The Correlation between Energy Resources Tariffs, Inflation and Competitiveness

Tatiana Gutium
National Institute for Economic Research
NIER
Chisinau, Republic of Moldova
gutium.tatiana1@gmail.com

***Abstract*—Energy resources tariffs directly affect both the price of the goods and their competitiveness. A growth of tariffs is one of the factors that drives the price index, and provokes a rise in prices for both domestic and imported goods. Therefore, it is important to investigate the relationship between the rate of growth of energy resources tariffs and the dynamics of the level of inflation, as well as to analyze the correlation between tariff levels and competitiveness. Based on the results of the analysis, the author has developed proposals for reducing tariffs and for improving competitiveness, and has described the problems which need to be solved for increasing the competitiveness.**

Keywords—economic indicators; macroeconomics; monopoly; supply and demand; exchange rates.

I. Introduction

The competitiveness of goods is influenced by many factors, some of which are characteristic only for certain types of goods. Nevertheless, two factors, price and quality, are the main factors affecting competitiveness, and these two factors are characteristic for all types of goods. If the increase in quality leads to the increase in the competitiveness of goods, then the increase in price will decrease competitiveness.

The cost is an integral part of the price, and energy resource is one of the resources spent on both the production of goods and the provision of services. Therefore, an increase in energy tariffs will lead to an increase in the price of goods and services, i.e. to an increase in the consumer price index, to inflation and to decrease competitiveness. Thus, it is important to explore the relationship between energy tariffs and inflation, and the competitiveness of goods.

II. The Evolution of Energy Resources Tariffs

The author chose Bulgaria and Turkey for a comparative analysis of energy resources tariffs in the Republic of Moldova and in other countries.

Bulgaria was an agrarian country and become an industrial one from the European Union with a developed agriculture. According to the data of the United Nations Economic Commission for Europe, the share of agriculture in Gross Domestic Products (GDP) of Bulgaria was 4.2% in 2018 year, but in GDP of Moldova – 11.8%, the share of industry in Bulgarian GDP was 23.1%, and in Moldova's GDP – 17.4% [1]. Nevertheless, the Bulgarian industry also as the Moldova's one is very dependent on energy imports.

Turkey is one of the trading partners of the Republic of Moldova, which exports large volumes of agricultural production in our country, although Moldova is an agrarian state. This situation can be explained by the fact that the Turkish agricultural products are more competitive compared to the Moldavian one.

The electricity tariff in Moldova (except last semester) and in Bulgaria registered an increasing trend, and in Turkey – decreasing during the period 2015-2018 (Fig. 1). Therefore, Turkish goods have become more competitive by price and have penetrated the Moldavian market and the Bulgarian market.

In the second half of 2018, the electricity tariff in the Republic of Moldova decreased by about 10% [2]. A continuous reduction of the tariff is advantageous for consumers (producers of goods and services, households), but it is unprofitable for the energy sector.

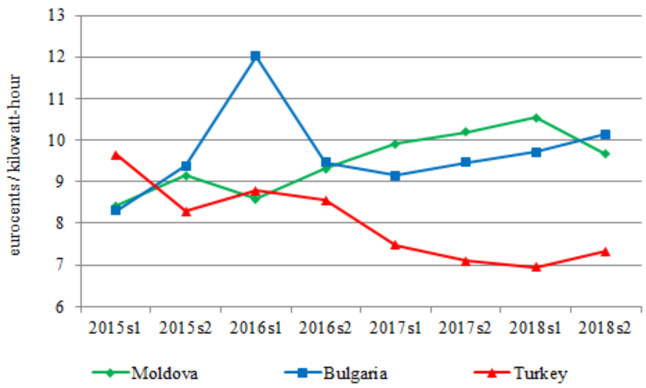

Fig. 1. Evolution of electricity prices for non-household consumers including all taxes and levies (Band IC : 500 MWh < Consumption < 2 000 MWh).

The tariff cannot be reduced continuously. One of the measures to create conditions that allow consumers to save on energy costs, and the energy sector to maintain its profitability is the introduction of time-differentiated tariffs.

978-1-7281-4011-7/19/$31.00 ©2019 IEEE

In Moldova, a retail electricity price includes energy supply cost and three components of network cost: transmission, distribution and delivery cost. The ratio of network costs to the cost of electricity supply in our country is increasing (Fig. 2).

