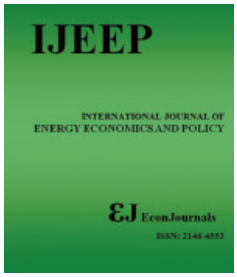

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Energy Efficiency in Rent Seeking Economies: Is Credit Capable of Breaking the Energy Curse?

Dmitry Burakov*

Department of Monetary Relations and Monetary Policy, Russian Federation, Financial University under the Government of Russian Federation, Moscow, Russia. *Email: dbur89@yandex.ru

ABSTRACT

In this article, we set ourselves a task of determining a potential of using credit for improving energy efficiency in the economy of rent seeking. Based on cross-country analysis and using channels' approach to estimation of institutions' and market's efficiency we come to conclusion that persistently low energy efficiency in East European countries may be a result of low quality market institutions. Testing a hypothesis of credit being the source of improving energy efficiency (e.g., through introduction and granting energy efficient loans) showed that the effect of credit channel is negative in case of low quality institutions in the economy and low elasticity of national markets. On opposite, credit is capable of breaking the energy curse, when successful institutional infrastructure is functioning, and competitive environment takes its place when geographical and spatial features are taken into account.

Keywords: Energy Efficiency, Rent Seeking, Credit Market
JEL Classifications: E02, G21, O13, Q43

1. INTRODUCTION

The energy efficiency of the economy today is one of the most important tasks to maintain the sustainability and development of the national economic system. Unfortunately, in some cases, energy inefficiency is becoming a serious obstacle to achieving these goals. For example, a number of countries is significantly inferior to others on this indicator. In the case of the U.S., energy efficiency is at the level of developing countries while maintaining high productivity of the economy. Ensuring high energy efficiency is associated with the introduction of new technologies that reduce the energy intensity of production, their large-scale distribution in order to maintain a competitive position on world markets of goods and services. Indeed, energy efficiency is defined and depends on many factors, starting with the climatic features and finishing with quality of market institutions. Therefore, adverse climatic conditions can lead to large needs in electricity generation to produce the same amount of gross domestic product (GDP), which reduces energy efficiency (as, for example, in the countries of the Scandinavian Peninsula). Otherwise, the favorable climate naturally helps to increase energy efficiency of the economy, even at low rates of economic growth (as, for example, in the case of the Philippines and Bangladesh). However, even with these local extreme, there are countries that demonstrate lack of energy efficiency (for example, Russia, Belarus, Iran, Mexico etc.).

In these cases, the explanation for low energy efficiency may not be tied to the natural and climatic conditions. A lot of literature on the subject largely explains low energy performance by using outdated technological equipment, inefficient logistics routes of delivery of electricity (in the view of economic geographical dislocation theory in the works of Krugman), migration factors: low demand for electricity at a given distribution of centers of production due to migration to mega policies and low utilization of production capacities. However, all the above factors are of strength in the short-term, medium-term periods. In case of highly elastic markets, problems of obsolete equipment, problems of logistics routes and migration flows can be solved. In some cases, in some countries, problems of low energy efficiency last for 15-20 years and begin to provide not so much a trend, but much more stable regularity - regularity of low energy efficiency of the economic system. The explanations of the sources of this pattern

in the works of world's researchers are associated with the appeal to deep foundations of economic relations; to search for causes of sustainable inefficiency of the energy industry. For example, in case of Russia, energy efficiency indicators remain extremely low for the past 15 years. The basis of models, developed by the researchers, is laid down as a rule, in institutional inefficiency - failure to observe the rights and obligations of the parties to the contract relationships, ineffective functioning of judicial systems, as well as the offset in the functioning of institutions in the direction of search and extraction of rents on non-market principles of behavior (North, 1990; Polterovich, 1999). In the works of Russian researchers sustainable economic equilibrium with suboptimal outcomes due to the violation of the rights and obligations of the parties to the contractual relationship is called stable institutional traps. In these terms, it is accepted that the activities of market agents are directed to an inefficient allocation of limited resources to extract rents. Most of the studies on institutional and economic picture of Russia is very definitely asserts the presence of the traps (e.g., Bass, 2005) in various forms and for various reasons.

In connection with the existence of such suboptimal equilibrium in the economy we assume that the efficiency of the energy market must also be under the influence of this inefficiency, which is confirmed by stable low energy efficiency. Then it seems logical to assume that energy efficiency should be related to the quality of market institutions on one side.

