"НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ "ВЫСШАЯ ШКОЛА ЭКОНОМИКИ"

НАУЧНЫЙ ДОКЛАД

По результатам подготовленной научно-квалификационной работы (диссертации) на тему: «Влияние развития региональных рынков газа в Европе на контрактные формы и внутриотраслевую конкурентоспособность российского газа»

Талипова Аминам Садыковна

Направление подготовки 38.06.01 Экономика

Профиль (направленность) программы – 08.00.05 Экономика и управление народным хозяйством (управления предприятиями, отраслями, комплексами – промышленность)

Аспирантская школа по экономике

Аспирант   _____ / Талипова А.С./
подпись

Научный руководитель _____ / Проф., д.э.н., Кузнецов Б.В. /
подпись

Директор Аспирантской школы_____ / Доц., к.ф.м.н., Демидова О.А./
подпись

Москва, 2019

RUSSIAN GAS EXCHANGE: A NEW INDICATOR OF MARKET EFFICIENCY AND COMPETITION OR THE INSTRUMENT OF MONOPOLIST?

INTRODUCTION

Natural gas is one of the most important traded energy commodities along with oil and coal. It has unique physical characteristics, which differ its value chain from others, easy to store energy commodities. Gas transport and storage are more difficult and expensive. For a long time, natural gas transport was limited primarily to pipelines. Therefore, historically, the global gas market had a regional structure. International gas trade soared to only 30% of global production in the last two decades, mostly due to deregulation and new LNG infrastructure [1].

Today world gas market still has a regional structure with a different level of competition in each region:

1.   Fully competitive and mature gas hubs – Henry Hub (HH) in the USA and National Balance Point (NBP) in the UK, respectively;
2.   Partly competitive in the EU;
3.   State-regulated in Asia-Pacific region.

Russia is the largest gas producer and exporter worldwide. In 2018 it had a record 41.5% share of the European market [2]. Three companies operate in the market: Gazprom, Novatek, and Rosneft. While Gazprom has a by-law export monopoly for the pipeline gas, it has to compete with two other payers and protect its 51% share in the domestic market.

Russian gas market has two unique features: biased price regulation due to the cross-subsidization of industrial and household consumers, and Gazprom's ownership of the Unified Gas Supply System (UGSS). The state-regulation pricing mechanism and other factors discussed further in Section 2.2., lead to a gradual transition of industrial consumers located in highly profitable regions from Gazprom to independent producers. This transition has eroded Gazprom's profit margin and domestic market share from 80% to 68% since 2010.

In 2016 FAS suggested a long-term deregulation reform and nominated SPIMEX to be its central element. The vice prime minister supported the proposed changes and pointed out that the SPIMEX price and average over-the-counter (OTC) price should form the new benchmark, which should ultimately substitute the regulated price. Gazprom supported the reform, claiming that domestic competition is unfair due to cross-subsidized pricing favored unregulated producers.

FAS sees the SPIMEX gas pricing as a market indicator in moving toward removing price floor regulation for Gazprom.

The main purpose of the paper is to analyze the primary metrics of the gas exchange as the number of players and their dominant position, liquidity, unbiasedness of futures price to spot at maturity.

To do that we imply the basic market efficiency theory, formulated by Eugene Fama, and its later modifications for energy commodity markets. The analysis includes the investigation of the current level of competition between gas producers and econometric modelling of monthly and daily gas trades in 2014-2019 at SPIMEX.

1.   LITERATURE REVIEW

Deregulation of gas markets in the USA, EU, and the UK

The USA was a pioneer of gas industry deregulation. Started in 1978 from the Natural Gas Policy Act and continued until the end of the 1980s, deregulation reduced the share of long-term contracts. The liberalization of well-head prices and transportation (FERC order #436) was an essential part of reform [8],[9] .Pierce in his work [10] also notes about the missteps in the regulation of the monopoly price, notably the regulation of area-rates for costs, which caused gas supply shortages. The differences in the prices settled across the end-use markets observed on supply-side (well-head and city gate), and demand-side (electrical, industrial, household, and commercial) markets were analyzed by [11]. Rosput [12] discussed the success of the state policy of deregulation after the Natural Gas Policy Act (NGPA).