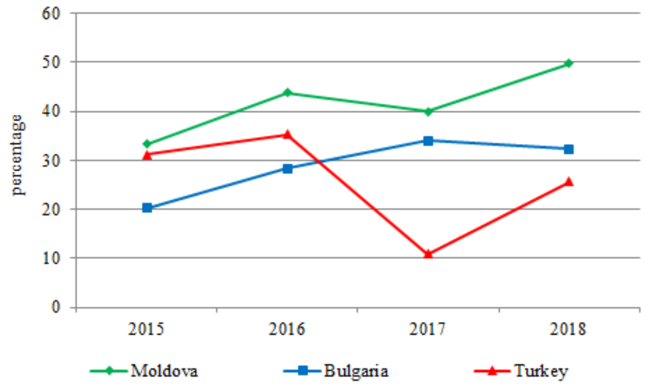

Fig. 2. The ratio of network costs to the cost of electricity supply.

Thus, the final consumers ensure an additional profit for electricity providers, although they could pay directly to the manufacturer, or in the extreme case, there could be only one company between the producer and the consumers, and not three [3].

The ratio of network costs to the cost of electricity supply is growing, so the management of this component of cost is especially important. In case of Turkey, this indicator is decreasing, as result Turkish commodities are cheaper and more competitiveness than Moldavian goods.

In 2018 year, gas price had decreased in Moldova, but had increased in Bulgaria and Turkey (Fig. 3).

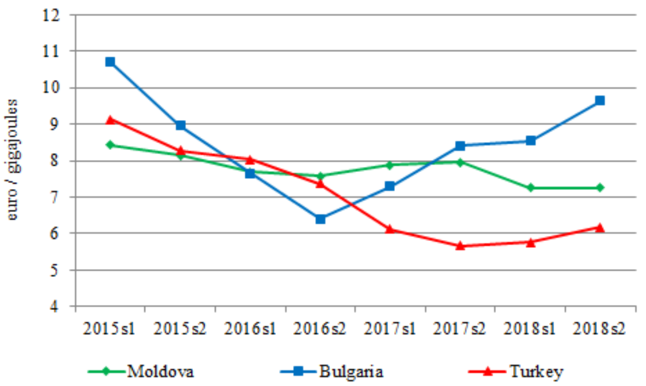

Fig. 3. Evolution of gas prices for non-household consumers including all taxes and levies (Band I3 : 10 000 GJ < Consumption < 100 000 GJ).

But the ratio of network costs to the cost of gas supply was increased (to 39.07% in 2018). In Moldova it became bigger than the ratio in Bulgaria (21.16%) and Turkey (10.67%). Comparing the result of analyze, we conclude that the price of gas for Moldavian consumers could be lower if the intermediaries did not raise the tariff for their services. The best solution for Moldavian business is to reduce number of intermediaries.

III. The Relationship Between Energy Resources Tariffs and Inflation

In 2018, the inflation rate was moderate. Despite the fact that the National Bank of Moldova set the inflation target of 5.0% per year with a possible diversion of ± 1.5 percentage points [4], the rate of inflation was relatively high values in the second half of 2015 and 2017, and in the first half of 2016 (Fig. 4).

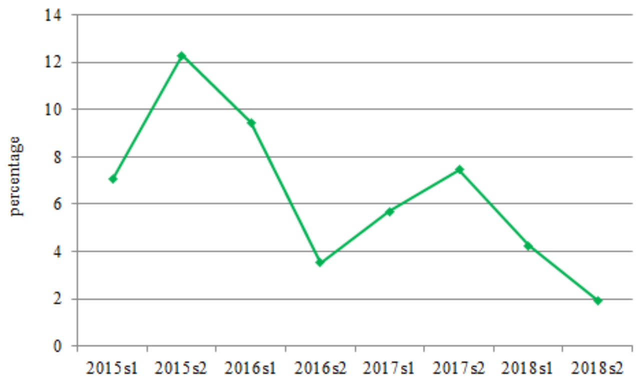

Fig. 4. Evolution of the inflation rate in Republic of Moldova.

