# Charles University in Prague

Faculty of Social Sciences

Institute of Economic Studies


MASTER'S THESIS

# Predatory Behaviour in Transportation Sector

# - "Czech Railways v. Leo Express" case


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Academic Year: **2017/2018**

# Declaration of Authorship

The author hereby declares that he compiled this thesis independently; using only the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, January 3rd, 2018

Signature

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# Abstract

It is important to control whether dominant companies in particular market sectors follow laws and rules and do not abuse their dominance at the expense of weaker companies. This behaviour is likely to damage current or avoid the entry of new competitors, shrink the competition and set the environment for price changes the consumer is exposed to. The thesis clarifies the theoretical aspect of this issue and tries to apply it on the real case from the railway transport sector in order to describe the procedure of defining relevant market and market share and investigating the abusive behaviour. A questionnaire survey among railway passeners is an integral part of the thesis.



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|---|---|
| **JEL Classification** | D21, D22, K21, L11, L12, L40 |
| **Keywords** | Predatory prices, relevant market, SSNIP test, railway transport, Czech Railways |


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# Abstrakt

Je důležité kontrolovat, zda společnosti mající dominantní pozici na konkrétním trhu dodržují zákony a pravidla a nezneužívají svého postavení na úkor slabších hráčů na trhu. Takovéto chování totiž poškozuje existující zdravou konkurenci a zabraňuje vzniku konkurence nové, zúžuje možnosti volby spotřebitele a způsobuje prudké nežádoucí změny cen, kterým je spotřebiel vystaven. Práce pojednává o teoretických aspektech predátorského chování a aplikuje ho na reálný případ z dopravního sektoru za účelem popsání procesu zjišťování relevantního trhu a tržního podílu a odhalování predátorského chování. Nedílnou součástí je i dotazníkový průzkum mezi cestujícími.



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| **Klasifikace** | D21, D22, K21, L11, L12, L40 |
| **Klíčová slova** | Predátorské ceny, relevantní trh, SSNIP test, železniční doprava, České dráhy |


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# Acronyms

| | |
|---|---|
| **AAC** | **Average Avoidable Costs** |
| **ATC** | **Average Total Costs** |
| **AV** | **Absolute Value** |
| **AVC** | **Average Variable Costs** |
| **CR** | **Czech Railways** |
| **e.g.** | **Exempli Gratia (For Example)** |
| **EC** | **EuroCity** |
| **EN** | **EuroNight** |
| **etc.** | **Et Cetera (And So On)** |
| **HHI** | **Herfindahl-Hirschman Index** |
| **LE** | **Leo Express** |
| **LRAIC** | **Long-Run Avoidable Incremental Costs** |
| **MC** | **Marginal Costs** |
| **RJ** | **RegioJet** |
| **SC** | **SuperCity** |
| **SSNIP** | **Small but Significant Non-Transitory Increase in Price** |
| **SŽDC** | **Správa železniční dopravní cesty** |
| **TEN-T** | **Trans-European Transport Networks** |
| **TFEU** | **Treaty on the Functioning of the European Union** |
| **ÚOHS** | **Úřad pro Ochranu Hospodářské Soutěže** |

# Master's Thesis Proposal

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| **Supervisor:** | |
| **Defense Planned:** | June 2017 |

**Proposed Topic:**

Predatory Behaviour in Transportation Sector - "Czech Railways v. Leo Express" case

**Motivation:**

In the economy, the competition between market participants is generally accepted and supported, because it leads to more efficient producing, product innovation and setting as low but still adequate prices as possible. Unfortunately, in a real world, sometimes things do not go as well as they should have gone; strong companies with a huge market power often try to abuse their dominant position to weaken the power of their smaller rivals, or even to drive them out of the market, in order to get customers on their side. This behaviour is obviously considered anti-competitive and is illegal in most countries.

The thesis will address predatory behaviour - a way in which a company can abuse its dominant position on the market - in a great detail and tries to find a new reasons why companies resort to this type of conduct. The topic is very interesting, but contents a lot of complicated and misleading things. Precise definition of relevant market plays a crucial role in investigating whether or not the predatory strategy have been implemented. Moreover, it is important to distinguish between legal and illegal type of price cutting carefully, because the border between them is very thin - predatory prices are often only slightly below the price level of a healthily competitive environment and thus are difficult to detect. The theoretical claims about how much the prices can fall before they reach the predatory level seem to be inconsistent and difficult to implement. The more complicated this topic is, the more attention it deserves.

The thesis describes this practice both from theoretical and practical point of view. Theoretical part focuses on both economical and law approach of this issue, deals with the. Practical part of the thesis analyzes one of the recent cases from the field of transportation sector that have happened in the Czech Republic - Czech Railways v. Leo Express a. s. In 2014, state-owned company Czech Railways was accused of abusing its dominant position on the route Prague - Ostrava, which consisted of implementing the predatory pricing strategy.

**Hypotheses:**

1. Hypothesis #1: Relevant market includes only railway transport on the route Prague - Ostrava.
2. Hypothesis #2: Czech Railways have a dominant position on the market.
3. Hypothesis #3: Czech Railways implemented predatory pricing strategy towards Leo Express.

4. Hypothesis #4: Czech Railways practiced non-financial predatory strategy towards Leo Express.

**Methodology:**

Theoretical part:
1. I will analyze existing literature, research papers, Court decisions etc. in order to provide a consistent and comprehensive theoretical background.

Practical part:
1. I will analyze price data, data available in annual reports, data from Czech Statistical Office, data from Office for the Protection of Competition, schedules and timetables.
2. In order to estimate a current economic situation of companies, I will analyze their financial results (balance sheets, income statements, cash flows etc.) and create a SWOT analysis.
3. In order to confirm a dominant position of Czech Railways, I will determine market share, calculate concentration ratio and Herfindahl-Hirschman Index.
4. For determining relevant market, I will apply a SSNIP test and critical loss. I will do my own research among railway transport consumers and analyze the collected data in order to properly define a relevant market.
5. In order to detect a predatory conduct, I will try to use cost-based tests (Areeda-Turner test) and analyze other possible sources of evidence of predatory behaviour.

**Expected Contribution:**

The main contribution of the thesis lies in the questionnaire survey among consumers of transport services on the route Prague - Ostrava. The survey will serve most importantly as an application of SSNIP test, which is one of the important tools for determining relevant market, and partly as a tool for revealing consumer's preferences. The main question to be answered is whether the railway transport customers would switch to readily available substitutes (in this case it is for example bus transport) in response to a hypothetical small (in the range of 5% to 10%), yet permanent relative price increase. Additional questions will be focused on revealing the reasons for not switching to other type of transport and other consumer's preferences. The survey should provide a realistic background and will be one of the key issues of the thesis.

In addition, the thesis is also expected to shed light on the issue of predatory behaviour, combine economic and legal approach and provide a consistent and comprehensive theoretical background and apply it to real concrete case. Since the case has not been closed yet, significant contribution of the thesis also lies in its complex analysis and estimation of how the Court would be likely to decide.

**Outline:**

Theoretical part
1. Introduction: motivation, literature overview
2. General description of predatory conduct
3. Economic approach: economic models of predatory conduct
4. Law approach: European regulation and legislation related to abuse of dominant position
5. Conditions for predatory pricing implementation:
   5a. dominant position - market share, concentration ratio, Herfindahl-Hirschman

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5b. relevant market - SSNIP test, critical loss

5c. profit sacrifice and losses recoupment

6. Predatory pricing strategy as a component of game theory, chain-store paradox
7. Detection of predatory pricing - cost-based tests
8. Non-financial predation

Practical part

1. Introduction of "Czech Railways v. Leo Express" case, sources of data
2. Evaluation of economic and financial situation of companies, SWOT analysis
3. Analysis of the case in relation to predatory conduct (financial and non-financial)
4. Analysis and evaluation of own survey and application of the results

Conclusion, linking theoretical knowledge with practical experience

**Core Bibliography:**

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# 1 Introduction

In the economy, the competition between market participants is generally accepted and supported, because it leads to more efficient producing, product innovation and setting as low but still adequate prices as possible. Unfortunately, in a real world, sometimes things do not go as well as they should have gone; strong companies with a huge market power often try to abuse their dominant position to weaken the power of their smaller rivals, or even to drive them out of the market, in order to get customers on their side. This behaviour is obviously considered anti-competitive and is illegal in most countries.

This thesis focuses on predatory pricing - a way in which a company can abuse its dominant position on the market. This topic is very interesting, but contents a lot of complicated and misleading things. It is important to distinguish between legal and illegal type of price cutting carefully, because the border between them is very thin - predatory prices are often only slightly below the price level of a healthily competitive environment and thus are difficult to detect. The theoretical claims about how much the prices can fall before they reach the predatory level seem to be inconsistent and difficult to implement. The more complicated this topic is, the more attention should be given to it.

The objective of this thesis is to clarify the theoretical aspects of this issue and apply it on the real case from the railway transport sector in order to better understand the procedure of defining market share and relevant market and investigating the abusive behaviour. The real case is related to the railway route Prague - Ostrava and to companies Czech Railway and Leo Express, since the firstly mentioned has been accused of implementing predatory strategy on this route.

Chapters 2 to 5 and their subchapters are dedicated to predatory behaviour from theoretical and economical point of view and summarize the theoretical process of detecting predators.

# 2 Predatory Pricing in General

From a global perspective, predatory pricing involves any pricing strategy whose goal is to drive out or weaken competitors, soften the competitive process, or preclude potential entrants, to such a degree that the competitive process is harmed and consumer welfare is reduced (OECD, 2007). From a practical point of view, the predating company sets the prices of its products or services very low that its smaller and weaker competitors cannot handle it, which brings them under a huge financial stress. These financial troubles lower their ability to compete effectively and may - in the worst but often inevitable case - force them to exit the market. After reducing or eliminating (by excluding weaker rivals from market) the competition, which is the main goal of this strategy, the predator's market power increases significantly which makes him able to raise prices above the original ones in order to recoup losses suffered during the "predating" period of time. These losses occur because predating prices are set below the firm's costs.

Predatory pricing is disadvantageous not only for businesses, but also for consumers, even though at first glance it seems to be good for them. At first, predatory pricing may be beneficial for consumers because they can take the advantage of a very low prices the predator offers, but this situation does not last forever. After some time, the weaker competitors are forced to exit the market because they are not able to keep up with the predator (i.e. are not able to lower their prices as much as the predator is) and go bankrupt. If they are not dropped out, their ability to compete effectively is significantly reduced. The predator then raises the prices above the competitive level in order to compensate for the losses it suffered. Thus, the consumers face the prices that are even higher than the original ones and the weaker competitors are damaged, and this damage may be irreparable.

In the competition, the excluding mechanism is natural - weak and inefficient competitors are forced out of the market while the innovative and overall efficient ones survive. The problem occurs when the "victims" which were excluded from the market have been as efficient (i.e. it has the same costs) as the one which forced them to leave, but unfortunately less strong in terms of finances, know how, guaranteed

backing or other sources. This situation is harmful for the competition as a whole and moreover, it is harmful for a consumer, because his/her range of choices has been significantly limited now and he/she often has no other alternative that would be of the same quality.

The abuse of dominant position is defined in Article 102 of the Treaty on the Functioning of the European Union (TFEU). In Czech Republic, the main authority ensuring fair competition and solving cases is the Office for Protection of Competition (Úřad pro ochranu hospodářské soutěže, ÚOHS). Usually, European case laws are used as precedents or benchmarks for domestic cases.

## 2.1 Economic Approach

As mentioned above, the basis of the predation is to discourage newcomers or threaten existing rivals by setting below-cost prices. Costs of dominant firm are lower due to learning-by-doing effect and large volume of production (economies of scale). On the other hand, costs of new entrants are usually high. The environment of imperfect competition also plays into predator's hands, mainly due to asymmetric information that allows it to set the prices according to other competitors. There are several economic models or approaches describing different types of predation, in this section tsome of them are briefly described.

### 2.1.1. Signalling Model

The main reason of predation is to influence thinking of potential competitors and to provide biased information about market condition - predator wishes that potential rivals evaluate these conditions as unfavourable and decide not to enter the market.

### 2.1.2. Reputation Model

When the incumbent firm behaves as a predator, it gains the reputation of "strong and dangerous" rival, which may be beneficial in a way that potential competitors may be deterred from entering the market. It might be quite difficult and costly to build up such reputation, but the risk of increased competition is significantly eliminated and the incumbent firm can enjoy the customer's loyalty.

### 2.1.3. Game Theory

The game theory model is related to the assumption that there exists an information assymetry in terms of predator's and newcomer's costs, with the advantage on predator's side (*e.g.* due to more experience on the market). As a consequence, an intended predator might be able to create more effective predatory strategy and benefit from this assymetry.

# 3 Conditions for Predatory Pricing Implementation

In the next few paragraphs, some conditions that must be satisfied when implementing predatory pricing strategy are mentioned. Otherwise, predatory pricing would not be rational or even possible concern.

## 3.1 Dominant position

As already mentioned above, predatory pricing is a strategy through which a dominant company tries to handicap its existing competitors or even to prevent the potential ones from entering the market. This behaviour is considered an abuse of dominant position and is very harmful for competition and also for consumers. Article 82 (former Article 86) of the European Union Treaty states that any abuse by one more undertakings of a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market in so far as it may affect trade between Member States. According to these facts and definitions, we can state that a dominant position on a certain market is a crucial condition that must be satisfied when suspecting a company of implementing the predatory pricing strategy. If a company would not have been found dominant, it would not have been expected that such firm presents a risk for healthy competition. In other words, if a dominant position is not proven, it is not possible to abuse it.

It is important to note that dominant position in itself is not an anti-competitive thing and thus is not illegal - it starts to violate the competition when it is consciously used to damage other participants. In this situation, the competitor acts against the law.

