

End Fuel prices and their drivers in the Czech Republic

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Abstract - This paper deals with understanding drivers influencing the end price of fuels in the Czech Republic and ramifications for relevant companies. Its aim is to provide a comprehensive understanding of all relevant elements that have been influencing end prices of gasoline and diesel during last 8 years, understand their leverage and uncover which of those were the most important for this development. These are then researched using mainly graphical analysis and statistical tools. The delivery is that both prices of gasoline and diesel are highly correlated with the price development of crude oil and the prices of their respective commoditized barges expressed in the nominal value of CZK. It was also discovered that there are visible tendencies for asymmetrical pricing reaction and reaction lags, which could serve as a basis for a follow-up work. We also tried to examine the level in which Czech crown as a national currency provides cushion against up and down swings in commodity markets. Based on these findings several conclusive recommendations for relevant companies were built and delivered.

Keywords - Barge, crude oil price effect, Czech end fuel market, diesel price, exchange rate, gasoline price

I. INTRODUCTION

The role of end fuel prices is very important in every country, and the Czech Republic is no different, because apart from providing private customers with means of transportation, they influence a large part of the economy, since they make a significant part of the cost structure of transport and logistics companies, which make up a backbone of many important industries. Therefore understanding what drives these prices could help better grasp on their dynamics and provide valuable insights into how could certain companies be able to optimize their purchasing decisions. Third one that there is a tendency to drive price up, however their decrease tends to be much more subtle, i.e. so called asymmetric pricing. Last but not least we tried to examine the role of the Czech currency in mitigating up and down swings in commodity markets. All these hypotheses come from general notions of this market in the Czech Republic and will be scrutinized throughout the paper. The final outcome should be a set of applicable recommendations or insights for relevant

companies, which could help them to understand what is happening to the prices, what kind of patterns there are and which business implications therefore arise from it.

II. THEORETICAL BACKGROUND AND FORMER STUDIES OVERVIEW

To understand pricing mechanism in respective markets we used a study done by Asche, Gjølborg and Volker [1] providing a fairly compelling analysis on a possible exogenous character of crude oil price development and an interesting work by Johansen [2] providing a framework for understanding long-run price relationships between crude oil and refined products and mutually between these products, however unfortunately not covering gasoline and diesel. For the purposes of this paper the most important finding is that crude oil prices are only weakly exogenous, which means that in the long-run, which is the major focus of this paper, there is no reverse feed of the end product prices back to crude oil price, hence crude oil price could be considered as an independent variable. It is important to mention though that the study provides an evidence of a slight reversed feed in the short-run, which will be also of the interest, however since this paper is focused only on the Czech market, which is in the whole magnitude quite negligible.

Rao [3] seeks to understand if there is a causality between the development of crude oil prices and the refined products, where he eventually concludes that there is, in fact, a causal relationship. Whereas the market itself is very distant from the researched one, the heterogeneity of the character of fuels can provide a base for the thinking in the work, especially since these findings are backed but numerous other studies.

A deeper analysis of trends between crude oil and gasoline prices is provided by Mirantes et al. [4], where they demonstrate the non-stationarity of crude oil and refined products and on the other hand stationarity of refining margins and their co-integration with a long-term dynamics, which further supports the hypothesis that there is a tight correlation between crude oil prices and refined products and also that refining margins tend to remain stable and quite easily observable over the course of time.

Another hypothesis is provided by Radchenko [5], who argues that in the end gasoline market there are lags in changes of the gasoline price in response to the changes on the crude oil market. This hypothesis was tested on empirical data gathered in the US between 1991 and 2002 however again the character of these reaction does not discriminate its existence

also on the Czech market and can therefore provide one reasoning for imperfect reactions of the end market.

In its other paper, Radchenko [6] further develops the idea of the oil price volatility and the response from the gasoline market however here he presents a hypothesis, that reactions towards the crude oil price development on the gasoline market are asymmetric, meaning that the reaction on an upward movement of oil prices is sharper than the other way around. A similar conclusion is drawn by Bettendorf et al. [7] based on a study conducted on the Dutch market between 1996 and 2004, which concluded that these changes are indeed asymmetrical with a stronger reaction to an upward change in a spot price, therefore this behavior is not typical only for US market. According to our research we may see the same behavior of price also in the Czech market.