However, the highest level of inflation occurred in 2015 due to economic recession that spread from one sector of national economy to another. Prices rose significantly and the national currency depreciated against the US dollar. The main causes of the economic downturn in 2015 are: the recession from the Russian Federation and Ukraine (the main trading partners), theft of the billion in the banking sector, adverse climatic conditions (drought).

Some macroeconomists have used the model of economic equilibrium between aggregate demand and aggregate supply AD-AS for inflation analysis. They came to conclusion that a number of factors influence inflation: inflationary expectations, the GDP gap, change in government spending, growth rate of the nominal money supply, change in marginal propensity to consume and marginal propensity to saving, tax rate, the sensitivity of investments to changes in GDP and interest rates, tariffs of natural monopolies like energy resources, and so on [5], [6], [7], [8].

Researchers use only a few influence factors in modelling inflation, since the determination coefficient of model with a large number of exogenous variables is very low. Gordon de Brouwer and Neil R. Ericsson have developed an inflation model for Australia, in which tariffs of natural monopolies are considered as one of key institutional factor of inflation [9]. In their article “Modelling Inflation in Australia”, economists concluded that follow variables affect inflation and these one are statistically significant:

- the current change in petrol prices;
- the previous quarter’s output gap;

- the previous quarter's mark-up [9].

The tariffs of natural monopolies have influence over inflation. We have elaborated the model of relationship between inflation and tariffs to confirm this hypothesis. We have didn't include GDP gap because there are not data about potential GDP of Moldova.

$$d(\log cpi) = -0.018 + 0.235 d(\log P_e) + 0.189 d(\log P_g) + 0.05 D17s2 \quad (1)$$

$R^2 = 0.916678$

where:

cpi – Consumer Price Index;

P_e – electricity prices for non-household consumers excluding taxes and levies (bi-annual data), in percentage as compared to the previous period;

P_g – gas prices for non-household consumers excluding taxes and levies (bi-annual data), in percentage as compared to the previous period;

$d(\log)$ – the first-order difference of logarithms;

$D17s2$ – dummy variable for 2017 semester 2;

R^2 – the determination coefficient.

The result has shown that the impact of electricity price is greater than the impact of gas price. If the price of electricity is increased by 10 percentage points, the inflation will increase by 2.35 percentage points; if the gas price is raised by 10 percentage points, the inflation will increase by 1.89 percentage points.

Afia Malik has elaborated another inflation model which has been described in article "The Impact of Oil Price Changes on Inflation in Pakistan". This model includes six exogenous variables, but determination coefficient of this one is low (0.36). Only after excluded two variables (real effective exchange rate, fiscal deficit scaled by GDP) the determination coefficient became higher (0.58) [10].

In the literature we could find the opinion that price increases stimulate energy saving. But this is not true in any cases, because it depends on price elasticity of demand for electrical energy.

Studies conducted by the author have shown that in the case of the Republic of Moldova the relationship between the rise in energy prices and the rate of decline in energy intensity and electrical intensity of GDP is very weak.

The growth of electricity tariffs contributes to the rising production costs and, consequently, higher prices; all of these provoke the raise of cost of living and the decrease of real wages. Inflation is not convenient for buyers and producers because they buy goods, raw materials and energy resources.

The analysis of the competitiveness of energy resources has showed that although gas is ecologically pure in comparison with coal, the gas price has been downward and the coal price is upward. In recent years, there is a tendency for gas to be relatively more attractive by price not only in relation to coal, but also to electricity. Another factor that considerably diminishes the competitiveness of coal is the high services tariffs provided by rail.

IV. THE ANALYSIS OF CORRELATION BETWEEN TARIFF AND COMPETITIVENESS

The Republic of Moldova is a country with no valuable and rare minerals; it has natural resources (forestry, aquatic) and minerals (deposits of non-metallic useful substances), but soil is the main natural wealth. Soil fertility and diversity allows the cultivation of a wide assortment of agricultural plants. However, petroleum resources are required to carry out agricultural work. Price increase for gasoline and diesel automatically conducts to increase the price of agricultural products; as a result the cost of production of the food industry will rise, which will lead to a decrease in the competitiveness of these goods (Fig. 5).

Domestic mineral resources are used in construction, production building materials, glass manufacturing, chemical industry, etc. Large quantities of electricity are used in the manufacture of listed goods. The increase in the price of electricity will have analogous effects as in the previous case; the competitiveness of manufactured goods will decrease.

