The end of long-term contracts? Gas price and market dynamics in Central and Eastern Europe

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***Abstract*—This paper analyses the development of natural gas prices in Central and Eastern Europe (CEE) and assesses its drivers. Furthermore, the relation to recent changes in import contracts is discussed. The methodological approach consists of a panel analysis, in which wholesale gas prices in CEE countries are explained by a set of exogenous drivers, and a descriptive part on changes in contracts. The results provide evidence that a decreased share of oil-indexed long-term contracts has significantly reduced gas prices in Central Europe. Accordingly, the evaluation of contracting trends suggests that importing companies in CEE countries tend to replace expiring long-term gas import contracts with short-term agreements.**

***Index Terms*-- natural gas, pricing mechanism, panel analysis, long-term contracts, Central and Eastern Europe.**

I. INTRODUCTION

Natural gas is traded partly via bilateral agreements (long-term and short-term) and partly at gas exchanges. In Europe, different pricing mechanisms for wholesale trading[1] of natural gas coexist, namely oil-price escalation (OPE), where prices are indexed to a lagged average of oil prices, fundamental pricing in competitive gas markets (GOG) and in few cases also government regulated prices (GRP) (cf. [1]).

In the recent years, there has been a shift from OPE to GOG that started in Nortwestern Europe in the EU with the UK being the pioneer by establishing a National Balancing Point (NBP) in the year 1996. In 2008, the regional shares of GOG and OPE were already quite diverse across Europe. While Great Britain has a share of GOG of 100 %, Central and Eastern Europe (CEE) was dominated by oil-indexed long-term contracts (LTCs) with no share of GOG in the Baltic and Southeastern European countries at all. The level of prices, however, was not so different between OPE and GOG due to the persistence of a strong coupling of both to the oil price dynamics. This changed in 2009/10, when the gas price dynamics at the European hubs decoupled driven by an oversupply of international markets. In the following years, gas suppliers in more and more countries were trying to profit from the low hub prices by both increasing the share of GOG and renegotiating the existing oil-indexed LTCs. The interplay of these developments with the hub price dynamics itself has led to a diversification of gas price dynamics throughout the EU. While the transition to GOG has been progressing quickly in central European countries in the recent years, the Baltic and the Southeastern European countries are just starting to make use of trading at gas exchanges (cf. [2]).

Given those developments, it is important to better understand the drivers of the wholesale gas prices and the role of GOG and OPE in particular. On the time scale of one to five years, wholesale gas prices are expected to be mainly influenced by the share of GOG competition and by the oil price development (cf. [3]). This leads to the hypothesis that countries with an increasing share of GOG have experienced a lowering impact on prices due to the higher level of competition. However, the impacts are rather complex, as the rising share of GOG may also influence the indexing in LTCs.

This paper aims at shedding light on the diverse trends of GOG and OPE in CEE. To this end, the paper investigates the dynamics of import prices of natural gas in selected countries[2] in the period 2009 – 2015, and assesses the variations in impacts of drivers on the import prices econometrically. Leaning on those quantitative results, the recent developments in CEE with regard to import contracts are discussed.

II. LITERATURE

There is an ongoing stream of econometric analyses of drivers of wholesale gas prices. Since our analysis concerns the period after 2008, we mainly focus on the recent literature. In [4], it is shown that between 1994 and 2007 gas prices were

[1] Following [1], wholesale gas prices are defined as the price at the 'point of first sale' in the country, which can be the price at a hub, the import price in or the production price in case of domestically produced gas.

[2] Bulgaria, Czech Republic, Estonia, Germany, Latvia, Lithuania, Slovenia, Slovakia; the selection of countries was based on data availability

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mainly driven by weather and inventory effects on the one-hand and by the development of the crude oil price on the other hand. In [5], a vector error-correction model is used to show that the gas prices in the US and Europe were coupled via the crude oil price before 2009 and have become decoupled after the gas price decline due to the economic crisis and oversupply of markets. In [6], it is shown that there is a seasonal switching between coupling and decoupling. Reference [7] applies a structural vector autoregressive model to the German gas market with the result that the gas price development was mainly influenced by the oil and coal prices in the time frame of several months to years. In [8], a gravity model is applied to investigate the role of LNG in regional gas markets. The findings suggest that the global trade of LNG has an impact on regional gas markets, but does not result in a global coupling of markets. In summary, the literature suggests that is reasonable to consider regional wholesale gas prices but to take global variables into account. To assess the main drivers of wholesale gas prices in CEE countries, a random correlated effects model (cf. [9]) with a linear specification is applied to panel data in this paper. This is especially interesting when comparing different markets and examining the hypothesis that part of the total variance seems to be driven by the difference between countries [10]. To our knowledge, a panel analysis of wholesale gas prices for a group of countries has not been carried out yet.