The second block of the literature describing the ways to improve the efficiency of the energy market of the country is influenced mainly by market methods and mechanisms to achieve this goal. E.g., by introduction of new energy-intensive technologies, stimulating the real sector to the change of technological orders, such goals are achieved (Blumstein and Taylor, 2013). In terms of the need to maintain energy efficiency at the proper level and also in terms of the need to maintain the continuity of the reproduction process, opportunities to invest in energy-saving technologies are extremely limited. According to the mainstream literature on the energy market one of the solutions may be found in the use of credit resources, project finances, incentivizing to develop energy-saving behavior.

We therefore set ourselves the question - could the use of credit schemes be effective for increasing energy efficiency of the economy in the context of institutional traps.

The remaining part of the article is organized as follows: Section 2 provides a detailed review of literature on the question stated in the research; Section 3 provides methodological instruments used in the study; Section 4 provides econometric cross-country analysis of interlinkages between institutional and energy efficiency in different economies; also, a hypothesis of credit channel of improving energy efficiency is tested; Section 5 presents results of the carried out research and identifies areas of further research.

2. LITERATURE REVIEW

The issue of energy efficiency of the national economy is quite acute for many countries. Ensuring excellence and maintaining a competitive advantage in the energy sector are of need to ensure the security of the economy. Unfortunately, energy efficiency in a number of developed and developing countries is inferior. For example, in Russia energy efficiency of production is lower than in the top 10 countries, or even in some former republics of the USSR. Moreover, ineffectiveness of this kind persists during the past 15 years in Russia, as well as in a number of East European countries (Cornillie and Fankhauser, 2002; Kalyoncu et al., 2013). What could be the reason for such a low growth of energy efficiency in these economies? Above we referred to natural factors and factors of the technological structure of production. However, even considering these factors, the question remains open. Why technology update is extremely slow and has a local branch character? Why has the growth of investment and public expenditure on improving energy efficiency failed? We can assume that purely economic factors play a secondary role.

Modern literature on energy economics proposes to consider this issue in the context of different factors - environmental factors, geographical and territorial conditions, in the conditions of open and closed economy, the institutional environment, the structure of the economy, technological factor, public policy in the field of energy security, the financial environment and other factors. Let's consider each of literature arrays.

Thus, a number of authors (Aufhammer and Mansur, 2014) in a very convincing manner demonstrate a direct relationship between the relative level of energy efficiency and climatic features of the country. As a rule, the higher the average temperature, the lower the demand for energy to provide heating in order to protect key assets, reduce production costs (Buchan, 2010). Thus in a relative sense the energy efficiency of production increases, while productivity may be very low and the intensity high.

Another factor with a direct impact on the energy efficiency of production is considered to be the territorial factor. Its action is manifested in two main channels. So, on one side, large extent of territory and the range of production centers of consumption leads to increased energy needs, as a source that, ceteris paribus, leads to lower energy efficiency. Thus, the location of the centers of production and consumption must be economically efficient (Krugman, 2009). The second channel of impact of this factor is territorial contingence of production centers on the inter-country level (if the level of energy efficiency in the neighboring country is higher, it. Ceteris paribus, leads to a loss of competitive position and migration of demand and capital of households and economic units in another country). (Eliseev, 2013) A vivid example of the relationship between energy efficiency and the competitive position of the country is the movement of capital and monthly migration (border crossing) between the Republic of Belarus and the Republic of Poland. At the time, as the energy efficiency of the Polish economy is about 70% higher than in the Belarusian economy, the ratio of Polish capital flows to Belarusian economy is 23 to 1 (Stuggins et al., 2013). Of course, the basis of migration of demand is not only energy efficiency, but a lower level of prices, both for households and for businesses. However, if you look at the average cost of production of GDP in Poland and Belarus, one can see that the share of energy consumption in Belarus is higher

than in Poland by 45% (Stuggins et al., 2013), which logically affects price levels.

Another important factor influencing the level of energy efficiency of economy is the state of openness or closedness of the national economy. So, in the work of Von Hippel and Hayes (1996) it is noted that in a closed economy, energy efficiency will be significantly lower in the absence of competitive pressure, rather than in the open one. However, this assertion is true only ceteris paribus. In the case of a closed economy, energy efficiency can actually be lower due not only to the lack of competitive pressure in international markets, but also due to the policies of national authorities, as well as the level of development of science in the relevant fields. A vivid example of a relatively "closed" economy is North Korea. According to international statistics, energy efficiency of North Korea is inferior to South Korea on 43% (EIA, 2014).