## 3.2 Relevant market definition

To measure the ability of a company to threaten the healthy functioning of the competition, a relevant market must be defined, because it often plays a key role when analyzing whether a violation of antitrust law has occurred or not - a dominant

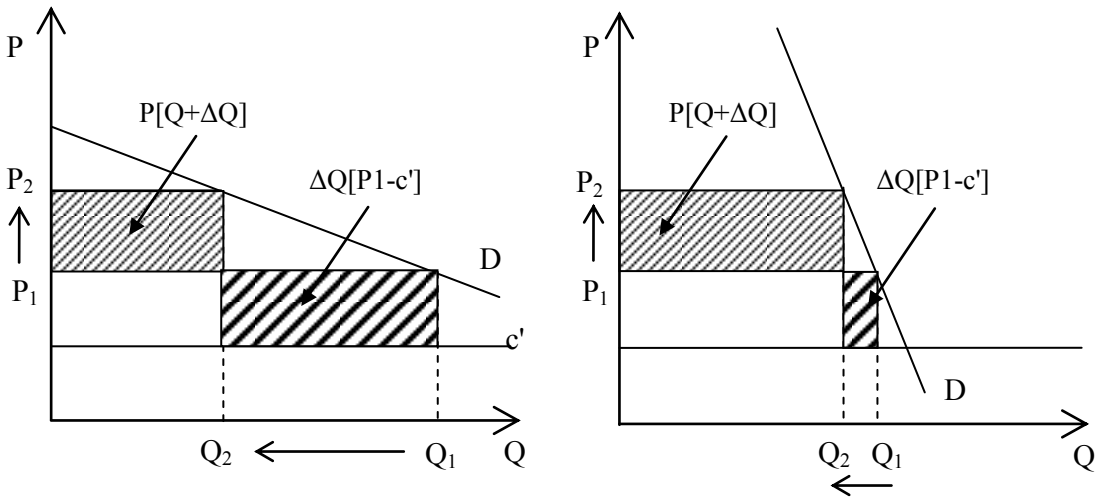
position exists only on certain precisely defined relevant market. The relevant market can be described as all those products and/or services in a defined geographic area which are regarded as interchangeable or substitutable since they have similar characteristics, use and other features. This follows that the relevant market has two inalienable dimensions (product dimension and geographical dimension) and is defined by consumer's actions and preferences. Product market includes all the goods or services that are readily and reasonably interchangeable for one another in terms of their use, price and characteristics. Geographical market then describes the location where the producers of sellers of these products compete. The conditions for a competitions must be deemed sufficiently homogenous here. When defining the relevant market, both these aspects must be taken into account. Without determining this, one cannot be able to evaluate whether the accused company has a power to damage competition, respectively if its position is really dominant.

### 3.2.1. SSNIP Test

One of the most important tools for measuring the relevant market is the **Small but Significant Non-transitory Increase in Price Test** (hereinafter **SSNIP Test**). The SSNIP Test was firstly introduced in 1982 and since then it has been widely used by authorities to properly define the relevant market in order to detect possible abuse of dominant position. SSNIP test defines the relevant market by determining whether a given increase in product prices would be profitable for a hypothetical monopolist in the candidate market (AMELIO, DONATH, 2009). In other words, the aim of the test is to determine the actual or likely responses of consumers and competitors to the small but significant and persistent increase in prices. At first, the smallest possible set of products is concerned. If the price of a product is increased by 5 % - 10 % and the product is not substituted by other products from outside the market, it implies that the price increase is profitable and thus the product itself is a relevant market. If the product is substituted after the price increases, it implies that there is a readily interchangeable product and it is possible to include it into the relevant market - relevant market is now wider and the process continues. The SSNIP Test is repeated until the increase in price is profitable and the relevant market is thus defined.

**Figure 3.1**: Representation of (non)profitability of 5-10% price increase on the candidate market

a) Non-profitability (relevant > candidate) b) Profitability (relevant = candidate)




Source: own creation

The figure ndicates that the increase in price brings two opposite effects. On one side, there is an increase of profit of the hypothetical monopolist from the addtional unit sold (the lightly hatched area), but on the other hand, it loses customers who are not willing to pay a higher price for particular product any longer (the bold hatched area). In case that the price increase appears profitable, the candidate market is assumed to be relevant market. In the opposite case, if the price increase makes consumers switch to substitutes and the action is hence non-profitable for the hypothetical monopolist (increase in price cannot balance or even extend loss from customers outflow), the candidate market with high probability does not correspond to relevant market and thus must be redefined (extended with the substitutes).

SSNIP test may be applied by astimating **critical loss**, which is defined as the maximum cut of the output and hence loss of sales that a company can sacrifice during price increase strategy without making this strategy unprofitable. If the critical loss is higher than the real loss from strategy, the price increase was succesfull in terms of profitability and there is thus no need to widen the relevant market. The same pattern holds for **critical elasticity of demand**.

### 3.2.2. Indicators of the market structure

The most direct way how to measure the firm's position on a certain market is the determination of the **market share** - it is the percentage of the market on which the firm operates and serves. The market share can be measured through the units sold by the firm, or through its revenues. Unit market share (Eq. 3.1) means the units sold by a particular company as a percentage of total market sales, measured in the same units (FARRIS, 2008):

$$Unit\ Market\ Share\ (\%) = \frac{\#\ of\ unit\ sales}{\#\ of\ total\ market\ unit\ sales} * 100 \qquad (3.1)$$

Revenue market share (Eq. 3.2) does not refer to the units sold by firms, but it calculates with the prices at which this units are sold:

$$Revenue\ Market\ Share\ (\%) = \frac{sales\ revenue\ in\ \$}{total\ market\ sales\ revenue\ in\ \$} * 100 \qquad (3.2)$$

There is no certainty that high market share means market dominance, and there are also no uniform criteria of what percentage of the market must the firm operate to be dominant - some studies say that the firm is likely to be dominant if its market share is more than 40 percent, some of them state that it should be more than 60 percent. Anyway, the market share does not have to be be the best indicator of dominance, because there are a lot of other factors that play a role: consumers, suppliers, other businesses within the same market, existence of entry barriers or laws and regulations at the home state level or European union level.

**Concentration ratio** is a measure of the total output which is produced in given industry by a given number of companies within the industry. It shows the percentage market shares of most commonly four or eight biggest competitors, i.e. how "big" piece of the certain market do each of them have under control (Eq. 3.3).

$$CR = \sum_i^n s_i \qquad (3.3)$$

In extreme cases, if the concentration ratio is 0 %, it indicates that there is a perfect competition, if the ratio equals 100 %, there is a monopoly in the market.

Another way how to measure the size of the competitors within a market is the **Herfindahl-Hirschman Index** (HHI, Eq. 3.4). HHI is defined as the sum of the squares of the market shares of each company and it can range from 0 to 10 000 points. As the concentration of a certain industry decreases (as the competition increases, respectively), the index decreases, too.

$$HHI = \sum_{i=1}^{n} s_i^2 \tag{3.4}$$

If there is a healthy competition environment with no dominant players on the market, the HHI index is small. The opposite is true for high values of this index - these refer to the existence of the dominant company with significant market power, or even monopoly.

## 3.3 Profit sacrifice and losses recoupment

In relation to the dominant position, it is quite clear that the predator must be dominant, because it must have a substantial power to drive other firms out of the market - it means that it must be mainly financially strong to be able to cope with the losses it suffers during the "predating" period. It In other words, predatory firm must be able to sacrifice its short-term profits in order to achieve the long-term gains in the future.

As already mentioned above, after excluding some of the existing rivals or discouraging potential rivals from entering the market by using dumping prices, the incumbent firm sets the prices above the competitive level (this activity is called supra-competitive pricing) in order to cover the losses. This is called losses recoupment. In fact, the predator believes that the profits generated from overpriced goods or services will more than cover the losses it incurred.

The predatory pricing strategy does not always have to turn out well. The incumbent firm should consider that there is a risk of undervaluing the strength of the (potential) rivals or even overvaluing its own. If the competitors that should have been driven out of the market were stronger that the incumbent firm originally expected, the period of losses might be prolonged and it would be very difficult for the predator to recoup them. In extreme cases, this long-term resisting might be liquidating for the incumbent. Thus, it is extremely important to do a detailed market

research and analysis of all the competitors in certain market or industry, of course within the bounds of ethics.

# 4 Detecting Predatory Prices

One of the facts that makes the issue of predatory prices so difficult and interesting is that they are often only slightly below the price level of a healthily competitive environment and thus are very difficult to detect. The question that arises is obvious - how to distinguish between low prices which are the result of effective and healthy competition, and low prices that are harmful and can have a really bad consequences on the whole system?

When detecting whether the predatory pricing strategy has been implemented, the following issues must be analyzed:

- whether incumbent firm's short-run profits are being sacrificed,
- whether the strategy is likely to lead to the exclusion of a competitor and
- whether short-run losses will be recouped in the long run (BISHOP, WALKER, 2010).

Above mentioned issues are crucial for the strategy and briefly describe the whole process through which the company must go when implementing it - lowering the price, reducing or eliminating the competition and setting supra-competitive price.

## 4.1 Price-Cost Testing

The prices of goods and/or services of a dominant competitor cannot be just said to be too low and thus anti-competitive, without putting in comparison with some benchmarks or indicators. The prices are usually deemed predatory if they are below some type of costs, while the measurement of these costs must be appropriate; firms that voluntarily sacrifice profits even if their main goal is to generate them seem to behave irrationally and thus "suspiciously". The opposite is true for prices that are above the costs of dominant firm - they are not considered predatory.

It depends on the costs structure of the incumbent firm. There are several types of costs that can be used as a basis for the measurement - marginal costs (MC), average variable costs (AVC), average avoidable costs (AAC), long-run avoidable

incremental costs (LRAIC) *etc*. All these types of costs can serve as a benchmark, more or less appropriately.

### 4.1.1. Average Avoidable Costs (AAC)

Average Avoidable Costs (hereinafter AAC) include all costs (fixed and variable) that could have been avoided in case that a certain quantity of product output had not been produced or a certain action (*e.g.* entry) had not been reaized. It is the type of costs that are more appropriate for measuring. Simply saying, it is generally accepted that the prices that are below AAC are considered predatory - the firm charges price that cannot compensate sources used for producing the product or providing the service. Thus, the firm behaves economically irrationally, which may be a reason to suspect it of predatory behaviour.

### 4.1.2. Long-Run Avoidable Incremental Costs (LRAIC)

Long-Run Avoidable Incremental Costs (hereinafter LRAIC ) is the average of all the (variable and fixed) costs that a company incurs to produce a particular product or service (INTERNATIONAL COMPETITION NETWORK, 2012). LRAIC is typically higher than AAC, because it also includes fixed costs that were spent before the "predatory period", and also for instance costs of research and development of new product; due to that, LRAIC might be even better proxy when revealing predatory behaviour. The problem of this approach is that LRAIC is often difficult to measure.

### 4.1.3. Areeda-Turner Test

The Areeda-Turner Test suggests that prices are predatory when they are below marginal costs. This approach is reasonable; when the firm's revenues from one sold unit are lower than costs of producing this unit, it would be rational for the firm to quit producing because the losses might be devastating. Thus, there is a high probability that the firm consciously acts as a predator. In practice, it is difficult to calculate this type of costs, hence the use of marginal costs as a proxy has been abandoned and replaced by average variable costs (AVC).

### 4.1.4. The Two-Tier Test

The Joscow and Klevorick's Two-Tier Tests consists of two consecutive approaches - the first tier analyzes the market as a whole, its structure and characteristics mainly in terms of competition (if it is competitive or rather monopolistic). If the market seems to be monopolistic and the probability that the predatory behaviour might occur, the second tier takes place - it focuses on the cost structure of an incumbent firm. If the prices offered by incumbent firm are lower than AVC, they are identified as predatory with no chance of defense. Prices above AVC and below ATC (average total costs) may be also illegal, but the firm can try to refute this claim by providing undisputable evidence. Finally, prices which are above ATC are not considered as a threat to competition and are absolutely legal.

# 5 Non-Financial Predation

Although this project focuses on predatory pricing, predatory behaviour do not have to be necessarily of a financial nature - non-price activities also deserve attention. Moreover, non price predation is less expensive than the financial one, because the incumbent firm do not have to lower prices below its costs and thus do not have to sacrifice the short-term profits. There are several ways how the dominant firm can make the life of the competitors more difficult without the use of financial tools.

## 5.1 Raising Rival's Costs

The cost-raising strategies are - as their name suggests - mainly designed to raise the costs of these competitors. It is not even necessary to exclude rivals from the market; when facing higher costs, the supply of the rivals obviously decreases due to reduced output, which leads to decrease in overall supply and thus increase of price. The dominant firm then benefits due to higher profit and higher market share. This may be done for example by noisy advertising or making vertical price squeezes.

## 5.2 Scheduling

Non-price predation also includes effort of the incumbent firm to reduce the ability of its rivals to serve their customers. The example of such activity may be scheduling, which is widely used in transport industry - the aim is to significantly reduce the demand of competitors by scheduling the services on the same times as the competitors, or to exhaust the types of services in order to make it impossible for the competitors to run this services. For example, the incumbent firm in transport industry can set the departure times just before the times of other competitors within the industry, which can attract more consumers. However, this activities are not beneficial for consumers, because the range of departures times is narrower.

## 5.3 Brand Proliferation

This type of non-price predation means introduction of a lot of just slightly different and thus hardly distinguishable brands by the predator so that there is no brand left for other competitors to introduce.

# 6 Czech Railways v. Leo Express Case

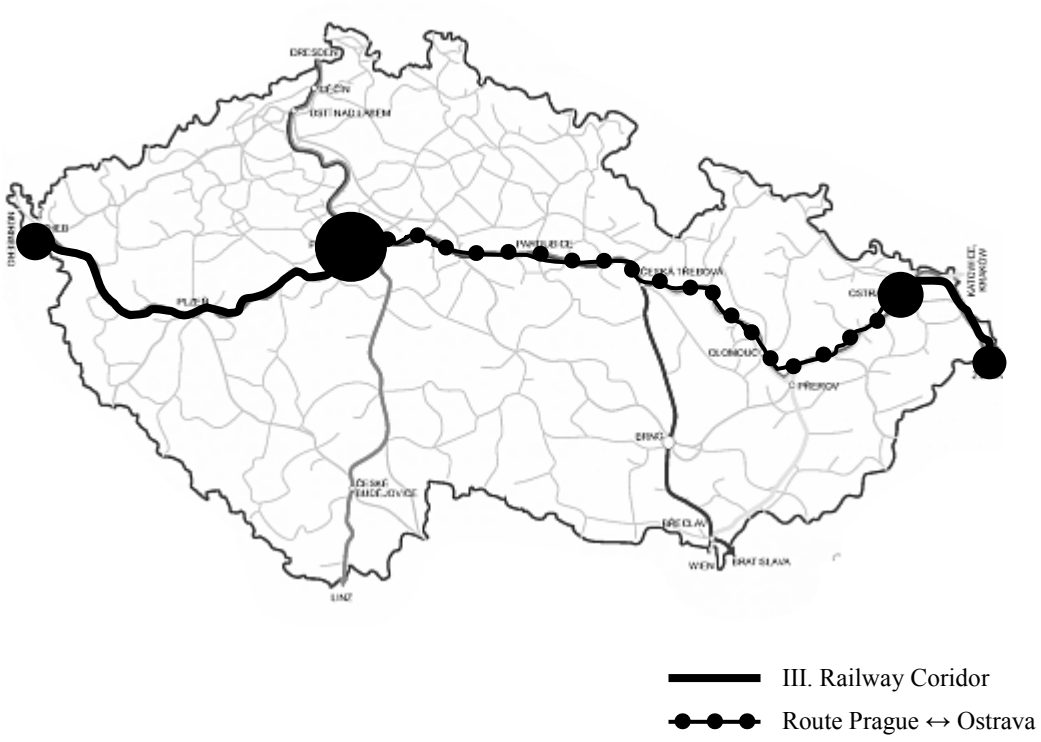
In the empirical part of this thesis, the theoretical findings are to be applied on the real case that has been happening on the railway market - Czech Railways (CR) v. Leo Express (LE) case. In July 2014, the private transport company LE officially expressed its suspicion that CR offer tickets on the route Prague ↔ Ostrava that are not likely to cover even its costs of operating on this route. The main reason is said to be the reduction of active competition by eliminating the LE's business activities on the mentioned route.