Researchers concluded that FERC actions increased trade volumes at the spot market and strengthened competition [13]. Brokers were able to transfer their gas between pipeline companies through so-called market hubs. It led to the development of standard gas contracts at Henry Hub [14] and the decline of long-term contracts volumes with "take-or-pay" clause [15]. During the transitional period, several gas shortages and bubbles happened mainly because of the inconsistency of reforms, price regulation, or demand stagnation [16]. Later studies, as noted in [17], concluded that if the infrastructure appeared as a natural monopoly, then unbundling could support competitive markets and LNG infrastructure development.

The next example of gas market deregulation is coming across the pond, from the UK, at the end of the 1980s. As stated by [18], the fundamental problem in identifying and regulating of natural gas monopoly is subadditivity. According to[6], there are two fundamental problems for the competition in the gas industry: high transportation costs and regional regulatory differences. Recent work by [19] points out that privatization of British Gas and further market liberalization resulted in the liquid market with balancing, non-physical trade, hedge opportunities, availability of real-time information and National Balance Point (NBP) gas hub development as a benchmark.

Some authors quantified the effect of market deregulation through the cost function [20] or measured the competition through storage capacity auctions [21] and concluded a high competition among players. Later studies [22] used the equilibrium between oil and gas prices.

In continental Europe, the first idea to create a united gas market came from the 1950s when the EU was under development. The first Gas Directive appeared in 1997 as an instrument of critical significance for the introduction of some competition. Directive's likely impact on the European gas market developments is provided by several studies [23],[24].

Work of [25] analyzed the importance of capacity constraints and efficiency differences in the European gas market. They found that ongoing liberalization and competition may not necessarily lead to lower prices. In recent extensive work by [26], the author discusses the concept of a gas hub, the current level of gas hubs development in the EU and their ability to build Gas Target Model (GTM). He states that the only UK and Dutch hubs are developed enough, gives a clear path of how long it takes to develop a benchmark in gas industry.

Market efficiency theory definition

Development of natural gas trading hubs over the last three decades made it crucial to analyze underlying financial instruments. Fama [27], as a founder of the theory, postulated that an efficient market should provide accurate signals for resources allocation. It means that firms can make effective production-investment decisions based on efficient market pricing information. On the other side, investors can buy, assuming that securities prices from the efficient market at any time "fully reflect" all available information.

Further works of [28] and [29] investigated the rising problem of systematic non-zero returns in the period following earnings announcements inconsistent with Fama's theory. Later [30] criticized the theory of efficient markets and argued that news is by definition unpredictable, and, thus, resulting price changes must be unpredictable and random.

2. NATURAL GAS INDUSTRY ORGANIZATION, CURRENT STATE AND THE PROPOSED REFORM

2.1 Russian gas industry reorganization

Gas industry in Russia inherited its unified pipeline infrastructure from the former Soviet Union. In 1993 Gazprom was formed as the national state-owned company that accumulated all the assets. Figure 1 shows the main government decisions to reorganize the Russian domestic gas market.

In 1996 Gazprom Mezhregiongaz (from now on Mezhregiongaz), wholly owned by Gazprom, took control over UGSS – the entire system of pipelines in the country. Government Decree #1021 [47], seized government regulation of natural gas prices for all producers, except for Gazprom, who kept control over pipelines. According to Government Resolution № 1021, any natural gas producer in Russian, who is not Gazprom's affiliate, is considered as an independent producer.
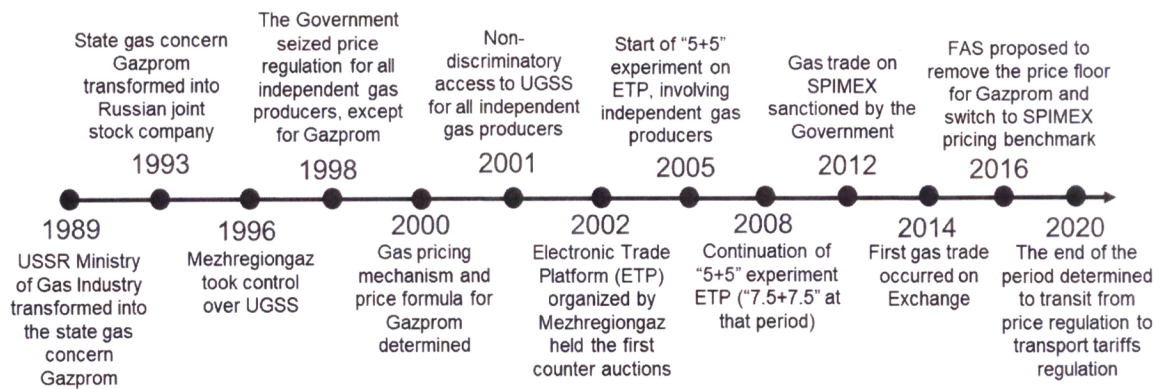
Figure 1 Most influencing government decisions on reorganization Russian domestic gas market

