



Open access passenger rail competition in the Czech Republic



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ABSTRACT

This paper analyses open access passenger railway competition in the Czech Republic between 2011 and 2014. This competition emerged when the major railway connection between Prague and Ostrava, which was operated only by the incumbent, was entered by two private operators, RegioJet in September 2011 and LEO Express in January 2013. Theoretical studies and experience from other countries suggest that this competition should lead to a price war, intensive market dynamics and product differentiation. The findings from the market development on the Prague–Ostrava route are broadly consistent with these predictions. The open access competition has led to an intensive price war with 2nd class tariff declines reaching 46%. Innovative marketing and selling strategies have significantly increased the spread of prices, and price discrimination and yield management techniques are used extensively. All operators has been unprofitable on the line, leading to financial stress and accusations of predatory pricing on the part of the incumbent. The quality of service on the line has increased substantially with standardisation, new on-board services and higher frequency. The average number of seats per train has declined significantly, and new operators have been able to win 55% market share from the incumbent. Service frequency is higher but is strongly concentrated during rush hours.

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1. Introduction

Open access in international passenger rail transport has been permitted in the EU since January 2010, including the right to carry domestic passengers, provided that the primary purpose is to serve international passengers and that doing so would not threaten the financial equilibrium of public service obligations (Nash, 2010). As a result, several international open access connections have emerged; however, their scale is limited and many of them are commercial brands of the national rail incumbents. In national rail passenger markets, public policy varies throughout Europe. Some countries do not allow open access at all, some do but have not seen actual entry, and in a few European countries, commercial open access has emerged (IBM, 2011). Currently, the UK, Germany, Sweden, Italy, Austria, Slovakia and the Czech Republic are the European countries with operating open access service (European Commission, 2013). There is, however, an important difference between open access entry in the UK, Germany and Sweden and open access in Italy, Austria, the Czech Republic and Slovakia. The open access entry in the UK, Germany and Sweden has taken place in niche markets, avoiding direct full-scale competition with the incumbent (Deutsche Bahn in Germany and

a franchise holder in the UK). These entries have typically been low-scale, targeting small, neglected market segments and usually competing with lower prices/lower quality strategy (Griffiths, 2009; Séguret, 2009; Fröid and Nelldal, 2015). However, recent open access entries in Austria, Italy, Slovakia and the Czech Republic have varied. In all these cases, new entrants have challenged the incumbent on the most important railway connection with the highest-density passenger flows in the country. These entries have been full-scale with intensive price competition and a clear aim of winning substantial market shares from the incumbent with lower prices and comparable/better service quality. These entries have resulted in intensive price competition and widespread accusations of responsive predatory pricing on the part of the incumbent. Because these new open access entries began recently, there is only limited and preliminary research on the impact of this new type of open access on market development (Crocco and Violi, 2013; Cascetta and Coppola, 2013; Beria et al., 2014; Bergantino et al., 2015 for Italy and Tomeš et al. (2014) for the Czech Republic).

This paper aims to enhance this knowledge, focusing on the Czech Republic, where in September 2011 and January 2013, two private operators entered the major railway connection Prague–Ostrava, once operated solely by the incumbent. At present, there is a unique situation in which three open access passenger operators compete on the same line. Because empirical evidence about the impact of open access entry on railway markets used to be scarce, simulation and theoretical studies were used to model

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them. Their results were used to assess possible impacts of open access competition on the development of railway markets in academic and political discussion. Therefore, it is important to determine whether the actual impacts of open access competition on railway markets accord with the experiences of other countries and with the predictions of theoretical and simulation studies. The paper aims to analyse the impacts of open access competition on the development of the rail market on the Prague–Ostrava line. We have concentrated on analysing price development, market share and product differentiation. The paper is organised as follows. Section 2 provides a literature review, Section 3 describes the development of competition on the Prague–Ostrava route, Section 4 analyses market development, Section 5 discusses the findings, Section 5 addresses policy implications and Section 6 presents the conclusions.

2. Literature review

Two types of open access competition can be observed in contemporary Europe. The first type is competition in niche markets, which has operated for many years in the UK and Germany. The second type is more recent; it is typically by head-on entry on the principal railway route and can be observed in Austria (2011–), the Czech Republic (2011–), Italy (2012–), Slovakia (2014–) and Sweden (2015–). In the following paragraphs, we review experience with these open access entries.

The experience in the UK is reported in Jones (2000), who states that the concept of open access competition was suppressed in the UK to avoid threatening the financial validity of franchises. The open access entry is strongly regulated, and a potential open access operator must prove that it will generate new traffic and will not only steal customers from existing franchised operators (ORR, 2011). As a result, open access competition in the UK is present on routes London–Hull, London–Bradford and London–Sunderland, linking these cities with London by direct connections that were previously lacking. The benefits of these niche market open access entries were reported as lower fares for customers (11–32%), new direct service, increased service quality (Griffiths, 2009), and higher frequency of service (Temple, 2014). The disadvantages can be identified as higher operating costs, questionable impact on revenues due to decreased fares and shorter-length trains. The share of open access competition accounts for 0.1% of passenger journeys and 0.6% of passenger revenue in Great Britain (Griffiths, 2009). Generally, open access competition in the UK has so far focused on niche markets that have been neglected by the franchise holder (Preston, 2009). However, the situation may change because the regulator ORR approved new direct services from Blackpool to London on the West Coast Main Line, to be provided starting in 2018.