Since the case has been recently evaluated by high instances (High Court in Prague and also European Commision) and since a lot of data which are needed for computations are treated as an important business secrets and hence are not provided to the public, only the data which are publicly available and estimations based on these data were used. Due to this fact, the final outputs cannot fully reflect the real situation and results, since it is highly impossible to cover all the aspects and conditions related to the analyzed case.

## 6.1 Prague ↔ Ostrava Route

The route from Prague to Ostrava and vice versa is a part of the Third (III.) Railway Coridor which connects Cheb on the west of the Czech Republic and Mosty u Jablunkova on the very east. The overall length of the route is 665 kilometers. It belongs into the nation-wide rail system whose operator is Správa železniční dopravní cesty, státní organizace (SŽDC). The line is also included in the TEN-T program - the program for financial support of the development of transeuropean transport network in order to ensure its interconnection, coherence and interoperability and to be easily accessable. The line is a subject of constant modernization - in 2005, it took approximately 3 hours and 42 minutes to get from Prague to Ostrava by the fastest train (and vice versa), nowadays it takes 3 hours and 1 minute (according to a timetable).

**Picture 6.1**: III. Railway Coridor




Source: author

**Table 6.1**: The timeline capturing the main milestones and price development on the railway route Prague ↔ Ostrava (lower travel classes, 2005-2013)

| | |
|---|---|
| December 11, 2005 | SuperCity (SC) Pendolino trains by Czech Railways (CR) started to operate on the route Prague ↔ Ostrava |
| September, 2011 | CR set its ticket prices at CZK 638/CZK 510, 550, 590 for Pendolino and CZK 439/CZK 310, 350, 390 for other trains |
| September 26, 2011 | Student Agency s.r.o. started to operate on route through its subsidiary RegioJet (RJ) |
| October, 2011 | CR set its ticket prices at CZK 495/CZK 430 for Pendolino and CZK 295/CZK 230 for other trains |
| | RJ set its ticket prices at CZK 295 |
| December, 2011 | CR set its ticket prices at CZK 495, 395/CZK 430, 330 for Pendolino and CZK 295/CZK 230 |

| | |
|---|---|
| | for other trains |
| | RJ maintained its ticket prices at CZK 295 |
| November 13, 2012 | Leo Express (LE) started to operate on the route |
| November, 2012 | CR set its ticket prices at CZK 395, 495/CZK 330, 430 for Pendolino and CZK 295/CZK 230 for other trains |
| | RJ maintained its ticket prices at CZK 295 |
| | LE set its ticket prices at CZK 137-532 (for different travel classes) |
| December, 2012 | CR set its ticket prices at CZK 395, 495/CZK 310, 410 for Pendolino and CZK 295/CZK 210 for other trains |
| | RJ sets its ticket prices at CZK 295, 325/CZK 139, 239 |
| | LE sets its ticket prices at CZK 137-319 (for different travel classes) |
| August, 2013 | CR maintains its ticket prices at CZK 395, 495/CZK 310, 410 for Pendolino and CZK 295/CZK 210 for other trains |
| | RJ maintains its ticket prices at CZK 295, 325/CZK 139, 239 |
| | LE sets its ticket prices at CZK 137-329 (for different travel classes) |
| July, 2014 | LE sued CR for implementing predatory strategy on the route Prague ↔ Ostrava |
| December, 2015 | The claim for loss profit compensation for LE was rejected by the Municipal Court in Prague |
| November, 2016 | European Commision started to investigate whether CR's prices were below-cost |
| December, 2016 | High Court in Prague probably started to investigate the case |

Note: prices in the table are ordered as "price of regular ticket for different travel classes (if multiple) / price of timely ticket for different travel classes (if multiple)"

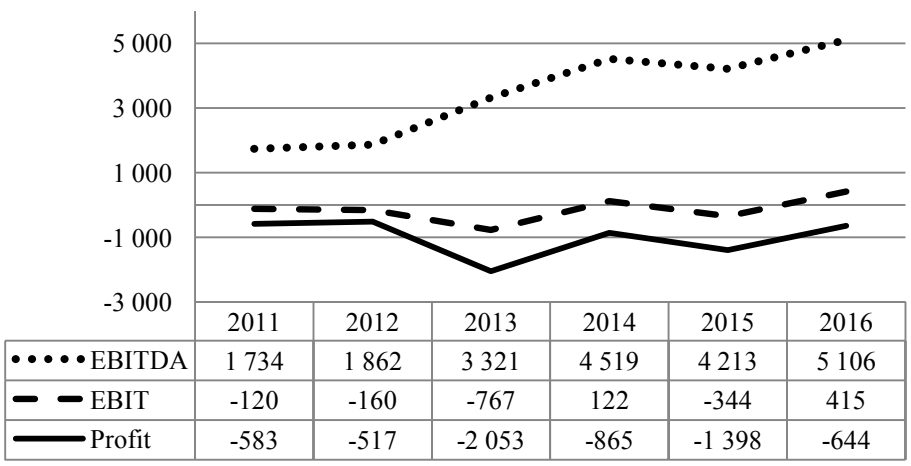
Source: author according to JANDOVÁ, REDERER (2013)

The timeline reflects the development of full prices, hence not adjusted for discounts or club cards. However, the trend seems not to be any different - increases in price occur according to the similar formula.

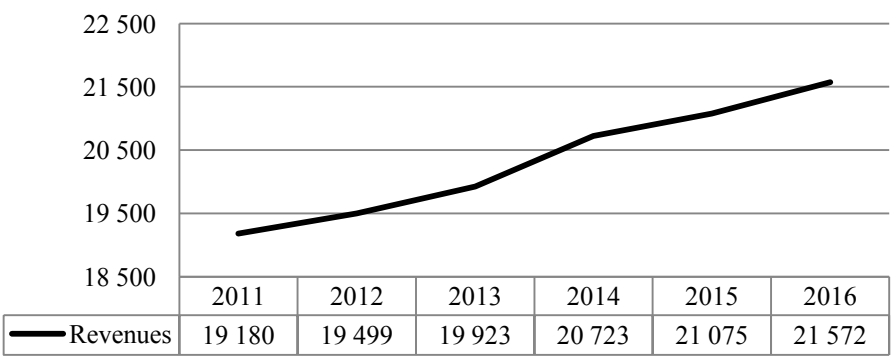
There are three railway companies currently and historically operating on the route Prague ↔ Ostrava: state-owned company **Czech Railways** (hereinafter CR), and private companies **RegioJet** (hereinafter RJ) and **Leo Express** (hereinafter LE).

The most significant company on this route with the longest history is CR. Below is a brief summary of revenues and profits of the company in recent years.

**Figure 6.1**: CR's financial results (in mil CZK, 2011-2016)




| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| EBITDA | 1 734 | 1 862 | 3 321 | 4 519 | 4 213 | 5 106 |
| EBIT | -120 | -160 | -767 | 122 | -344 | 415 |
| Profit | -583 | -517 | -2 053 | -865 | -1 398 | -644 |




| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| Revenues | 19 180 | 19 499 | 19 923 | 20 723 | 21 075 | 21 572 |

Source: author based on Annual Reports of CR

In years 2013 and 2015 CR experienced the deepening of losses in public transport, even though the revenues has had a steadily rising tendency since 2011. In the end of year 2012, LE started to operate on the route Prague-Ostrava, hence the number of competitors increased from two (CR and RJ) to three (CR, RJ and LE).

When assuming the existence of predatory pricing, such losses (in 2013) might have been caused e.g. by substantial ticket price reductions made in order to successfully compete and "win" the customers. The coverage of losses on a particular route could be ensured by extra money created in more profitable operations (routes), or by applying the "cross-financing" - losses experienced in one business operation are covered by subsidies linked to another operations. However, due to a lack of available data, it is not possible to make a statement about it. Another reasons for increasing losses in 2013 and 2015 could be for instance higher personal or operational cost (due to e.g. multiple lockouts on railway tracks requiring the immediate implementation of alternative bus services) or higher interest expenses. Data of remaining two railway companies could not be included, because the financial results of railway transport are consolidated with the results of bus transport.

Since the thesis focuses mainly on customer opinions and preferences (due to implementation of SSNIP test in order to reveal relevant market), SWAT analysis is applied in order to evaluate main strengths and weaknesses and reveal opportunities and threats from the external market environment. The SWOT analysis was created based on the opinions of author of the thesis.

**Table 6.2**: SWOT analysis of CR

| **STRENGTHS** | | | | **WEAKNESSES** | | | |
|---|---|---|---|---|---|---|---|
| | | *IMP* | *EV* | | | *IMP* | *EV* |
| 1. | Developed and highly connected track network | 0,3 | 3 | 1. | Only railway transport service offered | 0,15 | -2 |
| 2. | Long history of brand | 0,01 | 4 | 2. | Negative associations with brand | 0,15 | -1 |
| 3. | Huge number of trains per day | 0,25 | 5 | 3. | Poor board service | 0,22 | -4 |
| 4. | Market control, signif. market player | 0,33 | 3,5 | 4. | Old wagons | 0,2 | -4 |
| 5. | Huge transport capacity | 0,1 | 3 | 5. | Lack of technical tools aboard | 0,1 | -3 |
| 6. | Marketing tools, corporate identity | 0,01 | 2 | 6. | Delays | 0,18 | -4 |
| | **Total** | **3,67** | | | **Total** | **-3,15** | |

| OPPORTUNITIES | | | | THREATS | | | |
|---|---|---|---|---|---|---|---|
| | | *IMP* | *EV* | | | *IMP* | *EV* |
| 1. | Increas. importance of eco-transport | 0,25 | 5 | 1. | Entry of new competitors | 0,35 | -3 |
| 2. | Bus transport inclusion | 0,05 | 1 | 2. | Loss of current passengers | 0,26 | -1,5 |
| 3. | Increasing "laziness" of passengers | 0,1 | 3 | 3. | Nature disasters affecting the source of electricity, fuels | 0,09 | -4,5 |
| 4. | Subsidies and grants | 0,2 | 3 | 4. | Threat of course proceedings | 0,15 | -3,5 |
| 5. | Strategic partnerships w. competitors | 0,2 | 1 | 5. | Expansion of road transport (bus, car) | 0,1 | -3 |
| 6. | Modernization of systems and services | 0,2 | 2,5 | 6. | Expansion of short-distane air transp. | 0,05 | -4 |
| | **Total** | **2,90** | | | **Total** | **-2,87** | |

Source: author

**Table 6.3**: CR's SWOT analysis results

| | |
|---|---|
| Total Strengths | 3,67 |
| Total Weaknesses | -3,15 |
| **Total internal part** | **0,52** |
| Total Opportunities | 2,90 |
| Total Threats | -2,87 |
| **Total external part** | **0,03** |
| **Total overall SWOT analysis result** | **0,55** |

Note: IMP = importance (0,1 = least important, 0,9 = most important), EV = evaluation (1 = least beneficial/probable, 5 = most beneficial/probable; -1 = least threatening/probable, -5 = most threatening/probable)

Source: author

The result of SWOT analysis is higher than 0 and lower than 1, which is neither positive nor negative. The main differences are between values of internal part, so CR should work on its internal issues mainly. Developed and highly connected network of railway tracks seems to be one of CR'S biggest advantages. On the other hand, CR should work on its internal weaknesses, mainly on improving services aboard and modernizing its trains. Better delay solutions might also be a subject of improvement, since it could also help solve the problem with worse reputation of CR. Nowadays, more and more people are interested in ecologic aspects of various sectors, including transport sector, hence the popularity of railway trasport experiences stable growth. This fact, however, could bring new competitors, as well as legislation regulating the level of environmental impact.

## 6.2 Relevant market

As mentioned above, the relevant market is the material and geographical market with sufficiently homogeneous competition conditions where the supply of certain goods which are - in terms of their price, main features and inended use - comparable or (mutually) substituable meets demand for these goods. In transport sector, it is necessary to consider whether the consumer's demand could be effectively met by different companies within one type of transport (*e.g.* railway transport) or by various types of transport (road, air, ship *etc.*). Different transport differ in costs, prices, service and so on.

From the product point of view, it is assumed that - in the CD vs LE railway transport case - the relevant market should include all tickets offered by all railway companies operating on the route, since the ticket prices, service, length of journey and other features are similar among them. Time-sensitive and price-sensitive customers are assumed. Air travel is assumed not to belong in the relevant market due to significant differences in costs and hence ticket prices, and also schedules and frequency of departures. Bus travel is also assumed not to be a part of relevant product market, mainly because the journey takes much longer than the one taken by train. However, the SSNIP test is to reveal whether the bus or other type of transport really belongs into the relevant market or not.

Since the products are to be substituable also in terms of geographical aspects, the only logical output here is that the relevant geographical market corresponds to the route Prague ↔ Ostrava, since the ticket for another route would be worthless for passenger who wants to travel between these two cities. Moreover, the route is one of the key strategic routes in Czech Republic and it is possible to realize it directly without any transfers, hence it is not needed to include any other indirect routes in the market. Assuming these conditions, it is possible to state that the competitive conditions are similar here for all operating companies.

The assumption of route Prague ↔ Ostrava being the relevant market can be also supported by various case laws within the European Union or decisions made by Office for the Protection of Competition (ÚOHS). European Commision Competition Authorities usually apply the "point of origin/point of destination concept" when

solving cases from transport sector, which assumes that indirect routes including required stations does not have to be considered sufficient substitutes for passengers.