Another important factor affecting the level of energy efficiency is the structure of the economy. A number of authors believes that the more capital intensive is the production in the national economy, the higher the energy efficiency, ceteris paribus (Lutzenhiser and Biggart, 2001). For example, it is known that in economies dominated by agriculture (as % of produced and realized GDP), the level of energy efficiency is lower than in industrial and/or post-industrial economies. Indicative in this case is the example of India. The transition from agrarian to an industrial model of the economy is coupled with the steady increase of energy efficiency. So, on the one hand the growth of capital-intensive manufacturing and service sectors leads to greater GDP growth than further concentration in the agricultural sector. On the other hand is growing energy consumption, but the consumption growth rates are inferior to the GDP growth rates, which creates the condition for the growth of energy efficiency. In case of concentration of GDP around the spheres with low capital intensity of production in the medium term the law of diminishing rate of return in the Marxist sense of the word, is brought to life. However, the growth of capital intensity of production also has its limits for growth of energy efficiency - A result of the transition to a new economic system and new technological wave, would be the emergence of the Jevons paradox, eventually (Freire-Gonzalez and Puig-Ventosa, 2015). For example, the transition to industrial model in India caused a surge of capital-intensive industries, which resulted in GDP growth due to new industries. This, in turn, has increased the energy efficiency of production relative to the previous formation. Thus, from 1990 to 2000, the energy intensity of production in India declined by 38%. From 2000 to 2010, a similar reduction was by 30% (Sudhakara Reddy and Ray, 2010). However, in the last decade, there has been stagnation in energy efficiency, which is caused by the exhaustion of the potential of a new technological paradigm based on existing competitive advantages (the cost of labor as a factor of production). So, in the last 5 years the growth rate of energy efficiency decreased to 2-3%.

Technology is a key source of innovation, competition and growth of welfare of the society. On technologies, many great economists noticed their importance. Among them Schumpeter (1982 [1934]) and Kondratieff (1984), and many others may be pointed out. Technologies also take a central place in the energy economics. Thus, the development of technology as a factor of reducing the capital intensity of production, and, consequently, increasing the energy efficiency of production, is recognized by many researchers (e.g., LePoire, 2009). Permanent modification of technologies - innovations - reduce energy consumption to a more rational use. In this case also the relationship between technological innovation persuasion and improving the energy efficiency of the GDP must be stressed (Berndt, 1990). For example, if we compare the level of energy intensity of production on the last two Kondratieff waves, we can see that the energy efficiency has increased significantly. This is a very striking evidence of the relationship between innovation, capital intensity and energy efficiency of the production process. So, fourth Kondratieff cycle, dating from 1947 to 1983 is characterized by average level of energy efficiency of the world economy (energy consumption per unit of output) in 27-30 MTOE. Fifth Kondratieff cycle (1983-2018 gg.) characterized the reduced energy costs for the production of GDP to 20 MTOE by the end of 2011 (Grinin et al., 2012).

This allows, albeit indirectly, to think that innovation and change in technological structure really reduce the capital intensity of production and increase energy efficiency of the economy at the global level.

Also in the literature on the issue of energy efficiency, sufficient attention is paid to the state policy for energy field. The policy of the national and supranational authorities set a goal of reducing energy consumption in the production of GDP to maintain a competitive edge on one hand. (Gillingham and Newell, 2006) On the other hand, aim at ensuring the welfare of the population. In the basis of various programs and reforms is the transition to energy-saving technologies in production; the allocation of funds in the form of grants, subsidies and loans targeted on the update of the means of production and infrastructure of the national economy. It is believed that the assistance of the state helps to increase energy efficiency of production, but estimates of the direct effect of these measures differ not only from country to country, but depending on the forms and types, as well as the specifics of these measures (Bergman, 1988). It is important to note that the measures of state support, and the availability of this support, the choice of subjects of energy funding reforms is strongly correlated with the quality of its institutions and the market in a single country.

This fact leads us to another group of factors that are considered to have a potential impact on the energy efficiency of the production of GDP - financial environment. The scope and terms of lending by banks and financial intermediaries for energy efficiency projects directly depend on a number of factors - demand for energy efficient loans, the expected return from the investment credits, quality of collateral, terms of the loan, the risk of recoupment and many others. It should be noted that the volume of market loans for energy efficiency differ. Thus, in some developed countries (e.g. USA, UK and some EU countries) market volumes of lending to energy efficiency projects reach 29-32% of the total portfolio of loans to non-financial sector. In some rapidly developing countries (China, India, Brazil, Turkey), their share

ranges from 35% to 48% according to experts (EIA, 2015). The market for energy saving loans is specific, even among developing countries. For example, in Russia, Belarus and Kazakhstan the share of these loans in total corporate portfolio is <10% (EIA, 2015). This specificity is explained in the scientific literature on the issue in different ways. So, some experts are inclined to see the problem in high risks of this kind of loans; others believe the inadequate volume of the market to be the consequence of high interest rates (risk premiums, or initially high key rate set by the monetary authorities). Still others believe this situation is a consequence of the low elasticity of the national economy - the absence of incentives for borrowers to implement energy saving technologies. Anyway, it is considered that the factor of credit resources necessary for increased energy efficiency has a positive effect (Palmer et al., 2012).