Germany has a sharp division between regional and long-distance passenger transport, with the former subsidised and often tendered and the latter unsubsidised and left to open access competition. Despite the full liberalisation of long-distance rail transport, the market is dominated by Deutsche Bahn, with market share over 99% (Deville and Verduyn, 2012). From 1994 onwards, there were approximately ten entries of new operators against DB (Séguret, 2009); however, the majority failed, and only two operators are surviving in niche markets (European Commission, 2013). The reasons for unsuccessful entries of new private operators against Deutsche Bahn were suggested as high infrastructure charges (Link, 2004), hidden integration of long-distance and regional transport (Séguret, 2009) and discrimination against new operators by Deutsche Bahn (Nigrin, 2014).

Sweden has allowed commercial open access on its entire network; however, due to low commercial attractiveness, it is not

widely utilised. Open access operates only on two lines in the south of the country. Operator Öresundståg entered the Gothenburg–Malmö/Copenhagen line against the state incumbent by differentiating its product (price, comfort, frequency), and the incumbent was forced to leave this regional market (Anderson, 2012). During the competition between 2008 and 2010, the market share for trains increased from 21% to 28%, and the competition seems to have stimulated demand due to more departures and fare diversity, including many inexpensive tickets (Fröid and Byström, 2013). The second open access operator is Snälltåget, which has been serving the long-distance route Malmö–Stockholm since 2010 and in summers also Malmö–Berlin. Due to this entry, there was a sharp decline in ticket prices (Snälltåget, 2015). However, according to the European Commission (2013) Snälltåget does not have any significant impact on the Swedish rail market. The frequency of Snälltåget between Malmö and Stockholm is 1 or 2 pairs of trains per day (Snälltåget, 2015). The more dedicated head-on entry occurred in March 2015 when MTR launched its services between Stockholm and Gothenburg against the incumbent SJ, starting with four services per day and planning to increase them up to eight per day (Barrow, 2015).

Italy was the first European country to have open access entry, on the major high-speed line Milan–Firenze–Rome–Napoli in April 2012. Cascetta and Coppola (2013) stated that as a result of open access competition, prices decreased by 31% in the first year, and ridership increased significantly. Croccolo and Violi (2013) claim that the new competitor has not eroded the traffic of the incumbent; however, it generated new traffic because of reduced fares, improved quality, increased frequency and diversification of service. However, the new private competitor is still unprofitable and accuses the state incumbent Trenitalia of anticompetitive behaviour in the areas of predatory pricing and infrastructure capacity allocation (Bergantino et al., 2015).

In Austria, open access competition began in 2011 when the main railway connection Vienna–Salzburg began to be operated by the private company Westbahn alongside the state incumbent ÖBB. As a result of open access competition, there was a decline in prices and an increase in the frequency of connections (Kováčik, 2014). ÖBB reacted by responsive price cutting. The Westbahn was claiming problems with the infrastructure entrance due to vertical integration of ÖBB (Westbahn, 2013). The Czech Republic has had open access since September 2011 with two operators and since January 2013 with even three operators competing. Tomeš et al. (2014) presented the first results of the open access competition in the Czech Republic, documenting significant price declines, infrastructure capacity pressures and benefits for customers. The impact of open access competition on customers' perceptions was presented in Jade et al. (2015), and Chmelík (2015) analysed determinants of a modal split on the Czech railways routes. The impact of passenger rail liberalisation on regional transport in Central Europe was presented by Taczanowski (2015). Open access passenger rail operations in Slovakia started in December 2014, where the operators from the Czech Republic began competing against the state incumbent, effectively connecting its open access operations in the Czech Republic and Slovakia. The immediate result was a decrease in prices and increases in service quality and frequency of connections. These empirical results provide some initial experiences with the impacts of open access entry on the development of railway markets. However, these experiences are only preliminary because the head-on market entries have only operated for a few years; as a result, there could hardly be definite conclusions based on them.

Limited previous practical experience with open access entry has stimulated theoretical and simulation work designed to

predict the results of on-track competition. Preston et al. (1999) simulated possible effects of head-on competition on the busy intercity line in the UK with the aim of predicting its impact on market development. The authors analysed four possible scenarios, including cream skimming, head-on competition, product differentiation and niche entry. Their results show that the emergence of some competition was likely but would not enhance economic welfare unless it led to cost reduction and/or product differentiation. The competition was sustainable only in the case of low infrastructure charges, and the benefits to users were usually lesser than the loss of the producer's surplus. While cream skimming (duplication of only the most profitable services) resulted in a large transfer of benefits from producers to customers, operators were usually able to remain profitable. Regarding head-on competition, intensive price competition led to drastic falls in the incumbent's profits. The resulting situation benefits passengers due to higher frequency and reduced costs but is likely to lead to a price war and the final withdrawal of one competitor from the market. Consumers benefit greatly from this scenario; however, the total impact on welfare is negative. Product differentiation and/or niche market entry may be more sustainable scenarios. Johnson and Nash (2012) followed up on this study and modelled the impact of open access competition on the long-distance international route with a strong domestic market. Its result indicates that open access competition brought benefits to consumers but diminished the incumbent's profits, and moreover, it was difficult for new entrants to attain profitability unless their costs were significantly lower than those of the incumbent.