**Box 6.1**: European Commision Case Law - KLM/ALITALIA

Case No COMP/JV.19 - */*** KLM / ALITALIA
European Commision, 1999

*"...The parties have contended that factors like the development of hub-and-spoke systems and deregulation have lead to significant evolutions in the air transport sector and in particular to the creation of a "global air transport market" where networks compete against each other.*

*The Commission does not deny this evolution that affects the supply side of the market. However, from the demand side, the consumer continues to ask for a 6 transport service between two points. In this respect, each point-of-origin / point-ofdestination5 pair operated by either of the parties constitutes a relevant market (hereafter referred to as O&D pairs)..."*

**Box 6.2**: European Commision Case Law - Air France/KLM/Alitalia/Delta

CASE AT.39964 - Air France/KLM/Alitalia/Delta
European Commision, 2015

*"...The Commission has traditionally defined the relevant market for scheduled passenger air transport services on the basis of the 'point of origin/point of destination' ('O&D') city pair approach. Such a market definition corresponds to a demand-side perspective, whereby passengers consider all possible alternatives of travelling from a city of origin to a city of destination, while they do not generally consider one city pair to be substitutable for a different city pair.20 Under this approach, every combination of a point of origin and a point of destination is considered to be a separate market..."*

**Box 6.3**: Office for the Protection of Competition - STUDENT AGENCY vs ASIANA

STUDENT AGENCY, s.r.o. vs ASIANA, spol. s r.o.
Office for the Protection of Competition (ÚOHS), 2011

*"...Regarding the geographic aspects of relevant market, the European Commision Competitive Authorities's "point of origin/point of destination" method of defininf the relevant market was taken into account. It states that other indirect routes may not be acceptable as substitute for consumer.*

*In the present case, the route Prague ↔ Brno is analyzed. There exist a direct connections betweet these two destinations, both by road (D1 motorway) and by rail. Therefore, it is not necessary to consider other indirect routes which are probably not acceptable for passengers in terms of satisfying their transport needs. Moreover, the route Prague ↔ Brno is special for its strategic importance..."*

After estimating the market scope, the next step is to analyze whether the company accused of abusing behaviour truly has a dominant position on the market.

## 6.3 Market share

As mentioned in the theoretical part, the first step in determining whether a company abused its dominant position is to properly define a market shares of all market players. In some literature, the company has a dominant position if it possesses 50 % of market or more. According to the European law, when having 50% and greater market share, the company is able to endanger the healthy competition by abusing its dominant position. In other sources, the threshold is only 40 %.

The aim of this subpart is to estimate whether the CR have a dominant position on route Prague-Ostrava.

**Table 6.4**: Approximate number of direct trains on the route Prague-Ostrava and conversely (weekly, 2013)

| | | |
|---|---|---|
| Czech Railways | 280 (EX: 126, SC: 140, EC: 14) | 52,64 % |
| RegioJet | 126 | 23,68 % |
| Leo Express | 126 | 23,68 % |
| **Total** | **532** | **100 %** |

Source: author

Table 6.4 shows that CR has the highest number of direct trains on the route Prague-Ostrava (20 each day, regardless the differences between weekdays and weekend). CR has a 52,64 % of total number of direct trains on this route. Indirect trains were not included, since the length of journey significantly differs from the average direct journey.

**Table 6.5**: Approximate average number of seats in trains, maximum number of sitting passengers (weekly, 2013)

| | |
|---|---|
| Czech Railways | EX: 463 (1. + 2. class)<br>SC: 331 (105 of which are 1. class)<br>EC: 350 (1. + 2. class) |
| RegioJet | 219 (2. class only) |
| Leo Express | 233 (6 Premium, 19 Business, 208 Economy) |

| | |
|---|---|
| Czech Railways | 126 * 463 + 140 * 331 + 14 * 350 = 109 578 |
| RegioJet | 126 * 219 = 27 594 |
| Leo Express | 126 * 233 = 29 358 |

Source: author

According to these tables, CR also has the greatest capacity, which was highly expected since it also has the largest number of trains. Individual capacity of trains highly depends on the departure/arrival time - number of wagons differ in different day times, hence the average of capacities of all trains per day was used.

These results support the assumption that CR has a dominant position on the route Prague-Ostrava, but it is not possible to confirm it. Since the train occupancy rates or the number of passengers itself is unknown because most companies treat is as an important business secret, the author used alternative method of determining the number of passengers: first, the average of the approximate occupancy rates of two

remaining market players (RJ and LE) were used, and second, the 50% occupancy rates was expected (we expect inefficiency of CR here).

**Table 6.6**: Approximate average occupancy rates of the trains on the route Prague-Ostrava

| | |
|---|---|
| Czech Railways | / |
| RegioJet | 80 % (2012) |
| Leo Express | 73 % |

Source: author

Due to increasing competition and hence decreasing willingness to provide public with data that could be competitively interesting and usable, approximate occupancy rates of RJ and LE bind to various time periods. RJ's rate is from 2012, the same year in which LE entered the market (in December 2012), hence it is not impossible to assume that the number changed in 2013 (downward due to increasing number of possible carriers or upward because of increasing number of passengers choosing train as a mean of transport). Occupancy rate of LE was estimated on the basis of public data for january, february, march and june - for april and may the march data were used, and for the rest of months the june data were applied.

**Table 6.7**: Estimated approximate number of passengers on the route Prague-Ostrava and conversely (yearly, 2013)

| | |
|---|---|
| Czech Railways | / |
| RegioJet | 80 % of (52 * 27 594) = 1 147 910 |
| Leo Express | 73 % of (52 * 29 358) = 1 114 430 |
| **Total without CR** | **2 262 340** |

Source: author, based on questionnaire survey

The total number of passengers of RJ and LE calculated from numbers of seats in trains and published average occupancy rates is 2 262 340 for the whole year 2013. Only places for sitting were taken into account. According to these estimates, CR would have to serve the same number of passengers in order to have at least 50 % of the market. With these 50 %, CR would have a dominant position on the route Prague-Ostrava and thus it would be able to abuse its position. In this case, the total number of passengers on this route in 2013 would be 4 524 680 - CR would have 50% market share, RJ would have 25,37 % and LE 24,63 %. Since the route Prague-Ostrava is one of key routes for CR, it is possible to consider it as likely.

As mentioned above, the average of the occupancy rates of two remaining market players (RJ and LE) and the 50% occupancy rates were assumed.

***a) the average of the occupancy rates of RJ and LE***

The average occupancy rate is 76,5 % here ((80 + 73) / 2). Hence,

*76,5 % of (52 * 109 578) = 4 359 013*

In this case, CR would have transported 4 359 013 passengers in year 2013 from Prague to Ostrava and *vice versa*, which is 65,83 % of the total number. RJ would have 17,34 % and LE would have the remaining 16,83 %. The total number of passengers would be 6 621 353. With this significant market share, CR would certainly have a dominant position on the route.

***b) 50% occupancy rate***

Here we assume that the decisions of CR about number of trains or schedules or other activities make its business inefficient. The average occupancy rate would be 50 %, which is rather low and generates inefficiency.

*50 % of (52 * 109 578) = 2 849 028*

In this case, CR would have 2 849 028 passengers in 2013, which corresponds to 55,74 % of the total number. RJ would have 22,46 % and LE would have the remaining 21,80 %. The total number of passengers would be 5 111 368. Hence, despite of high inneficiency, CR would still possesses dominant position on the route. Taking it from opposite point of view - in order to have 50% market share on the route, CR occupancy rate would have to be approximately 39,70 %, which is deeply below 50 %. In the Annual Report for year 2013, CR state that the occupancy rate for this year was only 25 %, but this is the overall result including all routes CR operate at.

According to the estimated results for the purposes of this theses, it is possible to assume that CR have a dominant position on the route Prague-Ostrava.

Herfindahl-Hirschman Index (HHI) for the route Prague-Ostrava could be computed now. First, it is necessary to take estimated maret shares of all market

players. Since there are two estimated values for each railway company (due to two different possible occupation rates of CR), two scenarios can be simulated:

**Table 6.8**: Herfindahl-Hirschman Index

| | Market Shares (in %) | |
|---|---|---|
| | Scenario 1 | Scenario 2 |
| CR | 65,83 | 55,74 |
| RJ | 17,34 | 22,46 |
| LE | 16,83 | 21,80 |
| **HHI (points)** | **4 917,51** | **4 086,64** |

Source: author

$HHI_{Scenario1} = 65,83^2 + 17,34^2 + 16,83^2 = 4\ 333,59 + 300,68 + 283,25 = 4\ 917,52$

$HHI_{Scenario2} = 55,74^2 + 22,46^2 + 21,80^2 = 3\ 106,95 + 504,45 + 475,24 = 4\ 086,64$

On both scenarios it is visible that the more balanced the market shares are, the lower the index is - lower index indicates less probability of the existence of a dominant market player. The result of scenario 1 differs from the result of scenario 2 by approximately 830 points, it is higher due to the higher market share of CR. Values around 5000 points are considered quite high and refer to high market concentration, which could be a breeding ground for unhealthy competition occurance.

## 6.4 SSNIP Test

As already mentioned above, relevant market plays a key role when analyzing whether a violation of antitrust law has occurred or not. Only with a precisely defined relevant market it is possible to detect someone's dominant position. For the purpose of this thesis, the questionnaire survey was carried out. The survey serve most importantly as an application of SSNIP test, which is one of the important tools for determining relevant market, and partly as a tool for revealing consumer's preferences. The main question to be answered was whether the railway transport customers would switch to readily available substitutes (in this case it is for example bus transport) in response to a hypothetical small (in the range of 5 % to 10 %, eventually 15 %), yet permanent relative price increase. Additional questions were

focused on revealing the reasons for (not) switching to other type of transport and other consumer's preferences.

### 6.4.1. Application

The questionnaire for SSNIP test survey was made up of close questions that should in result reflect passenger's choices, preferences, decision making process and willingness to pay. The graphical representation of survey results are to be found in Appendix.

The questionnaire survey took place in April 2017 on the main railway station in Prague and Ostrava, in random days and times in order to avoid similarities and rather capture the diversity of passengers traveling on the route Prague ↔ Ostrava. Passengers traveling on different routes were not included in the survey because of geographical disparity and other different market circumstances. The research sample contains 259 respondents (N = 259). The questionnaire in its core form is to be found in Appendix.

**Table 6.9**: Individual shares of transport companies on respondents

| | AF | *RF (%)* |
|---|---|---|
| Czech Railways | 166 | *64,09* |
| RegioJet | 62 | *23,94* |
| Leo Express | 31 | *11,97* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

Majority of respondents use the services of CR on the route Prague ↔ Ostrava. This might be the result of significantly higher number of dispatched trains CR offer on the mentioned route.

**Table 6.10**: The purpose respondents mostly travel to Prague/Ostrava for (a) and - in case of work purposes - decision of its employer (not) to pay for the travel (b)

| | AF | *RF (%)* |
|---|---|---|
| School | 161 | *62,16* |
| Work | 50 | *19,31* |
| Visit | 31 | *11,97* |
| Vacation | 17 | *6,56* |
| **Total** | **259** | ***100,00*** |

| | AF | *RF (%)* |
|---|---|---|
| Yes | 12 | *24,00* |
| No | 38 | *76,00* |
| **Total** | **50** | ***100,00*** |

Source: author, based on questionnaire survey

The most frequent reason of respondent's traveling to Prague/Ostrava is studying in on of these destinations. When applying generally, students would make up a significant part of passengers on this route since the number of important Czech universities are located here. In case of work purposes, respondents were asked whether their travel expenses are are reimbursed by their employers. 12 respondents which answered positively are lately excluded from statistical testing since their decisions regarding the price changes might be influenced by this fact.

**Table 6.11**: The frequency of the journey to Prague/Ostrava (per year)

| | AF | *RF (%)* |
|---|---|---|
| Once | 11 | *4,25* |
| 2-5 | 20 | *7,72* |
| 6-11 | 16 | *6,18* |
| 12-24 | 51 | *19,69* |
| 25-39 | 75 | *28,96* |
| 40-52 | 82 | *31,66* |
| More than 52 times | 4 | *1,54* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

Next question in the questionnaire examines the frequency of respondent's traveling between mentioned locations. This aspect is important mainly because it is assumed to affect respondents decision making about price changes - respondents traveling more frequently are assumed to be more sensitive to smaller changes in price than those who travel only sporadically. This effect is lately tested in statistical part of the thesis.

**Table 6.12**: Travel class usually chosen by respondents

| | AF | *RF (%)* |
|---|---|---|
| Economy | 176 | *67,95* |
| Premium | 70 | *27,03* |
| Business | 13 | *5,02* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

Among the respondents, the economy class seems to be the most widespread travel class, probably due to lower ticket prices. Only approximately 32 % of them use the services offered by higher classes. It should be noted that every transport company operating on the route Prague ↔ Ostrava offeres different service to its passengers and also their travel classes are rated and priced differently. For instance, CR does not usually have business classes in their trains, since they are usualy divided into 1. and 2. classes, eventually the so-called "quiet section". RJ's trains only disposed of 2. class wagons in 2013, meanwhile LE offers both premium (1. class) and business class.

Higher classes in each train are usually in a minority, which is most likely another reason for the low numbers in the survey.

**Table 6.13**: Shares of respondents according to whether they considered other types of transport before choosing train or not (6.10.a) and which type (6.10.b)

| 6.10.a | AF | *RF (%)* |
|---|---|---|
| No | 213 | *82,24* |
| Yes | 46 | *17,76* |
| **Total** | **259** | ***100,00*** |

| 6.10.b | AF | *RF (%)* |
|---|---|---|
| Bus | 15 | *32,61* |
| Car | 31 | *67,39* |
| **Total** | **46** | ***100,00*** |

Source: author, based on questionnaire survey

Only a very small percentage of respondens from the sample have ever thought about using another mean of transport for their traveling and if they have ever done so, they rather considered car than bus - there are two times more respondents that would rather choose car to get to one of the mentioned locations (compared with bus). The next question detects the main reason of finally choosing train upon all other possible means of transport.

**Table 6.14**: Main reasons for choosing railway transport to Prague/Ostrava upon other types of transport

| | AF | *RF (%)* |
|---|---|---|
| Length of journey | 140 | *54,05* |
| Safety | 47 | *18,15* |
| Comfort | 36 | *13,90* |
| Price | 15 | *5,79* |
| Schedule | 8 | *3,09* |
| Service | 7 | *2,70* |
| Other | 6 | *2,32* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

Majority of respondents consider length of journey the most important reason for choosing train as their mean of transport on the route Prague ↔ Ostrava. This results were highly expected according to the fact that the bus travel is much longer here - it takes approximately in the range from 5 hours to 6 hours and 30 minutes to get to Prague/Ostrava from Ostrava/Prague by bus, compared with train journey that takes approximately 3 hours and 20 minutes. The second most frequent reason for chooding railway transport seems to be the feeling of more security. The price of bus ticket is almost comparable or even higher than the train ticket, hence some respondents state the ticket price as a reason.

