Edward Molendowski[1] Anna Gapys[2]

THE ROLE OF THE GAS SECTOR IN THE ECONOMY OF THE RUSSIAN FEDERATION BEFORE AND AFTER THE 2008 CRISIS[3]

Abstract: The article presents the results of an analysis of the impact of the gas sector, including of profits from gas exports, on the economic performance of the Russian Federation in 2000-2016. The period covers the so-called 'golden years' 2000-2007 of staggering gas prices; the 2008 crisis and the following years of slow recovery. The analysis was based on the hypothesis that the manner of income redistribution in Russia did not translate into sustainable social growth. In the conclusion part, the Authors attempted to verify the effectiveness of the export-led growth (ELG) strategy as exemplified by the Russian Federation.

Keywords: Russian Federation, Gazprom, ELG strategy

Introduction

In the last decade of the 20th century and in the early 2000s, Russia underwent turbulent changes. The collapse of the bipolar division of the world, the fall of superpower ambitions and the deep socio-economic crisis of the 1990s constituted the basis for the development of the political and economic strategy of the Russian Federation. Russia's orientation towards growth had always been coupled with efforts

---

285

at extending political influence, reinforcing (or regaining) direct pressure areas and playing a dominant role in the international community. The exportation of energy materials, both the source of substantial financial receipts and a problematic issue to the European countries dependent on supplies thereof, seemed to be the perfect policy tool for the RF.

Treating exports as a driver of economic growth was reflected in the theory of export-led growth (ELG). The above approach gained in importance in the 1970s. ELG is a development strategy aiming to increase output through orientation towards foreign markets. It is a product of three elements supporting the openness of economies to trade: the comparative advantage (Hecksher–Ohlin–Samuelson) theory related to the gains from trade between economies characterised by different endowments with capital and labour; the benefits of open trade in the process of controlling the rent-seeking phenomenon; and the later developed effect of open trade on growth[4].

The analysis of the attainments of modern economic theories suggests that the development model based on the ELG strategy has been exhausting slowly. There are at least five arguments to corroborate the above conclusion[5].

When considering the effect of exports of commercial raw materials on a country's economic growth, it is worth mentioning the peak oil theory. Peak oil literally means the maximum rate of petroleum extraction. The authors of the theory refer to the point in time when the maximum extraction and production rate of this commodity (e.g. the number of millions of barrels of oil extracted daily) is reached, followed by an irreversible decline. It is worth adding that there are peak theories concerning other raw materials as well, which also translates into the applicability of the ELG strategy as a driver of economic growth in the long term[6].

This article aims to present the results of an analysis of the impact of the gas sector, including profits from gas exports, on the economic performance of the Russian Federation in 2000-2016. The period covers the so-called 'golden years' 2000--2007 of staggering gas prices; the 2008 crisis and the following years of slow recovery.

In the case of using receipts from raw material exports as an element of a country's economic development strategy, income redistribution is an issue of particular importance. The process should ensure steady improvements not only in economic indicators but also primarily in social ones. The analysis was based on the hypothesis that the manner of income redistribution in Russia did not translate into sustainable social growth. It was an additional motivation to carry out the study.

Therefore, the investigation presented attempts to verify the effectiveness of the ELG strategy in practice, as exemplified by the Russian Federation.

---

[4] T.I. Palley, *The Rise and Fall of Export-led Growth*, Working Paper No. 675, Levy Economics Institute, New America Foundation, July 2011, p. 4.

[5] *Ibidem*, pp. 15-17.

[6] Ch. Kerschner et al., *Economic vulnerability to Peak Oil*, 'Global Environmental Change', Universitat Autonoma de Barcelona, 2013, p. 2.

1. Reasonable redistribution of income in the light of modern theories

The redistribution of income, i.e. its repeated distribution in the population in a fairer manner, is connected with the idea of freedom understood in positive terms. Whereas freedom in a negative sense means freedom 'from' something, or the lack of restrictions on an entity imposed by institutions or other entities, understanding freedom in a positive sense reflects possibilities and opportunities of an entity, or freedom 'to do' something. Therefore, it is insufficient for the state as a whole not to obstruct activities pursued by its citizens, entities or individuals must also have resources and tools to achieve their goals. The maximisation of freedom in a positive sense leads to redistribution and egalitarianism. Equality may concern both rights and equal access to basic goods, resources, skills and even raw materials[7].

With regard to reasonable redistribution of income, the achieved effect of redistribution is obviously of importance. Similar results can be obtained with the use of different tools, e.g. Negative Income Tax (NIT) and Universal Basic Income (UBI)[8]. NIT is an expression of right-wing libertarianism, stressing the role of rights and freedoms in a negative sense. UBI, in turn, reflects the ideas of egalitarianism and emphasises the significance of freedom in a positive sense.