Ivaldi and Seabright (2003) constructed a theoretical model of head-on open access competition, and based on their prediction that due to the economics of density, there is a high probability of price wars to win competitors' customers because the marginal costs of additional transport are less than the average costs. This is expected to lead to unsustainable competition because unless competitors have the same cost curves, one will be forced to leave. As a result, both competitors will seek ways to soften the impacts of competition by differentiating their products (different services, non-changeable tickets, no interconnections). The incumbent is expected to resort to responsive aggressive price-cuts not only to avoid repulsing the newcomer but also to protect its connecting traffic. Railway networks with a high share of connecting traffic will therefore be prone to a stronger response from the incumbent and intensive price wars. Additionally, it is likely that the incumbent will use predatory pricing or that the newcomer will claim it as a defence against legitimate but vigorous competition.

These studies have common ground regarding merits and disadvantages of on-track competition. They predict benefits to customers in the form of lower costs, higher frequencies and better service. However, these gains are insufficient to compensate for the losses of operators (especially of the incumbent) in the form of lost profits. The economies of traffic density are diminished, and in many scenarios, on-track competition results in an unsustainable price war with the final withdrawal of one of the competitors. Additional problems include strains on infrastructure capacity and concentration on peak times and major destinations with neglect of off-peak times and smaller destinations. Based on these papers, the desirability of open access competition on railways is questioned. Specifically, these studies predict the following outcomes on the market in case of head-on competition:

- *Price competition.* The entry of a new operator triggers an intensive price war in the market. The operators are motivated to win additional passengers by means of attractive price

strategies because the cost of additional traffic (if there is available capacity) is low.

- *Market share.* The high fixed and low marginal costs give rise to economies of density in passenger railway transport. Thinner traffic flows together with falling prices are the reason for the predicted unprofitability of operations in the open access regime. The weaker operator will be forced to leave the market.
- *Product differentiation.* To escape the pressure of intensive competition, the operators will resort to product differentiation, seeking to offer various services to improve the possibility of price discrimination and to escape direct price competition from competitors.

3. Development of competition on the Prague–Ostrava line

The liberalisation of passenger railway transport in the Czech Republic used to be very slow, and until recently, the entire market was dominated by the incumbent České dráhy (ČD). This situation changed recently when two new private operators entered the Prague–Ostrava line. These entrances resulted in a unique case of open access competition among three operators. This chapter chronologically describes the gradual development of open access competition in the Czech Republic in the period 2011–2014.

3.1. Before entries of private operators

The Prague–Ostrava route is the busiest railway line in the Czech Republic with the highest density of both freight and passenger traffic (Fig. 1). Prague is the capital of and the largest city in the Czech Republic with approximately 1.4 million inhabitants, and it is an administrative, cultural and commercial centre of the country. Ostrava is the second-largest agglomeration with approximately 0.8 million inhabitants and the centre of the north-eastern industrial region, and there is extensive traffic between these two cities.

The high density of railway traffic on the Prague–Ostrava line is determined by the fact that the direct highway between Prague and Ostrava includes a long roundabout route via Brno. Therefore, the railway has a strong competitive advantage over the road on this particular line. Specifically, the length of the last bus line was 402 km, and the journey took 5 h and 20 min; in comparison, the railway route is 356 km and has a travel time of 3:05. Furthermore, frequent congestion is typical of the road highway Prague–Brno–Ostrava, and air service is marginal, which further increases the competitiveness of rail.

České dráhy is the state-owned railway incumbent operator in the Czech Republic. České dráhy was the only operator on the Prague–Ostrava line until September 2011. It operated two classes of service on this line: standard Intercity (IC) service and luxurious Supercity (SC) service. Intercity service was provided by a great number of different rolling stock and therefore was typified by uneven and unpredictable quality. In contrast, Supercity service had the fastest and most comfortable trains in the Czech Republic, and service was provided by new and standardized Pendolino trains. SC, which offered short travel times and high quality service, targeted high-income customers. Its timetable was based on regular tact intervals with almost no adjustments for peak days and hours. České dráhy did not introduce any special rates or discounts on this line, and fares were calculated according to the national tariff system. Despite the rigid approach of České dráhy to marketing and advertising, its trains on the Prague–Ostrava route were distinguished by high occupancy rates.



Fig. 1. Main railway passenger lines in the Czech Republic.
Source: own elaboration based on SŽDC map.