Resolution #1021 of December 29, 2000, determined gas pricing mechanism for Gazprom. Amendments to this Resolution became prerequisites for market liberalization and a transition from regulated price for Gazprom to the regulation of transportation tariffs for all players [48].

The second substantial change happened in 2002 when Mezhregiongaz created the first experimental Electronic Trading Platform (ETP) with counter auctions trading [47]. Unfortunately, the experiment was declared unsuccessful and closed at the end of 2009.

Despite all declared attempts to increase competition, international experts agreed that there was no real reform. International Monetary Fund (IMF) recommended improving governance of all "natural" monopolies in Russia, including Gazprom. These recommendations included preparation of restructuring/privatization plan, enforcing of tariff regulation, and incentivizing of market competition [49]. In early 2000, IMF expert concluded that the only significant action at that time was a merge of gas distribution companies. This decision resulted in development of gas transmission tariffs system and price regulation for gas monopoly. Since 1998, the Government and infrastructure monopolies have been very unwilling to start structural reforms [45].

Nevertheless, further attempts to enlarge competition were undertaken. In 2001 the government amended the Decree #426 dated July 1997, allowing the right of access to UGSS on a non-discriminatory basis, but only if Gazprom had free pipeline capacity [50]. However, in reality, Gazprom provided access in "first come-first served" regime.

The later amendment to this Decree, introduced in 2012, obliged Gazprom to provide the pipeline transport to any seller at the newly established natural gas trading section of SPIMEX. The first gas trade occurred in October 2014. The intention was to create an open gas market, increase competition, and form a fair price. By the term "fair price" here we use the same language as it was used by FAS and SPIMEX officials: "…well-timed transition from state regulation of gas prices for Gazprom to the regulation of a single gas transportation tariff will allow to identify the fair market price of gas and launch an effective mechanism for investing in production and gas transportation assets in order to maintain a balance of supply and demand on the Russian gas market in the long term"[51].

In 2016 FAS proposed a reform package for gas market deregulation till 2020. Following the published Decree draft, the lower limit of the regulated gas price for Gazprom would be dropped, and the SPIMEX price indicator would become a new market benchmark as it was planned previously.

At the same time, FAS allowed UGSS to stay as a part of Gazprom, therefore maintained its export monopoly and prohibited international competition of domestic producers. This status quo was (naively) believed to secure dominance of Russian gas in the EU market.

The proposed reforms are also controversial since price deregulation does not mean market deregulation. The proposed pricing mechanism in the presence of an active player with spare production capacity may allow market manipulation by dumping in the growing unregulated segment.

As we show in this paper, the opposite transition takes place - unregulated ("market") price is, de facto, is closely tied to the regulated one with some discount. Besides that, the cross-subsidization remains the industry practice and further distorts the price environment far from pure competition.

2.2 Qualitative analysis of gas trade on SPIMEX

In this subsection, we qualitatively analyze and demonstrate why the price at the exchange cannot be an effective market indicator.

Futures and spots are two instruments currently traded on gas exchange. Once a month, futures trading with delivery for the next month is held. There is also a special spot contract trading for the next business day.

As of Jule 2019, more than 40 customers from over 60 regions of Russia participated in trading at SPIMEX with three main gas producers as described in the scheme.

There is no balancing on the exchange, no possibility of reselling not consumed gas, no daily gas volume measurement. Therefore, market participants only after a month, when the futures mature, know about how many volumes were de facto consumed. Since there is no secondary market, only qualified brokers can buy gas at the exchange on behalf of clients.