In [3], a classification of the drivers of wholesale gas markets is provided. Central findings of [3] are the following:

- In the short-term (< 1 year), central drivers are economic and weather conditions on the demand side as well as infrastructure interruptions on the supply side. The demand for gas shows strong seasonal variations, which are compensated by filling up gas storages in summer, and emptying them in winter. Structurally, prices are influenced by GOG competition. In this context, local storage capacities allow reducing price peaks.
- In the medium-term (1 – 5 years), the main impact on prices is exerted by the economic development as well as the structural drivers given by the market shares of pricing mechanisms. Namely, hubs prices are influenced by the oil-indexed prices of LTCs on this time scale. Moreover, a higher share of GOG is expected to result in lower prices due to the higher level of competition.
- In the long-term (> 5 years), the supply side is driven by the availability of domestic resources and infrastructure development. Demand is influenced by economic growth but also by energy and climate policy. As oil-indexed LTCs often run 20 years and more, the oil price remains an important structural driver. In addition, the diversification of suppliers may lower prices by decreasing import dependencies.

As this paper addresses the main drivers of wholesale gas prices in the period 2009 – 2015, the focus is on the medium term. Therefore, monthly averages of prices are considered, which do not show the full erratic movement of short-term impacts such as supply interruptions and short-term weather events. Furthermore, long-term impacts of resource availability and diversification of supply are hardly visible in the medium-term, which will be compensated by a descriptive part about recent trends with regard to import contracts.

The literature with regard to gas market dynamics in CEE is rather limited. In [1], an overview of the shares of different pricing schemes in different world regions is provided, which suggests that the share of GOG has significantly increased in Central European countries between 2005 and 2015, but only slightly in the Baltic and Southeastern European countries. Reference [2] analyses the maturity of gas exchanges in Europe and provides evidence that even in 2015 hub trading of gas is still either poorly developed or does not exist at all in CEE. Apart from that, the literature mainly focuses on the gas sector development in a single or a small group of countries, see e.g. [11] – [13]. Most of it is qualitative with the exception of [11], where the interplay of wholesale and retail gas prices in the Czech Republic is analyzed quantitatively. This paper fills this gap in literature by a quantitative analysis of a broad spectrum of CEE countries based on data available in the Eurostat international trade database.

III. Methods

The methodological approach relies on two descriptive parts on price developments and recent trends with regard to import contracts in CEE as well as an econometric analysis. For the latter, monthly averages of wholesale prices of piped gas wholesale gas prices in CEE as endogenous variables are explained by a selected set of exogenous variables.

Natural gas is traded with differing shares partly via bilateral agreements and partly at gas exchanges. While the prices at exchanges are publically available, prices of bilateral agreements are not. Therefore, border prices are used as proxies for estimating wholesale prices. The border price of a country is defined as the quotient of the publically available cash flows and volume flows of imported piped natural gas and, hence, reflects both pricing mechanisms, GOG and OPE. It is important to note that domestic production and LNG imports are not included in this price proxy.

With regard to the border prices of piped natural gas within the EU, there are groups of countries with similar developments. However, there are important differences in the individual properties of the countries. These differences, e.g. the share of GOG and domestic production, cause a significant diversification of price dynamics among them. Hence, a panel approach was pursued for three separate groups of European countries: the Baltic and Southeastern European states, both of which still being dominated by OPE, and the Central European countries being in transition to GOG. The selection of groups was based on similar access to infrastructure and suppliers. Only countries with sufficient data availability were included. More precisely, a panel analysis has been carried out for the border prices for piped natural gas in

- Czech Republic, Germany, Hungary, Slovakia (“Central”),
- Bulgaria, Romania, Slovenia (“Southeastern”), and
- Estonia, Latvia, Lithuania (“Baltic”).