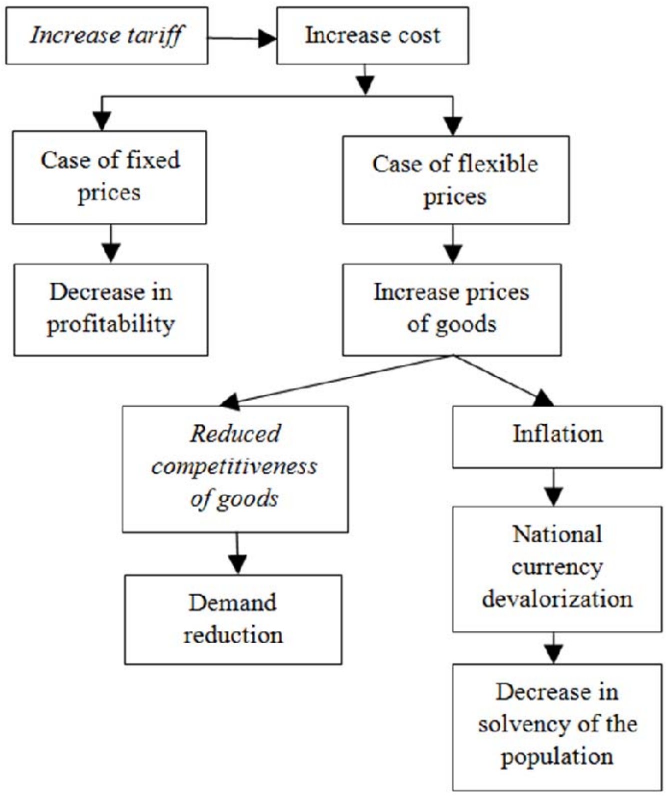

Fig. 5. The correlation between the change of tariff level and the change of competitiveness.

In the case of fixed prices, the raise in the energy resources tariff will result in an increase in the cost, and, naturally, this will hit the profitability of farms and industrial enterprises (Fig. 5).

In the case of flexible prices, if enterprises were tried all their increased costs and expenses to pass on to the final consumers, it would have social consequences. In Moldova, there is a tendency to get profit primarily due to the constant increase in prices. This situation does not contribute to the growth of the national economy.

Domestic entrepreneurs face two main tasks: development in the domestic market and increasing their share in the global market. Since the western and eastern markets are different, it is necessary to diversify domestic products and increase competitiveness of goods.

To analyze the competitiveness of industry from an energy point of view, it is necessary to research the relationship between Gross Value Added in manufacturing and electricity prices for industrial consumers (Fig. 6). To ascertain the comparability of price of electricity in different countries, in Figures 6 and 7, author has used a common unit of money and the price of electricity was recalculated in euro cents.

Bulgaria and in the Republic of Moldova, electricity prices increased in the period of 2015-2018. There is the opposite situation in the case of Turkey; the electricity price has fallen (in eurocents/kilowatt-hour) and the cost of goods has fallen too, but the Gross Value Added in manufacturing (in euro) has increased. This growth was due to the increased competitiveness of Turkish industrial commodity. One of the factors for the growth of competitiveness is a reduction in the cost and price of the finished product. In the period under review, Turkish goods have become more competitive according the price.

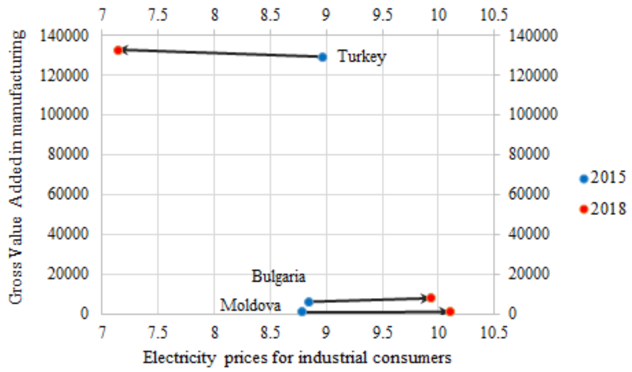

Fig. 6. The correlation between Gross Value Added in manufacturing (current prices, million euro) and electricity prices for industrial consumers (eurocents/kilowatt-hour).