**Table 6.15**: Opinions of respondents whether they would (not) notice the 5% increase in price of their train ticket and how would they react on this price change (other circumstances remain unchanged)

| | AF | *RF (%)* |
|---|---|---|
| Definitely yes | 19 | *7,34* |
| Rather yes | 133 | *51,35* |
| No idea | 2 | *0,77* |
| Rather no | 77 | *29,73* |
| Definitely no | 28 | *10,81* |
| **Total** | **259** | ***100,00*** |

| | AF | *RF (%)* |
|---|---|---|
| Stay | 229 | *88,42* |
| Switch to other railway comp. | 17 | *6,56* |
| Switch to bus transport | 1 | *0,39* |
| Switch to other type of trans. | 3 | *1,16* |
| I do not know | 9 | *3,47* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

With this question, the SSNIP test itself is started to being applied. Respondents were asked whether they would notice the small 5% positive change in price of their price ticket and what would be their likely reaction on it. According to the results, it is possible to state that even the majority of asked respondents would notice the change in price, most of the whole sample would ignore it and stay with their chosen transport company, eventually they would switch to another carrier within the railway transport. Hence, it seems that that small increase in price would not significantly affect the market distribution and it could be profitable for the hypothetical market leader.

**Table 6.16**: Opinions of respondents whether they would (not) notice the 10% increase in price of their train ticket and how would they react on this price change (other circumstances remain unchanged)

| | AF | *RF (%)* |
|---|---|---|
| Definitely yes | 33 | *12,74* |
| Rather yes | 162 | *62,55* |
| No idea | 7 | *2,70* |
| Rather no | 43 | *16,60* |
| Definitely no | 14 | *5,41* |
| **Total** | **259** | ***100,00*** |

| | AF | *RF (%)* |
|---|---|---|
| Stay | 201 | *77,61* |
| Switch to other railway comp. | 42 | *16,22* |
| Switch to bus transport | 2 | *0,77* |
| Switch to other type of trans. | 9 | *3,47* |
| I do not know | 5 | *1,93* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

As the percentage change in ticket price increases, the share of respondents who would notice it rises as well. The number of respondents that are not sure of their consumer behavior also increases, but the values remain quite low - it seems that most people are quite sure of their price sensitivity. The higher the price would be, the less respondents would stay with their actual railway company, but simultaneously the more portion of the sample would stay with railway transport and only change the carrier (when holding the rest of railway transport conditions stable). The number of respondents switching to bus transport rised only by one unit, which could indicate the incomparability of these two transport types.

**Table 6.17**: Opinions of respondents whether they would (not) notice the 15% increase in price of their train ticket and how would they react on this price change (other circumstances remain unchanged)

| | AH | *RH (%)* |
|---|---|---|
| Definitely yes | 58 | *22,39* |
| Rather yes | 149 | *57,53* |
| No idea | 9 | *3,47* |
| Rather no | 30 | *11,58* |
| Definitely no | 13 | *5,02* |
| **Total** | **259** | ***100,00*** |

| | AH | *RH (%)* |
|---|---|---|
| Stay | 175 | *67,57* |
| Switch to other railway comp. | 67 | *25,87* |
| Switch to bus transport | 6 | *2,32* |
| Switch to other type of trans. | 10 | *3,86* |
| I do not know | 1 | *0,39* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

From the author's point of view, 15% increase in price can already be viewed as considerable, hence almost 80 % of questioned respondents would notice it. Nevertheless, 67,57 % of the sample would not change the carrier whether they noticed the price change or not, and the number of respondents choosing another railway carrier still rises. In other words, there are only 16 people who would completely change the type of transport.

**Table 6.18**: Maximum relative price increase of train ticket respondents are willing to accept without changing their transport habits (N = 231)

| | AF | *RF (%)* |
|---|---|---|
| 20 % | 48 | *20,78%* |
| 25 % | 63 | *27,27%* |
| 30 % | 68 | *29,44%* |
| 35 % | 23 | *9,96%* |
| 40 % | 20 | *8,66%* |
| 45 % | 5 | *2,16%* |
| 50 % | 4 | *1,73%* |
| Total | **231** | ***100,00%*** |

Source: author, based on questionnaire survey

The question dealing with the willingness to pay was dedicated only to those respondents whose transport expenses were not paid by their employers and who would not switch to other type of transport even after 15% ticket price increase. These respondents were excluded because the conditions they are exposed to might

distort the results of the whole survey. Respondents with employer-covered transport expenses in fact do not spend their own money and hence their real income is not affected (reduced) by it - their sensitivity to price change on the other hand is very likely to be negatively affected. The rest of excluded respondents have already expressed their tendency to change type of transport after 5-15% price increase, hence asking them would be incorrect.

The above mentioned relative price increases represent the upper bounds at or below which included respondents would definitely buy the railway ticket. Above the certain bound, the certain respondent would not use railway transport any longer and (s)he would switch to other type of transport (bus, car or other). In some cases (respondents that would stay with actual railway company even after 15% increase in price), the chosen bound might include intermediate decision-making step: staying with railway transport but switching to other railway company and then switching to bus/car/other transport.

**Table 6.19**: Experience with traveling by bus on the route Prague ↔ Ostrava (6.16.a) and opinions on the railway and bus transport interchangeability (6.16.b) and main differences between railway and bus transport (6.16.c)

| 6.16.a | AF | *RF (%)* |
|---|---|---|
| Yes | 48 | *18,53* |
| No | 211 | *81,47* |
| **Total** | **259** | ***100,00*** |

| 6.16.b | AF | *RF (%)* |
|---|---|---|
| Rather yes | 9 | *3,47* |
| Rather no | 250 | *96,53* |
| **Total** | **259** | ***100,00*** |

| 6.16.c | AF | *RF (%)* |
|---|---|---|
| Length | 197 | *76,06* |
| Safety | 23 | *8,88* |
| Service | 16 | *6,18* |
| Price | 5 | *1,93* |
| Other | 6 | *2,32* |
| I do not know | 12 | *4,63* |
| **Total** | **259** | ***100,00*** |

Source: author, based on questionnaire survey

Only a small portion of survey participants have ever traveled by bus on the route Prague ↔ Ostrava (table 6.16.a), which is a logical result since 96,53 % of respondents conider the railway and bus transport rather uninterchangable (table 6.16.b). The length of journey seems to be the most significant difference (6.16.c). Even though only 18,53 % of respondents have the experience with bus travel, only 4,63 % of the whole sample was not able to specify the main difference, hence it is

not excluded that they might do a certain market research before choosing the type of transport.

**Table 6.20**: Identification questions: sex (6.17.a), age (6.17.b), net income (6.17.c), education (6.17.d)

| 6.17.a | AF | *RF (%)* |
|---|---|---|
| Male | 145 | *55,98* |
| Female | 114 | *44,02* |
| **Total** | **259** | ***100,00*** |

| 6.17.b | AF | *RF (%)* |
|---|---|---|
| Less than 18 | 6 | *2,32* |
| 18 - 26 | 174 | *67,18* |
| 27 - 36 | 59 | *22,78* |
| 37 - 46 | 15 | *5,79* |
| 47 - 56 | 5 | *1,93* |
| 57 - 66 | 0 | *0,00* |
| **Total** | **259** | ***100,00*** |

| 6.17.c | AF | *RF (%)* |
|---|---|---|
| 0 - 5 000 | 8 | *3,09* |
| 5 001 - 10 000 | 76 | *29,34* |
| 10 001 - 15 000 | 57 | *22,01* |
| 15 001 - 20 000 | 25 | *9,65* |
| 20 001 - 25 000 | 27 | *10,42* |
| 25 001 - 30 000 | 24 | *9,27* |
| 30 001 - 35 000 | 5 | *1,93* |
| 35 001 - 40 000 | 2 | *0,77* |
| Refuse | 35 | *13,51* |
| **Total** | **259** | ***100,00*** |

| 6.17.d | AF | *RF (%)* |
|---|---|---|
| Elementary school | 10 | *3,86* |
| High school - apprent. | 32 | *12,36* |
| High school - grad. | 101 | *39,00* |
| Vocational school | 15 | *5,79* |
| University | 101 | *39,00* |
| **Total** | **259** | ***100,00*** |

Note: apprent. = apprenticeship, grad. = graduation

Source: author, based on questionnaire survey

Last questions in the questionnaire were related to respondent's features. It is visible that, from the gender perspective, the random collection of data was very well done since the sex ratio is 1,28. According to age, younger respondents significantly prevail over middle-aged and older ones. This corresponds to the result that the most frequent reason of travel to Prague/Ostrava is school purpose (see Table 6.7). In terms of net income, after the consolidation od first three levels, more than 54 % of survey participants fall into the category of CZK 0-15 000, which could be related to a higher number of students in the sample.

**Table 6.21**: Relative changes in respondent's noticing during 5, 10 and 15% price increasing

| **Yes** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 152 | 182 | 207 | **-** |
| ΔAF | 0 | 30 | 25 | **55** |
| *ΔRF (%)* | *0,00* | *19,74* | *13,74* | ***36,18*** |

| **No** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 105 | 57 | 43 | **-** |
| ΔAF | 0 | -48 | -14 | **-62** |
| *ΔRF (%)* | *0,00* | *-45,71* | *-24,56* | **-59,05** |

| **No Idea** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 2 | 7 | 9 | **-** |
| ΔAF | 0 | 5 | 2 | **7** |
| *ΔRF (%)* | *0,00* | *250,00* | *28,57* | ***350,00*** |

Note: Yes = definitely or rather notice the change in price, No = definitely or rather not notice the change in price, No Idea = no opinion on this aspect

Source: author, based on questionnaire survey

The tables above summarize and show how the price sensitivity logically rises with higher relative price increase. Positive answers about price noticing "Definitely yes" and "Rather yes" were merged together into "Yes" for this purposes, as well as negative answers "Definitely no" and "Rather no". Positive answers increased by 36,18 % as the price change rised from 5 to 15 %. *Vice versa*, negative responses decreased by 59,05 %. Neutral answers increased by 350 %, however the absolute values are small here. Nevertheless, this result could represent the increasing tendency of people to doubt whether they would notice the price change or not as the percentage rises.

**Table 6.22**: Relative changes in respondent's decisions during 5, 10 and 15% price increasing

| **Stay R** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 246 | 243 | 242 | **-** |
| Δ AF | 0 | -3 | -1 | **-4** |
| *Δ RF (%)* | *0,00* | *-1,22* | *-0,41* | ***-1,63*** |

| **Switch B** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 1 | 2 | 6 | **-** |
| Δ AF | 0 | 1 | 4 | **5** |
| *Δ RF (%)* | *0,00* | *100,00* | *200,00* | **500,00** |

| **Switch O** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 3 | 9 | 10 | **-** |
| Δ AF | 0 | 6 | 1 | **7** |
| *Δ RF (%)* | *0,00* | *200,00* | *11,11* | ***233,33*** |

| **No Idea** | 5% | 10% | 15% | **Tot** |
|---|---|---|---|---|
| AF | 9 | 5 | 1 | **-** |
| Δ AF | 0 | -4 | -4 | **-8** |
| *Δ RF (%)* | *0,00* | *-44,44* | *-80,00* | ***-88,89*** |

Note: Stay R = stay with railway transport, Switch B = switch to bus transport, Switch O = switch to other unspecified mean of transport, No Idea = no opinion on this aspect

Source: author, based on questionnaire survey

In this part, the answers "Stay (with actual railway company)" and "Switch to other railway company" were merged to better reflect the definition of the relevant market. After merging, it is visible that the number of survey participants staying with rail decreased only by four passengers. The number of respondents that would switch to bus or other transport records positive change, however it rised only very slightly even after the 15% price increase - from one to six passengers (in case of bus) and from three to ten passengers (in case of other means of transport). It is possible to state that the higher the relative price increase is, the better people decide since the number of respondents without opinion records gradual decrease.

### 6.4.2. Results and evaluation

In the tables below, the basic results of SSNIP test are shown. For the purposes of this thesis, we treat CR as a hypothetical monopolist here.

**Table 6.23**: Numbers of respondents regarding their behaviour after price increase and chosen travel class

| | **5% increase in price** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stay | | SwitchR | | SwitchB | | SwitchO | | NoIdea | | **Total** | |
| Class | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. |
| Students under/at age of 26 | 66 | 14 | 7 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | **78** | **14** |
| Remaining respondents | 33 | 34 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | **37** | **37** |
| **Sum** | **99** | **48** | **11** | **1** | **1** | **0** | **1** | **0** | **3** | **2** | **115** | **51** |
| **Total** | **147** | | **12** | | **1** | | **1** | | **5** | | **166** | |
| | **166** | | | | | | | | | | | |

| | **10% increase in price** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stay | | SwitchR | | SwitchB | | SwitchO | | NoIdea | | **Total** | |
| Class | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. |
| Students under/at age of 26 | 55 | 12 | 17 | 2 | 1 | 0 | 3 | 0 | 0 | 0 | **76** | **14** |
| Remaining respondents | 33 | 29 | 6 | 3 | 0 | 1 | 0 | 1 | 2 | 1 | **41** | **35** |
| **Sum** | **88** | **41** | **23** | **5** | **1** | **1** | **3** | **1** | **2** | **1** | **117** | **49** |
| **Total** | **129** | | **28** | | **2** | | **4** | | **3** | | **166** | |
| | **166** | | | | | | | | | | | |

| | 15% increase in price | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stay | | SwitchR | | SwitchB | | SwitchO | | NoIdea | | **Total** | |
| Class | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. | 2. class | Higher cl. |
| Students under/at age of 26 | 44 | 9 | 26 | 4 | 3 | 1 | 3 | 0 | 0 | 0 | **76** | **14** |
| Remaining respondents | 33 | 29 | 5 | 5 | 0 | 1 | 1 | 1 | 0 | 1 | **39** | **37** |
| **Sum** | **77** | **38** | **31** | **9** | **3** | **2** | **4** | **1** | **0** | **1** | **115** | **51** |
| **Total** | **115** | | **40** | | **5** | | **5** | | **1** | | **166** | |
| | **166** | | | | | | | | | | | |

Source: author, based on questionnaire survey

The table below shows the possible SSNIP computations. The prices are related to the year 2013 and are used as a secondary data (JANDOVÁ, REDERER, 2013), because there is no other chance how to find prices retrospectively. However, for the simplification of computations, the average prices for sudents and adults were created (the effect of timely tickets and rush hours is included).