3.2. The entry of RegioJet and LEO express

RegioJet (RJ) is a private passenger rail operator that operates in the Czech Republic and Slovakia. The mother company of RegioJet is Student Agency, a very successful bus operator which managed – with its standardized quality and aggressive pricing – to push many small bus operators out of the market. The company currently dominates intercity bus market in the Czech Republic. However, the incumbent railway company proved a much more difficult opponent than small bus operators. The first rail service of RegioJet was launched in September 2011 with trains consisting of used carriages purchased from Austrian Railways. After being modernised, it was comparable in quality to the ČD Intercity service; however, its purchasing and operating costs remained relatively low. In response to the rigid marketing of ČD, RegioJet profiled itself as a fashionable operator, offering high quality and customer-focused service for lower prices than those set by ČD. In particular, RegioJet enhanced quality standards on the line by introducing new on-board services, such as free refreshments, silent sections and children's sections, free Wi-Fi and free seat reservations. RegioJet attracted many customers by guaranteeing a high and stable quality of on-board services, which contrasted sharply with the IC trains operated by České dráhy.

Having overcome the initial shock, ČD began to cope with the challenge by both improving service quality and setting a new tariff policy. ČD has gradually standardized the quality of IC trains, introducing silent and children's compartments and improved catering in its dining cars, and has introduced in SC service wi-fi, newspapers and refreshments, all free of charge. To ensure consistent quality of IC trains, ČD also began replacing its rolling stock. In reaction to RegioJet's yield management pricing strategy, ČD adjusted its fares in accordance with peak and off-peak demand, and its rates quickly fell by 30%. In return, RegioJet filed a complaint with the Office for Protection of Competition (UOHS), arguing that ČD had been loss making on this line even before the price decrease and that its price cutting should therefore be interpreted as predatory pricing. Based on the suspicion that ČD had allegedly abused its dominant position through predatory pricing, UOHS subsequently initiated proceedings against České dráhy in January 2012. Nevertheless, UOHS has neither delivered any decision nor taken any measures yet, stating as justification that due

to the unclear structure of ČD's costs, it is difficult to prove whether the incumbent's prices were set under operating costs. In addition to disputes over pricing, restricted approach to some essential facilities was another obstacle for RegioJet in the first months of its operation. Despite the vertical separation of infrastructure and operation in the Czech Republic, ČD remained the owner of railway stations and washing plant facilities and restricted RegioJet's access to some of them.

LEO Express is another private open-access operator that entered the Prague–Ostrava route. In contrast to RegioJet, its owner had no previous experience in transport, and the launch of LEO Express service was accompanied by a series of problems. Consequently, its startup date was repeatedly postponed, and LEO Express entered the line in January 2013 with new suburban electric multiple units utilised for long-distance service. LEO Express intensified competitive pressure by further reducing prices. Because LEO Express was the last to enter the market, it experienced difficulties, including in attracting customers on this competitive market. LEO Express was also disadvantaged by the fact that it owned only five multiple units without any operational reserves, which compared with the much bigger and flexible fleets of RegioJet and České dráhy caused problems in accommodating peak demand and resolving occasional breakdowns.

The passenger railway transport in the Czech Republic between Prague and Ostrava has undergone rapid development, which has led to a unique situation: competition of three operators on the same line, providing service without public subsidies. In addition to quality improvement and a decline in tariffs, product differentiation, innovative marketing strategies and legal disputes can be observed. There is a close connection between open access competition in the Czech Republic and emerging open access competition in Slovakia on the Žilina–Košice main route, which began in December 2014. All three Czech competitors have entered this route against the incumbent Slovak Railways, connecting its open access in the Czech Republic with the open access in Slovakia (Prague–Ostrava–Žilina–Košice).

4. Market development

Open access competition had a profound impact on the development of the passenger railway market on the Prague–Ostrava

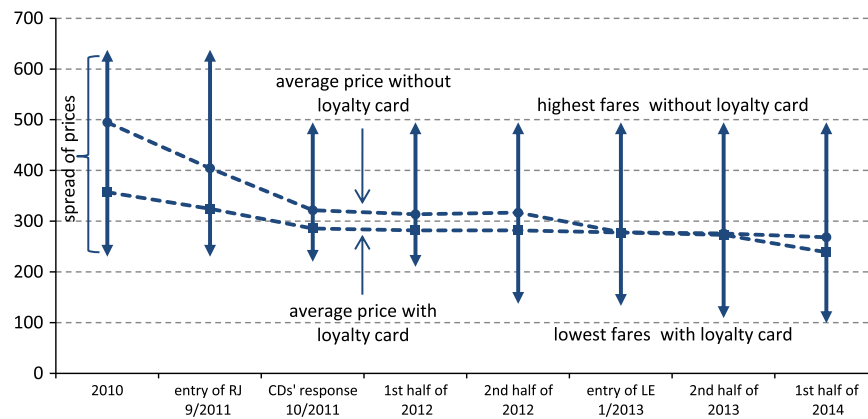


Fig. 2. Average price of basic (2nd class) one-way ticket on the Prague–Ostrava route (in CZK; weighted average of all operators).
Source: own calculation.

route. We attempted to measure and analyse this impact, concentrating on price competition, market share and product differentiation.