The contribution of industry to creation of value added increased in both countries, in Bulgaria and in Moldova, but this increase took place both due to an increase in the physical volume of industrial output and due to an increase in the price level.

It is necessary to analyze the relationship between Gross Domestic Product per capita and electricity prices for household consumers to assess the competitiveness of the national economy from the standpoint of the population (Fig. 7).

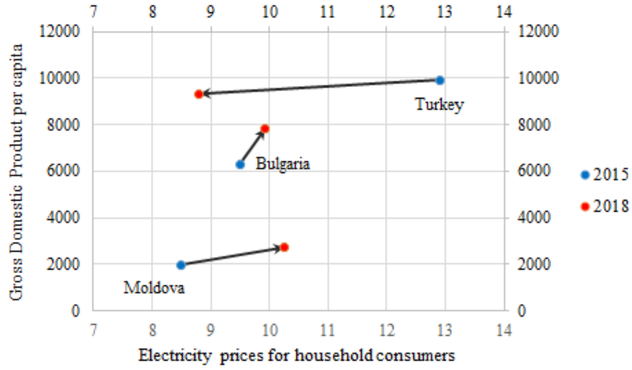

Fig. 7. The correlation between Gross Domestic Product per capita (current prices, euro per capita) and electricity prices for household consumers (eurocents/kilowatt-hour).

This relationship reflects if the welfare of the population changes under the influence of rising electricity prices. In Bulgaria Gross Domestic Product per capita increased significantly compared with the increase in the price of electricity, and in the case of Moldova, the correlation was opposite. With regards to Turkey, although nominal GDP per capita fell in 2018 compared with 2015, the decline in the price of electricity (in eurocents/kilowatt-hour) was much more significant.

In 2015 the electricity tariff in Republic of Moldova was much lower than in Bulgaria and Turkey, but already in 2018 the situation changed. From the three analyzed countries, in Turkey there was the lowest price (in eurocents/kilowatt-hour), but in the Republic of Moldova the price was the highest. However Turkey's GDP per capita decreased in 2018, this level still remained relatively higher comparative the level in another analyzed countries.

The results of the analysis have showed that the competitiveness of the national economy and industry of the Republic of Moldova is relatively lower compared to the economies of Bulgaria and Turkey.

The Fig. 8 shows the correlation between the Consumer Price Index (CPI) and the Electricity Price Index. Considering that the CPI is the price index for consumer goods in the national currency, the electricity price in the national currency (but not in euro) was used in the calculation of the Electricity Price Index. A positive correlation was established between these indices.

Inflation and exchange rate are closely related. The devaluation of the national currency leads to a decrease in the competitiveness of imported goods compared to domestic goods. As the price of imported goods becomes relatively higher, consumers' preferences will change, they will prefer to buy domestic goods, but not more expensive imported ones. This effect is called the effect of transferring the fluctuations of one indicator to another.

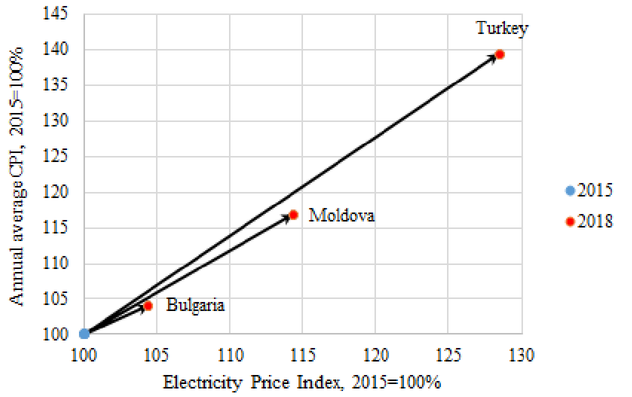

Fig. 8. The correlation between Consumer Price Index (CPI) and Electricity Price Index for household consumers (national currency).

The magnitude of the transfer effect depends on a number of factors. According to Guillermo A. Calvo and Carmen M. Reinhart, some of the main factors that affect the transfer of exchange rate fluctuations to the inflation are the country's macroeconomic stability and its level of development. The more stable the national economy, the lower the inflation rate, and the less the transfer effect [11]. In 2015-2018, higher inflation was recorded in Turkey [12], therefore, the transfer effect is very high, and in Bulgaria it is low one, and accordingly the value of the transfer effect is also small.