In order to find out whether the profits from price increase exceed the losses from outflow of customers, it is necessary to address revenues and costs of CR and its margin. For proper computations, marginal costs would serve much better, however, due to a lack of concrete data about CR's cost structure, a less appropriate but simplified computations were used here. Table 6.23 summarizes total revenues and costs of public (passenger) transport for year 2013 (taken from CR's Annual Report).

**Table 6.24**: CR's revenues and costs of pubic (passenger) transport (in mil. CZK)

| | |
|---|---|
| Revenues | 19 923 |
| Costs | 16 602 |

Source: author according to CR Annual Report 2013

Then, following formulas were used in order to estimate at least potentially possible numbers:

$$Profit = \ sales\ units\ Q * (price\ per\ unit\ P - cost\ per\ unit\ C)$$

$$Margin\ (\%) = \frac{(total\ revenues - total\ costs)}{total\ revenues} * 100$$

CR's margin has been thus computed as:

$$Margin\ (CR, \%) = \frac{(19\ 923\ 000\ 000 - 16\ 602\ 000\ 000)}{19\ 923\ 000\ 000} * 100 = \mathbf{16,67}\ \%$$

Following tables then show profits after individual price increases. Results are still related to the questionnaire survey.

**Table 6.25**: Initial customers and profit values

| **Initial values** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 78 | 246 | 204,99 | 3 198,78 | (2. class) |
| | 14 | 808 | 673,31 | 1 885,66 | (High.cl.) |
| | | | | **5 084,44** | |
| Remaining respondents | 37 | 328 | 273,32 | 2 023,16 | (2. class) |
| | 37 | 808 | 673,31 | 4 983,53 | (High.cl.) |
| | | | | **7 006,69** | **12 091,13** |

Source: author

**Table 6.26**: Profits after 5% price increases with raising costs

| **5% price increase (PI)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 66 | 258 | 214,99 | 2 838,66 | (2. class) |
| | 14 | 848 | 706,64 | 1 979,04 | (High.cl.) |
| | | | | **4 817,70** | |
| Remaining respondents | 33 | 344 | 286,66 | 1 892,22 | (2. class) |
| | 34 | 848 | 706,64 | 4 806,24 | (High.cl.) |
| | | | | **6 698,46** | **11 516,16** |

| **5% PI (Stay+SwitchR)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 73 | 258 | 214,99 | 3 139,73 | (2. class) |
| | 14 | 848 | 706,64 | 1 979,04 | (High.cl.) |
| | | | | **5 118,77** | |
| Remaining respondents | 37 | 344 | 286,66 | 2 121,58 | (2. class) |
| | 35 | 848 | 706,64 | 4 947,60 | (High.cl.) |
| | | | | **7 069,18** | **12 187,95** |

Note: as prices rise, costs proportionally rise, too - it is assumed that the company has to bear additional costs of predatory behaviour (e.g. due to reduction of its customer base)

Source: author, based on questionnaire survey

In this scenario (table 6.25), the costs rise together with price, according to the assumption of incuring additional costs due to predatory strategy implementation. It

is visible that even the 5% increase in ticket prices would lead to unprofitability, since the effect of price increase is not capable to balance or even exceed the effect of the outflow of customers, despite the number of leaving respondents is not high. The potential profit would decrease from CZK 12 091,13 to CZK 11 516,16 after this action would take place. Nevertheless, this means that it is necessary to widen the relevant market in order to make it worth monopolising. Since the offered product (or rather service) is a public transport in this case, it is again the public transport that remains as the single possible substitute product. However, the question is whether the relevant market should include - besides the CR's railway transport - only other railway tickets, or also for instance bus tickets. The initial assumtion and hypothesis is that the bus transport should not belong into the relevant market since there are many differences among the main features of these types of transport (mainly in the lenght of journey). Hence the first consolidation has been done within the railway transport - the respondents who would stay with actual railway company and respondents who would switch to another railway company were merged togehter. As a result, with the increased number of respondents, the increase in profit occured - to hypothetical CZK 12 187,95. Hence, the railway tickets of the remain railway companies seem to be the only substitutes, excluding the bus transport from the game. The logical result is that the hypothetical monopolist would benefit from price increase after taking control of the substitutes - other railway companies operating on the route Prague ↔ Ostrava.

Even though the 5% price increase and the "takeover" of the customers of competitive railway companies appears to be sufficient to become a hypothetical monopolist on the chosen market, tables below show the results in case that 10 and 15% price increase took place, in order to show different scenarios that may happen on this market when trying to monopolize it.

**Table 6.27**: Profits after 10% price increases with rising costs

| **10% price increase (PI)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 55 | 271 | 225,82 | 2 484,90 | (2. class) |
| | 12 | 889 | 740,80 | 1 778,40 | (High.cl.) |
| | | | | **4 263,30** | |
| Remaining respondents | 33 | 361 | 300,82 | 1 985,94 | (2. class) |
| | 29 | 889 | 740,80 | 4 297,80 | (High.cl.) |
| | | | | **6 283,74** | **10 547,04** |

| **10% PI (Stay+SwitchR)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 72 | 271 | 225,82 | 3 252,96 | (2. class) |
| | 14 | 889 | 740,80 | 2 074,80 | (High.cl.) |
| | | | | **5 327,76** | |
| Remaining respondents | 39 | 361 | 300,82 | 2 347,02 | (2. class) |
| | 32 | 889 | 740,80 | 4 742,40 | (High.cl.) |
| | | | | **7 089,42** | **12 417,18** |

Note: as prices rise, costs proportionally rise, too - it is assumed that the company has to bear additional costs of predatory behaviour (e.g. due to reduction of its customer base)

Source: author, based on questionnaire survey

**Table 6.28**: Profits after 15% price increases qith rising costs

| **15% price increase (PI)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 44 | 283 | 235,82 | 2 075,92 | (2. class) |
| | 9 | 929 | 774,14 | 1 393,74 | (High.cl.) |
| | | | | **3 469,66** | |
| Remaining respondents | 33 | 377 | 314,15 | 2 074,05 | (2. class) |
| | 29 | 929 | 774,14 | 4 490,94 | (High.cl.) |
| | | | | **6 564,99** | **10 034,65** |

| **15% PI (Stay+SwitchR)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 70 | 283 | 235,82 | 3 302,60 | (2. class) |
| | 13 | 929 | 774,14 | 2 013,18 | (High.cl.) |
| | | | | **5 315,78** | |
| Remaining respondents | 38 | 377 | 314,15 | 2 388,30 | (2. class) |
| | 34 | 929 | 774,14 | 5 265,24 | (High.cl.) |
| | | | | **7 653,54** | **12 969,32** |

Note: as prices rise, costs proportionally rise, too - it is assumed that the company has to bear additional costs of predatory behaviour (e.g. due to reduction of its customer base)

Source: author

It is visible that the results are in both cases similar to the 5% price increase scenario and they show the same trend. At first, the increase in ticket price cannot balance the loss of customers resulting in lower profit (from CZK 12 091,13 to CZK 10 547,04 in case of 10% price increase and CZK 10 034,65 in case of 15% price increase), but after merging passengers who would stay within their chosen railway company and passengers who would switch to different one, the hypothetical

monopolist's loss turns to profit and even in larger scale (to CZK 12 417,18 in case of 10% price increase and CZK 12 969,32 in case of 15% price increase).

Hence, all three CR scenarios with rising costs appear to show similar pattern, probably due to the high number of customers that would switch to other railway company instead of the other mean of transport. Only a minor share of respondents would switch to bus or other type of transport even after 15% price increase, which supports the assumption that the railway transport is irreplaceable on the route Prague ↔ Ostrava. However - generaly speaking, regardless the profitability of scenarios and the importance of railway transport on this route as such - the higher the price increase, the higher the risk of losses for predator in case it failed in taking over enough customers. On the other hand, the higher the price increase, the higher the probability of excluding competitors from market and subsequent recoupment of suffered losses.

Another set of scenarios is shown below in table 6.28.

**Table 6.29**: Profits after 5%, 10% and 15% price increases with constant costs

| **5% price increase (PI)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 66 | 258 | 204,99 | 3 498,66 | (2. class) |
| | 14 | 848 | 673,31 | 2 445,66 | (High.cl.) |
| | | | | **5 944,32** | |
| Remaining respondents | 33 | 344 | 273,32 | 2 332,44 | (2. class) |
| | 34 | 848 | 673,31 | 5 939,46 | (High.cl.) |
| | | | | **8 271,90** | **14 216,22** |

| **10% price increase (PI)** | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 55 | 271 | 204,99 | 3 630,55 | (2. class) |
| | 12 | 889 | 673,31 | 2 588,28 | (High.cl.) |
| | | | | **6 218,83** | |
| Remaining respondents | 33 | 361 | 273,32 | 2 893,44 | (2. class) |
| | 29 | 889 | 673,31 | 6 255,01 | (High.cl.) |
| | | | | **9 148,45** | **15 367,28** |

| 15% price increase (PI) | Sales units | Price (CZK) | Cost (CZK) | Profit (CZK) | |
|---|---|---|---|---|---|
| Students under/at age of 26 | 44 | 283 | 204,99 | 3 432,44 | (2. class) |
| | 9 | 929 | 673,31 | 2 301,21 | (High.cl.) |
| | | | | **5 733,65** | |
| Remaining respondents | 33 | 377 | 273,32 | 3 421,44 | (2. class) |
| | 29 | 929 | 673,31 | 7 415,01 | (High.cl.) |
| | | | | **10 836,45** | **16 570,10** |

Source: author, based on questionnaire survey

In these three scenarios, costs remain constant and margin rises, which lead to higher profits with no need to widen the relevant market. In author's opinion, scenarios with increasing costs are more likely since there may occur any additional spending due to predatory strategy implementation. For instance, loss of some customers might increase marginal costs - railway company still has to operate certain trains whether they are half empty of not.

Tables 6.29 and 6.30 summarize the absolute and percentual outflow of CR passengers regarding the travel class and status (students under/at 26 and others). It is obvious that the number of respondents staying with CR decreases as the price of ticket rises. Table 6.31 then shows elasticities for each group of respondents.

**Table 6.30**: Absolute outflow of respondents (CR passengers) after 5%, 10% and 15% price increase

| 5% price increase | Stay | | Leave | |
|---|---|---|---|---|
| Class | 2. class | Higher cl. | 2. class | Higher cl. |
| Students under/at age of 26 | 66 | 14 | 12 | 0 |
| Remaining respondents | 33 | 34 | 4 | 3 |
| **Total** | **147** | | **19** | |
| | **166** | | | |

| 10% price increase | Stay | | Leave | |
|---|---|---|---|---|
| Class | 2. class | Higher cl. | 2. class | Higher cl. |
| Students under/at age of 26 | 55 | 12 | 21 | 2 |
| Remaining respondents | 33 | 29 | 8 | 6 |
| **Total** | **129** | | **37** | |
| | **166** | | | |

| 15% price increase | Stay | | Leave | |
|---|---|---|---|---|
| Class | 2. class | Higher cl. | 2. class | Higher cl. |
| Students under/at age of 26 | 44 | 9 | 32 | 5 |
| Remaining respondents | 33 | 29 | 6 | 8 |
| **Total** | **115** | | **51** | |
| | **166** | | | |

Source: author, based on questionnaire survey

**Table 6.31**: Absoule and relative outflow of respondents (CR passengers) after 5%, 10% and 15% price increase

| | Initial values | | 5% price increase | | | | 10% price increase | | | | 15% price increase | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2. cl. | High. | 2. class | | Higher cl. | | 2. class | | Higher cl. | | 2. class | | Higher cl. | |
| | AV | AV | AV | % | AV | % | AV | % | AV | % | AV | % | AV | % |
| Students under/at age of 26 | 78 | 14 | -12 | -15,38 | 0 | 0 | -23 | -29,49 | -2 | -14,29 | -34 | -43,59 | -5 | -35,71 |
| Remaining respondents | 37 | 37 | -4 | -10,81 | -3 | -8,11 | -4 | -10,81 | -8 | -21,62 | -4 | -10,81 | -8 | -21,62 |

Source: author, based on questionnaire survey

**Table 6.32**: Price elasticities for train tickets for different groups of respondents

| | 5% price increase | | 10% price increase | | 15% price increase | |
|---|---|---|---|---|---|---|
| | 2. class | Higher | 2. class | Higher | 2. class | Higher |
| Students under/at age of 26 | -3,076 | 0 | -2,949 | -1,429 | -2,906 | -2,381 |
| Remaining respondents | -2,162 | -1,622 | -1,081 | -2,162 | -0,721 | -1,441 |
| **Total (consolidated)** | **-2,29** | | **-2,23** | | **-2,05** | |

Source:

Price elasticity tells us how the demanded quantity of certain product changes with its price change. Only 5-15% price changes were included. Demand for train ticket seems to be highly elastic here, which is considered rather unlikely since there are not as many substitutes available. The reason of such high elasticity might be that only those respondents who would stay with their chosen railway company have been included - those who would stay with railway transport and only switch to another railway company have been included in the opposite group, which probably increases the elasticity results (their chosen substitute is still connected to railway transport).

## 6.5 Statistical Modelling

Using various econometrical models, the purpose of this subchapter is to find out how, by what and to which extend the price sensitivity and decision-making process of respondents is affected. Hence, the dataset for the modeling is the sample from SSNIP test application. Two basic models are used in this thesis - Logit model and Ordinary Least Squares model (OLS).

### 6.5.1. Logit Model

In econometrics, Logit models take place in statistical modelling when the individual values of the independent variable are rather states and do not acquire quantitative values. These qualitative variables are reffered to as categorical or discrete. Logit model estimates the probability of a certain result within the dependent variable according to the effects of independent variables. In order to estimate probability, the dependent variable is mostly treated as a binary (dummy) variable, which assumes only two values: 0 and 1 (zero-one coding). 0 stands for the negative position and 1 stands for the positive one. The logit function is as follows:

$$\text{logit(P)} = \ln\left(\frac{P}{1-P}\right) = b_0 + b_1X_1 + \ ... + b_nX_n = X\beta \tag{6.1}$$

$$\frac{P}{1-P} = e^{X\beta} \tag{6.2}$$

$$P = (1 - P) * \ e^{X\beta} \tag{6.3}$$

$$P = \ e^{X\beta} - \ e^{X\beta} * \text{P} \tag{6.4}$$

$$P\left(1 + e^{X\beta}\right) = \ e^{X\beta} \tag{6.5}$$

$$\boxed{P = \frac{e^{X\beta}}{1+e^{X\beta}}} \tag{6.6}$$

In Eq. 6.6, letter P on the left hand side stands for the probability that one out of two possible outcomes (in case of binary variables) takes place. According to the right hand side of equation, it transformed from linear (Eq. 6.1) to non-linear function.