Germany is included in the "Central" group because its pricing structure was qualitatively more similar to those of its eastern neighbours than to the other Western European countries in 2009 (starting point of the studied time period).

Based on the aforementioned literature, it is assumed that on the monthly time scale the wholesale price is mainly driven by hub prices of piped natural gas, the gas price in oil-indexed contracts and the price of domestic production weighted by the respective market shares. Since LNG is also traded via GOG completion and via oil-indexed LTCs, the impact of LNG prices is implicitly covered. Hence, the LNG price is not considered as a driver in order to avoid endogeneity. It is well-known that oil-indexed prices usually are based on the prices of heating and fuel oil with more than one time lag to compensate for volatility (see e.g. [3]). Thus a similar approach is pursued here. Due to data availability, however, the price of crude oil is used instead of oil products. Accordingly, the set of exogenous variables is chosen as the Brent crude spot price of crude oil, the price of natural gas at the NBP hub, whose monthly average strongly correlates with the TTF marker price, the share of domestic production and the share of GOG with respect to the total amount of traded gas. The prices of domestically produced gas are not available and, hence, have to be reflected by the coefficient of the domestic share. After linearization, the model is specified as:

$$\begin{aligned} \textit{Border price}_{i,t} = {} & C_{dom}\ \textit{domestic share}_{t} + C_{GOG}\ \textit{GoG share}_{t} \\ & + C_{oil,6}\ \textit{oil price}_{t-6} + C_{oil,11}\ \textit{oil price}_{t-11} \\ & + C_{hub,2}\ \textit{NBP hub price}_{t-2} + \text{error} \end{aligned} \quad (1)$$

where i: country, t: month; C_{var} *coefficient of variable var.*

The econometric analysis of (1) comprises a random correlated effects (RCE) model with a linear specification. It incorporates the by-group means of all country-dependent exogenous variables as additional independent variables [8]. This allows accounting for changes of factors within and between countries including the heterogeneity unobserved by a fixed-effect model. The model covers monthly data between 01/2008 and 09/2015 but analyses are limited to 2009 – 2015 to account for time lags. To reflect that there has been a transition from OPE to GOG, the time period is split into two sub-periods, which are the same for all panels for reasons of comparability: 2009 – 2012 and 2013 – 2015. Details are given in Table I (see [15] for additional information).

TABLE I. DEPENDENT AND INDEPENDENT VARIABLES

Variables	Description	Unit
Dependent variable		
Border price for piped natural gas	Weighted average of import prices by exporting country	€/MWh monthly
Independent variables		
UK hub price for natural gas	Monthly average of the day-ahead price at the NBP hub	€/MWh monthly
Price of crude oil	Monthly average of the Brent crude spot price	€/MWh monthly
Domestic share in total consumption	Moving annual average of dom. production per consumption	0 – 100 monthly
Share of GOG in total traded piped gas	GOG-traded piped gas per sum of GOG- and OPE-traded gas	0 – 100 annually

The creation of the variables used for the panel data regression for wholesale gas prices was mainly based on the Eurostat database ComExt on international trade[3]. This database provides monthly volumes of traded gas and the corresponding cash flows, which by definition yield the border prices. The German border price was derived from data provided by the BAFA. Data for the dependent variables originated from various sources (EEX, Eurostat, IGU).

IV. MARKET AND GAS PRICE DYNAMICS IN CEE

Here the recent dynamics of border prices in CEE and changes in the shares of pricing mechanisms are described. This is the basis for the panel analysis in the following section.

According to [1], gas trading in Central Europe has experienced significant changes in the last decade. While OPE declined from 85% in 2005 to 32% in 2014, GOG increased from almost zero in 2005 to 53% in 2014. Until 2010, the dynamics of border prices in Central Europe roughly mirrored the lagged oil price dynamics with a peak of up to 38 €/MWh at the end of 2008 and a drop down to 16 €/MWh at the end of 2009. The dynamics started to diversify, when hub prices for natural gas decouples from the oil price development (see Figure 1.). While the German border price deviated already in 2010, the Czech border price peaked at more than 35 €/MWh in 2012 and moved to lower levels only in 2013. In 2015, all border prices in Central Europe reached a level of 20 – 24 €/MWh after showing a valley in 2014 that correlated with a drop of European hub prices suggesting an increased importance of gas-price indices (see [14]).