A key factor, according to some specialists affecting the level of energy efficiency of the national economy is the quality of institutions. Empirical analysis in a number of papers (López and Mitra, 2000; Fredriksson et al., 2004; Helm, 2010) shows that countries with high quality of market institutions are characterized by higher levels of energy efficiency than countries with a low one. For example, taking into account the climatic factor, Hugyecz (2011) shows that the energy efficiency of the economy of Poland is higher than the energy efficiency of Belarus, Ukraine, Hungary and Romania. In a comparative study of energy consumption and GDP of Organization for Economic Cooperation and Development (OECD) countries, Simsek (2014) showed that the total energy efficiency of the USA and the countries of the Scandinavian Peninsula (climatic factor) is several times higher than in Russia. In other words, a number of authors admits that the quality of market institutions has a significant impact on the energy efficiency of the national economy. It is also believed that the quality of institutions and the type of economy (market economy or an economy of rent-seeking activities) directly affects all the other factors like technology and innovation, government support measures and the use of financial instruments for the funding of the energy reforms.

At the same time, in the literature on the issue almost nobody pays attention to the specifics of energy efficiency in the economies of rent seeking with poor market institutions. There is no clear explanation of the phenomenon of steadily low energy efficiency, a kind of manifestation of institutional traps. Also rather little attention is paid to potential of credit market in terms of enhancing energy efficiency. Just a few works (López and Mitra, 2000) refer to the successful use of various financial products in order to accelerate energy reforms. There is also a number of studies indicating barriers to the effective use of credit as a factor in increasing the energy efficiency of the economy, largely highlighting lack of experience, high interest rate charges due to large risk premiums, undeveloped insurance programs and so on. Yet in these papers, conditions of poor market institutions are not taken into account. Also there was not conducted any comprehensive research to determine reasons for such long periods of low energy efficiency – "energy stagnation," as well as studies with a clear view on the role of credit in enhancing this kind of efficiency in the conditions of economy of rent seeking.

3. METHODOLOGY OF RESEARCH

To test our hypothesis about the causes of sustainably low energy efficiency in the economy of the rent-seeking on the one hand, and to assess the potential impact of the credit market on the energy efficiency of the national economy, we use two methodological techniques. To determine the reasons for the existence of energy stagnation in countries with low institutional quality, we use channel approach to finding causal relationships.

Thus, according to institutional economics there are at least three channels that define the basic characteristics of economic systems: institutional channel, showing the relationship between the level of corruption in the economy and the degree of protection of the rights and obligations of the parties of economic relations; competitive channel, which reflects the degree of competitive pressure in the markets of goods and services in national economy; competence channel to reflect the quality of the labour market (assessment of barriers when entering the labor market, possibilities of realization of human capital, etc.) (Acemoglu et al., 2004; Acemoglu and Robinson, 2010).

We assume that the energy efficiency of the national economy should be in a certain relation with the channels of market interlinkages. Also important is to check the presence/absence of the relationship between energy efficiency of the economy and the quality of technological base of the economy (the degree of wear of fixed assets).

To assess the dynamic component (the energy stagnation) we use the data of dynamics of energy efficiency in the countries of the sample to estimate their impact on the state of stagnation.

To assess the potential impact of the credit market on the destruction of the stagnant trend in the energy sector, we use methods of correlation analysis on cross-country level. The aim is to determine the effect of changes in the share of energy-efficient loans in developing and institutionally inefficient economies, taking into account climatic and geographical features.

To measure energy efficiency we use annual data for energy intensity of countries in the sample - aggregate energy consumption per dollar of GDP (in 2005 dollars, purchasing power parity). To measure the channels of market linkages we use Transparency International data for similar countries in the sample for the corresponding time period (as used in classical studies by Acemoglu et al., 2004; Bass, 2005). Institutional channel is determined by the relationship of the level of corruption and the index of protection of rights of subjects of economic relations; competitive channel is based on data for estimation of competition pressure; competence channel is based on data for quality assessment of the labor market in the National Economy. For assessment of technologies we use data from the National Statistical Agencies according to the degree of wear of the equipment. To assess the potential impact of the credit market to improve energy efficiency we use data from the national reserve/central banks of the countries in the sample by the volume/rate of growth of loans granted to non-financial sector for energy efficient projects.