The linear regression is not to be an appropriate model when having binary outcome, since it assumes only continuous dependent variable with normally distributed errors and not the categorical one.

Tve the SSNIP test dataset consists of both numerical and caterorical variables. Tables below summarize their main statistical features.

**Table 6.33**: Basic statistical summary of the dataset for numeric variables

| | **PriceChangeMax** |
|---|---|
| **Min** | 20 |
| **1. Quartile** | 25 |
| **Median** | 30 |
| **Mean** | 28,59 |
| **3. Quartile** | 30 |
| **Max** | 50 |

Source: author

**Table 6.34**: Basic statistical summary of the dataset for binary and factor variables

| **PriceChange5** | | | **PriceChange10** | | | **PriceChange15** | | |
|---|---|---|---|---|---|---|---|---|
| No | 98 | 39,68% | No | 51 | 20,65% | No | 201 | 81,38% |
| Yes | 147 | 59,51% | Yes | 189 | 76,52% | Yes | 9 | 3,64% |
| NoIdea | 2 | 0,81% | NoIdea | 7 | 2,83% | NoIdea | 37 | 14,98% |
| **Total** | **247** | **100,00%** | **Total** | **247** | **100,00%** | **Total** | **247** | **100,00%** |
| **Reaction5** | | | **Reaction10** | | | **Reaction15** | | |
| StayRail | 234 | 94,74% | StayRail | 231 | 93,52% | StayRail | 230 | 93,12% |
| NoIdea | 9 | 3,64% | NoIdea | 5 | 2,02% | NoIdea | 1 | 0,40% |
| SwitchOther | 3 | 1,21% | SwitchOther | 9 | 3,64% | SwitchOther | 10 | 4,05% |
| SwitchBus | 1 | 0,40% | SwitchBus | 2 | 0,81% | SwitchBus | 6 | 2,43% |
| **Total** | **247** | **100,00%** | **Total** | **247** | **100,00%** | **Total** | **247** | **100,00%** |
| **Frequency** | | | **Class** | | | **OtherMoT** | | |
| 0-1 | 11 | 4,45% | economy | 172 | 69,64% | no | 201 | 81,38% |
| 2-5 | 20 | 8,10% | premium | 66 | 26,72% | yes | 46 | 18,62% |
| 6-11 | 16 | 6,48% | business | 9 | 3,64% | **Total** | **247** | **100,00%** |
| 12-24 | 46 | 18,62% | **Total** | **247** | **100,00%** | | | |
| 25-39 | 75 | 30,36% | | | | | | |
| 40-52 | 75 | 30,36% | | | | | | |
| 53-365 | 4 | 1,62% | | | | | | |
| **Total** | **247** | **100,00%** | | | | | | |

| BusTravel | | | Sex | | | Age | | |
|---|---|---|---|---|---|---|---|---|
| no | 200 | 80,97% | male | 135 | 54,66% | 0-17 | 6 | 2,43% |
| yes | 47 | 19,03% | female | 112 | 45,34% | 18-26 | 172 | 69,64% |
| **Total** | **247** | **100,00%** | **Total** | **247** | **100,00%** | 27-36 | 54 | 21,86% |
| | | | | | | 37-46 | 10 | 4,05% |
| | | | | | | 47-56 | 5 | 2,02% |
| | | | | | | **Total** | **247** | **100,00%** |

| Education | | | NetIncome | | |
|---|---|---|---|---|---|
| elemen | 10 | 4,05% | 0-5000 | 8 | 3,24% |
| higha | 31 | 12,55% | 5001-10000 | 76 | 30,77% |
| highg | 96 | 38,87% | 10001-15000 | 57 | 23,08% |
| vs | 13 | 5,26% | 15001-20000 | 25 | 10,12% |
| uni | 97 | 39,27% | 20001-25000 | 24 | 9,72% |
| **Total** | **247** | **100,00%** | 25001-30000 | 20 | 8,10% |
| | | | 30001-35000 | 5 | 2,02% |
| | | | 35001-40000 | 1 | 0,40% |
| | | | Refuse | 31 | 12,55% |
| | | | **Total** | **247** | **100,00%** |

Source: author

The Logit models treat the dependent variables PriceChange5Yes, PriceChange10Yes and PriceChange15Yes as probabilities of noticing particular price increase. The models are specifed as follows:

$$\begin{aligned} logit(PriceChange5Yes_i = 1) = {} & \beta_0 + \beta_1 * Frequency_i + \beta_2 * Class_i + \beta_3 * OtherMoTYes_i + \\ & \beta_4 * BusTravelYes_i + \beta_5 * Female_i + \beta_6 * Age_i + \\ & \beta_7 * Education_i + \beta_8 * NetInc_i \end{aligned} \quad (6.7)$$

The same equation holds for dependent variables PriceChange10Yes and PriceChange15Yes. Variables used in the model are described below in box 6.4.

**Box 6.4**: Description of variables used in the Logit models

*PriceChange5/10/15Yes* - dummy variable including passengers from the sample that would probably notice the 5/10/15 percent change in the price of their ticket

*Frequency* - frequency of traveling on route Prague ↔ Ostrava, number of carried journeys per year

*Class* - travel classchosen by passengers from the sample

*OtherMoTYes* - dummy variable including passengers from the sample who have considered other mean of transport before choosing train

*BusTravelYes* - dummy variable including passengers from the sample who have ever travelled by bus on the route Prague ↔ Ostrava

*Female* - dummy variable including female passengers from the sample

*Age* - age of passengers form the sample

*Education* - the highest education level achieved by passengers from the sample

*NetInc* - approximate net income of passengers from the sample

The subscript stands for each respondent-passenger from the sample. The variable PriceChange5Yes is the dummy variable for the categorical variable PriceChange5, PriceChange10Yes is the dummy variable for the categorical variable PriceChange10, PriceChange15Yes is the dummy variable for the categorical variable PriceChange15, OtherMoTYes is the dummy variable for the binary variable OtherMoT, BusTravelYes is the dummy variable for the binary variable BusTravel and Female is the dummy variable for the binary variable Sex.

**Table 6.35**: The results of estimation of the Logit model for dependent variable PriceChange5Yes

| **Dependent variable: PriceChange5Yes** | | | |
|---|---|---|---|
| | Coefficient | Standard Error | z-statistic |
| Frequency | 0,6321 | 0,1215 | 5,2020 |
| Class | −0,7458 | 0,2893 | −2,5784 |
| OtherMoTYes | 0,5547 | 0,3988 | 1,3907 |
| BusTravelYes | 0,6255 | 0,4114 | 1,5203 |
| TrainBusIntYes | 0,2219 | 0,8839 | 0,2510 |
| Female | −0,51431 | 0,3039 | −1,6923 |
| Age | 0,1676 | 0,2515 | 0,6665 |
| Education | 0,0979 | 0,1258 | 0,7780 |
| NetInc | −0,0062 | 0,0715 | −0,0869 |
| Constant | -2,1947 | 0,9401 | -2,3346 |
| N | | 247 | |
| McFadden $R^2$ | | 0,183144 | |
| Adjusted $R^2$ | | 0,123159 | |
| Akaike criteria | | 292,3533 | |
| Log Likelihood | | -136,1767 | |

Source: author

**Table 6.36**: The results of estimation of the Logit model for dependent variable PriceChange10Yes

| **Dependent variable: PriceChange10Yes** | | | |
|---|---|---|---|
| | Coefficient | Standard Error | z-statistic |
| Frequency | 0,9150 | 0,1483 | 6,1685 |
| Class | 0,4474 | 0,3491 | 1,2815 |
| OtherMoTYes | 1,1243 | 0,5672 | 1,9822 |
| BusTravelYes | 0,7478 | 0,5507 | 1,3580 |
| Female | −0,5544 | 0,3734 | −1,4845 |
| Age | −0,0194 | 0,2975 | −0,0652 |
| Education | 0,0371 | 0,1507 | 0,2463 |
| NetInc | 0,0060 | 0,0922 | 0,0650 |
| Constant | −3,4470 | 1,1972 | −2,8792 |
| N | | 247 | |
| McFadden $R^2$ | | 0,275733 | |
| Adjusted $R^2$ | | 0,20888 | |
| Akaike criteria | | 213,0059 | |
| Log Likelihood | | -97,50297 | |

Source: author

**Table 6.37**: The results of estimation of the Logit model for dependent variable PriceChange15Yes

| Dependent variable: PriceChange15Yes | | | |
|---|---|---|---|
| | Coefficient | Standard Error | z-statistic |
| Frequency | 0,9057 | 0,1471 | 6,1578 |
| Class | 0,1440 | 0,3588 | 0,4015 |
| OtherMoTYes | 1,4141 | 0,7003 | 2,0192 |
| BusTravelYes | 1,0539 | 0,6494 | 1,6230 |
| Female | −0,4030 | 0,4141 | −0,9733 |
| Age | 0,0095 | 0,3182 | 0,0300 |
| Education | −0,11399 | 0,1666 | −0,6841 |
| NetInc | −0,0999 | 0,0971 | −1,0294 |
| Constant | −1,7527 | 1,1577 | −1,5140 |
| N | | 247 | |
| McFadden $R^2$ | | 0,310153 | |
| Adjusted $R^2$ | | 0,234356 | |
| Akaike criteria | | 181,8208 | |
| Log Likelihood | | -81,91042 | |

Source: author

The Logit output for the dataset does not seem to show any statistically significant data at any confidence level at all. However, some of the results and correlations seem to correspond to the logical assumptions - for instance, the model output states that the higher the traveling frequency is, the more likely the responents are to notice the 5-15% price change since they often check prices when buying tickets. The variable Class is negatively cerrelated in the first model (the higher the travel class, the less sensitive the respondents are to price changes).

Dependent variables Reaction5StayRail, Reaction10StayRail and Reaction15StayRail have been treated as probabilities of staying with the railway transport when particular price increase takes place. The models are specifed as follows:

$$\begin{aligned} logit(Reaction5StayRail_i = 1) = {} & \beta_0 + \beta_1 * Frequency_i + \beta_2 * Class_i + \beta_3 * OtherMoTYes_i + \\ & \beta_4 * BusTravelYes_i + \beta_5 * Female_i + \beta_6 * Age_i + \\ & \beta_7 * Education_i + \beta_8 * NetInc_i \end{aligned} \quad (6.8)$$

The same equation holds for Reaction10StayRail and Reaction15StayRail.

The variable Reaction5StayRail is the dummy variable for the categorical variable Reaction5, Reaction10StayRail is the dummy variable for the categorical variable Reaction10 and Reaction15StayRail is the dummy variable for the categorical variable Reaction15. Conditions among independent variables remain unchanged and hence the right hand side of the equation corresponds to the the right hand side of the previous model.

**Table 6.38**: The results of estimation of the Logit model for dependent variable Reaction5StayRail

| **Dependent variable: Reaction5StayRail** | | | |
|---|---|---|---|
| | Coefficient | Standard Error | z-statistic |
| Frequency | 0,1315 | 0,2244 | 0,5863 |
| Class | 0,3262 | 0,6482 | 0,5032 |
| OtherMoTYes | −1,1895 | 0,6566 | −1,8117 |
| BusTravelYes | −0,8711 | 0,6879 | −1,2663 |
| Female | −0,3573 | 0,5864 | −0,6093 |
| Age | 0,0398 | 0,5851 | 0,068 |
| Education | −0,0383 | 0,2531 | −0,1512 |
| NetInc | 0,1124 | 0,1658 | 0,6782 |
| Constant | 2,1895 | 1,8284 | 1,1975 |
| N | | 247 | |
| McFadden $R^2$ | | 0,059201 | |
| Adjusted $R^2$ | | -0,137149 | |
| Akaike criteria | | 115,8288 | |
| Log Likelihood | | -47,91438 | |

Source: author

**Table 6.39**: The results of estimation of the Logit model for dependent variable Reaction10StayRail

| Dependent variable: Reaction10StayRail | | | |
|---|---|---|---|
| | Coefficient | Standard Error | z-statistic |
| Frequency | −0,0192 | 0,2557 | −0,0751 |
| Class | −0,0332 | 0,5965 | −0,0557 |
| OtherMoTYes | −3,3483 | 0,7299 | −4,5877 |
| BusTravelYes | −1,1161 | 0,7831 | −1,4252 |
| Female | 0,7103 | 1,0576 | 0,6716 |
| Age | 0,9536 | 0,6465 | 1,4749 |
| Education | −0,3463 | 0,5167 | −0,6701 |
| NetInc | 0,2555 | 0,2597 | 0,9838 |
| Constant | 0,2502 | 0,2039 | 1,2268 |
| N | | 247 | |
| McFadden $R^2$ | | 0,282872 | |
| Adjusted $R^2$ | | 0,114122 | |
| Akaike criteria | | 104,9926 | |
| Log Likelihood | | -42,49628 | |

Source: author

**Table 6.40**: The results of estimation of the Logit model for dependent variable Reaction15StayRail

| Dependent variable: Reaction15StayRail | | | |
|---|---|---|---|
| | Coefficient | Standard Error | z-statistic |
| Frequency | −0,1638 | 0,3283 | −0,4991 |
| Class | −0,1180 | 0,7501 | −0,1574 |
| OtherMoTYes | −4,5341 | 1,0291 | −4,4059 |
| BusTravelYes | −1,5469 | 1,0425 | −1,4838 |
| Female | 2,1458 | 0,9525 | 2,2529 |
| Age | −0,0580 | 0,6625 | −0,0876 |
| Education | 0,6529 | 0,3483 | 1,8747 |
| NetInc | 0,1686 | 0,2220 | 0,7593 |
| Constant | 3,0984 | 2,2862 | 1,3553 |
| N | | 247 | |
| McFadden $R^2$ | | 0,530901 | |
| Adjusted $R^2$ | | 0,36934 | |
| Akaike criteria | | 78,0707 | |
| Log Likelihood | | -29,03535 | |

Source: author

Even with increasing frequency, respondents do not seem to make any changes after 5% price increase, however as the relative price increase rises to 10 and 15 %, the variables appear to be negatively correlated and parameter values show increasing trend. It stands that when 10 or 15% price increase takes place, the probability of staying with the current wailway company decreases. Hence, the maximum relative price increase at which respondents would still stay with actual transport company might lay in the interval between 5,1 % and 10 %. The same pattern holds for travel class - when 10 or 15% price increase appears, with higher travel class the probability of staying decreases (the opposite correlation holds for 5% price change). With higher travel frequency, two effects might arise - respondents must spend bigger portion of their real income when frequently traveling, hence they are likely to be more sensitive for price changes, but it could be more difficult for them to look for new transport options and adjust to different time schedule. This could be the reason why the correlation changes from positive (5% price change) to negative (10 and 15% price change) - only in case of higher price increase it is worth making market research and adjust to another transport options.

