TECHNIKA TRANSPORTU SZYNOWEGO

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OIL PRICE DEVELOPMENT AND ECONOMIC IMPACTS ON THE TRANSPORT SECTOR

Abstract

Oil prices one of the main factors influencing the national economy in the long run. Their development has been unpredictable in the last years and it will likely continue in the future. They will be influenced by the geopolitical situation, the development of the world economy and the problems of the European currency union can also have an impact. The paper aims at the development of oil and fuel prices and their impacts on carrier costs and the transport sector as a whole.

INTRODUCTION

The costs of a business are the financial value of its production inputs [1]:

$$TC = \sum_i r_i x_i, \tag{1}$$

where TC...total costs, x_i...production factors and r_i...their unit prices.

In transportation, the fuel or energy costs are one of the most important cost items. In this paper we will concentrate on the direct fuel costs and thus mainly on the road and air transport. The fuel price depends mainly on oil price, excise and value added tax rates and also on the exchange rate of US dollar. The oil price is one of the factors that impact the direct costs and this is why it will be treated in the next chapter.

1. OIL PRICE DEVELOPMENT

Oil and its price is the key parameter of the development of an economy [2]. Through influencing the price of transport it has also effect on the inflation and everyday life. It is of course a big question, whether present fluctuations are caused by the giving out of the oil stock or by the functioning of other factors. As for the year 2008, just these other factors caused the drastic growth of oil price. The causes can be found above all in the coming economic recession with the decrease of the American dollar and speculations at commodity markets. In the connection with the following decrease of the GDP the oil price than started to sink logically and its today's growth can be explained by the economic revival. The short term rapid fluctuations are caused by instable situations in oil exporting countries. These fluctuations can be the demonstration of the world political instability and as well

a sign of more serious problems, the analysis of this topic is already out of the economic character of this paper.

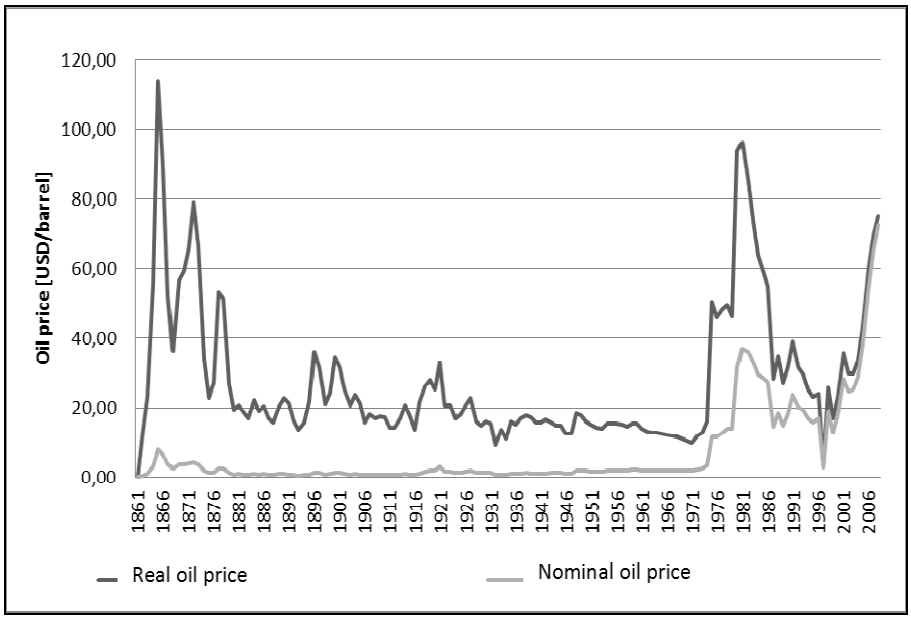

Fig. 1. Development of the nominal and the real oil price, USD/barrel

(**source** [3])

The mankind will shortly come into the epoch, when the oil will be albeit sufficient, however its extraction will be far more difficult and also costly, which is connected with the failing energetic return of its extraction. In this sense it can be supposed that the oil price will be the basic parameter that will influence the implementation of other technologies of the propulsion of vehicles or alternative fuels, which are not able to compete as for costs with the oil fuels for the present.

Here we will concentrate on quantifiable oil price drivers, however speaking about the year 2008, we can not pass over the terrorist attack of 9/11 2001, followed by the release of the US monetary policy. Cheap credits combined with the state support of ownership housing consequently caused the mortgage crisis. When speculators started to get clear of risky credits and to invest into “safe” commodities, their prices increased. The oil was a typical example and its price reached 144 US$ per barrel in 2008 [2].