4.1. Methodology

Regarding price competition, we sought to calculate the impact of open access competition on the average prices for 1st and 2nd class. Because there is a plethora of tariffs, we have chosen those tariffs that were comparable for all operators and used by a majority of customers. We have chosen the 4 most common tariffs (regular fare, in-time booking, loyalty fare and in-time booking together with loyalty fare). According to our estimates, these tariffs cover approximately 85% of all the prices on the market. We then calculated the weighted average of these prices to obtain the indicator of average prices on the market. The weights were calculated as shares of used tariffs among customers.

Another task was to calculate the estimated market shares of the competitors. We began by calculating the total seat capacity on the line from timetables, average number of coaches and average seat capacity of coaches. We continued by adding the average seat occupancy for every operator. RegioJet is publishing this indicator, and it is possible to calculate it for LEO Express based on its data on total revenue and revenue per passenger kilometre. The most difficult task was calculating occupancy for ČD because it refuses to disclose these data. We were able to utilise our own customer survey for 2013 and ČD press reports to calculate these occupancies for 2010 and 2013.

Lastly, we analysed product differentiation on the line, concentrating on changes in service quality, travel times, choice of departure times and frequency of service.

4.2. Price competition

The entries of private competitors triggered an intensive price war on the Prague–Ostrava route. We collected data and calculated average prices on the market and their spreads. The average price was calculated as the weighted average of the prices of all three competitors. We distinguished prices in the 1st and 2nd classes and with and without customers' loyalty cards. We monitored the period between September 2010 and 2014, and the average price of the most common ticket (2nd class without loyalty card) fell after the entry of RegioJet from CZK¹ 495 to CZK 404, after the entry of LEO Express fell further to CZK 278, and dipped as low as CZK 268 in September 2014. Therefore, the total drop in the price

of the most common ticket between September 2011 and September 2014 was 46%. In the following graph, we document the development of average prices on the market and their spreads (Fig. 2).

A long-term decline in average prices can be observed. Operators occasionally tried to increase prices in some market segments; however, pressure from competition quickly pushed prices back down. There was a convergence of average ticket prices with and without loyalty card, perhaps because as operators faced growing competitive pressure, there was less room to offer better prices to their loyal customers. The variability of prices remained high throughout the entire period because private competitors introduced the strategy of yield management through on-line booking, and prices became more dependent on occupancy of the trains and reservation dates. There was a significantly smaller decline in prices in 1st class compared with 2nd-class tickets. First-class service constitutes approximately 15% of the capacity and 20% of the revenues of the market. However, the average price in this segment stagnated in 2011–2013 and dropped slightly in 2014. However, the spread of prices increased enormously. In September 2011, the average price in this category was CZK 748, with spread of prices from 659 to 859; however, in September 2014, the average price was CZK 643 with price spread from CZK 295 to 999. This smaller price decline (–14%) can be explained by different passengers being served by the 1st and 2nd classes. Second class is used by price-sensitive customers (typically students) who value new high-quality service; however, low price is their main priority. First class is preferred by business travellers who are more sensitive to quality and supply of additional service and less sensitive to price. Therefore, 2nd class is typified by intensive price competition, whilst 1st class is marked by competition in quality. The significant drop in prices led to problems with profitability for all three competitors. The prices on the Prague–Ostrava route fell to CZK 78 (EUR 2.8) for 100 km, which is lower than the average in the Czech Republic, and far under the levels in Western Europe. All the competitors are struggling to reach the break-even point; however, due to low ticket prices, diminished economies of density, high costs of rolling stock and increasing demand for quality on the route, it will be hard for any operator to attain profit under these conditions.

RegioJet and LEO Express have been unprofitable operating the Prague–Ostrava route, and they specified their losses in their annual reports (Table 1). České dráhy declined to officially disclose the data for the Prague–Ostrava route and claimed that they were slightly profitable on the Prague–Ostrava line; however, it is not possible to verify this claim from the annual report because ČD published data on revenues and costs for all passenger traffic in the Czech Republic without any separate specification of the

¹ Czech koruna.

Table 1
Revenue and profits of operators in 2012–2013 (in millions of CZK).
Source: own elaboration based on annual reports of ČD (2013), RegioJet (2013), and LEO Express (2013).

	2012		2013	
	Revenue	Profit	Revenue	Profit
České dráhy (ČD) ^a	19 500	–517	19 900	–1 795
RegioJet	246	–76	318	–93
LEO Express	7	–76	158	–159

^a The data for the entire Czech rail passenger network.

Prague–Ostrava line. However, it is extremely improbable that the incumbent's statement about the profitability on the Prague–Ostrava line is true. ČD has a 66% share of public subsidies in its total operating revenue and much higher unit costs than private operators; as a result, it can hardly achieve profit on this unsubsidised line when both more cost-efficient private operators are heavily unprofitable. The public claim by České dráhy is probably motivated by public relation considerations and by ongoing investigation of competition authorities regarding its predatory pricing.

