GAS GROUP

Position Paper

European Economic Liberalization and Households' Gas Prices

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Introduction

The creation of a European Single Market has been a pillar since the institutions of the Treaty of Rome in 1957, whilst economic integration on a large scale occurred only between the 1980s and 1990s with the Single European Act in 1986 and the Maastricht Treaty in 1992 (Kaiser and Varsori, 2010). Beside the attempt to create a single political entity to strengthen the weight of the European economies towards the non-European commercial counterparts, the Treaties main emphasis was internal, namely in the creation of a European Single Market. The abolition of commercial barriers among the member states in all the economic sectors aimed to exploit the comparative advantages of the different sectors of the European economies. The goal was on one hand to increase the scale of production and distribution of the most efficient sectors thanks to the largest dimension of the European market as opposed to the national markets; on the other hand, to boost economic growth in Europe.

The joint achievement of efficiency gains and economic growth through liberalization seemed to work effectively for most of the sectors targeted in the manufacturing industry as well as services (Sharp, 2003), despite the unpredictable dynamics that this structural change could have involved, especially in terms of distributions of efficiency gains among the consumers. The latter drawback indeed has emerged with particular strength in the sectors of general interest, particularly between 1900s and 2000s. Network industries indeed are characterized by natural monopolies, which implies that the monopoly is the most efficient market arrangement in term of costs to afford (Baumol, 1977). Therefore, despite the beneficial effect

that liberalization brought in several sectors, the performances of the key industries seem to have worsened, with negative implications both on the supply side as well as the consumers' welfare (Florio, 2013). This was particularly evident since beginning of this process, namely between 1990s and mid-2000s, when the liberalization measures were adopted at a large scale and generated great transformations on the market structures, namely unbundling the infrastructure networks from the other phases of the supply chain and opening the market to new competitors (Ceriani and Florio, 2010).

This paper shows that this trend persisted also in the last years, showing that the gas price for household in Europe continued to increase despite the decrease of gas demand due to the European economic recession. However, the trend was not confirmed in some specific case, i.e. Denmark and Hungary, due to the effect of additional policies implemented by both countries.

Data

To investigate the impact of market entry policy reforms on the gas price for domestic users, we combine the two existing datasets: Eurostat data on gas prices for domestic consumers and ETCR data on regulation of networks starting from 2007. This provides us with a balanced dataset of 17 EU countries (Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom) for the period from 2007 till 2013 (inclusively). In total, we have 114 country-year observations.

Heteroscedasticity and autocorrelation problems can be severe in panel data. Specifically, in the presence of heteroscedasticity and autocorrelation regression coefficients are unbiased but they become no longer efficient (bias in the standard errors). Due to the fact that autocorrelation is a problem in macro panels with long time series (over 20-30 years) (Baltagi, 2008), it does not represent a serious problem in our micro panel. Thus, we estimate the ordinary least square (OLS) model with Huber-White standard errors to mitigate potential bias in the standard errors due to the non-constant variance across observations:

$$Price_{i,t} = b_0 + b_1(Entry)_{i,t} + b_2 (Controls)_{i,t} + d_t + e_{it} \qquad (1)$$

where $Price_{i,t}$ = average annual consumers' gas price, kilowatt-hour;

Entry $_{i,t}$ = entry regulation (starting from 0 (regulated) to 6 (unregulated));
Controls $_{i,t}$ = public ownership (starting from 0 (none) to 6 (100% publicly-owned)), vertical integration (starting from 0 (none) to 6 (integrated)), market share (starting from 0 (<50% of the market is controlled by the largest company) to 6 (>90% of the market is controlled by the largest company);
d_t = time dummies;
$e_{i,t}$ = error term.

Cross-country differences (i.e. culture, moral attitudes and perceptions) are likely to affect our empirical estimates. Therefore, we further estimate our model using the fixed effects estimator (FE) by modelling, $n_{i,,}$ the individual time-invariant heterogeneity, via demeaning all the variables (Wooldridge, 2010) :

$$Price_{i,t} = b_0 + b_1(Entry)_{i,t} + b_2(Controls)_{i,t} + d_t + n_{i,} + e_{it} \qquad (2)$$

Furthermore, we also re-run the both models using the lagged $Entry_{i,t-1}$ on the right side of equations (1) and (2) to verify whether the market entry reforms have a lagged effect on the gas prices for domestic consumers. Ceteris paribus, it is likely that the effect of the public intervention is likely to affect consumers' gas prices with the time lag. In addition, as far as serial correlation in the annual gas prices often carry relevant information on gas prices, we decided to complement our static models with introducing some dynamics. In particular, we added the lagged $Price_{i,t-1}$ on the right side of equations (1) and (2). We expect a significant positive correlation for the countries investigated in our sample. Due to the limited sample size, we decided to estimate further dynamic specifications of our model using the OLS and FE methods instead of the instrumental variable estimators. Therefore, the results derived from our dynamic models should be taken carefully due to the possibility of existing of the Nickell's bias (Nickell, 1981).

Descriptive statistics and correlations for the key variables are presented in the Table 1. We did not find any evidence of relevant multicollinearity problem, since the check of VIF values of all the independent variables are below the conventional thresholds in any model. As we can see from Table 1, there is a highly significant negative correlation between the gas prices for domestic consumers and market entry reforms ($p<0.01$).

Table 1. Descriptive statistics and correlations

	Mean	S.D.	Min.	Max.	1	2	3	4	5
1 Price	0.05	0.01	0.02	0.08	1.00				
2 Entry	0.21	0.42	0.00	2.20	-0.27**	1.00			
3 Public	2.25	2.00	0.00	6.00	-0.01	0.08	1.00		
4 Vertical	4.08	1.19	0.00	5.25	-0.00	-0.05	0.46***	1.00	
5 Mrktstr	3.11	2.07	0.00	6.00	-0.07	0.16†	-0.20*	0.01	1.00

The variables are the following: Price (annual gas price for consumers), Entry (market entry reforms), Public (public ownership), Vertical (vertical integration), Mrktstr (Market structure concentration). † p<.10, * p<.05, ** p<.01, *** p<.001.

Table 2 reports the findings of the main static regression specifications. As we can see from Model (1), the effect of the market entry reforms is negative and highly significant. In other words, prohibiting new entrants to enter the gas market significantly decreases gas prices for consumers. Moreover, we observe that the lagged effect of the market entry reforms variable is also highly significant. In terms of the control variables, we observe that there is a sign that higher public ownership decreases consumers' gas prices. In addition, we find that higher vertical integration of a firm influences negatively consumers' gas prices.