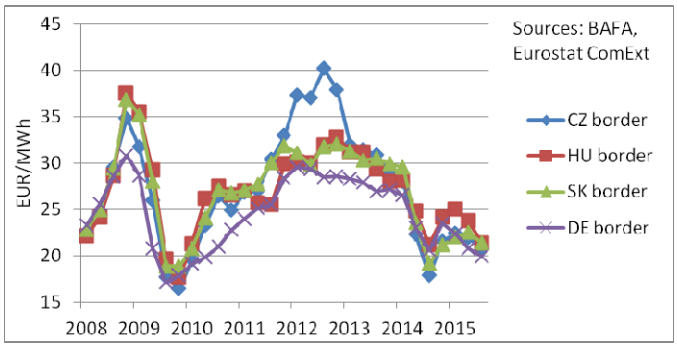

Figure 1. Border prices for piped natural gas in the Czech Republic (CZ), Hungary (HU), Slovakia (SK) and Germany (DE).

OPE was still the dominant pricing mechanism in Southeastern Europe in 2015. Croatia was the only country with a non-zero but small share of GOG in 2015. Romania has a special role in the region, as it has a high share of domestic production with a wholesale price that is partly tied to regulated end-user prices. As in Central Europe, the dynamics of border prices in Southeastern Europe mainly reflected the lagged oil price dynamics until 2011 (see Figure 2.). After 2011, the border price of Romania developed differently from the remaining countries. Until the end of 2012, the price steadily decreased to a level of 28 €/MWh (comparable to the German border price), while the border prices of Bulgaria and Slovenia peaked at more than 40 €/MWh following the peak

[3] http://epp.eurostat.ec.europa.eu/newxtweb/

of oil prices. In 2013, Bulgarian and Slovenian prices relaxed to a price level of 28 – 32 €/MWh. At the end of 2014, the Romanian border price returned to the price level of the other Southeastern European countries, which all significantly dropped in 2015 as did the oil price.

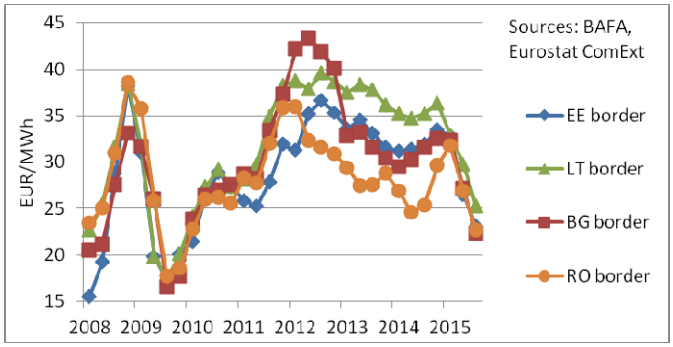

Figure 2. Border prices for piped natural gas in Bulgaria (BG), Estonia (EE), Lithuania (LT) and Romania (RO); Latvia and Slovenia not shown.

Due to the lack of other import opportunities, the imports to the Baltic countries originated solely from Russia until 2014 with a vanishing share of GOG. However, since 2015 Lithuania has also been importing an increasing share of LNG from Norway [14]. As in the rest of CEE, the border prices in the Baltic countries roughly followed the lagged oil price dynamics until 2010. In 2011, the border price of Estonia and Latvia significantly deviated to lower levels, while the Lithuanian border price continued to evolve similar to an oil-indexed price and reached a level of more than 36 €/MWh. In the sequel, the spread between the Estonian and Lithuanian price remained but stayed relatively constant. On the contrary, the Latvian price deviated to even lower levels in 2013 and only afterwards moved in parallels. With the dropping oil price in 2015, the regional price spread shrunk significantly resulting in a price level of 22 – 25 €/MWh (see Figure 2.). A comparison suggests that LTCs were renegotiated earlier in Estonia and Latvia. This also matches with the fact that Lithuania later was offered a retroactive discount on imports from Russia, which is not contained in the shown figures [12].

V. Results of the Panel Analyses

Here the results of the panel analyses of border prices in Central Europe, Southeastern Europe and the Baltic countries are provided and related to the results in the preceding section.