1.1. The relation between oil price and US dollar value

The most important quantifiable factors influencing the oil price are the GDP of demanding states and the value of the US dollar, used in oil trading. The tightness of the dependence of the oil price and these factors can be expressed by the correlation coefficient and graphically demonstrated by the regression line. The Fig. 2 shows the dependence of the oil price on the dollar exchange rate. The value of dollar is expressed by the exchange rate of the US dollar and the currency basket (SDR). The basket of currencies diversifies the variability of values of the individual currencies. The oil price as well as the dollar value are not adjusted for the inflation, so they are real. The correlation coefficient is -0,787 in this case, what evidences a tight indirect dependence.

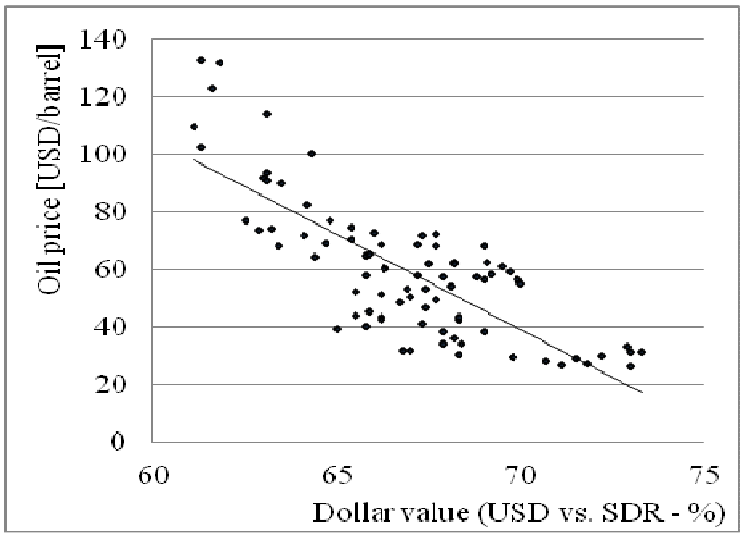

Fig. 2. Dependence of the oil price on the dollar exchange, rate

(**source**: www.opec.org, www.imf.org)

2.2. The Relation between oil price and the GDP of the G7 group

For the purpose of the calculation of the dependence of the oil price and the GDP of demanding states we chose the G7 countries as the demanding ones, thus the strongest world economies. The correlation coefficient is +0,79 in this case, what means a tight direct linear dependence. The Fig. 3 shows this dependence by a regression line.

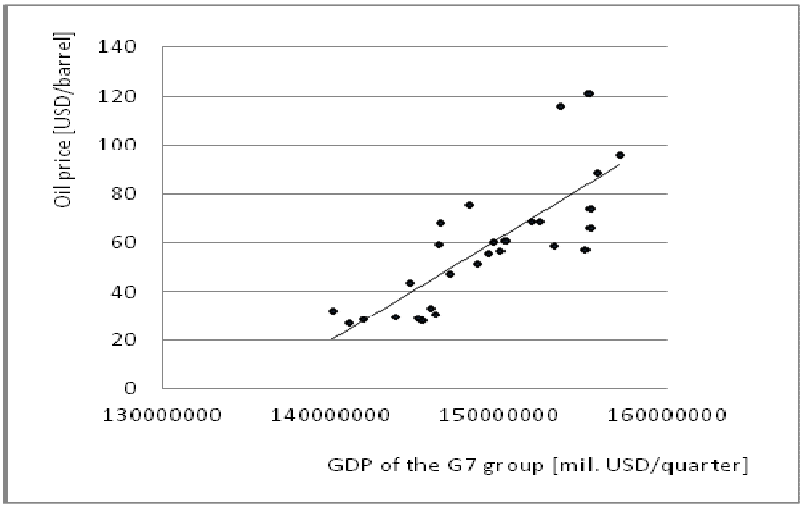

Fig. 3. Dependence between oil price and the GDP of the G7 group

(**source**: www.consensuseconomics.org, www.econstats.com).

2. IMPACTS ON THE TRANSPORT SECTOR

2.1. Road transport

Calculating the costs of output unit, e.g. transport output in road transport, i.e. vehicle kilometer travelled, we use the division of costs to the direct ones and the overhead ones. The average costs of transport output unit in road transport can be expressed by the following formula (2):

$$c_L = p \cdot c + c_d + \frac{C_h}{v} + \frac{C_o}{L} \tag{2}$$

where c_L…average cost per kilometer travelled, c…fuel consumption rate [l/vkm], p...unit fuel price, c_d…other direct cost depending on the distance (lubricants, wear&tear, road toll etc.), C_h…other direct cost depending on the operation time (e.g. direct wages), v...technical velocity of the vehicle, C_o…fixed cost (depreciation, insurance, road tax and overhead expenses) and L...total yearly distance travelled.