Table 2. Static model specifications

Dep.var.: Price $_{i,t}$	**OLS(1)**	**OLS(2)**	**FE (3)**	**FE(4)**
Constant	0.044***	0.047***	0.074***	0.080***
	(10.57)	(13.46)	(6.19)	(7.79)
Vertical $_{i,}$	-0.000	-0.000	-0.006*	-0.007*
	(-0.08)	(-0.16)	(-2.82)	(-2.92)
Mrktstr $_{i,t}$	-0.000	0.000	-0.000	0.000
	(-0.03)	(1.02)	(-0.18)	(1.59)
Public $_{i,t}$	0.000	-0.000	-0.001	-0.003*
	(0.12)	(-0.00)	(-1.08)	(-2.36)
Entry $_{i,t}$	-0.006***		-0.002	
	(-4.13)		(-1.11)	
Entry $_{i,t-1}$		-0.006***		-0.001
		(-3.61)		(-0.87)
Time FE	Yes	Yes	Yes	Yes
R-squared	0.25	0.24	0.02	0.02
N	114	98	114	98

t statistics in parentheses, robust standard errors
† p<.10, * p<.05, ** p<.01, *** p<.001

Table 3 shows the results of the additional dynamic regression specifications. As we can see

from model (4), and confirmed in all subsequent specifications, the lagged price variable is strongly significant and positively related to the prices in the following year. Both the OLS and FE models confirm again the negative relationship between market entry reforms and consumers' gas prices. The negative lagged effect of the entry variable is supported, however, only by the OLS model.

Table 3. Dynamic model specifications

Dep. var. Price $_{i,t}$	**OLS(5)**	**OLS(6)**	**FE(7)**	**FE(8)**
Constant	0.015***	0.015***	0.066***	0.064***
	(5.19)	(5.00)	(6.06)	(5.75)
Price $_{i,t-1}$	0.783***	0.790***	0.338**	0.341**
	(13.70)	(13.55)	(3.53)	(3.33)
Vertical $_{i,t}$	-0.000	-0.000	-0.006*	-0.006*
	(-0.70)	(-0.65)	(-2.56)	(-2.49)
Mrktstr $_{i,t}$	0.000	0.000	0.000	0.000
	(0.47)	(0.43)	(1.53)	(1.43)
Public $_{i,t}$	-0.000	-0.000	-0.004*	-0.003*
	(-1.19)	(-1.35)	(-2.48)	(-2.51)
Entry $_{i,t}$	-0.003*		-0.003**	
	(-2.35)		(-3.50)	
Entry $_{i,t-1}$		-0.002†		0.000
		(-1.72)		(0.01)
Time FE	Yes	Yes	Yes	Yes
R-squared	0.80	0.80	0.13	0.13
N	97	97	97	97

t statistics in parentheses, robust standard errors
† p<.10, * p<.05, ** p<.01, *** p<.001

Case Studies

The Denmark case

An interesting case study is Denmark. Copenhagen developed the interest over the natural gas after the 1970s oil crisis in order to reduce the energy dependence, thanks also to the discover of important deposits in the North Sea. Until the end of 1990s, the gas management chain was under the state control; in 2000, the Danish government enforced the "Natural Gas Supply Act", which embraces the EC Directive 98/30 for the energy market unbundling and entry transparency[1]. Moreover, since 2004, the consumers are free to choose their energy supplier

[1] Bonzanni L., Merighi F., Roccatagliata M., *L'Effetto delle Riforme sui Prezzi al Consumo del Gas in Danimarca*, Facoltà di Scienze Politiche e Sociali, Università degli Studi di Milano, A.A. 2015/2016, p. 7.

and, in the same year, it was created the Energynet.dk, the national transmission system operator for electricity and natural gas[2].

Energynet.dk has the main task "to maintain the overall short-term and long-term security of electricity and gas supply"[3]. As it is written on its website, the company has several other tasks, such as the creation for objective and transparent conditions for competition on the energy market and its monitoring[4]. Concerning the Danish natural gas market, as it is specified in the related section of the company's website, "*All natural gas consumers in Denmark have been free to choose their gas supplier since 1 January 2004. Most often it is large gas consumers, especially heat and power generators, and major industrial consumers who have changed gas suppliers. The liberalization has made it possible for everyone to set up as a gas supplier or shipper*"[5]. Concerning the other sector of the market, there are three operators for the distribution: Naturgas Fyn Distribution, HMN Naturgas and DONG Gas Distribution; for what concerning the retail sector, there are thirteen different companies; finally, the DONG Energy Gasforsyning is the furniture company.[6]

According to the OECD indicators of regulation on energy, transport and communications (ETCR), the liberalization of the Danish gas market is confirmed. If we consider the period between 2007 and 2013, it is particularly notable the indicator of the entry regulation: indeed, on a scale of values between 0,00 and 6,00 (where 0,00 is equivalent to a free access to the market while 6,00 a market franchised to one firm), the Danish natural gas market shows a total free market from 2007 to 2013, as it is show in the Fig.1.

Fig. 1. *Danish ETCR Indicators for Gas Market*

		Gas				
Country	year	Overall	Entry	Public Ownership	Vertical Integration	Market structure
Denmark	2007	2,52	0,00	4,10	4,50	1,50

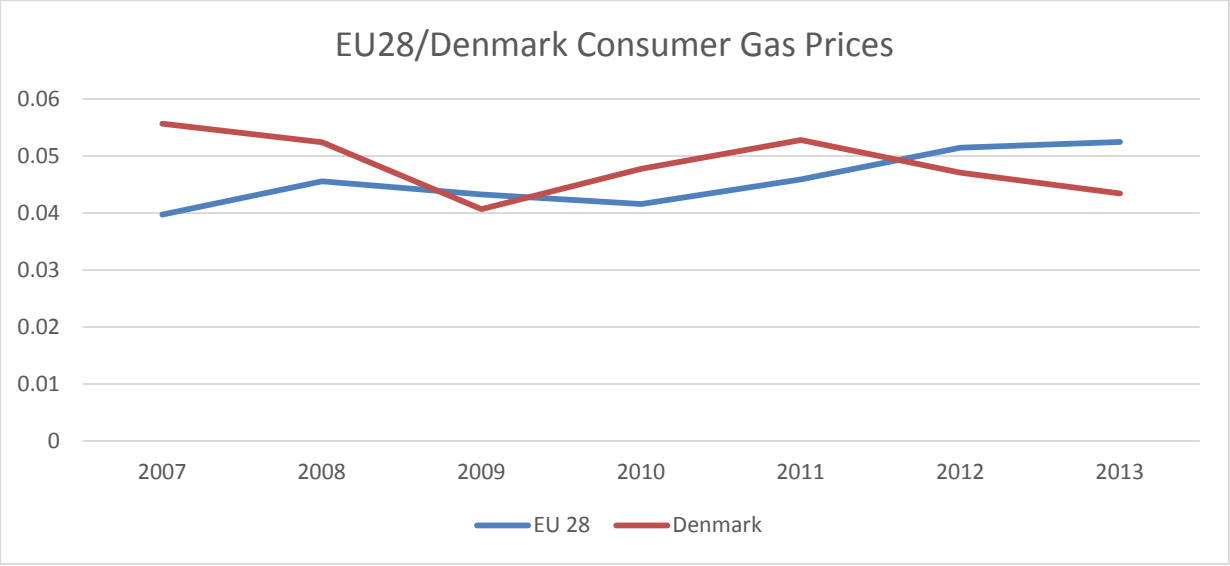
[2] *Ibid.*
[3] (n.d.). Retrieved June 29, 2016, from http://www.energinet.dk/EN/OM-OS/Om-virksomheden/Sider/default.aspx
[4] *Ibid.*
[5] (n.d.). Retrieved June 29, 2016, from http://www.energinet.dk/EN/GAS/Det-danske-gasmarked/Sider/nydefault.aspx
[6] Cit., *L'effetto delle Riforme sui Prezzi al Consumo del Gas in Danimarca*, p.7.