Deputy head of FAS gives the following argument: "Free market prices are slightly lower than regulated prices on average. In certain periods of increased demand, they may be ahead of them, but in general, the consumer has the opportunity to gain the value by legalizing prices in the domestic OTC market". Unfortunately, since the entire market focuses on OTC contracts, which account for ~95% of all trade, it cannot be said that a lower price is an indicator of the market. One also cannot be sure that such a big player as Gazprom does not move gas volumes out of price regulation through trading them at the exchange.

By law, Gazprom may sell up to 17.5 bcm/year at the exchange keeping its share below 50%. On the one hand, this limit reduces overall liquidity. On the other hand, the regulator initially set 50/50 parity so that Gazprom cannot dominate the trade. Therefore, the only strong motivation for independent producers to trade at the exchange is guaranteed access to the transmission system. Independent producers are required to disclose to Mezhregiongaz their trade volumes for transportation planning a month ahead of physical delivery. Therefore, Gazprom has a unique advantage of knowing in advance the market supply and free transport capacities for each balancing point and potentially use this information against other participants.

Despite an increase in trading, from 7.6 bcm in 2015 to 20.3 bcm in 2017, the exchange is still in little demand from gas producers and consumers. As a matter of fact, in 2018, trading volume fell to 15.1 bcm, with less than 5% of the total industrial consumption traded at the exchange.

In 2018, Gazprom's share in sales on the exchange reached a record of 89% (Figure 6). FAS ignores this fact.
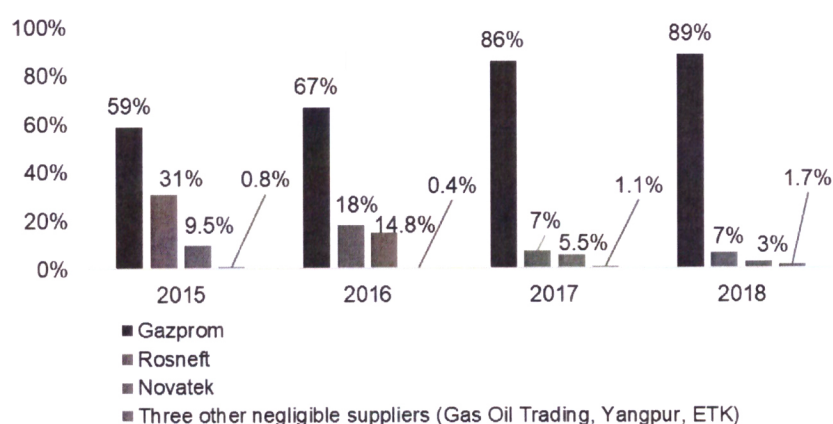

Figure 2 Gas volumes traded in SPIMEX by sellers, 2015-2018, (%). Source: SPIMEX, authors

The next indicator of effective exchange trading is a level of concentration on the demand side and a large number of independent buyers. The main problem here is the share of Gazprom affiliates. On average, all the affiliates buy more than 50%, in only five months during the entire period this share was slightly less than 50% (Figure 7),. Today their share steadily exceeds 60%. What is more remarkable,

2/3 of the total volume sold by Gazprom is bought back by Mezhregiongaz, the company that has all the information about the volumes of other sellers and free capacity as discussed previously.

Therefore the exchange is a promising tool for transfer pricing, bypassing to price regulation, and margin redistribution along the value chain for tax purposes from upstream companies (sellers) to middle stream (mainly Mezhregiongaz) and back if needed.

For example, it lawful for affiliates to purchase gas from Gazprom at the exchange with a price lower than the regulated one. This gas than can be sold to the final consumer at the regulated price when there is an arbitrage opportunity to do so. FAS and SPIMEX have done close to nothing to fix that loophole even though signing a contract by the same company as a buyer and seller among other bylaws is explicitly prohibited by the trading rules of the exchange.

Since 2018, Gazprom has sent to the government several appeals in order to remove restrictions on the volume cap motivating it by the need for a more liquid trade. At the moment, there are no expectations that independent producers will significantly increase production and supply at the exchange to keep their share. More importantly, there is no additional demand from independent buyers because GDP growth is currently below 2%.

Therefore, if the cap would be lifted, the exchange will more likely become a trading platform for internal Gazprom transactions as it was with Mezhregiongas ETS.