The National Bank of Moldova pursues inflation targeting at the level of 5% annually. Therefore, over the analyzed period, the CPI increased and amounted to 116.8% in 2018 compared to 2015. Given the economic and political instability, the consequences of the theft of a billion from the banking system, if the National Bank has not pursued the described policy, the effect would have been much greater.

V. Conclusion

The increase in energy tariffs leads to inflation and to reduce profitability of enterprises. In order for the energy sector not to suffer, and the energy supply system to be efficient, as well as to prevent a decrease in profitability, the government is forced to shift the burden of paying electricity from industrial enterprises to the population.

But this solution is not single. One of the solutions is introduction the differentiation of electricity tariffs. Another solution is saving energy resources. The problem of energy saving and resource saving are the main problem of the national economy, especially in the case of a country that does not have fuel resources.

The introduction of time-differentiated tariffs is one of the cheapest solutions to resolve the problems of the Moldova's energy sector. This solution has some benefits:

- it stimulates energy saving;
- reduces the cost of expanding the power transmission system;
- provides a constant load;
- minimizes the number of outages during peak periods.

The calculations showed that an increase of energy resources tariff should not exceed inflation. Taking into account that the National Bank of Moldova has set the inflation target of about 5% per year, therefore the growth of tariff should not exceed this target.

Stopping rising energy tariffs or reducing them should be done rationally to prevent the redistribution of saved money resources so that they would not be concentrated only by a small group of economic agents. Savings must be invested in the economy.

The listed measures are vital, but they are not sufficient, so the author proposes another set of solutions:

- strengthening non-price incentives for energy saving to maintain the growth rate of energy efficiency of the economy;
- creating a favourable investment climate that would attract saved money as a result of the pricing policy in the national economy;
- providing tax benefits to economic agents who finance scientific and technological progress, introduce innovations, promote domestic goods in foreign markets;
- promoting anti-trust policy;
- improving energy markets for equitable distribution among their participants;
- minimizing the number of intermediaries.

It is necessary to increase the competitiveness of both goods and the national economy. To growth competitiveness of goods, Moldova should reduce production costs, improve its quality, increase production efficiency and enhance anti-monopoly control over suppliers.

A number of problems need to be solved for increasing the competitiveness of the national economy:

- provide political and economic stability;
- repatriation of stolen money from the banking system;
- strengthen the national currency;
- fighting corruption;
- reduction the share of non-observed economy in GDP;
- developing education and supporting science;
- creating new jobs;
- digitalizing the national economy;
- supporting the development of those sectors of the national economy that have relatively low energy intensity, high labour productivity and competitiveness, high potential for growth in value added.

REFERENCES

[1] https://w3.unece.org/PXWeb/en/Charts?IndicatorCode

[2] https://ec.europa.eu/eurostat/web/energy/data/database

[3] T. Gutium, “Quantifying the comparative advantage of domestic goods on the internal market,” in The Journal Contemporary Economy, vol. 3, no. 1, 2018, pp. 38-45.

[4] https://www.bnm.md/ro/content/rata-inflatiei-0

[5] R. Arnold, Macroeconomics, 13th ed. Boston: Cengage Learning, 2018.

[6] R. Dornbusch, S. Fischer and R. Startz, Macroeconomics, 13th ed. New-York: McGraw-Hill Education, 2017.

[7] M. Wickens, Macroeconomic Theory. A Dynamic General Equilibrium Approach, 2nd ed. Princeton: Princeton University Press, 2012.

[8] S. Williamson, Macroeconomics, 6th ed. London: Pearson Education Limited, 2018.

[9] G. Brouwer and N. Ericsson, “Modelling Inflation in Australia,” in Journal of Business and Economic Statistics, vol. 16, no. 4, 1998, pp. 433-449.

[10] A. Malik, “The Impact of Oil Price Changes on Inflation in Pakistan,” in International Journal of Energy Economics and Policy, vol. 6, no. 4, 2016, pp. 727-737.

[11] G. Calvo and C. Reinhart, “Fear of Floating,” in The Quarterly Journal of Economics, vol. 117, no. 2, 2002, pp. 379-408.

[12] https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu /Statistics/Inflation+Data/Consumer+Prices