For the period 2009 – 2012, the RCE estimator shows a strongly significant positive impact of the crude oil price for medium to long time lags (six to eleven months) for all three panel groups, which explain a large part of the dynamics during this period. This indicates the importance of oil-indexed LTCs in all countries. In Central Europe, however, the coefficient is significantly smaller than in the Baltic and Southeastern countries and the marker prices at Northwestern European hubs (represented by the NBP hub price) with a shorter time-lag (two months) also have a strongly significant positive impact of similar order (see TABLE II.). Here one has to take into account that the hub prices are partly driven by the oil price themselves so that the impact of the oil price may be underestimated in a model that contains also a hub price.

TABLE II. RANDOM CORRELATED EFFECTS ESTIMATORS OF DRIVERS OF WHOLESALE GAS PRICE IN THE PERIOD 2009 – 2012

Variables	Central	Southeast	Baltic
Crude oil price (lag of 6 m)	0.27***	0.45***	0.47***
Crude oil price (lag of 11 m)	0.15***	0.17***	0.07**
Hub price NBP (lag of 2 m)	0.32***	0.07	0.06
Mean dom. share in consum.	0.38	-0.11	0
Domestic share in consumption	-0.39	0.08	0
Mean GOG share in traded gas	0.00	0	0
GOG share in traded gas	-0.10***	0	0
Constant	7.51***	4.82***	5.21***
R^2 overall	0.80	0.79	0.76
number of observations	196	147	147

Note: significance level: 1%: ***, 5%: **, 10%: *; prices are indicated in Euro/MWh, shares in %

Furthermore, the rising share of GOG is strongly significant for comparably lower prices. It mainly explains the deviations of prices from a standard oil-indexed price but also explains a notable part of the difference between the countries (with the share in Germany increasing earlier than in the other countries). For the Baltic and Southeastern countries the GOG share is vanishing in 2009 – 2012 and thus cannot show an impact. The mean GOG share as well as the share of domestic production and its mean does not show a significant impact.

For the period 2013 – 2015, the RCE estimator yields significant results that strongly differ between the three groups of countries (see TABLE III.). For the Central European countries, the crude oil price stays a relevant driver, but the medium-lagged part of oil-price indexation becomes insignificant. In accordance with that, the price decreasing impact of the relative share of GOG has also grown, which is, however, partly offset by a positive impact of the country mean of the GOG share. Moreover, the share of domestic production and its country mean both become drivers, with impacts of different sign. The data does not allow providing a clear explanation for those effects. On the other hand, a very clear trend is visible with regard to the impact of hub prices at Northwestern European hubs: the impact that was already strongly significant before has more than doubled. This provides important evidence for the diversification of supply and for the fact that renegotiations of LTCs have also led to the introduction of gas-indexed components.

TABLE III. RANDOM CORRELATED EFFECTS ESTIMATORS OF DRIVERS OF WHOLESALE GAS PRICE IN THE PERIOD 2013 – 2015

Variables	Central	Southeast	Baltic
Crude oil price (lag of 6 m)	-0.01	0.24***	0.38***
Crude oil price (lag of 11 m)	0.22***	0.18*	0.09
Hub price NBP (lag of 2 m)	0.76***	0.07	-0.03
Mean dom. share in consum.	0.74***	-0.26***	0.00
Domestic share in consumption	-0.71***	0.22***	0.00
Mean GOG share in traded gas	0.15***	0.00	0.80***
GOG share in traded gas	-0.27***	0.00	-0.11**
Constant	7.62*	6.85	7.99**
R^2 overall	0.81	0.56	0.81
number of observations	123	98	95

Note: significance level: 1%: ***, 5%: **, 10%: *; prices are indicated in Euro/MWh, shares in %

For the Southeastern countries, the crude oil price stayed a strongly significant driver, although with lower and less significant impact: the long-lagged part (11 months) of oil-price indexation becomes less significant and the coefficient of the short-lagged part (6 months) is significantly reduced.