Denmark	2008	2,53	0,00	4,11	4,50	1,50
Denmark	2009	2,53	0,00	4,13	4,50	1,50
Denmark	2010	2,54	0,00	4,15	4,50	1,50
Denmark	2011	2,54	0,00	4,16	4,50	1,50
Denmark	2012	2,62	0,00	4,48	4,50	1,50
Denmark	2013	2,63	0,00	4,50	4,50	1,50

Source: http://www.oecd.org/eco/growth/indicatorsofproductmarketregulationhomepage.htm

Does this strong liberalization of entry requirements affect the gas consumer prices? In order to answer to this question, we need to analyze the Danish gas prices for domestic consumers from 2007 to 2013: as we can notice in Fig.2, the general trend is a price that goes down, except for a small parenthesis between 2009 and 2011. This data is in direct contrast with the price trend in the other EU countries, which experienced a general increase in prices for natural gas.

Fig. 2. Denmark Consumer Gas Prices' Comparison.

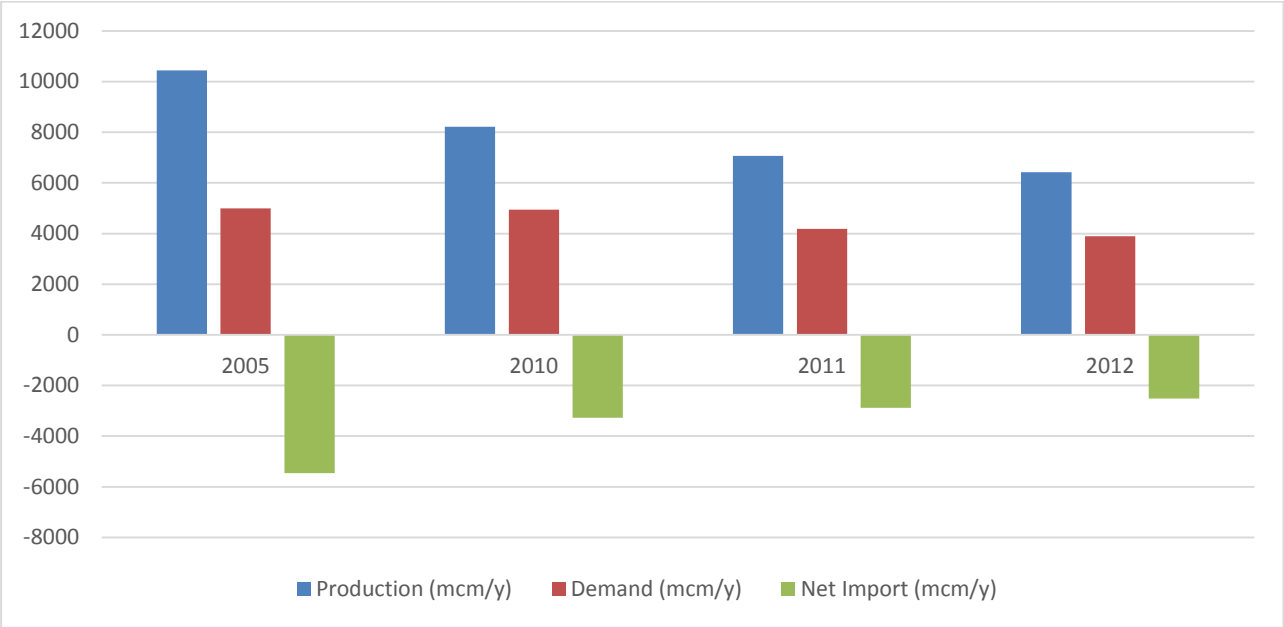


Source: Eurostat

The increases in the gas prices between 2009 and 2011 can be justify by the decreasing in the domestic production, due to the exhaustion of the gas deposit, and the consumer demand that remained unchanged (see tab.1); thus, the prices could be raised, for instance, by the companies' will to compensate the economic losses or the increase in the importation of gas.

Moreover, according to the International Energy Agency, Denmark increasingly use other sources in the production of primary energy, as hydro or renewable[7].

Table 1 Production, demand and net imports of natural gas in Denmark between 2005-2012.



Source: International Energy Agency

To sum up, we can say that in general the liberalization reforms carried out by the Danish governments during the last two decades had a limited impact in decreasing the consumers' gas price. Since 1990s, there was a constant government commitment in following the EC Directives, but the evidences showed that the prices did not decrease significantly, as it has been expected. However, it must be underlined that nowadays the gas consumers' price is lower and with a downward trend than the EU28 average price. The Denmark case has to be monitored in the next years in order to see if the prices decrease and due to which factors.

Hungary

Regarding to the present position paper the authors found as an appropriate example the case of Hungary. The main points of the research include the following conditions according to the

[7] International Energy Agency, *Energy Supply Security 2014*, p.141.

new implemented European instruments in the energy sector encouraging the policy of competitiveness in the country – fully liberalized energy market, regulated TPA, importance of gas sector as a major energy resource.

The reason for choosing Hungary as a case study of the present paper was made through detailed analysis that showed differences with the tendency of increasing the average gas prices established in the most EU Member States. Hungary seems an exception with its continuously decreasing price levels.

The impact influencing the gas price in Hungary has a complex structure. As mentioned above there is a variety of factors playing important role for the market. These factors include oil price indexes, global economic environment, political state and in particular, policy-making of every state. Part of the present position paper's aim is to observe the influence of the Third European Energy Legislative framework on the state of gas sector in Hungary, which sets out more strict rules of the game than it was previously done in this field.

By using ECTR indicators (which are based on a somewhat arbitrary "cardinalisation") and the historical development of the gas sector, the current paper shall put on revision the objectives and effectiveness of the implemented European reforms in the sector through the previous years.