4. EMPIRICAL FINDINGS AND DISCUSSION

Data on energy efficiency of sampled countries with low quality institutions, confirm the existence of a kind of energy stagnation - A situation in which the rate of decline of energy use per $ 1 GDP equals to zero or is minimal. Thus, data in Figure 1 reflect existence of energy stagnation in the last 10 years in the developing economies of the rent-seeking activity, where market mechanisms are weak, and the allocation of resources takes place between interest groups (North, 1990). For comparison, Figure 2 presents data for developing countries, characterized by the improvement of the quality of the institutional environment. As can be seen, on the one hand, energy consumption per $ 1 GDP falls at a greater rate than in the countries in the first sample. On the other hand, in the last 10 years, these countries were able to show greater energy efficiency in absolute terms than the countries of the first sample.

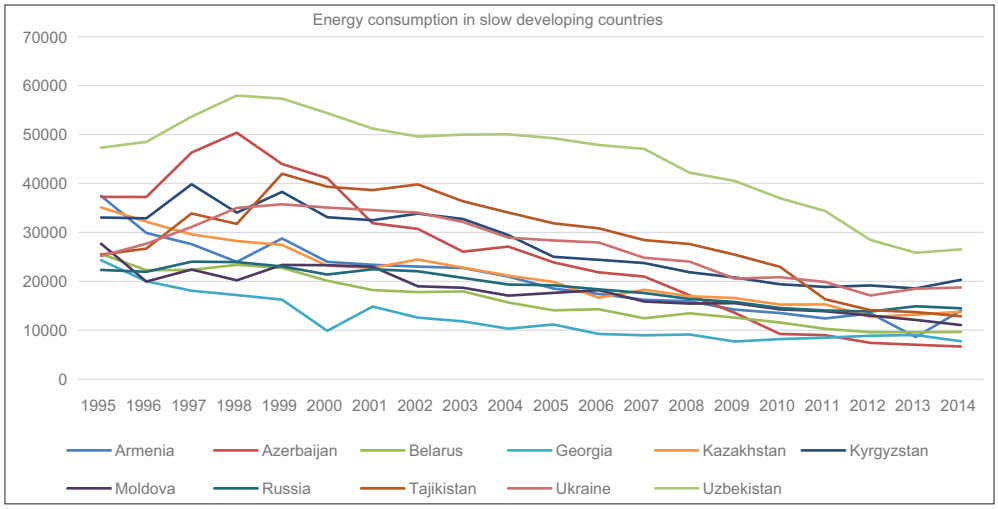
Table 1 presents average for 10 years growth rate of energy intensity for countries with poor institutions and improving quality of institutions, measured as average growth rates of institutions' quality over last 10 years according to transparency international data.

It should also be noted that there is a stable relationship between the quality of market institutions and the main characteristics of the economic system of the country - The level of competitive

Table 1: Comparative statistics on energy intensity and market institutions' quality in sample countries

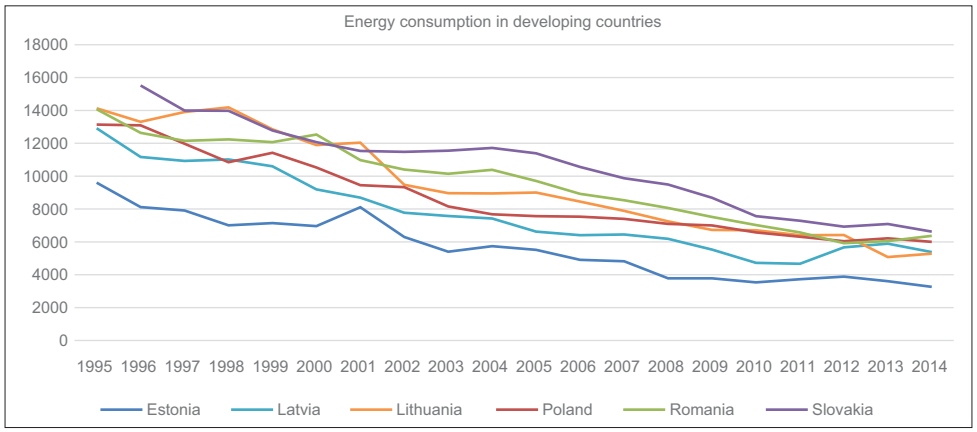
Country	EI average, %	IQI, %
Armenia	−3.45	−0.45
Azerbaijan	−0.32	−0.34
Belarus	−1.13	−0.24
Georgia	−2.32	−0.52
Kazakhstan	−4.53	−0.54
Kyrgyzstan	−2.13	−0.74
Moldova	−4.22	−0.21
Russia	−2.14	−0.02
Tajikistan	−2.73	0.17
Turkmenistan	2.67	−0.03
Ukraine	−1.23	−0.05
Uzbekistan	−2.79	−0.12
Poland	−3.93	−4.52
Estonia	−5.04	−5.67
Latvia	−4.19	−3.24
Lithuania	−4.78	−4.32
Slovakia	−5.32	−4.61