In the worst-case scenario, the exchange will become not an indicator of the price of supply and demand, but an indicator of the price of Gazprom, as the dominant producer when price regulation is lifted.

With more detail analysis of the trading data, some anomalies may be observed (Figure 8). Let's consider two time series of futures and spot prices. As a spot price here, we take the weighted-average spot price for the whole month period of the future contact delivery (usually from 22nd day of the month of trade to 20th day the following month).
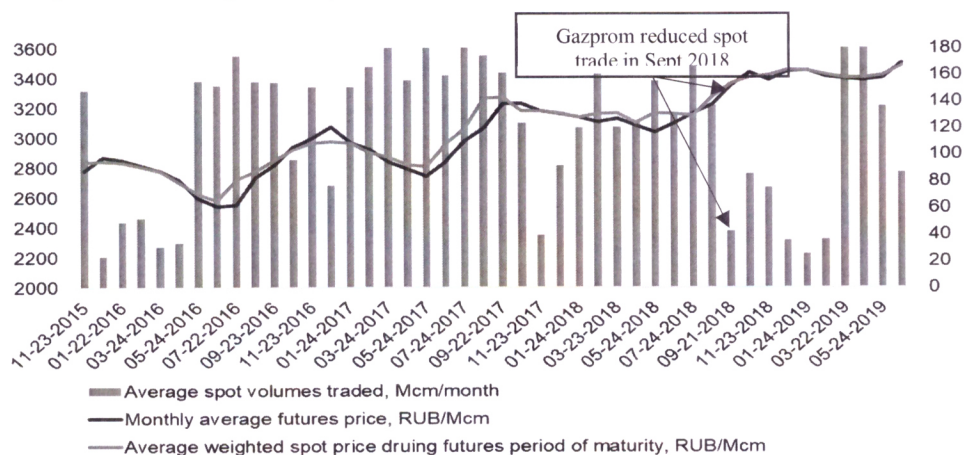

Figure 3 Futures prices (RUB/Mcm), weighted-average spot price for the corresponding futures' delivery month (RUB/Mcm), spot contracts monthly volumes (Mcm/month) in 2015-2019. Source: SPIMEX, authors

METHODOLOGY

A large number of researchers address the problem of the Russian gas industry reorganization. Some papers contain only descriptive methods, while others use equilibrium models to identify the fair market price. Though these works addressed the problem of industry structure and the dominant position of Gazprom, they lacked to assess trading at SPIMEX.

Our contribution to existing knowledge is the analysis of the market efficiency based on actual trading data in SPIMEX gas exchange. Deregulation of the price floor for Gazprom and transition to the market indicator is a strategic government decision which requires comprehensive assessment. In this paper, we address this decision and provide a conclusion about whether the current market is capable of replacing government regulation of the domestic gas market. It should be noted that we do not aim in

this paper at identifying the evidence of price manipulation or forecast the futures prices. This topic, however, may become a fruitful area of research in the future.

Stock markets play an essential role in the national economy. They bring sellers and buyers together, reflecting current market supply and demand. Not surprisingly that all players expect the market to be a proper allocation for their commodities and capital, and that prices contain all the information. As mentioned previously, it is called efficient market. If on the exchange one player obtains exclusive information and can set the price, while other players will have to follow, then such exchange can not be considered as a market. All the more, it is not reasonable to take it as an indicator for the OTC market. The current state of the exchange shows the dominance of the state-owned company, small volumes traded, and a lack of brokers activity. It is the main reason for testing market efficiency and choosing the model described below. We test whether the market for natural gas futures and spot is consistent with market efficiency theory.

Some notes should be mentioned before the model description. First, some authors notice that if energy commodities are storable, spot prices reflect both current supply and demand conditions. They reflect expectations for those conditions in the future because market participants can arbitrage between the current spot price and the futures price [36]. In our paper, this thesis is not applicable due to the Gazprom's monopoly rights on the gas storages, and complicated access for independent producers.

Second, for energy commodities, the net long positions of producers/users are relatively close to zero [36]. This thesis is also not taken into consideration because of the too low liquidity on the exchange. All producers rather hedge their sells with long-term OTC contracts, than with futures and forced by the FAS to sell the gas on exchange.