Gas Sector Overview

Natural gas plays the most important role in Hungary's energy consumption and accounts for 37.8%. Crude oil and petroleum products come second. The power generation mix is dominated by nuclear energy (50%), gas-fired generation (31%) and solid fuels (16.7%).[8]

Hungary's natural gas consumption in 2013 reached 9.22 Billion m3; gas generation, on the other hand, was 2.46 Billion m3. The country imports most of its gas from Russia via Ukraine at Beregdaroc (56.3 mcm/d), but also small amounts via Austria at Mosonmagyarovar (12.1 mcm/d).[9]

[8] Energy Sectorial Overview - Hungary, Introduction to the Hungarian energy market, 2014
[9] Natural gas suplly infrastructure, Pipelines and LNG Terminals, p.18, Available at: http://www.iea.org/publications/freepublications/publication/hungary_2012.pdf

Market liberalisation of natural gas sector in the EU countries, also in case of Hungary, has been seen as crucial tool to provide bigger and wider choice and as well better products at reasonable prices for consumers across the EU. Liberalisation of natural gas sector is an integral part of the EU policy objectives in the recent two decades.The liberalization of the Hungarian electricity and natural gas market was completed in 2008. Today every consumer has the legal right to choose their supplier, although the prices for universal suppliers are still regulated. The major part of Hungary's energy supply is imported, and will remain so for a long time.

The main market regulatory body is the Hungarian Energy and Public Utility Regulatory Authority (MEKH), with the main task of license issuing and ratification of grid fees for transmission and distribution system operators[10]. HEO - is an independent body of the administration.

Since 1st January 2012, HEA is obliged to calculate gas tariffs using the methodology imposed by the Ministry.

Regulatory Affairs and Structure of Ownership

The Hungarian Energy Office (HEO) is the regulator for natural gas. It approves the network code which provides for transparent and non-discriminatory access to the network for all user groups. In practice, the regulator's powers are often limited to providing advice to the minister, who has the right to set system usage and connection tariffs and the price of "universal supply" (notably to households). The HEO co-operates closely with the Hungarian Competition Authority and the Hungarian Consumer Protection Authority. The parameters of their co-operation are detailed in a joint agreement which is reviewed every year.

The third European Union gas market directive (2009/73/EC) obliges EU member states to separate the transmission system operations of vertically integrated companies from their other operations.[11] Hungary opted for the independent transmission operator option, and its parliament amended the Gas Act accordingly in January 2010. Consequently, the gas

[10] Ibid.
[11] Directive 2009/73/EC of the European Parliament and the Council , Official Journal of the EU, Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0094:0136:en:PDF

transmission owner/operator FGSZ remains 100% owned by MOL but is subject to heavy regulation and permanent monitoring to ensure non-discriminatory system operation.

MOL (Magyar Olaj-es Gazipari Rt) was privatized in 1996. Unlike the other privatized companies, no Western companies own strategic interests in MOL. The shares then had the following structure – 25% owned by the Hungarian government, 38% by Western institutional investors and 37% by Hungarian and Western private investors. MOL was the sole producer, importer of gas into Hungary, owner, sole owner and operator of gas storage facilities, sole owner and operator of high-pressure pipelines and the wholesaler of gas in Hungary (Pierce, 2000).

Nowadays MOL Group is an integrated, international oil and gas company, headquartered in Budapest. Its ownership structure is as follows in %[12]:

Hungarian State - 24.74
Foreign Investors - 22.38
CEZ MH B.V. - 7.35
Oman Oil Limited - 7.00
Domestic institutional investors - 5.64
Unicredit Bank AG - 5.15
OTP Bank Plc. - 4.79
Domestic private investors - 4.78

In Hungary, FGSZ Földgázszállító Zrt. (FGSZ Natural Gas Transmission Private Company Limited by Shares, in short form FGSZ Ltd, and referred to as FGSZ) is currently the only company to hold a transmission system operator license. It is part of MOL Group. Its activity is carried out under market conditions regulated by law. Aside from domestic natural gas transmission, FGSZ also performs transit activities for Serbia, Bosnia-Herzegovina, as well as cross border deliveries towards Romania, and Croatia and Ukraine. In international

[12] MOL web-site at:
https://molgroup.info/en/about-mol-group/company-overview/mol-group-organization

comparison, the Company's pipeline network represents the highest technology standards. FGSZ ranks among the region's companies of strategic importance[13]

In the event of a crisis, the TSO is responsible for operational crisis management. However, decisions regarding certain strategic questions may remain in the hands of the regulator or government. There are no specific emergency plans between the Hungarian TSO and neighboring countries. In the case of natural gas, the structure of the natural gas NESO is similar to the oil NESO, but the crisis committee includes partners from the natural gas industry such as the limited company FGSZ and the energy service provider E.ON, as well as other relevant authorities.

There is a mixture of public and private ownership of energy assets in Hungary. MOL, the former national oil company privatized in the 1990s, dominates the upstream oil and gas industry and operates the national gas transmission system. Natural-gas sales to captive customers are undertaken by five regional monopolies, all of which are foreign-owned (by E.On, Gaz de France and Italgas). The municipality of Budapest owns half of the Budapest Supply Company, while the other half is owned by RWE.[14]

The Hungarian transmission system was connected to the Soviet natural gas network in 1975. The gas transmission pipeline between the Austrian border and Győr was commissioned in 1996, thus Hungary implemented a two-way supply system, and was connected to the European network, opening the way for trading gas with the EU member countries. The length of the existing transmission system is 5782 km long, including nearly 400 gas transfer stations and 6 compressor stations.

Hungary joined the European Union on 1st of May 2004. The new Member State had to develop a new EU-conform regulatory environment, as well as to fully transform the Hungarian structure of natural gas distribution, and re-regulation of the domestic gas market. The Law XLII of 2003 and the implementation decrees entered into force on January 1, 2004. As the most important result of the said changes in law the former gas monopolies were eliminated, and new gas transmission, storage and supply companies were established from the former units of MOL Plc. Natural Gas Division (the sole holder of gas supply license), with independent legal entity status. This new regulatory system unbundled the gas trade from

[13] FGSZ ownership information at:
http://molgroup.info/en/our-business/natural-gas-transmission
[14] Hungary: Inventory of estimated budgetary support and tax epanditures for fossil-fuels, Energy resources and market structure, OECD, Available at: http://www.oecd.org/site/tadffss/HUN.pdf

the gas system operation (TSO), and domestic gas trade will in the future be pursued not on the basis of exclusivity, any party will be allowed to perform such operations, of course, subject to the relevant license.

On 25 June 2008, the Act XL of 2008 on Natural Gas Supply came into force, which facilitated the further liberalisation of the market. The amendment of 14th January 2010 to the Act based on Directive 2009/73/EC of the European Union established a new framework for natural gas transmission, storage, distribution and supply. FGSZ Ltd operates according to the ITO (Independent Transmission Operator) model ensuring the unbundling of activities stipulated by the EU directive.

The essence of the ITO model is to ensure that, in case the transmission operator is part of a vertically integrated company, its operation should be in accordance with the regulations regarding separation from production and commercial activities. Under the ITO model FGSZ Ltd operates independently of the mother and subsidiary companies.

FGSZ Ltd is prescribed by law to provide fair access to the network for all market players in a non-discriminatory way, implement all necessary investments and contribute to the integration of European gas markets.