Figure 1: Energy intensity in slow developing economies



Source: Author's calculations on data of US Energy Information Administration

Figure 2: Energy intensity in fast developing economies



Source: Author's calculations on data of US Energy Information Administration

pressure in the market of goods and services, and the quality of the functioning of the labor market. In the earlier works of Bass, 2005; Acemoglu et al., 2004; Acemoglu and Robinson, 2010 analysis of market channels of interlinkages was carried out, stating that improvement of the quality of institutions increases competitive pressure in domestic markets, which, in turn, leads to improved quality of the labor market. We conducted a retest of these channels on the data of the last 5 years, which confirms the results of above mentioned authors (Figures 3-5).

Based on the received confirmation of the existence of the relationship between the quality of institutions and the functioning of the market, we assume that these channels have the potential to impact energy efficiency of the national economy. Verification of this hypothesis is based on the correlation analysis of the relationship between these channels and the energy intensity of the national economies of countries in the sample. The sample included mainly the countries of Eastern Europe with respect to climatic and geographical features.

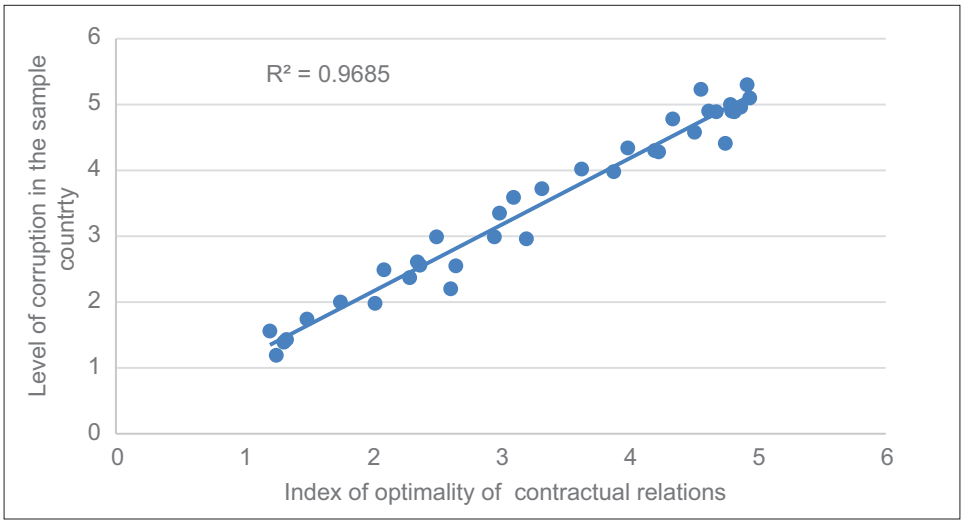
The analysis is based on the use of average growth rates of energy intensity in countries with poor market institutions over the last 15 years (2000-2014), and similar indicators of market interlinkages channels. Also, we try to assess how technological renewal of the economy contributes to reducing energy intensity. The results of correlation analysis are presented in Tables 2 and 3.

Table 2: Results of correlation analysis for low developing countries

Dependent variable (%)	EI avrg	IQI	CnC	CsC	Tech	EEC
EI avrg	1					
IQI	0.962001	1				
CnC	0.659633	0.67302	1			
CsC	0.385628	0.4006	0.550495	1		
Tech	−0.03008	0.087245	0.151982	0.144977	1	
EEC	−0.29295	−0.16172	−0.28908	−0.3804	−0.01917	1

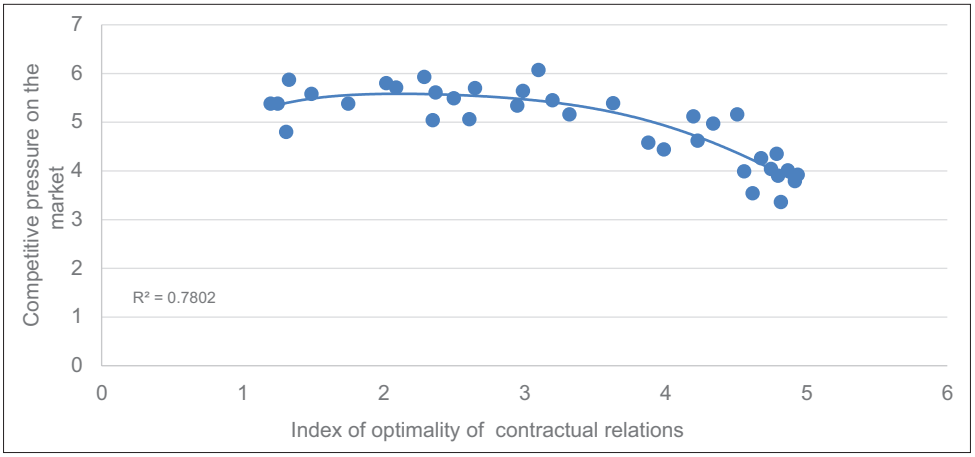
EI avrg, %: Average energy intensity's rate of growth for countries of the sample (year over year); IQI, %: Average institutions' quality improvement growth rates (year over year); CnC, %: Average growth rates of competitive pressure on the national market (year over year); CsC, %: Average growth rates of national labor market's quality (year over year); Tech, %: Average growth rates of equipment' depreciation (year over year); EEC, %: Average growth rates of granting energy efficient loans (year over year)