This may reflect price discounts in LTCs resulting from renegotiations of contracts in the context of an increasing price spread between GOG traded and oil-indexed gas. For the Southeastern European countries considered here, there is no share of GOG also in 2013 – 2015. Hence, it is not surprising that neither the GOG share nor the hub prices in Northwestern Europe show a significant impact on price dynamics in those countries. However, these findings also suggest that gas-indexed components have not been introduced to the major share of LTCs yet. Moreover, the share of domestic production becomes a driver with a significant positive impact and its mean having a significant negative impact. This partly explains the differences between the large domestic producer Romania and the other countries that do not have a domestic gas share. In this context, it is important to note that the imports to Romania significantly declined in 2013, as demand was mainly met by domestic production afterwards.

For the Baltic countries, impact of the crude oil price changes similar to the case of Southeastern Europe: the long-lagged part (11 months) of oil-price indexation becomes insignificant and the coefficient of the short-lagged part (6 months) is reduced, while the hub prices in Northwestern Europe do not show a significant impact on price dynamics. Again, this may be interpreted in the way that there were price discounts in LTCs without introducing gas-indexed components to the major share of LTCs yet. In the Baltic countries, there is no domestic production of gas. Finally, there is a moderately significant negative impact of the share of GOG, while the mean share has a strongly significant positive impact on the border price for piped natural gas. This may come as a surprise, but can be related to a particularity in the Baltic countries in the considered period. The only GOG share in the Baltic countries stems from the LNG terminal in Lithuania established at the end of 2014. When LNG imports were about to be launched, Lithuanian importers were granted a price discount and a retroactive price revision on the import of gas from Russia. On the other hand, a similar price discount had already been granted to Estonia and Latvia in 2011, when only Lithuania was implementing the EU Third Energy Directive, which resulted in Gazprom having to sell their shares in the Lithuanian gas importer [12]. Therefore, the mean level of border prices was higher in Lithuania than in the other Baltic countries for a certain period after 2011.

VI. RECENT GAS MARKET DEVELOPMENTS IN CEE

The panel analysis provided evidence that the impact of OPE on gas prices in CEE is decreasing. When looking at a certain country this change of gas price dynamics is a rather discontinuous process due to the fact that the supply usually relies on a few LTCs only. Moreover, there are severe infrastructure limitations for certain countries. Hence, changes mainly occur, when major LTCs expire or new infrastructure is put into place. It is thus interesting to take a closer look at those events in CEE countries. To this end, information about contract expiries and renewals between the Russian gas exporter Gazprom and main importers in CEE was compiled.[4]

[4] No other contracts were analysed because of Gazprom's historical role as the main gas supplier to CEE. In cases of several contracts with Gazprom, the contract representing the largest amounts of contracted gas was selected.

Only in five countries, LTCs with Gazprom expired in the period of 2009 to 2015, namely Bulgaria, Croatia, Estonia, Hungary and Lithuania, see Figure 3. Whereas the former kind of LTC was continued only in Bulgaria (with duration of ten years), the other four countries where LTCs expired demonstrated significant changes.

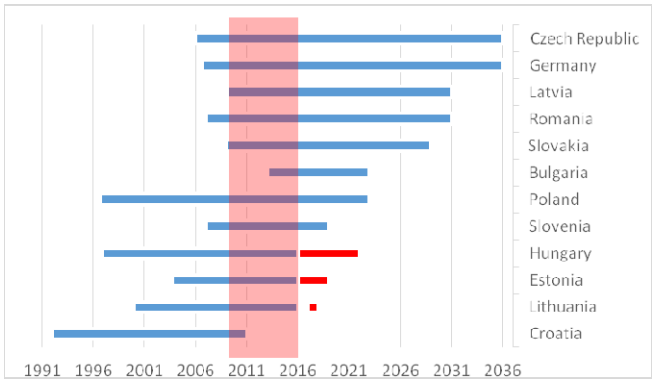

Figure 3. Duration of the contracts between Russian exporter Gazprom and most important national gas importers; new contracts with shorter duration in red (own compilation of publically available data from various sources).

The LTC between Gazprom and Croatian gas importer INA expired at the end of 2010. For the next three years, INA chose the Italian ENI as the main gas supplier. After the subsequent expiration of the contract with ENI in 2013, INA continued without signing any new LTCs at all. ComExt data shows that since late 2012 Croatia has had ongoing imports from Austria. This suggests that Croatia uses the combinations of opportunities to import gas from the Central European Gas Hub in Baumgarten via the Hungarian territory and a Hungary-Croatia interconnector opened in 2011 [16].