Companies with Operation License in the Gas Sector as of 31st December 2014[15]

- **Transmission System Operator** – FGSZ Zrt (Siófok, Hungary) Key executives-Mr. Janos Feher, Mr. Akos Retfalvi and Bernadett Galicz – owned by MOL.;

- **Natural Gas Transmission Company** – Magyar Gas Transmission Company; Chief Executive Officer of Magyar Gáz Tranzit ZRt. is Mr. Zsolt Birtalan. The owner of the Hungarian Gas Transit Ltd. is the Hungarian Government and it is represented by Ministry of the interior;

- **Natural Gas Storage Companies** (2) - Magyar Foldgaztarolo Zrt. and MMBF Foldgaztarolo Zrt.- 2. For MMBF Foldgaztarolo Zrt. -CEO for this company is Zsolt Csak and MOL Nyrt. won the tender and acquired an ownership share in the company as the owner of the future underground gas storage facility stake.In case of Magyar Foldgaztarolo Zrt.

[15] Statistical Data of the Hungarian Natural Gas System 2014 - https://fgsz.hu/hu-hu/Documents/41/a_magyar_foldgazrendszer_2014._evi_statisztikai_adatai.pdf

- **Pipeline Suppliers of Propane Butane Gas** (2) - PRIMAGAZ - HUNGARIA Ipari es Kereskedelmi Zrt. and TOTAL Hungaria Kereskedelmi Kft;

- **Natural Gas Distributors** (10) - Csepeli Erőmű Kft., E.ON DDGAZ Gazhalozati Zrt., E.ON KOGAZ Gazhalozati Zrt., EGAZ -DEGAZ Foldgazeloszto Zrt., FŐGAZ Foldgazelosztasi Kft., POWER Kft., MAGAZ Kft., NATURAL GAS SERVICE Kft., OERG Kft., TIGAZ -DSO Kft;

- **Universal Suppliers of Natural Gas** (7) - Alpiq Csepeli Erőmű Kft., E.ON Energiaszolgaltato Kft., FŐGAZ Zrt., GD F SUEZ Energia Magyarorszag Zrt., ISD POWER Kft., OERG Kft, TIGAZ Zrt;

- **Natural Gas Traders** (44);

- **Organized Natural Gas Market** - CEEGEX Zrt. – owned by MVM (Hungarian Electricity Ltd).

Key indicators

Source: Case of Hungary, p.133, 2014 Country reports of Europa.eu

Gas	
Number of entities bringing natural gas into country	20
Number of main gas entities	4
Market share of the largest entity bringing natural gas	32.91%
Number of retailers selling natural gas to final customers	44
Number of main natural gas retailers	6
Switching rates for gas (households)	1.5%
Regulated prices for households – gas	Yes
Regulated prices for non-households – gas	Yes

Importance of Gas Storage Infrastructure

Gas storage appears as a crucial factor for the high dependence of Hungary's electricity sector on gas-fired power plants, and a balancing option regarding to the high volumes of relatively inflexible residential demand. Hungary has five commercial storage facilities, with a total working capacity of 5.43 bcm and a withdrawal capacity of 72.0 mcm/d at the beginning of the winter months.[16] According to the current legislation all commercial storage can be accessed by third parties.

The gas supply interruption of January 2006 caused by Ukraine induced the Hungarian parliament to approve a new law, Act No. XXVI, 2006 on Safety Stockpiling of Natural Gas in February same year.[17] According to the act a strategic underground gas storage facility of 1.2 bcm was to be built, so as to provide Hungary with 40 to 45 days of autonomy if its main import source from Russia failed.[18]

The stockpile aims to protect households as well as customers who cannot switch to other energy sources. HUSA and MOL established MMBF Zrt, a private limited company, to own and operate the storage facility, which was completed in 2010. The gas is owned by HUSA.
In June 2010, Hungary amended the legislation to allow for a reduction in the minimum strategic stockholding level, the level to be determined on a yearly basis by the minister. With regard to this, 280 mcm had been sold with a view to bringing stocks in line with declining gas consumption, bringing the country's strategic stock levels down to 0.92 bcm..[19]

Hungary's natural gas emergency response measures for use in the event of an interruption to supplies are set in Government Decree No. 265/2009. (XII. 1.) Korm.

[16] Hungarian gas storage, you can count on it, 2012, Available at: http://www.naturalgaseurope.com/hungarian-gas-storage-you-can-count-on-it-4908
[17] Act XXVI of 2006, on the Strategic Storage of Natural Gas, Available at: http://www.husa.hu/wp-content/uploads/2011/09/Stockpiling-Act-XXVI-2006-Natual-Gas.pdf
[18] Energy supply security 2014, Part 2, Chapte 4, Available at: https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_Hungary.pdf
[19] Oil and Gas security- emergency response of IEA countries,p.19, Available at: http://www.iea.org/publications/freepublications/publication/hungary_2012.pdf

Gas Pipelines Infrastructure[20]