4.3. Market shares

Before the entry of private operators, transport capacity on the Prague–Ostrava route comprised 23 return trains per day, consisting of 15 ČD IC trains and 8 ČD SC trains. After RegioJet entered the route, there was an upward trend in the number of trains per day, reaching 40 return trains per day in 2013. Exposed to growing competitive pressure, ČD began reducing the numbers of trains in its IC service in 2014, and therefore, the number of connections dropped slightly that year (Fig. 3).

The higher frequency of service was accompanied by a decreasing number of seats on an average train. ČD had operated long IC trains (8–12 coaches) on the Prague–Ostrava when it was the only operator. RegioJet began competing with shorter trains (3–5 coaches); however, after successfully winning customers in 2012–2014, RegioJet began adding coaches, and ČD IC service began to shorten its trains. ČD SC and LEO Express have fixed seat capacity; therefore, they cannot so flexibly react to changes in demand (Table 2).

The impact of open access on transport capacity is visible. There is more daily service; therefore, passengers have a wider choice of departure times and can choose among the services of three different operators instead of the one that previously

provided service. However, these benefits for passengers come at a price: The capacity of an average train decreased with an increase in unit costs.

Furthermore, we sought to estimate the market shares of the operators. To obtain data on the operators' performance is difficult because the operators are declining to provide information due to competitive pressure and the ongoing investigation by competition authorities. Therefore, we had to estimate market shares from total capacity and estimated average occupancy. RegioJet and LEO Express have been publishing their train occupancy rates in their annual reports, and RegioJet announced occupancy rates of 80% for 2011, 85% for 2012, and 92% for 2013. LEO Express announced 50% occupancy for 2013. ČD has not officially published its occupancy rates for 2013; therefore, we had to estimate them. Occupancy rates for ČD in 2013 were estimated on the basis of our own consumer survey and additional information on market development on the route, and we estimate that both services SC and IC have an estimated load factor of 40%. In 2010, ČD was still relatively open, and it stated (České dráhy, 2010) that the average occupancy rate of ČD SC service was 60%. The occupancy rate of ČD IC service in 2010 can be inferred from a report of the Ministry of Transport (2010) and stands at 40%. Therefore, ČD seems to have stable occupancy rates; however, it has been reducing its number of coaches and amount of service under competitive pressure. Taking together transport capacity and operators' average train occupancy rates, we estimated transported passenger-kilometres on the Prague–Ostrava route (Table 3).

Based on these estimations, we estimate that the total market on the Prague–Ostrava route grew by 40% between 2010 and 2013. The new operators were highly successful in both winning ČD customers and attracting new customers to rail transport by setting lower prices and offering better quality. These new customers were former car users and completely new travellers because bus and air transport on the line had been negligible. It is possible to calculate estimated market share from the estimated transported volumes and to compare it with market share estimations from other sources (Table 4).

The Ministry of Transport is compensating for lower tariffs for students and pensioners. Operators are required to offer these better tariffs, and the Ministry compensates them for the price difference. From the total amount of compensation, it is possible to calculate the operators' shares of the discounted tickets market, which nevertheless may not precisely reflect the entire market because of the following reasons. Firstly there is no guarantee that the share of students and pensioners is the same across all three operators. Secondly, both České dráhy and RegioJet were accused of manipulating the numbers of students and pensioners in order

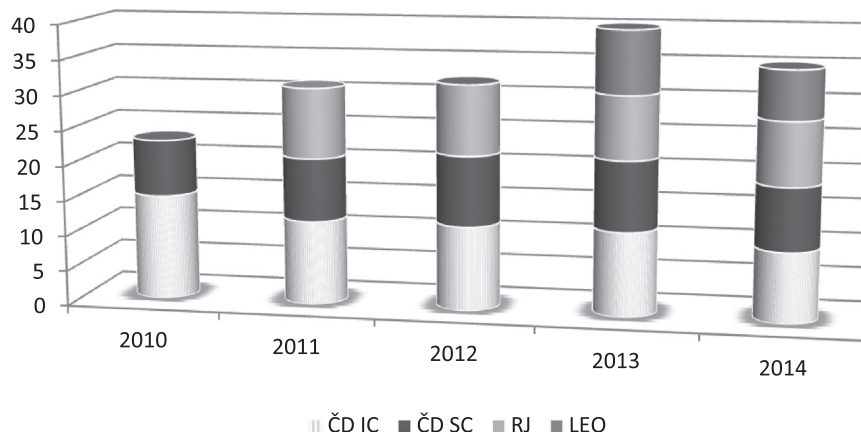


Fig. 3. Number of return trains on the Prague–Ostrava route (number of trains per day).
Source: own elaboration.

Table 2

Total capacity on the Prague–Ostrava Route.

Source: own calculations based on timetables and zelpage.cz (ŽelPage, 2015).