It follows from the formula (2) that that average costs can be decreased by two ways – by the cuts of the particular cost items or by the increase of the distance travelled which has its technologic, technical or economic limits (given by the demand). But the fuel price is an important item of direct costs of road carriers, the development of fuel prices in the Czech Republic is shown in Fig. 4.

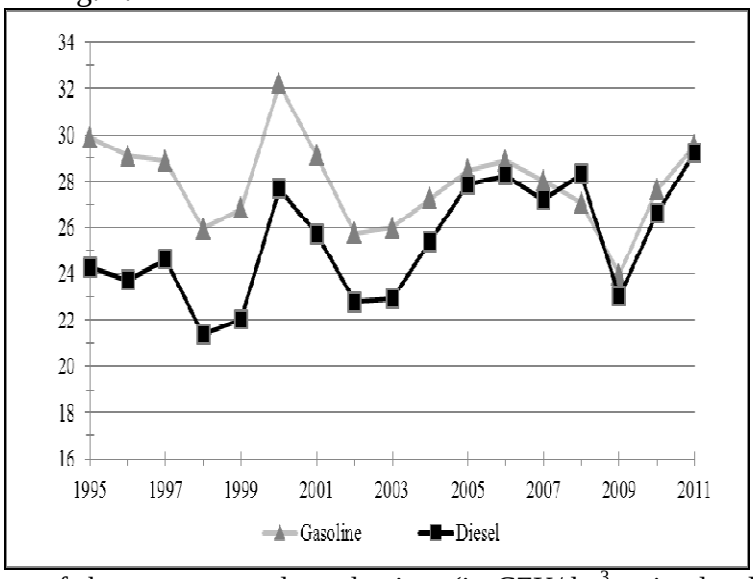

Fig. 4. Development of the average yearly real prices (in CZK/dm^3, price level 2005) of gasoline (ON 95) and diesel in the Czech Republic 1995 – 2011

(**source** [4,5], own calculations)

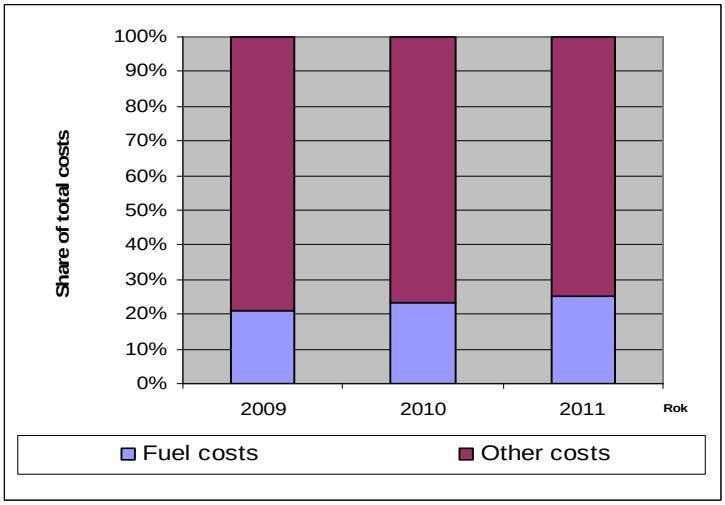

Fig. 5. Increase of the ratio of fuel costs on the total costs of Czech bus carriers 2009-2011

(**source** Ministry of Transport of the Czech Republic)

The influence of fuel prices on the road carrier costs can be demonstrated on the following graph in Fig. 5, showing the increasing ratio of fuel costs on the total costs of Czech bus carriers.

3.2. Air transport

In the air transport, the fuel price influence in much higher (see Fig. 5, 6, 7). The analyzed data come from the Association of European Airlines [AEA, 2011]. As shown in the graph in Fig. 6, the ratio between direct and indirect costs increased markedly since 1996. While these components were approximately equal in 1999, the share of direct costs is 69 % in 2010 and it has been growing.