When the 20-year long LTC between Gazprom and the main Hungarian gas importer, Panrusgaz, expired at the end of 2015, it has been extended by another four years in February 2016 [17]. According to a Hungarian source, in this period Panrusgaz will be acquiring quantities of unused take-or-pay gas that were moved forward in the previous LTC firstly by the previous co-owner of Panrusgaz, German company E.ON, followed by the new co-owner, Hungarian state-owned company MVM [18]. As compensation, Hungary had opened four new gas interconnectors in parallel to the previous LTC.

The main Russian gas importer to Estonia, Eesti Gaas, has signed a 3-year contract on gas supplies with Gazprom for gas supplies in 2016, 2017 and 2018 one month after the expiry of the Estonian LTC at the end of January 2016 [22]. The new contract is four times shorter than their previous LTC. According to [22], obligations to buy 91 million cubic meters of gas unused in the former LTC were annulled, which suggests that the unused take-or-pay quantities were moved to the new contract with Gazprom. Meanwhile, Estonia has started importing a share of LNG via the Lithuanian terminal.

The main gas importer in Lithuania demonstrated the biggest change in behaviour, which was possibly influenced by several factors. First, since the end of 2014 a new LNG terminal at the Baltic seaport of Klaipėda is operational. Second, the Lithuanian state took over the main gas import

contracts from now non-existing company Lietuvos Dujos, which before used to be co-owned by Gazprom [12]. When the LTC with Gazprom expired at the end of 2015, Lithuania went on by using unused take-or-pay quantities from the previous period without signing any contract with Gazprom for 2016 [19] – [20]. At the end of 2016, Lithuanian state-owned LITGAS and Lietuvos Dujų Tiekimas eventually signed a contract with Gazprom but only for one year and one third of the demand, the rest being covered by LNG [21].

In summary, gas importers in Estonia, Hungary and Lithuania all signed only short-term contracts instead of continuing with LTCs as before. Furthermore, all three countries went on using unused take-or-pay gas quantities from the LTCs that expired. This suggests that the pricing mechanism for the contracted volumes of gas is still OPE. Croatia is the only case, where there seems to be no contract with Gazprom at all after the expiry. In addition, several new gas interconnectors are planned in CEE, e.g. between Finland and Estonia (2019) as well as Lithuania and Poland (2021). These improved linkages may further facilitate to replace LTCs by other pricing mechanisms. This matches with the recent announcement that the Polish importer is not planning to renew its LTC with Gazprom that expires in 2022, despite a price decrease in the renegotiation of the LTC in 2012 [23].

VII. Conclusion

Between 2009 and 2015, the dynamics of border prices for piped natural gas in CEE was quite diverse. The strong drop of crude oil prices in 2015, however, reduced the spread in price dynamics again. While the share of OPE has decreased to less than one third in Central Europe in 2015, OPE remains the dominant pricing mechanism in Baltic and Southeastern Europe. As was shown by a panel analyses based on a random correlated effects model, the introduction of GOG markets has significantly decreased the impact of OPE on the border prices for natural gas in Central Europe. As a consequence, Central European countries were able to profit from lower hub prices before the oil price decline in 2015. Given the prevailing high share of OPE in the Baltic and Southeastern Europe, a still high impact of the oil price is not surprising. However, there is also evidence that the impact of the oil price is decreasing, which can be related to renegotiations of oil-indexed LTCs and the installation of a LNG terminal in Lithuania in 2014.

Even though initially the above price dynamics resulted in gas importers in the EU countries renegotiating their LTCs and attempting to include GOG pricing into them, the most recent developments in CEE took an unprecedented turn. Gas importers in the countries where LTCs with Gazprom expired all opted for short-term contracts instead of signing renegotiated LTCs. At least in Lithuania, the contracted volume has also decreased to a much lower share of their demand. This changeover can be related to the fact that they had more diversified routes of imports compared to the times when the previous LTCs were signed. Still, the developments in those countries are unusual, since the previous LTCs were also considered a guarantee for the security of gas supply. The new contracts were signed after the oil price decline, which indicates that the era of LTCs in trading of natural gas may come to end independent of the oil price dynamics.

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