Further theoretical background on this problematic is provided by Chevillon and Riffard [8], where it is enlighten how OPEC is able to shift the balance of power using its oligopolistic power. A deeper elaboration on how oil markets work and why it is possible to use spot prices for understanding the dynamics of the industry, even though the industry itself deals predominantly on the contract basis is offered by Fattouh [9] from the Oxford Institute for Energy Studies. Based on his argumentation, since the oil market is to a substantial extent, a physical market, futures prices should converge to the spot market because of the arbitrage opportunities.

Regarding the relation between the oil prices and the value of USD Novotný [10] in his work very convincingly illustrates how Brent price is linked to the USD exchange rate. The development itself has been observed since 1990s however Novotný goes further and seeks to examine the relationship between the price of oil and USD, since that is the currency in which it is traded. After analyzing the strength and direction of the relationship, he offers a point of view, which concludes that there is indeed a negative correlation. This finding should therefore strongly reflect into the price of oil expressed in Czech currency or to be more precise, to dampen it, since the growth of oil price means a drop in the nominal value of USD, which should theoretically mean a drop of its value against CZK, if everything else remains unchanged.

A paper on a similar topic was presented by Breitenfellner and Cuaresma [11], where they devote their time to exploring the linkage between crude oil prices and USD/EUR exchange rate and conclude that the negative correlation has several main reasons, among others efficiency of the monetary market and investments in crude oil related asset markets. Therefore they present a very similar conclusion as Novotný did.

A relationship between global economic development and crude oil prices was researched by He et al.[12], concluding a strong influence of the economic development on the crude oil prices (supporting the development of crude oil prices during the crisis). We used these studies as our inputs and we tried to go further to prove them on the Czech market with time series ending in year 2013.

III. METHODOLOGY

For understating the relationship between the crude oil (independent variable) and prices of barges and end prices of fuels (dependent variables) correlation analysis was used [13]. The same was applied for the mutual relationship between value of CZK in relation to USD and the oil prices. For our purposes we used the Pearson product-moment correlation coefficient, which is the most widely used. To understand the possible volatility of individual time series, mean and standard deviation was used.

Time series reflecting the development of end prices were cleared of VAT and excise tax to properly reflect changes in the underlying commodity.

To understand leverages correctly, it is necessary to untwist elements involved in this process and the magnitude of their impact.

Market-driven factors consist of elements which impact on the final price of fuels is determined by rationales arising through the interaction of different players on the market. In this group there are several significant factors to be considered, namely the crude oil price, then costs connected with each element of the supply chain involved in the process of extracting and delivering the final product (in this case, costs of refinement, distribution, marketing and margins of all involved parties, i.e. refineries, transportation companies, wholesalers and retailers) and finally relevant exchange rates. The most important exchange rate for the sake of this work is the CZK/USD ER, since all relevant quotes are denominated in USD.

Within the **administrative factors** we examined taxes, namely the Value Added Tax (VAT) and the excise tax. In recent years we had to include into our consideration also EU directives concerning minimal contents of bio-originated matters. However these factors contribute quite significantly on the end price of fuels (more than 50 %) they will not be included into our consideration since they are more or less stable over longer period of time and because their changes are more predictable.

Lastly, a group of **external factors** which do not directly fit into either of aforementioned groups. Here we may include for instance seasonality or the phase of the economic cycle.

Despite the fact, that there are certain distinctions between the price creation of gasoline and diesel, a significant part of their price creation is similar therefore they can be researched jointly to a certain extent.

IV. CONSTRUCTION OF THE FUEL END PRICE IN THE CZECH REPUBLIC

The crude oil and its markets constitute only the first component of the pricing. The second component covers the process of the purchase and physical delivery of the raw resource to the Czech Republic.

Tariffs connected with transporting crude oil are quite distinctive. There are generally two types of tariffs; cost-based and negotiated, whereas the latter type prevails for the transit tariffs. In general, the way how these tariffs are established and calculated shows significant difference from country to country and even with comparable methodology the spread of margins seems to be quite wide. Another issue is that since in

the majority of relevant countries these tariffs are negotiated on the state level and then implemented through the bilateral intergovernmental agreements, they are often subject to confidentiality rules and therefore it is difficult to understand the whole extent and therefore underpin the average costs relevant to the transferred amount [14].

Another element worth understanding is refinery margins, which could then help us to break down the overall margin to its three elements, i.e. refinery, wholesale and retail margins.