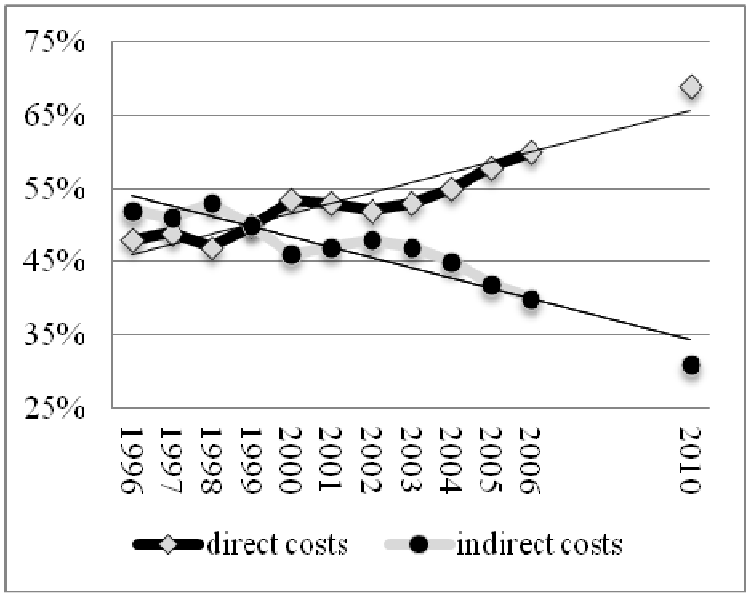

Fig. 6. Share of direct and indirect costs in European passenger air transportation and linear trends

(**source** [6,7]).

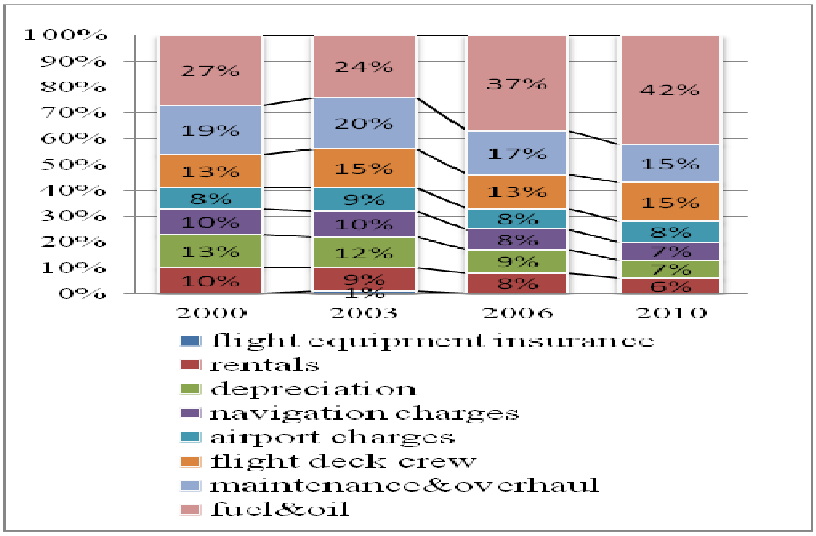

Fig. 7. Distribution of direct cost items in European passenger air transport

(**source** [6])

The detailed graph of the particular direct cost items in Fig. 7. Fuel cost becomes the most important cost item; it already represents 42 % of direct operating cost in 2010. The items "Maintenance & Overhaul" and "Depreciation" have been decreasing, what can be also explained by the fleet reduction of some important European airlines.

CONCLUSIONS

The fact, that the fuel price influences the costs of transport output, can then have the following consequences:

- The increase of the direct costs of the carriers; It can be balanced by the decrease of indirect costs like in the air transport. It can impact the transport quality.
- In the short term horizon the modal split can change. Assuming the low price elasticity of road transport demand, we can expect e.g. substitution of the air transport by the rail one on long distance routes.
- In the long term horizon the increasing oil prices can lead to alternative fuels and propulsion systems in the road transport, above all to higher use of hybrid and electric cars [8].

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VÝVOJ CEN ROPY A EKONOMICKÉ DOPADY NA DOPRAVNÍ SYSTÉM

Abstract

Ceny ropy jsou jedním z hlavních faktorů ovlivňujících národní ekonomiky i ekonomiku světovou. Jejich vývoj je v posledních letech obtížně predikovatelný a lze očekávat, že tomu tak bude i v budoucnu. Ceny ropy budou ovlivňovány mnoha nepředvídatelnými faktory, jako je geopolitická situace, vývoj HDP nebo problém Evropské měnové unie. Tento článek analyzuje ceny ropy a ukazuje, jak jejich růst v posledních letech ovlivňuje ceny pohonných hmot a náklady dopravců.

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