Figure 3: Institutional channel of market interlinkages



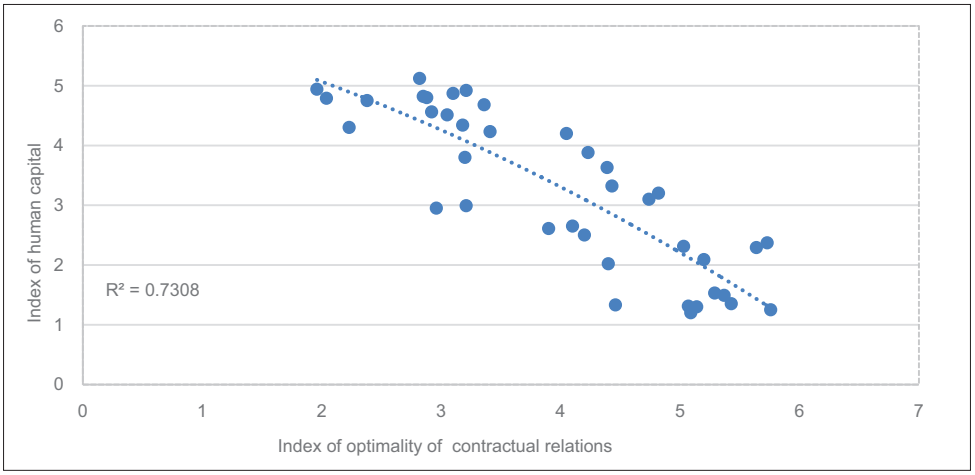
Source: Author's calculations on data of Transparency International Ltd.

Figure 4: Competitive channel of market interlinkages



Source: Author's calculations on data of Transparency International Ltd.

Figure 5: Competences channel of market interlinkages



Source: Author's calculations on data of Transparency International Ltd.

Table 3: Results of correlation analysis for fast developing countries

Dependent variable (%)	EI avrg	IQI	CnC	CsC	Tech	EEC
EI avrg	1					
IQI	0.983212	1				
CnC	0.695321	0.7381994	1			
CsC	0.431579	0.5995498	0.67504	1		
Tech	0.2212477	0.17592180	0.1941421	0.245219	1	
EEC	0.5751059	0.6890891	0.46418290	0.48138040	0.0732919	1

EI avrg, %: Average energy intensity's rate of growth for countries of the sample (year over year); IQI, %: Average institutions' quality improvement growth rates (year over year); CnC, %: Average growth rates of competitive pressure on the national market (year over year); CsC, %: Average growth rates of national labor market's quality (year over year); Tech, %: Average growth rates of equipment' depreciation (year over year); EEC, %: Average growth rates of granting energy efficient loans (year over year)

The results of the correlation analysis in Table 2 confirm our hypothesis. Thus, the maximum correlation among the variables accounted is for changes in the quality of market institutions. This conclusion is important because quality of institutions in the long-term helps to explain the existence of energy stagnation. Surprisingly, the change in the degree of depreciation of fixed assets is negatively associated with the energy intensity of the national economy in case of rent seeking economies. The explanation for this observation may lie in the replacement of obsolete equipment with new models of older series. In other words – It does not allow to reduce energy intensity of production. Also energy efficiency is in a certain relationship with the level of competitive pressure in the markets of goods and services, which also corresponds to existing mainstream of thought in the energy economics. Stably low or low increasing competition in rent seeking economies has a positive correlation with stagnating energy efficiency.