According to Czech National Bank (CNB) these margins have oscillated between 0,5 % and 3,5 % in case of gasoline, whereas the oscillation in case of diesel was somewhere between 3 – 6,5 % during the last two years. Based on the data from CNB, it seems reasonable to use a rough margin of about 1,5 for gasoline and 4,5 % for diesel [15].

However in most of the calculations we used prices cleared of VAT and excise tax, it is worth to mention also these taxes for better understanding of final price construction. Since the beginning of year 2012 the VAT is 21 % and the absolute amount of the Excise Tax added to gasoline is 12,84 CZK and for diesel 10,95 CZK.

Since all important supply-chain-wise components have already been introduced it is possible to estimate the remaining margin on the final price. The gross margin reflects not only margins of retailers, however also costs connected with transportation and distribution on the Czech territory. The end price construction illustrates Table I.

Table I - Construction of the end price of gasoline and diesel

Elements	Gasoline		Diesel	
	Price (CZK)	Share (%)	Price (CZK)	Share (%)
Crude oil price	14,7	40 %	14,7	40,3 %
Transportation	0,7	1,9 %	0,7	1,9 %
Refinery margin	0,56	1,5 %	1,63	4,5 %
Gross margin	1,85	5 %	3,03	8,3 %
Excise Tax	12,84	34,9 %	10,95	30 %
VAT	6,36	21 %	6,31	21 %
End price	36,7	100 %	36,4	100 %

Source: CNB, CCS and various

Note: Annual averages were used for prices and exchange rate conversions

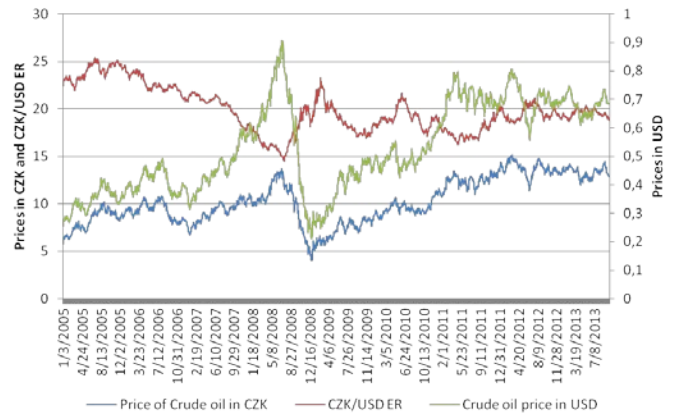
The exchange rate component is mentioned at the end of this part, since it stands a little bit aside of previous ones, however it has an importance for all of them. A more thorough analysis will be carried out later on, to uncover what kind of leverage the exchange rate really has and when it works in favor or against the development offered prices. For the sake of this model, a model rate of 20,18 CZK/USD was used to remain consistent with conversions, which have already been introduced.

V. IMPACT OF OIL PRICE AND EXCHANGE RATE DEVELOPMENT ON THE NOMINAL OIL PRICE CALCULATED IN CZK

As we may see in bellow mentioned Fig. 1 there is a negative correlation between exchange rate CZK/USD and crude oil prices. The national stand alone currency provides a

cushion for Czech customers since it softens all the up and down swings in crude oil prices and thus it provides additional stability for country economy.

Fig. 1 - Impact of oil price and ER development on the nominal oil price calculated in CZK



Source: Thomson Reuters, CSS, own calculations

VI. CRUDE OIL PRICE AND BARGES

To uncover impacts on the end prices we examined also FOB barges of gasoline and diesel delivered to ARA exchange. According to literature barges delivered to Rotterdam would have been better indicators in relation to the Czech Republic, however they are not accessible, and barges delivered to ARA should equally reflect the market conditions in case of wholesale prices of respective fuels. It is necessary to bear in mind that these prices are quotes for purchases done in the Netherlands, therefore the real wholesale prices of fuels in the Czech Republic will be slightly higher because of the inland premium, which represents an incorporation of virtual additional costs connected with a theoretical (or actual) delivery of these products to the Czech territory [16].

To be more precise, we used 10 ppm Barge FOB Antwerp-Rotterdam-Amsterdam (ULSD-10-B-ARA) for Diesel and 10 ppm premium unleaded gasoline FOB ARA (PU-10PP-ARA) for gasoline. The quotes used reflect the daily middle price of spot contracts.

