. (2016) "Opportunities and challenges for rail freight: what can bet he future added value?". Paper presented at the 4th Research Seminar on railway Policy, Karlsruhe, 11 March 2016.



Tye, W. (1990), The Theory of Contestable Markets: Applications to Regulatory and Antitrust Problems in the Rail Industry, Greenwood, New York.

Vierth, I. (2011), "15 years deregulated rail freight market – lessons from Sweden", paper presented at the European Transport Conference, 10-12 October, Glasgow.

Woodburn, A. (2014), "Development of rail freight in Europe: what regulation can and cannot do? United Kingdom case study", Discussion paper, Centre on regulation in Europe.

www.amadeus.bvdinfo.com

www.portofantwerp.com