Third, we do not set the aim to forecast futures prices. Though it is a common part of such analyzes [35], we stay apart from the prediction power estimation and evaluate the only market efficiency.

Finally, according to the chosen methodology, we consider the theory that the futures price explains the spot price, which assumes that all the information is in the market. We assume that in the absence of the secondary market and daily measurements of futures consumptions, there is no arbitrage for all players even within a month, and the model should show effectiveness. It will help us to make sure completely that within a month there is no arbitrage and no market player uses its power and information available for its benefit. It is an essential assumption because otherwise, players with exclusive information exist in the market. To test it, we evaluate the second model (Model 2). The difference is in time series. We use weighted-average spot prices as a corresponding price to the futures.

An extensive part of the research literature uses a well-established regression model described in Section 1, which we imply. Two important remarks here are that market efficiency has strong and weak forms. Weak form means that at least futures price explains the spot price at the corresponding date. In the model, it is expressed in one linear restriction when the β coefficient is equal to 1. A strong form of market efficiency is that futures market is unbiased, and all information is in the market, or there is no risk premium. In the model, the joint linear restriction of α=0 and β=1 is tested.

3.   MODEL DESCRIPTION

This chapter describes the model specification to test market efficiency used in the analysis. The methodology has been explained in previous studies described in Section 1. In theory, futures price are considered to be good predictors of spot prices. The simple relationship between the futures price and the expected spot price at delivery date is as follows:

$$F_T = E[F_t|I_t] \tag{1}$$

Where F_T is the futures price at maturity, which is equal to the daily spot price at maturity, E is a mathematical expectation operator, F_t is the futures price at time t for delivery at time T, I_t is the information available at the time t. If the information set is $I_t = F_t, F_{t-1}, ... F_{t-n}$ and $I_t \ni I_{t-1} \ni ...$, then the testing procedure assumes a weak form of market efficiency. Strong form requires I_{t-1} to contain all publicly available information.

Market efficiency states that futures price converges with the spot price at maturity and contains a risk premium. To do that, Eq. 1 expands into the following:

$$F_t = e^{-\rho(T-t)}E^f(t)[S(T)], \tag{2}$$

where $E^f(t)[S(T)]$ - is the expectation in the futures market in period t of the spot price in period T, and ρ is the continuously compounded rational expectations risk premium.

Eq. 2 assumes that there are no preliminary investments that deliver return equals to the risk premium. To obtain the linear relationship between the futures price and spot price, we take the logs of Eq. 2, and from now on we take the length of the forecast as $k=T-t$ which is equal to one month in our model:

$$f_{t,t+k} = -p_k + E_t^f s_{t+k} + \xi_T \qquad (3)$$

In Eq. 3, $f_{t,t+k}$ – is the log futures price, p_k – is the (assumed constant) risk premium scaled to the length of the forecast horizon k, $E_t^f s_{t+k}$- is the period t expectation in the futures market of the log spot price k periods ahead.

To interpret the formula into the spot price definition because we test the theory which states that futures price explain spot price, we subtract the current log spot price s_t from both sides of Eq. 3. The meaning of Eq. 4 is that the current spread between the futures price and spot price (the basis) on the left side is equal to the expected change in the spot price for the period until delivery less the risk premium on the right side.

$$f_{t,t+k} - s_t = -p_k + E_t^f(s_{t+k} - s_t) + \xi_T \qquad (4)$$

Now, we transfer to the right side of equality the change in spot price and consider it as a dependent variable which is explained by the basis (explanatory variable) and estimate the following regression which gives us the market efficiency test:

$$s_{t+k} - s_t = \alpha + \beta\left(f_{t,t+k} - s_t\right) + \xi_T \qquad (5)$$

We take risk premium $-p_k$ equals α so that the parameter α is interpreted as the constant component of the risk premium. If the basis $(f_{t,t+k} - s_t)$ provides an unbiased forecast of the future spot price, then two conditions must be met simultaneously in the model: $\alpha = 0$, $\beta=1$, and ξ_T has a conditional mean equal to zero.

This regression is typically estimated in the market efficiency literature, including for energy commodities [34]. To test the market efficiency, therefore, joint linear restriction of $\alpha = 0$, $\beta=1$ in the null hypothesis is performed.