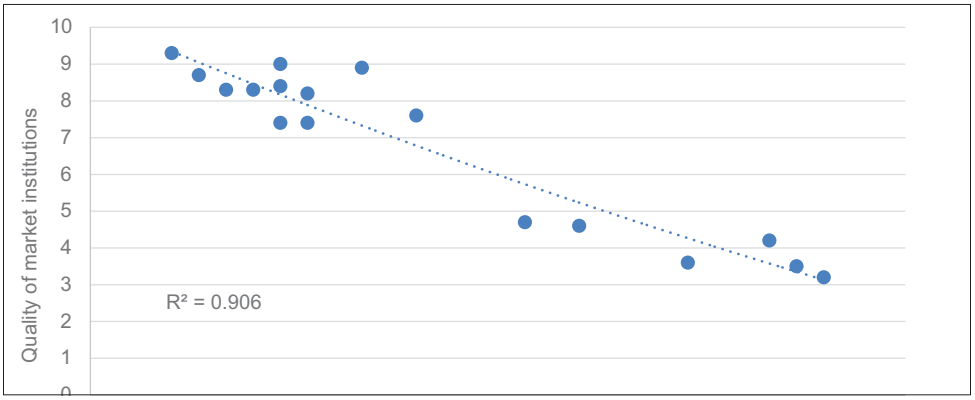
Testing second hypothesis of our study shows that correlation between growth rates of granting energy efficient loans and energy intensity decline is negative for countries with low quality institutions. This can be interpreted in the following way: slow or moderate growth rates of energy efficient loans are faced by negative or zero growth rates of institutions' quality. Also, a negative correlation may be explained by the inefficient use of energy saving credits. In case of weak market institutions, low growth rates of issuance of energy saving loans is faced by weak competition. Thus, the use of potential of credit to relieve the problem of energy stagnation is difficult.

If we turn to the results of correlation analysis of data for developing countries (Table 3), we see the following. First, the rate of growth of energy efficiency is positively correlated with the growth rate of the quality of institutions. Secondly, the data confirms the thesis according to which an increase of energy efficiency is associated with intensification of competition in the national market. Thirdly, positive is the correlation with the factor of technology. So, quite naturally becomes the reduction of energy intensity of production in connection with the replacement of obsolete equipment.

Also the data of correlation analysis reflect the presence of positive correlation between the change of energy intensity of production and changes in loans extended under the energy efficiency projects. However it is worth to mention that this correlation is observed with a lag of 3-5 quarters in the sample countries. This is because the introduction of new energy-saving technologies takes time. Thus, it can be assumed that the use of renewable energy credits allows increasing the efficiency of the national economy.

However, the relationship between them is uncertain. To clarify the situation enough to look at the data of the relationship between the change in volumes of energy efficient loans and the change in the quality of market institutions. The level of correlation between them is more restrictive. Then it can be assumed that the use of energy saving credits, has a significant impact on the energy efficiency of the economy then, and only then, when the quality of market institutions is of a high character. Otherwise, the role of credit is extremely weak. As confirmation of our thesis, we refer to the relationship between the specific weights of energy-efficient loans in countries with high and low quality of market institutions (Figure 6).

Figure 6: Dependence of energy efficient loans' share from quality of market institutions (institutional channel)



Source: Author's calculations on data of Transparency International Ltd. and reserve/central banks of sample countries

5. CONCLUSION

In this study, we were able to find evidence of the existence of energy stagnation in several countries, a situation in which the growth rate of energy efficiency equals to or tends to zero. In these circumstances, maintaining competitive advantages is difficult, as well as the maintenance of high economic growth. A search for sources of energy stagnation in the countries of Eastern Europe has led us to the conclusion that the main cause of this trend is persistently low quality of market institutions. In other words, energy stagnation is the result or the expression of a classic institutional trap. Weak market institutions, non-market incentives and forms of behavior (rent seeking and its distribution among interest groups) reduce competitive pressure on the markets and lead to the formation of a suboptimal equilibrium with an inefficient outcome.

In such conditions, reduction of energy intensity of production faces the problem of lack of sufficient market incentives for its reduction. A hypothesis of the credit channel of energy efficiency improvement in the economy of rent seeking is rejected by empirical facts, because functioning of the credit market is tied and is subordinate to the interest groups. This explains low growth rates of energy saving loans' issuance, low share of such loans in the total portfolio. In other words, an increase in such loans and their effect on the energy efficiency of the economy can be observed then, and only then, when main market linkages start to function - observance of contractual rights and obligations, extraction of market return, competition for this return, which implies the optimization of costs, including in the form of improved human capital, hardware upgrades in order to reduce capital intensity of production; usage of financial and credit resources for innovative purposes, and in order to maintain market niche of economic agents.

All of the above-mentioned trends are observed in rapidly developing countries of our sample that was confirmed by the study. Thus, the potential of the credit market in improving energy efficiency is revealed fully only in case of optimization of the institutional structure of the market, which requires structural reforms, development of civil society, improvement of judicial systems' functioning and other institutional elements.

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