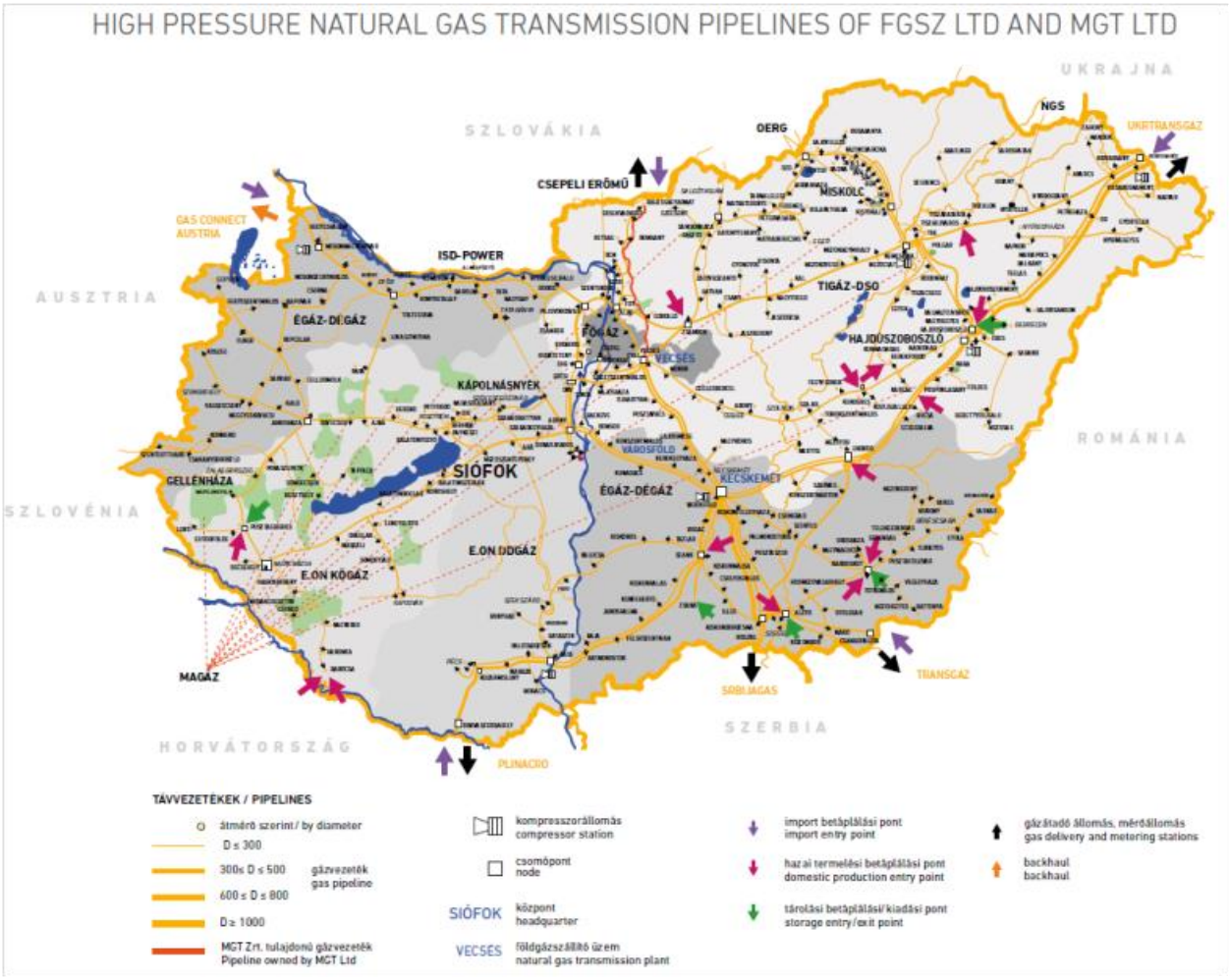


Fig. 3 Map of Hungarian Pipeline Infrastructure

Source: Statistical Data of the Hungarian Natural Gas System 2014

Gas Market Profile

The data source used for the purposes of the present paper is owned by University of Milan, Department of Economics, Management and Quantitative Methods. Analysis of the data for the case of Hungary is divided, according ECTR indicators[21], where the indicators are

[20] Web-site of Hungarian TSO - http://82.141.148.232/en/content/company
[21] Florio, M. 2013. Network Industries and Social Welfare, Oxford University Press

between 0,00 and 6,00 (where 0,00 is equivalent to a free access/private ownership to the market while 6,00 a market franchised to one firm/public ownership).

Entry regulation in gas sector in Hungary has three main periods of dramatic change. First represents the years before entering the EU and preparation measures of the country in the current sector. The second emphasizes the process of implementing of the Second Energy Package and the pre-liberalization period. Thus, the third is characterized as stable and continuous period which carry on with the EU policy for free entry.

Hungarian ETCR Indicators for Gas Market as follows:

- **Entry Regulation (fig. 4)**

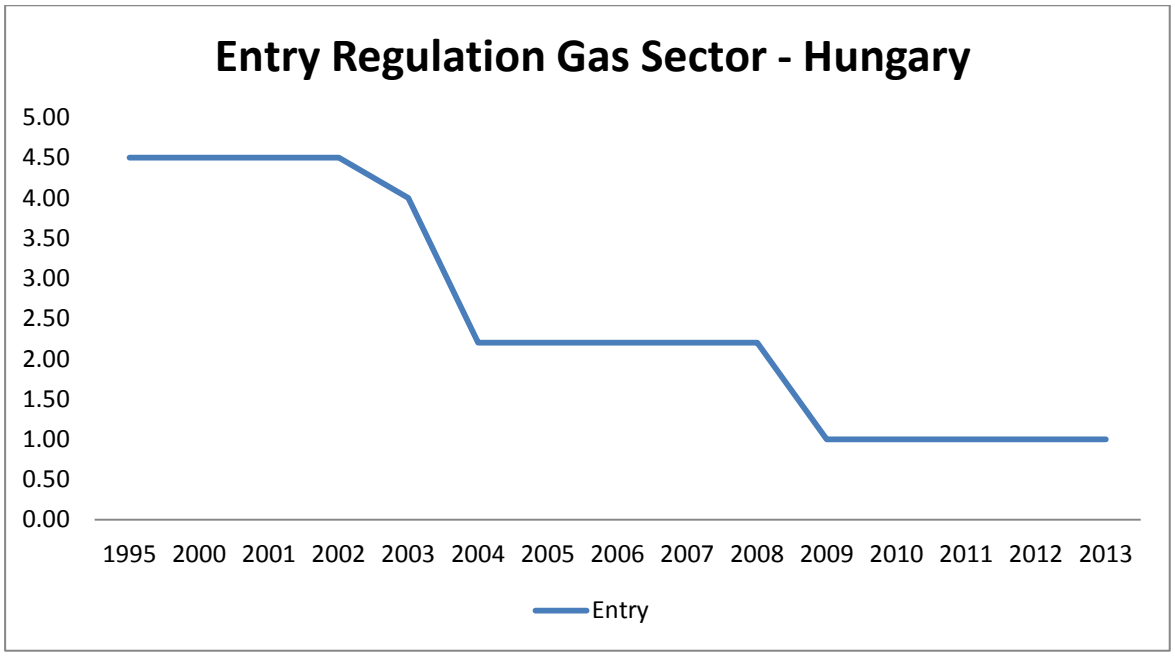


Fig. 4

- **Public Ownership**

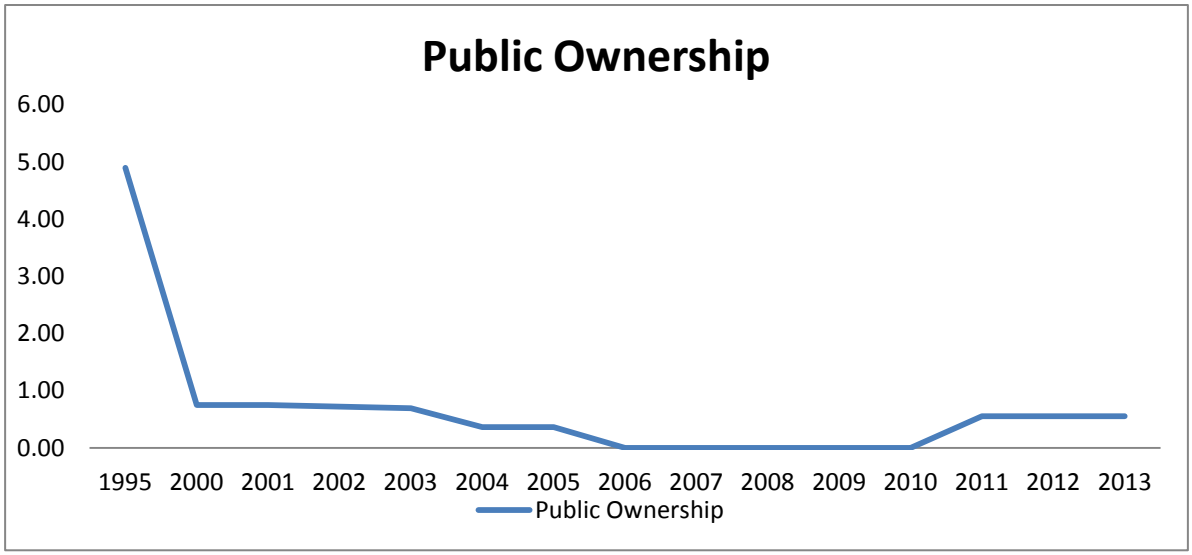


Fig. 5

- **Vertical Integration**

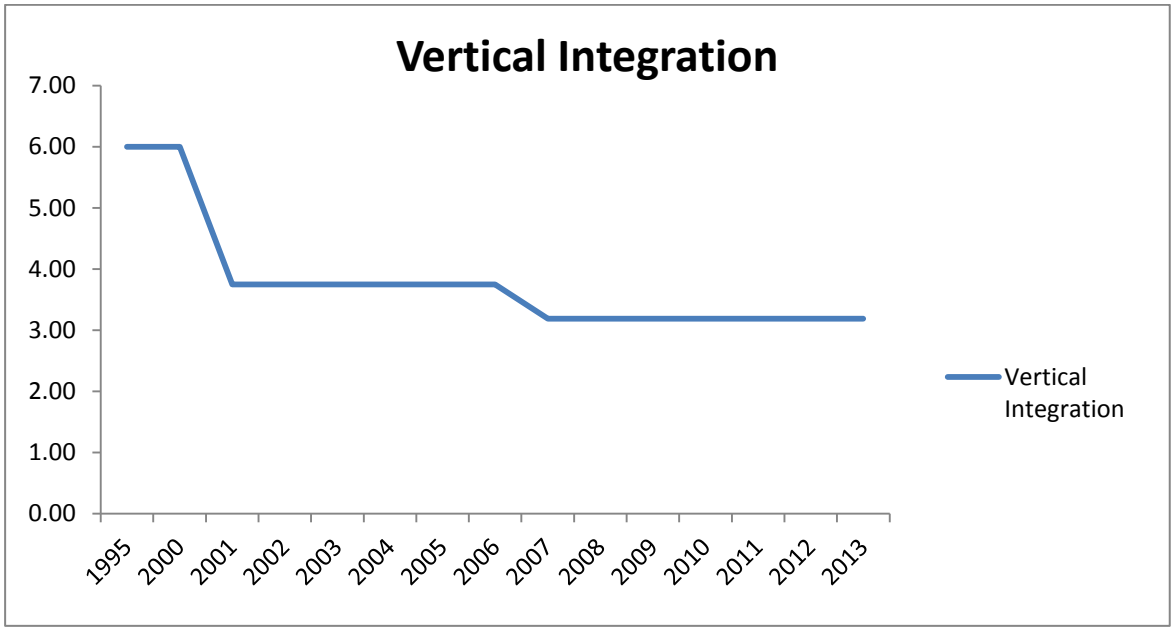


Fig. 6

- **Market Structure**

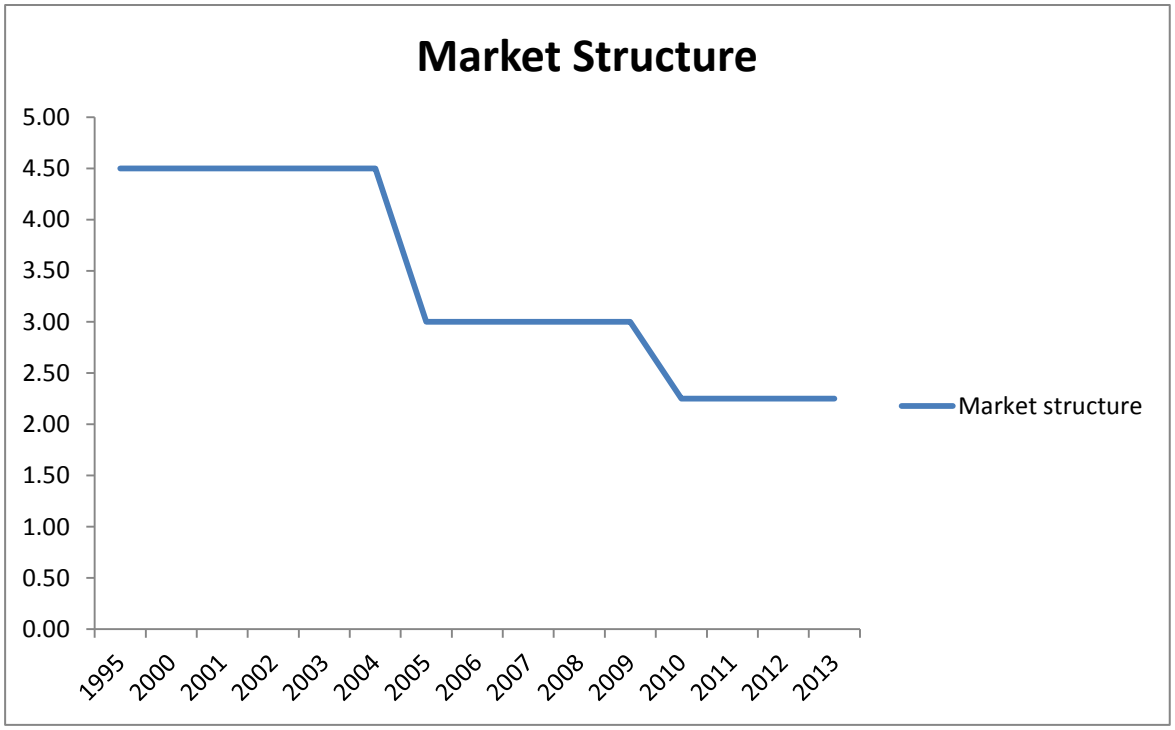


Fig. 7

Price Dynamics

Approximately 50% of the households in Hungary have natural gas service. Residential consumption of gas accounted for 28,3% of total Hungarian gas consumption in 1997 (Pierce, 2000).

As a result of the global economic crisis, following the global trends, energy consumption and demand in Hungary has decreased in the past decade. Natural gas consumption continues to sharply decrease, as it has in prior years, reaching 8.3 Mtoe in 2012. Domestic production accounted for 20.32% of total demand which has a significant decreasing in comparison with 1997. E.ON Földgáz Trade (purchased by the state owned company MVM in 2013) has a long-term gas supply contract with Gazprom. In 2012 imports from the West (from Austria, HAG-pipeline) exceeded imports from the East (from Ukraine, Beregdaróc) while in 2013 imports from the East were higher again. A large share of the western entry capacity was contracted by E.ON for Russian imports. Small scale gas transit has occurred in the direction of Serbia, Romania and Croatia[22].

[22] FGSZ Zrt, Foldgazszallito, Energikus Csapat 21. Szazadi Teljesitmeny, 2012, http://fgsz.hu/sites/default/files/documents/fgsz_eves_jelentes_2012_magyar.pdf.