The price development of respective barges tightly copy the price development of crude oil with a strong correlation with Brent spot prices (in particular 0,85 in case of gasoline and 0,9 for diesel). And as we learned there is marginally stronger correlation between crude oil prices and the end prices in the Czech Republic (0,94 for gasoline and 0,949 for diesel) rather than between barges and the end prices (0,938 for gasoline and 0,944 for diesel). Thus we used for further analysis Brent spot prices, since it constitutes the deciding rationale in the price creation of refined commodities in case of gasoline and diesel for end customers. However to examine lags between inputs changes and end price changes it was worth to use barges, where it is better apparent.

VII. ANALYSIS OF THE END FUEL PRICES IN THE CZECH REPUBLIC

For our analysis we used the database of CCS company [17] which provides daily averages for Natural 95 (the most

common gasoline with an octane rating of 95) and Nafta (diesel) again between January 4, 2005 and September 23, 2013. Before diving into the analysis it is important to mention few remarks concerning the analyzed set of data. This set is based on data taken from payments by bank cards, therefore a significant amount of data from cash payments might be missing, which might cause a certain extent of distortion in the analyzed time series, especially at the beginning of the data set, where the penetration of card payments was limited and therefore it is possible that this data is omitting several data sets, which might have influenced the average price.

Second limitation is that these prices are reflecting daily averages for the whole country, therefore they might be negatively (in terms of objectivity) influenced by two factors: possible price wars taking place in certain regions, where stronger players might try to take out weaker participants, and by sales of fuels imported illegally without a proper duty payment. Both of these factors might have a mitigating effect on the “real” average price, however given the number of gas stations and observations present in the sample, it seems sound to assume that this data set provides a solid picture of fuel prices and their development over the years.

The prices of both gasoline and diesel were cleared of VAT and the Excise Tax to better understand the development of market-driven factors. In this part the oil price were recounted using the daily exchange rate available on the pages of CNB.

We also tried to test the hypothesis of a generally quite spread notion of a so called “seasonality” of prices on the Czech market, which should allegedly reflect the situation when prices of fuels go up during the summer, where they should be presumably driven by growing demand, because of vacations, etc.

The logic of this notion is understandable, however severely limited and as it is possible to see from the graph, it fails to materialize on the Czech market. Even a possible increase in the demand during the summer is not therefore sufficient to overthrow the influence of crude oil prices, which are more sensitive to the overall economic development and market activities than to a possible growth in demand of fuels because of travelling during the summer in the western hemisphere.

If anything, it would probably make more sense for crude oil prices to go up during the winter propelled by a growing demand for other refined products during this time of a year. The literature and analyzed data however do not provide a tangible proof, that seasonality is a reoccurring pattern, which has a clear impact of prices. The thing is rather that the naturally growing demand during winter months is clashing with news about supply capacities and the general mood on the markets [18].

Fig. 2 - Comparison of crude oil prices, diesel barge prices and end diesel price in CZK



Source: Source: EIA, CNB, CCS, Thomson Reuters, own calculations
Note: End diesel prices cleared of VAT and excise tax as explained in the text

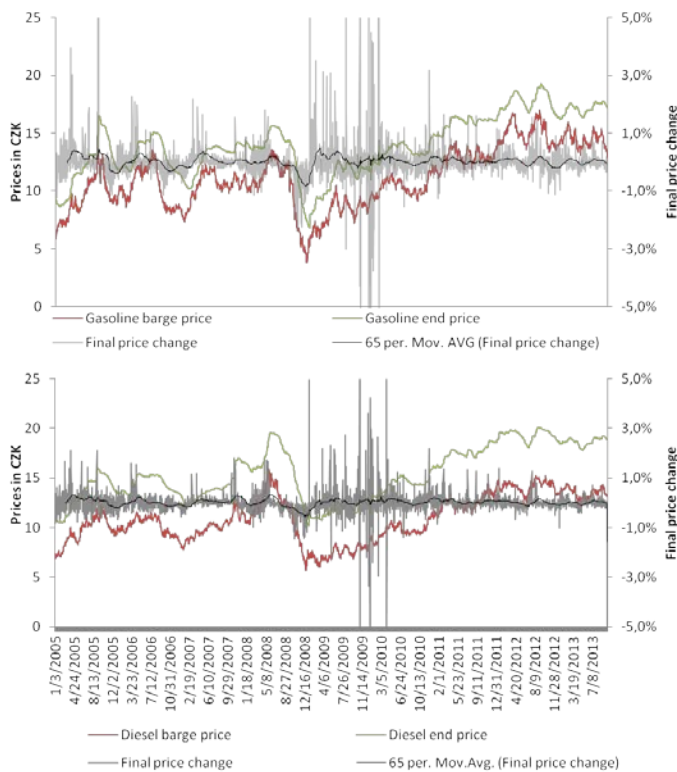
VIII. IS END PRICING OF FUELS ON THE CZECH MARKET TRULY ASYMMETRIC?