In our paper, due to our aim, we are less interested in proving the power of the futures price to forecast spot price. We rather focused on testing in-sample prediction properties such as efficiency and unbiasedness. Thus, noted by [52], these properties are often considered to be minimum requirements for optimal or rational forecasts.

Consequently, in the second model, we use the same regression and the same model specification with the only difference in spot prices time series. Here spot price (s_{t+k}^*, s_t^*) reflects weighted-average price during the month of futures expiration:

$$s_{t+k}^* - s_t^* = \alpha + \beta\left(f_{t,t+k}^* - s_t^*\right) + \xi_T \qquad (6)$$

The same joint linear restriction $\alpha = 0$, $\beta=1$ for a strong form of efficiency and $\beta=1$ linear restriction for a weak form of efficiency are tested.

4. RESULTS AND DISCUSSION

Before the regression model estimation, we run the Augmented Dickey-Fuller (ADF) test as we follow the assumption that the time series stationaries. ADF test has been used for a different type of processes: random walk with drift, random walk without drift, random walk with non-zero drift. All the time series we used in Model 1 and Model 2 show stationarity.

Then we take lags of spot prices logs $(s_{t+k} - s_t)$ which is our dependent variable. The predictor variable is the difference between the futures price log and spot prices log $(f_{t,t+k} - s_t)$. Logarithms of spots and futures and spots are given in Figure 10. All ADF tests show that our time series are stationary. Hence, we can estimate regression.
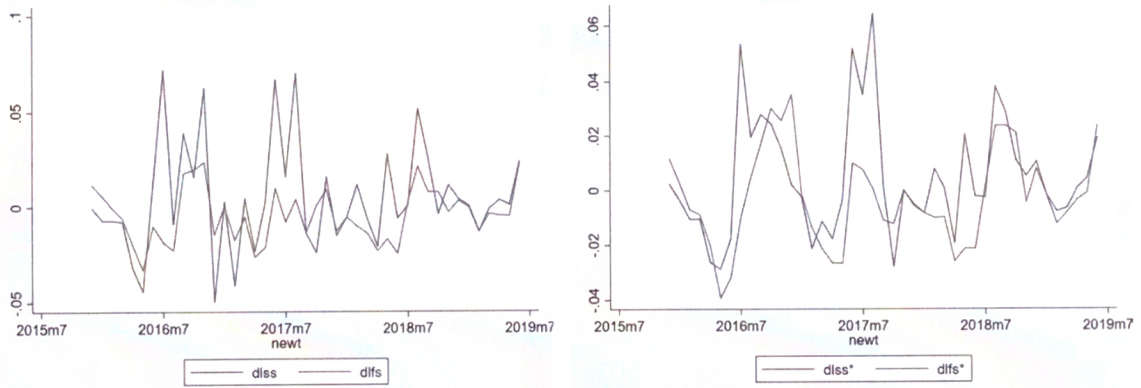
Figure 4 Time series logs of the dependent variable (dlss) and predictor (dlfs) for Model 1 (on the left) and Model 2 (on the right)

As mentioned previously, to estimate strong and weak forms of market efficiency, we imply two types of linear restriction:

1. $\beta = 1$ for a weak form of market efficiency in Model 1 and Model 2;

2. $\alpha = 0$ and $\beta = 1$ for a strong form of market efficiency in Model 1 and Model 2.

We present estimates of α, the constant, and β, the coefficient on the basis, and linear restriction tests for Model 1 and Model 2 in Table 1.

Table 1 Regression results for Model 1 and Model 2

	α estimate	Test $\alpha=0$, p- value	β estimate	Test $\beta=0$, p- value	Test $\beta=1$, p- value	Joint test $\alpha=0$ and $\beta=1$, p- value
Model 1	0.0098	0.0140	1.1323	0.0000	0.6138	0.0465
Model 2	0.0067	0.0200	0.6978	0.0000	0.0632	0.0068

Model 1

The results for Model 1 show that the hypothesis of a weak form of market efficiency cannot be rejected. At a 10% significance level, the joint hypothesis of linear restriction for a strong form of market efficiency is rejected.

From Table 1, we can conclude that the gas exchange is not efficient in a strong form and efficient in a weak one, so the exchange price cannot be considered as a benchmark for the OTC segment.