According to Hungary Country Reports of European Commission in Energy sector since December 2012 gas prices for household consumers were cut regarding to the political and regulatory debate during 2012 and 2013. The Minister of National Development approved a price adjustment equal to annual inflation at the beginning of 2012. Nevertheless, the price rise in gas imports created a mismatch between the level of regulated retail prices and the wholesale import price. Thus, could be the relevant explanation of falling down the prices shown on figure……..The regulation still has its dominant role in price dynamics. Nevertheless, the empirical findings of the present position paper show that entry regulation has (Third Party Access – TPA) a significant role on the price formation. As estimated with the method of econometrics instruments showed previously in the present paper.

Gas price - Excluding VAT and other recoverable taxes and levies

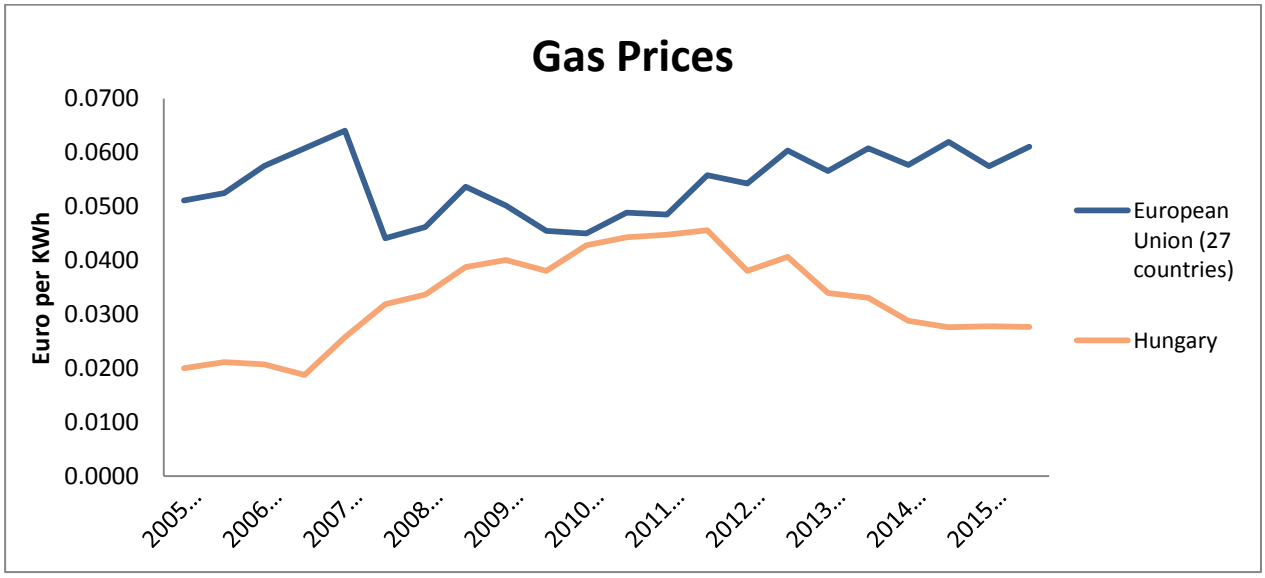


Fig. 8

Source: Data base of the University of Milan – Department of Economics, Management and Quantitative Methods

Comparison with the average price of gas in EU (27) and in Hungary in the period of 2005 – 2015 presents the reflection of price reduction by the government in 2012. It seems that price cuttings and the role of regulation were the main factors for price formation in Hungary.

Fig. 9 presents a similar line of movement between GPD and gas consumption, which does not show correlation with the decreasing of regulated price, but it shows that overall the gas intensity consumption is increasing.

Change in gross domestic product, domestic natural gas consumption and natural gas consumption intensity (%)

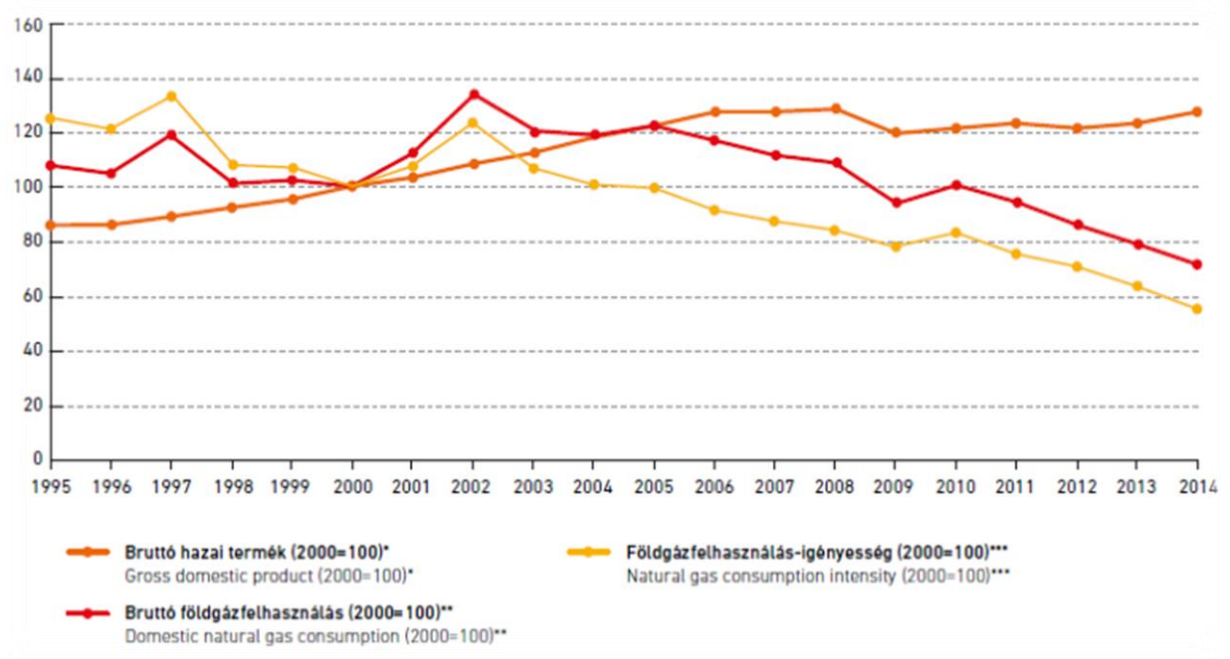


Fig. 9

Source: Statistical Data of the Hungarian Natural Gas System 2014

Conclusion

In the last 20 years the average gas price in Europe has increased despite the expectations of the EU institutions. The EU-led liberalization policies, addressed towards the former national public monopolies, have not succeeded to achieve the objectives planned. The fragmentation of the supply chain in sectors characterized by public monopolies such as gas has indeed generated an increase in the costs of production as well as various other inefficiencies at the governance level (Florio, 2013). It seems that the inefficiency on the supply side, provoked by the increase of competition in the European gas market, turned in to higher gas prices for the households. This was shown through a panel dataset of 17 EU countries during the period 2007 – 2013. The countertrends occurred in some European countries, i.e. Denmark and Hungary, are explained as a consequence of external factors, respectively a great decrease in the demand of gas due to an increase in the use of renewable energy and State regulation of gas prices.

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