Graphs developed in previous chapter visually support the hypothesis that results presented by Ratschenko [6] or Bettendorf et al. [7] concerning asymmetric pricing could be relevant also for the Czech market. In order to develop this hypothesis further and understand whether it is truly supported by data we will compare the daily relative differential in changes of prices of Natural 95, nafta and the respective barges. The underlying logic is to understand the difference between differentials in cases of increasing and decreasing prices.

As mentioned in the Methodology chapter, the analysis will be carried out by subtracting the relative daily changes in end pricing and pricing of commodities. This should provide two types of insights. First of all, the comparisons of slopes of upward and downward trends should provide an idea whether end market pricing is truly asymmetric (to be more precise, if the trajectory of upward movement is concave and the trajectory of the downward movement as well relative to the underlying development then the asymmetry is present) and if there are any lags concerning the reaction on a change (which would manifest in negative differential in case of upward trend or vice versa).

On following graphs you can see the relative differential day by day for gasoline and diesel. The comparison is done against prices of barges, since they visually seem to better reflect short-term price shocks relevant for the retail market.

Fig. 3 - Moving average of reactions towards price change in underlying commodity



Source: Thomson Reuters, CSS, own calculations

These figures further confirm that the reaction toward an increase in price is generally more significant than the reaction towards the decrease with a stronger inclination towards higher upward volatility in cases of growth of the underlying commodity. The moving average of 65 periods reflecting the average daily reaction towards changes in end prices also indicates an asymmetric pricing in respect to the development of the barge price, which is visible in both cases despite diesel being less sensitive. However it is also visible that the reaction is becoming somehow less sensitive with increase absolute value of the end price. This can have several reasons, where some of those were developed by Lewis and presented by Bettendorf et al.[7]. According to this, customers have myopic expectations, meaning that their expectations are based on past observations, i.e. if they observe lower prices only minimum of them decides to search for better prices, since they are satisfied by this result and they have only a very limited idea, what the “fair” price should be, which puts a lot of sense into a quite gradual decrease of the end price. On the other hand, when the cost element increases, companies tend to react very sharply on this incentive to remain profitable. This can also to a certain extent explain a less sensitive reaction towards the increase in commodity prices when the price of the end fuel is high. This development is actually rendering the remaining parts of the cost structure less demanding in the relative sense, providing retailers with a more leeway in terms of realizing the profit and therefore also presumably tightening the competitive environment, where participants are reluctant to increase prices, since the competitive response might not follow this tactics, which could cause a loss of customers to cheaper competitors.

The statistical estimation of how big the lag really is and where exactly is located, is a bit beyond the scope of this study and a good incentive to deepen the analysis in some follow-up econometrical work, however it is possible to understand it is relative frequency. To do this, two data will be observed. Firstly, what is the average differential (difference between change in barges and change in end prices) and in how many cases the reaction on the end market was reversed. This should provide us with a sense how sizeable the dissonance really is. The average differential, showing the relative difference between intraday changes, is 1,3 % over the set with a standard deviation of almost 1,7 % for gasoline, signalling that there are indeed significant differences between the daily change of the barge and the end price adjustment. For diesel this average is a bit lower, of 1,1 %, though the standard deviation is again higher of 1,3 %, suggesting that both fuels follow very similar patterns of behaviour. Another interesting insight is, that the relative frequency of reversed reactions (an end price adjustment which is opposite in terms of change to the change of the barge) for gasoline is over 30 %, namely 975 out of 3195 observations, which shows that the lags in adjustment are relatively frequent, and this number does not change very much for diesel (30,2 %).

There are several factors which might help to explain this at first sight surprising behaviour. One was offered by Radschenko [5] by stating that 97 % of price shocks are perceived only as swings which will be very quickly corrected by the market itself. The explanation could be however based on the fact, that gas stations have only limited ways how to adjust their prices to immediate changes. Based on the correlation with crude oil and barges pricing, it seems fair to assume that a gas station will set its prices in line with these price developments. However it has only limited time frame to do that and therefore it is not able to perfectly adapt to intraday changes. For instance if the gas station is setting its prices for the following day in the evening, it cannot observe what will happen the next day, which would then explain this slightly peculiar result. The other thing might be that this thesis is working with averages of spot prices, however the high and low values can also influence a behaviour of gas stations by biasing their expectations to higher/lower prices and thus diverging their pricing from the underlying asset.