Model 2

The results for Model 2 show, that the hypothesis of a weak form of market efficiency cannot be rejected at a 10% significance level. At 5% significance level, the hypothesis of linear restriction for a strong form of market efficiency is rejected.

From Table 1 for Model 2, we can conclude that within the month, the market is inefficient in a strong form. The rejected joint hypothesis indicates the use by one or more players of non-public information at the exchange as no other technical opportunities for arbitrage exist.

CONCLUSION

In the Russian gas industry today, FAS reform aims at the transition from regulated prices to the regulation of transportation tariffs only, which assumes deregulation of price floor for Gazprom. The reform should result in SPIMEX pricing benchmark development that will be a new indicator for OTC market.

Our conclusion is based on the following results:

1. Qualitative analysis of the primary metrics of SPIMEX shows that the exchange is not liquid enough. Only about 5% of the total domestic gas consumption is traded on SPIMEX. At the same time, Gazprom and its affiliates account for 90% of the total gas sold and for approximately 65% of total gas

purchased. This indicates that Gazprom may use SPIMEX as a platform through which it can lawfully smuggle gas under the price floor and transfer profits between production and distribution affiliates confusing regulators.

2. Contacted prices and volumes behave abnormally. For example, during winter, the spot price is lower than the futures price. During three summers in a row in 2015-2017, the spot price was higher than the futures one, while no seasonal and temperature anomalies were reported. In the same time, the summer spot volumes are higher than winter ones.

3. The results from Model 1 show only a weak form of market efficiency, and we reject the hypothesis about a strong form of market efficiency.

4. We used the same model specification with weighted-average spot prices over the month. The results show market inefficiency for strong and weak forms at all levels of significance in Model 2.

Finally, answering the question in the title, we can conclude that at the current state of gas exchange and level of competition in the industry, SPIMEX will, most likely, become a tool in the hands of the dominant player.

REFERENCES

[1] A. Talipova and S. Parsegov, "Evolution of Natural Gas Business Model with Deregulation, Financial Instruments, Technology Solutions, and Rising LNG Export. Comparative Study of Projects Inside the US and Abroad," in *SPE Annual Technical Conference and Exhibition*, 2018, pp. 24–26.

[2] Eurostat, "EU imports of energy products - recent developments - Statistics Explained," *Eurostat*, no. May 2019, pp. 1–13, 2019.

[3] The Government of the Russian Federation, *About the realization of natural gas at organized trades and amendments to the Government of the Russian Federation on state regulation of gas prices and access to the gas transport system of the open joint stock company "Gazprom,"* vol. 323. Russian Federation, 2012, p. 3.

[4] H. R. Mussey, J. S. Mill, and W. J. Ashley, "Principles of Political Economy with some of their Applications to Social Philosophy.," *J. Philos. Psychol. Sci. Methods*, vol. 8, no. 1, p. 26, 1911.

[5] C. C. Bratt, "Industrial action," *Br. Med. J.*, vol. 2, no. 6083, pp. 389–390, 1977.

[6] J. T. Jensen, "Open access-the new market approach to natural gas policy," *Energy Policy*, pp. 1005–1014, 1992.

[7] C. Pirrong, "The economics of commodity market manipulation : A survey," vol. 5, no. February, pp. 1–17, 2017.

[8] J. S. Henderson, "Edited by," 1986.

[9] J. R. Lemon, "Regulatory reform of interstate natural gas pipelines," *Contemp. Policy Issues*, vol. 4, no. 4, 1998.

[10] R. J. Pierce, "Reconstituting the natural gas industry from wellhead to burnertip," *Energy Law J.*, vol. 1, 1988.

[11] S. P. A. Brown and M. K. Yucel, "The Pricing of Natural Gas in U.S. Markets," *Econ. Rev.*, pp. 41–52, 1993.

[12] P. G. Rosput, "The limits to deregulation of entry and expansion of the US gas pipeline industry," *Util. Policy*, 1993.

[13] K. G. Arano and B. F. Blair, "An ex-post welfare analysis of natural gas regulation in the industrial sector," *Energy Econ.*, 2008.

[14] B. J. Clancy, "The State of Competition in the Natural Gas Industry," 2007.

[15] P. W. MacAvoy, *The Natural Gas Market : Sixty Years of Regulation and Deregulation*. New Haven, CT: Yale University, 2001.