### 6.5.2. OLS Model

Ordinary least squares (OLS) regression is a statistical method of analysis that estimates the relationship between one or more independent variables and a dependent variable; the method estimates the relationship by minimizing the sum of the squares in the difference between the observed and predicted values of the dependent variable configured as a straight line (WIKIPEDIA).

Simple regression model looks as follows:

$$y_i = \alpha + \beta x_i + \varepsilon \tag{6.9}$$

The dependent (numerical) variable is determined by two components: by explanatory variables and disturbances or errors. The concrete model for CR respondents has following form:

$$\begin{aligned} Y\,(PriceChangeMax_i) = {} & \beta_0 + \beta_1 * Frequency_i + \beta_2 * Class_i + \beta_3 * PriceChange5Yes_i + \\ & \beta_4 * PriceChange15Yes_i + \beta_5 * BusTravelYes_i + \\ & \beta_6 * TrainBusIntYes_i + \beta_7 * Female_i + \beta_8 * Age_i + \\ & \beta_9 * Education_i + \beta_{10} * NetInc_i + \varepsilon_i \end{aligned} \tag{6.10}$$

Variables used in the model are described below in box 6.5.

**Box 6.5**: Description of variables used in the Logit models

*PriceChangeMax:* numerical variable including maximum percentage price increase respondents would accept without changing transport company or type of transport

*Frequency* - frequency of traveling on route Prague ↔ Ostrava, number of carried journeys per year

*Class* - travel classchosen by passengers from the sample

*PriceChange5/15Yes* - dummy variable including passengers from the sample that would probably notice the 5/10/15 percent change in the price of their ticket

*BusTravelYes* - dummy variable including passengers from the sample who have ever travelled by bus on the route Prague ↔ Ostrava

*TrainBusIntYes*: dummy variable including respondents who do consider train and bus transport on the route Prague ↔ Ostrava inerchangeable

*Female* - dummy variable including female passengers from the sample

*Age* - age of passengers form the sample

*Education* - the highest education level achieved by passengers from the sample

*NetInc* - approximate net income of passengers from the sample

Table 6.40 then summarizes results that were achieved by estimating OLS model.

**Table 6.41**: The results of estimation of the OLS model for dependent variable PriceChangeMax

| Dependent variable: PriceChangeMax | | | | |
|---|---|---|---|---|
| | Coefficient | Standard Error | p-value | |
| Frequency | −0,0702 | 0,3356 | 0,8346 | |
| Class | 1,7169 | 0,7952 | 0,0319 | ** |
| PriceChange5Yes | −2,7703 | 1,052 | 0,0091 | *** |
| PriceChange15Yes | −4,6597 | 1,3493 | 0,0007 | *** |
| BusTravelYes | −0,7704 | 1,0559 | 0,4664 | |
| TrainBusIntYes | −1,2850 | 3,6041 | 0,7218 | |
| Female | −1,1167 | 0,8258 | 0,1776 | |
| Age | −0,6336 | 0,6538 | 0,3336 | |
| Education | −0,0413 | 0,3371 | 0,9026 | |
| NetInc | 0,506 | 0,1874 | 0,007 | *** |
| Constant | 32,1776 | 2,4243 | <0,0001 | |
| N | 231 | | | |
| $R^2$ | 0,28281 | | | |
| Adjusted $R^2$ | 0,250211 | | | |

Note: *** p<0.01,** p<0.05,* p<0.1

Source: author

As already mentioned above, the respondents who travel on the route Prague ↔ Ostrava for the work purposes and whose travel expenses are reimbursed by their employees were omitted, as well as those who have already decided to change the type of transport when 5-15% price increase took place.

Out of ten explanatory variables included in the model, variable Class appears to be statistically significant on 95% confidence level and variables PriceChange5Yes, PriceChange15Yes and NetInc are statistically significant even on 99% confidence level. Hence, it is not impossible to state that the null hypotheses about no dependece among the dependent variable and these four independent variables could be rejected. On the other hand, the $R^2$ and adjusted $R^2$ values are rather low here.

The Class results state that the respondents-passengers traveling in higher (i.e. more luxurious) travel classes are willing to pay more in maximum for the price ticket, or - in other words - are more resistant against the price increase. This could be explained for instance by higher real income of those respondents. The results for variables PriceChange5Yes and PriceChange15Yes can be interpreted as follows: respondents that were more sensitive to price changes and hence were more likely to notice the 5 or 15%

increase in price have lower upper bounds for the maximum ticket price. The negative correlation appears in both cases, the results for variable PriceChange15Yes are even more significant than for PriceChange5Yes, which is logical (respondents noticing 5% price increase are willing to pay 2,7703 % less than others in maximum, respondents noticing 10% price increase are willing to pay 4,6597 % less). The results for the last statistically significant variable NetInc imply that respondents with higher net income are likely to set their maximum prices higher, hence they are willing to pay more for the train ticket. This assumption appears highly probable.

The rest of explanatory variables used in the model seem not to be statistically significant at any confidence level. However, due to the topic of the thesis, the results related to bus transport might also be mentioned, even thought the relation is not confirmed within the model - respondents who consider train and bus transport interchangeable (regardless whether they have the previous experience with bus transport or not) seem to be willing to pay 1,2850 % less in maximum for the price ticket.

## 6.6 Cost analysis

After goinf through all the procedures and tests to determine market share, relevant market and other circumstances, at the end of the predatory price analysis it is necessary to make cost analysis in order to find out whether company sets prices below them or not. In many cases including this one, it is very difficult to properly determine company's costs when there is an absence of relevant data. First, in case of railway transport sector, it is very difficult to distinguish between fixed and variable costs. Second, due to lack of data it is impossible to extract fixed and variable cost spent on route Prague ↔ Ostrava from total fixed and variable cost of company. Third, it is possible that the cost structure of private company differs from the one of state-owned company in various aspects. Traction energy and fuels, employees costs (salaries, payoffs, social and health insurance) directly linked to the route, services offerd in night and restaurant trains, costs for using railway, marketing costs can be some examples of variable costs. Hence, lacking any other data, these costs were treated as variable, other possibly variable costs were ommited (although it is highly likely that the list is not exhaustive).

Table 6.41 shows overall and potentially variable costs of CR.

**Table 6.42**: Overall and potentially variable costs of CR for public passenger transport

| | | |
|---|---|---|
| | Overall costs of CR transport (not adjusted for amortization) | 31 369 000 000,00 |
| | **Overall costs of CR public passenger transport (not adjusted for amortization)** | **16 602 000 000,00** |
| | Share of public transport costs on overal costs | 52,92% |
| | | |
| | Total power costs (for pubic passenger transport) | 9 113 328 866,00 |
| | Total mployee costs (for pubic passenger transport) | 6 712 622 053,00 |
| **Variable costs** | | |
| Power costs | Traction costs | 2 408 652 819,00 |
| | Railway use costs | 1 879 168 412,00 |
| | Costs of services in night and restaurant trains | 57 413 971,00 |
| | Marketing costs | 93 867 287,00 |
| Employee costs | Salaries | 4 627 010 380,00 |
| | Payoffs | 198 693 612,00 |
| | Insurance costs | 1 545 245 590,00 |
| | **Total variable costs** | **10 810 052 071,00** |
| | | |
| | **Share of variable public passenger transport costs on total public passenger transport costs** | **65,11%** |

Source: author according to CR Annual Report 2013

Total power and employee costs for public passenger transport equal 52,92 % of total power and employee costs for overall transport (because divided costs in Annual reports are only for the whole railway transport). Specified variable costs for each group of variable costs for public passenger transport were obtained according to the percentige shares of variable costs for overall railway transport. Hence, after summing up all possible variable costs for public passenger transport, we found out that the share of variable public passenger transport costs on total public passenger transport costs is 65,11 %. This result can be thus used for computing share of variable costs on total costs on CR railway ticket.

**Table 6.43**: Total and variable costs per ticket

| | **Average total costs** | | **Average variable costs** | |
|---|---|---|---|---|
| | *2. class* | *Higher cl.* | *2. class* | *Higher cl.* |
| Students under/at age of 26 | 204,99 | 673,31 | **133,47** | **438,39** |
| Remaining respondents | 273,32 | 673,31 | **177,96** | **438,39** |

Source: author

If the price of certain ticket somehow and somewhen dropped below the bold amounts in the table 6.42, under specified circumstances it could be considered as an attempt to implement predatory pricing strategy. Costs were taken from previous SSNIP test from table 6.24 with initial prices and costs.

There is no chance to get real market prices from year 2013 that could be considered accurate and exact, hence it is not possible to fully examine whether they were below the average cost in some moments. According to the list of lower-travel-class sample prices from 2013 in table 6.1, CR prices of tickets do not seem to drop below estmated values, hewever, since the values are estimated on the basis of again estimated results, it is not possible to state it for sure. Nevertheless, taking in account available data and results, it is not possible to confirm the assumption of CR's predatory behaviour.

# 7 Conclusion

Railway transport is considered to be one of the most important types of transport in not only in Czech Republic and its popularity and usage still increases. Many passengers choose it in order to feel safer, save money and/or save nature. Railway network is densely connected and strategically important coridors are served well. Moreover, entering of various private railway companies in markets may contribute to the improvement of services offered by public and state-owned ones.

However, situation on market related to competiton seems to be often escalated and hard to evaluate. The product (railway ticket) became highly diversified due to various discounts, club cards and promo events that it is more and more difficult to evaluate whether there is any intention to disrupt or damage heathy competition on the market, especially for those who do not have any access to data needed to make proper evaluation.

Hypotheses that were stated for the purposes of this thesis can be summarized into one sentence as follows: CR have dominant position on relevant market which is created only by route Prague ↔ Ostrava and they implemented predatory strategy in order to eliminate competitor/s on this market. According to various results included in the thesis, it is possible to accept first two parts - analyses of quantities of trains, train capacities and estimated occupancy rates show that CR might be a dominant player on the market, and according to several reflections and law cases used as benchmarks it is possible to say that only the route Prague ↔ Ostrava is considered relevant market. Moreover, it was proved by SSNIP test that there is no other substitute for train ticket that would sufficiently satisfy passenger's needs, so another initial assumption has been confirmed - bus transport does not belong into the relevant market, only railway transport. Regarding the hypothesis about CR being predator on the route Prague ↔ Ostrava, this assumption about CR's predatory behaviout has not been confirmed.

Lack of appropriate data - especially those related to the route Prague ↔ Ostrava such as revenues, costs, number of passengers, occupancy rates and other -

leads to the need of estimating various probable scenarios using only publicly available information. Due to this fact, the final outputs cannot fully reflect the real situation and results, since it is highly impossible to cover all the aspects and conditions related to the analyzed case. On the other hand, it is obvious that companies treat these data as top secret in order to keep them away from other competitors, especially on this market where the situation is tense.

In case the predatory behaviour occurs on this market, it seems that customers have not suffered with these competition fights yet, since none of the competitors have succumbed and left the market till now. Czech competition authorities and also European Commision has been solved this case, thus it is sure thing that the results will be available to public one day.

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# Appendix A: Questionnaire for SSNIP test survey

1. Railway company you travel with:

a) Czech railways

b) RegioJet

c) Leo Express

2 Main reason of jour journey/s:

a) work

→ 2a) Is your travelling aid by employer?

a) Yes

b) No

b) school

c) visiting friends/family

d) vacation

e) other

3. Frequency of journeys per year:

a) once

b) 2-5

c) 6-12

d) 12-24

e) 25-39

f) 40-52

g) > 52

4. Travel class you usually choose:

a) 2. class/economy

b) 1. class/premium

c) Business class

5. Have you considered other means of transport before you chose traveling by train?

a) yes

b) no

c) I do not know

6. What were the options you considered?

a) bus

b) car

c) other mean of transport: _____

7. Why have you decided to travel by train?

a) Train is more comfortable

b) The journey is shorter

c) The train ticket is cheaper

d) The service is better in train

e) The train has better schedule

f) The train is more reliable

g) The train is more safe

h) other reason: _____

i) I do not know

8. Imagine that the price of train ticket from Prague to Ostrava (and conversely) will permanently rise by 5 %. Would you notice it?

a) Definitely yes

b) Rather yes

c) I don't know

d) Rather no

e) Definitely no

9. How would you react on this change?

a)I would stay with the current railway company

b) I would switch to another railway company

c) I would switch to bus transport

d) I would choose other type of transport (e.g. by car)
e) I do not know

10. Imagine that the price of train ticket from Prague to Ostrava (and conversely) will permanently rise by 10 %. Would you notice it?
a) Definitely yes
b) Rather yes
c) I don't know
d) Rather no
e) Definitely no

11. How would you react on this change?
a) I would stay with the current railway company
b) I would switch to another railway company
c) I would switch to bus transport
d) I would choose other type of transport (e.g. by car)
e) I do not know

12. Imagine that the price of train ticket from Prague to Ostrava (and conversely) will permanently rise by 15 %. Would you notice it?
a) Definitely yes
b) Rather yes
c) I don't know
d) Rather no
e) Definitely no

13. How would you react on this change?
a)I would stay with the current railway company
b) I would switch to another railway company
c) I would switch to bus transport
d) I would choose other type of transport (e.g. by car)
e) I do not know

14. By how much should the price of the railway ticket rise to make you switch to other type of transport?

a) by 20 %

b) by 25 %

c) by 30 %

d) by 35 %

e) by 40 %

f) by 45 %

g) by 50 %

h) by more than 50%

15. Have you ever travelled by bus on the route Prague-Ostrava (or conversely)?

a) yes

b) no

16. Do you consider railway and bus transport interchangeable on this route?

a) yes

b) no

c) I do not know

17. If not, what things do you consider the most different in train and bus?

a) length of journey

b) services provided

c) price of ticket

d) other: _____

e) I do not know

18. Sex:

a) Male

b) Female

19) Age:

a) < 18

b) 18-26

c) 27-36

d) 37-46

e) 47-56

f) 57-66

g) > 67

20. Education:

a) Elementary

b) High school - apprenticeship

c) High school - graduation

d) College

e- University

21. Net income (in CZK):

a) 0-5 000

b) 5 001 - 10 000

c) 10 001 - 15 000

d) 15 001 - 20 000

e) 20 001 - 25 000

f) 25 001 - 30 000

g) 30 001 - 35 000

h) 35 001 and more

i) I do not want to say