On the following figure prices of gasoline barge and end gasoline price are translated to an index more accurately showing the delayed reaction as well as a certain ignorance concerning sudden developments in the barge price. It is likely that these two observed patterns are mutually dependent because of their nature (since the reaction on the initial price change could be lagged, a participant is able to observe a following price adjustment, which is mitigating the impact of short-run price shocks).

The limited volatility of the end price is also very well documented on Fig. 4, where the index showing gasoline prices is much less volatile with an average of 1,5 and standard deviation of 0,28 than the barge index with an average of 1,9 and a standard deviation of 0,44 giving a narrower interval of distribution of $\pm$ one standard deviation by almost 10 %.

This figure is also providing yet another graphical proof that the pricing is asymmetric with a generally concave character,

which is reflecting the aforementioned tendency to reflect the upward trend more quickly than the opposing one. In the last period there are visible tendencies of a trend alternation to the convex curve, possibly reflecting the behaviour implied by the Lewis theory mentioned in the previous paragraphs.

It is visible that diesel prices expressed in indexes more tightly follow barge prices changes, which might be possibly caused by the seemingly lower volatility of the data set from day to day, which could suggest that if the change is not that strong on daily basis, gas stations have higher trust in the market and therefore they are more ready to make the change earlier. The tendency to asymmetrical pricing seems to be slightly weaker than in case of gasoline with quite quick adjustments towards both increases and decreases in the price. One reason of this could be that unlike gasoline diesel prices are targeting also corporate customers which are presumably more price sensitive and have a better overview of conditions on the market. Therefore the reaction is forced by the competitive pressures. Nevertheless it is still present.

Fig. 4 - Indexed expression of changes in barges and end prices of gasoline and diesel



Source: Thomson Reuters, CSS, own calculations

According to the presented data and their analysis it is therefore possible to conclude that the retail market of fuels in the Czech Republic shows signs of both asymmetric pricing and lags in reaction to changes, which both could be utilized by relevant companies.

IX. CONCLUSION AND PRACTICAL IMPLICATION

This paper sought to provide a comprehensive analysis of all important factors involved in the end gasoline and diesel price creation in the Czech Republic with a major focus on delivering an understandable and applicable insights for companies, which could benefit from understanding them.

Whilst a significant number of factors is involved, it has been concluded that there are only few ones (namely prices of crude oil, prices of gasoline and diesel barges and exchange

rate), which directly influence the pricing on daily basis and they are in the same time relatively easy to be observed.

The analysis of USD prices of crude oil and CZK/USD exchange rate also showed that there tend to be a strong inverse relationship between the prices of crude oil and the nominal rate of CZK/USD resulting into the fact that this exchange rate poses as a cushion for the volatile development of oil prices mitigating its impact in the prices expressed in CZK.

Following that, a strong positive relationship between crude oil, gasoline and diesel end prices and their respective barges has been established, leaving only narrow margin of differences, caused mainly by asymmetrical reactions and reaction lags.

Asymmetrical reactions of the end price to price changes in underlying commodities were present on the whole set of data, manifested by a generally concave shape of the reaction curve, pointing to a quicker adjustment to increasing price than vice versa. This trend tends to be stronger, when the end prices of fuels are relatively lower, likely relating to the hypothesis of Lewis, that companies tend to firstly secure at least some profitability, however after fulfilling this goal they start to incorporate the circumstances defined by their competitive landscape into their decision making. There are also numerous reaction lags presented, resulting in an imperfect adjustment of the end prices, which are however still very closely reflecting the development in underlying commodities.

All these insights provide several implications for concerned companies. There are generally two kinds of companies which can benefit from the outcomes of this work. Those might be either gas stations which can better understand the dynamics of the industry and therefore adjust their adaptation patterns. The second group consists of companies, which cost structure contains fuel. They tend to refrain from doing long-run hedging bets, because of cost savings or because of the variety of their business and they are not in the same time able to flexibly translate additional costs arising from fuel price fluctuations to their end customer pricing. This could be typically for instance a smaller size transportation company, which tends to buy larger quantities of fuel at given points of time and would like to understand what kind of patterns are reoccurring to better plan its purchasing decision and what kind of risks it will face doing so.