	2008	2009	2010	2011	2012	2013	2014
Average Number of Coaches Per Train	9.3	9.6	8.9	7.2	7.3	7.0	6.7
Average Number of Seats per Train	501	485	465	408	353	336	333
Total Daily Capacity (Number of Seats)	11,024	11,159	10,687	12,649	11,282	13,437	11,650

Table 3

Estimation of transported passenger-kilometres per day (in millions).

Source: own calculations from total capacity and average occupancy rates.

	ČD SC	ČD IC	RegioJet	LEO Express	TOTAL
2010	1.1	1.9	–	–	3.0
2013	0.7	1.2	1.6	0.7	4.2

to increase compensations. Also LEO Express published its own estimation; however, it did not include ČD IC service and may be

Table 4

Market share estimations.

Source: own; Ministry of Transport (2013); LEO Express (2013).

	ČD SC	ČD IC	RegioJet	LEO Express	TOTAL
2010 Our estimation	37%	63%	–	–	100%
2013 Our estimation	17%	28%	38%	17%	100%
Ministry of Transport	50%	–	35%	15%	100%
LEO Express	25%	–	45%	30%	100%

biased in favour of LEO Express. Thus, we believe that our estimation of market shares is the most reliable.

4.4. Product differentiation

Before private operators entered the market, service on the Prague–Ostrava route was clearly divided into two commercial categories of ČD–SC and IC service. SC service once had luxurious, fast and standardized trains targeting high-income customers, whereas IC service was offered on a plethora of different types of trains with variable quality and standards. The entrance of private operators changed the market situation completely. RegioJet positioned itself as a fashionable operator with standardized service high above the quality of ČD IC service. LEO Express, disadvantaged by being last on the market, had to offer further innovations in services, especially in marketing, catering and online reservations; however, the highly competitive and price-sensitive market forced it to essentially rely on the strategy of offering low prices. ČD had to react to the challenge of new operators and thus substantially increased the quality and standardisation of its IC service. IC service is also the only service on the route without compulsory advance seat reservations. Both private operators initially tried to compete with ČD IC service by offering higher speeds and shorter journey times (they were unable to do so against the faster ČD SC Pendolino service). However, the intensive price war and unused capacity made LEO Express reconsider its business strategy, and in 2014, the company again began calling at medium-sized stations to reach additional passengers, although this actually resulted in an increase in journey time (Table 5).

The fastest service on the route was ČD SC service, which has the advantage of tilting Pendolino trains capable of achieving higher travel speeds. The higher frequency of open access service did not influence travel times significantly because long-distance passenger trains have the highest priority in the allocation of timetable slots in the Czech Republic. However, open access competition is increasing congestion on this crucial line with

Table 5

Average journey time from Prague to Ostrava (hours).

Source: own elaboration based on timetables.

	2010	2011	2012	2013	2014
ČD SC	3:04	3:05	3:05	3:12	3:08
ČD IC	4:01	3:55	3:44	3:48	3:46
RegioJet		3:43	3:42	3:36	3:31
LEO Express				3:16	3:31

effects on the travel times of regional and freight trains (Tomeš et al., 2014). The open access competition is also affecting the timetable structure. Comparing departures from Ostrava before private operators entered the route in 2010 with the situation in 2014, a different distribution of departure times can be observed (Fig. 4). There was a significant increase in peak time departures and a reduction in off-peak times (especially reduction of night trains). The open access competition changed the structure of the timetable from former regular tact interval (introduced by the incumbent) to demand-derived timetable (induced by open access competition).

5. Discussion

The theoretical models predict a price war as a result of head-on competition with a significant decline in market price. That phenomenon occurred on the Prague–Ostrava line after the new private operators entered it. Notably, the new private operators seemed to be surprised by the swift and resolute reaction of the incumbent in improving its service and especially in reducing its prices. Both private companies have accused the incumbent of predatory pricing, but the case still has not been resolved by the competition authorities – if an affirmative decision is rendered, it could lead to legal proceedings against the incumbent. Unfortunately, being understaffed and having little experience with competition in the network industries, the competition authority is poorly equipped to resolve these cases; there is a clear need for a specialized regulator.

Theoretical studies further predict that unless competitors have the same cost structure, one of them will be forced to withdraw from the market. The present situation is such that all the operators operate at a loss, and none shows any intention of leaving the market. The incumbent, which is highly dependent on public subsidies, can hardly afford to leave the crucial railway market and disclose its weakness. The annual reports of RegioJet and LEO Express reveal that their direct costs of operation are probably covered by revenues but not costs of invested capital. However, rolling stock from Prague–Ostrava may have little alternative use; consequently, there could be significant challenges to redeploying it or selling it elsewhere. As long as operation is covering variable costs, they may have incentives to remain in business.