This paper provides a substantial amount of insights based on empirical data and analysis of long-run time series to be correspondingly instrumental, yet it also brings up several interesting questions which could be researched and possibly bring deeper dive into this dilemma.

There are two main rationales upon which these companies can react. It is the operational, or more of a "day-to-day" reaction and strategy, which helps to understand what will happen in the future.

From the operational point of view, both types of companies are expected to be able to a certain extent to plan ahead therefore they have some flexibility in their adjustments to the current development. Both groups are good off with observing spot prices of Brent or possibly barge prices development (however since these data are not publicly available as complete time series, the Brent time series should be good enough, since there is a very strong correlation), exchange rate

of CZK and USD and make adjustments based on these two or three time series.

For gas stations it is important to understand, what is the expected development in the end price to be able to find the balance between realizing as much profit per litre as possible whereas staying competitive price-wise. With that in mind a gas station wants to know what will happen to the end price when the underlying commodity changes.

First of all, it is important to follow the price of crude oil/appropriate barge calculated into CZK currency, which is the most telling factor. In this case it is possible to generally expect an existence of an exchange rate pillow, which will mitigate the swings in the price of the underlying commodity, therefore the impact in the end price will not be that volatile as a rule. With this observation there are then basically three *modus operandi*. If the underlying price goes up, gas stations can expect that if the current end price is relatively low, the adjustment will be quite quick and closely resemble the growth of the commodity price. This gives them a chance to make a quick adjustment and therefore extract additional profits. If the end price is however already high, it is a good idea to see how the market will adjust, since there is a good chance for the adjustment not to be that rapid, because other participants in the market are starting to be more aware of their competitors' behaviour and they are less willing to rapidly increase the price.

On the other hand, if the underlying asset price goes down, it is safe to assume that other players will adjust their retail prices only very gradually and therefore the same thing could be done by an individual gas station, which in the same time does not have to react immediately, since there are frequent time lags present, suggesting that the translation of the shocks occurring in commodities to the end price is delayed, which gives a leeway to that particular gas station, because the reaction does not have to be prompt.

Apart from these factors, which should be observed on a day-to-day basis, there are also long-term factors, which change very predictably and the magnitude of change is rather limited, nevertheless there are several things to this, about which is necessary to have an idea. In this context this is mainly the development of administrative factors, i.e. the tax burden and possibly content of bio-originated matters. All these factors influence the price however their effect is very well predictable.

To conclude, it is fair to mention that an individual gas station should seek to understand the particular development in its whereabouts. This dilemma is already outside of the scope of this work, yet it is important to stress that there might be differences in pricing and price adjustments based on physical location. A good strategy perhaps might be to run a mystery shopping around its whereabouts, prepare a time series and compare it with outcomes of this work.

In case of the second group of companies, the underlying logic is very much the same as for gas stations only in their case they need to understand how it is possible to mitigate the impact on their costs. They should therefore tend to purchase as soon as possible during the bullish development of the market thus taking advantage of reaction lags and surpassing the adjustment of gas stations. On the other hand, when facing more of a diving trend, it seems to be a good idea to wait for

some time to make the purchase since the adjustment of the end price tends to be more gradual.

The strategic perspective is then shared for both these players, because it mainly deals with understanding what will be the future development. This is again beyond the scope of this work and generally a quite problematic field, since forecasting of the price development of commodities is always a knotty job.

Despite this there are several points to be made. As it was already mentioned, there are two main groups of variables coming into play there, which could be subject to forecasting efforts. The first is the price of crude oil/barges and second is the exchange rate. In case of the first one, it is a good idea to observe trends accompanying its underlying factors (such as demand versus supply conditions, overall trends in consumption, etc.) as well as how it is perceived by investors, or to put it differently, how they treat it in connection to other commodities (as we already saw, there is currently a growing correlation between oil prices and prices of other commodities, suggesting that this is a place where we can extract some information). It could be also useful to monitor the nominal rate of USD as well as its effective rate, which can also hint about the prices of crude oil. For future development of crude oil prices it might be also relevant to observe prices of relevant futures, which were in the past able to implicitly forecast the development more precisely than analytics, however it is questionable how they are doing post-crisis [19]. It is though still important to keep in mind that this foretelling is based on empirical data from the past and therefore has only limited implications for the future development.

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