Another question is why new private operators on this line have chosen a strategy of head-on competition. It is noteworthy that the new private operators did not choose the strategy of

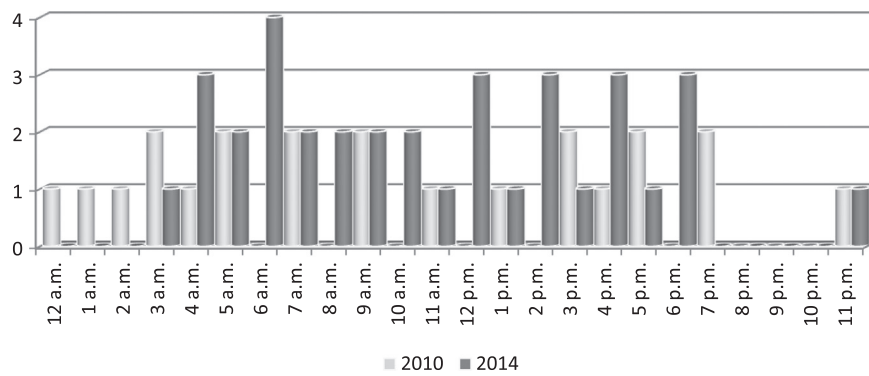


Fig. 4. Number of Passenger Trains Departing from Ostrava to Prague on Weekdays (number of trains per hour).
Source: own elaboration based on timetables.

cherry picking, duplicating only the most profitable service (rush hours, Fridays, Sundays). There are three interconnected reasons for their choice. First, it is difficult to organise peak time service only due to the necessity of circulating train units. Second, the marginal costs of running additional trains during saddles are low due to low infrastructure charges. Finally, the new private operators were optimistic about their chances of success against the incumbent.

It is important to properly clarify the role of the state and the state-owned incumbent in a newly liberalised environment. The state is forced to perform many conflicting roles. As the owner of the incumbent, it has an interest in the best economic results; however, by liberalising the sector and enabling open access on the most profitable line, the state is harming the economic prospects of the incumbent. The coexistence of commercial open access and subsidised PSO services in the rest of the network is uneasy.

The situation in the industry is complicated by non-existence of a dedicated industry regulator that could effectively resolve frequent disputes among open access competitors. This regulator should be not only independent but also capable of resolving these thorny issues with sufficient speed. The competition authority, which is empowered to resolve these issues in the Czech Republic, is not ready to resolve such specific cases, and its many years contemplating the verdict increases the anxiety of operators on the Prague–Ostrava line. The inactivity or inability to resolve these cases is imposing costs on all parties, and private competitors are threatening to sue the incumbent for anticompetitive behaviour and the state authorities for inactivity. Due to incomplete vertical separation in the Czech Republic (Tomeš et al., 2014), control of railway stations, depots and washing facilities stayed with the incumbent who makes it hard for the newcomers to use them. This is a fact that does not make the situation of open access operators any easier. A partial solution to this situation lies in transferring ownership of railway stations from the incumbent to the infrastructure manager that should happen in 2016. In spite of that, however, it is still hard for newcomers to access other facilities under incumbent's control (depots, washing facilities) and they are forced to costly build up their own facilities. The solution could be as follows: some of these facilities would be under control of the infrastructure manager, with access rights for all operators or stronger role of the independent regulator who could force the incumbent to allow access for other operators under fair conditions.

6. Conclusion

The Prague–Ostrava route is a major railway connection in the

Czech Republic with high passenger demand due to low inter-modal competition. Until September 2011, service on this route was operated solely by the incumbent. However, in September 2011 and January 2013, two private entrepreneurs began their operations, which resulted in the unique competition of three operators on the same route. Simulation and theoretical studies predict that such competition will lead to an intensive price war, market dynamics and product differentiation. The development of the Prague–Ostrava route is broadly consistent with the predictions of these studies. The prices of the most common tickets fell by 46%, and the fall was most intensive immediately after the first private operator had entered the route. The fall of prices was less significant in 1st class; however, price competition increased the spread of prices in both classes substantially. All three operators are currently unprofitable on the line; nevertheless, none shows any intention of leaving the market. This may change in the future when financial pressures on LEO Express or pressure from the competition authority on ČD may influence the competitive situation on the route. In addition to the decrease in prices, service quality has improved substantially. Strong development in innovative selling and pricing strategies has been recorded. The number of direct connections during rush hours has doubled; however, the number of evening and night connections has declined. The average number of seats per train has declined significantly at all times. After the emergence of open access competition, a strong trend of price differentiation between peak and off-peak fares appeared. The average occupancy rate is high but with high fluctuations among departure times and operators. However, cream skimming in the form of concentration on only rush hour departure times has not been reported, probably due to short travel times and the operational necessity of utilising rolling stock. The entry of private operators brought about a massive increase in quality, standardisation and innovation in services. The intensive price competition is forcing all three operators to seek continuous innovation in their services. The development of open access passenger rail competition is complicated by the non-existence of dedicated regulator. Sharp competition of operators leads to many disputes regarding access rights, anticompetitive behaviour and predatory pricing. The competition authority seems unable or unwilling to deal with such specialized case; therefore, there is a need for a dedicated industry regulator that would be capable of resolving many emerging competition issues.

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