In the context of income redistribution, attitudes in the population itself are invariably essential. Those largely depend not only on cultural conditions but also on the disparities between the rich and the poor and on the mobility of individuals along the social ladder[9].

One instrument of public policy for income redistribution may be the taxation of mineral raw materials. However, it is a very complex issue since the imposition of taxes on minerals aims not only to pursue economic interests but also to attain environmental objectives[10].

In connection with such a wide range of functions of taxation on mineral raw materials, they frequently limit one another in practice. Therefore, it is difficult to find an example of a country following an effective policy for the redistribution of income from taxes on the extraction of minerals[11]. Most frequently, taxes constitute state budget revenue and only surplus receipts from the sale of products are transferred to special national funds, e.g. in Norway and, in recent years, in Russia. In the latter country, high export prices of natural gas, among other raw materials, subsidise much underpriced gas sold in the domestic market. Although it involves a number of adverse effects the situation may also be treated as a form of income redistribution.

---

[7] D. Tondani, *Universal Basic Income and Negative Income Tax: Two different ways of thinking redistribution*, 'The Journal of Socio-Economics', no. 38, 2009, p. 2.
[8] R. Szarfenberg, *Dochód podstawowy dla wszystkich*, Instytut Polityki Społecznej Uniwersytetu Warszawskiego, 2008, http://rszarf.ips.uw.edu.pl/pdf/BI_forall.pdf, (03.07.2017), p. 2.
[9] Kerr W., *Income inequality and social preferences for redistribution and compensation differentials*, 'Journal of Monetary Economics', no. 66, 2014, pp. 63, 77.
[10] P. Söderholm, *Taxing virgin natural resources: Lessons from aggregates taxation in Europe*, 'Resources, Conservation and Recycling' 55, 2011, pp. 913-915.
[11] *Ibidem*, p. 920.

2. Potential of the Gazprom Group

According to data of the US Energy Information Administration (EIA), Russia has the most extensive deposits of natural gas in the world. They account for ca. one-fourth of all confirmed resources of blue fuel. At the same time, Russia is the world's second largest gas producer, only behind the United States[12]. But Gazprom itself holds approx. 72% of Russian reserves, representing 17% of global reserves, and ensures 66% of Russia's gas production[13]. Considering the strong fragmentation of competitors, the monopoly of Gazprom on the use of infrastructure and exportation of gas as well as the fact that it is a state-controlled structure, it can be assumed that Gazprom exerts dominating influence on the Russian gas market and the whole Russian economy. Therefore, the analysis of the importance of gas exports to the economic policy of the Russian Federation, the results of which are presented in the article, relies on data obtained solely for Gazprom. The findings and conclusions from the investigation were generalised to cover the whole market in Russian gas.

Table 1. Main indicators of the potential and resources of the Gazprom Group in 2001-2016

Year/ indicator	Gas resources (trillion m³)	Gas production (billion m³)	UGSS – Unified Gas Supply System (thousand km)	Number of compressor stations	Capacity of compressor stations (thousand MW)	Number of employees (thousand)
2001	28.1	512	147.4	253	42.6	311
2002	28.8	521.9	149.9	256	43	322
2003	28	540.2	153.8	264	43.8	330
2004	28.9	545	153	263	44.2	333
2005	29.1	548	155	268	44.8	397
2006	29.9	556	157	217	41	432
2007	29.8	548.6	158.2	218	41.4	436
2008	33.1	549.7	159.6	214	41.6	376
2009	33.6	462	160	215	42	394
2010	33.1	510	162	215	42.1	401
2011	35	513	165	211	41.7	404
2012	35.1	487	168	222	43.9	431
2013	35.7	487	169	247	45.9	460
2014	29	444	171	250	39	459
2015	29	420	171	250	46.2	462
2016	29	420	171	253	46.7	467

Source: Own study based on *Gazprom Annual Reports for 2001–2016, electronic documents, retrieved on 03/07/2017,* http://www.gazprom.com/investors/disclosure/reports/2016/.

---

[12] *Ibidem*, pp. 913-915.
[13] Gazprom Annual Report 2016, http://www.gazprom.com/f/posts/44/307258/gazprom-annual-report-2016-en.pdf, (03.07.2017), p. 14.

In 2001-2016, despite the crisis year of 2008, the transmission system was extended to include additional 24,000 km, whereas employment increased by 156,000 persons. Eight years after the crisis, gas production continued to be approx. 25% lower than the 2008 high. It was also connected with the sanctions imposed on Russia after the annexation of Crimea in 2014.

Furthermore, it is worth pointing out increased spending on research and development in the last 3 years covered (Figure 1). The Gazprom Group aspires to be not only the supplier of a primitive raw material, i.e. gas or crude oil, but also the provider of state-of-the-art technology, including technology for the aeronautical industry[14].
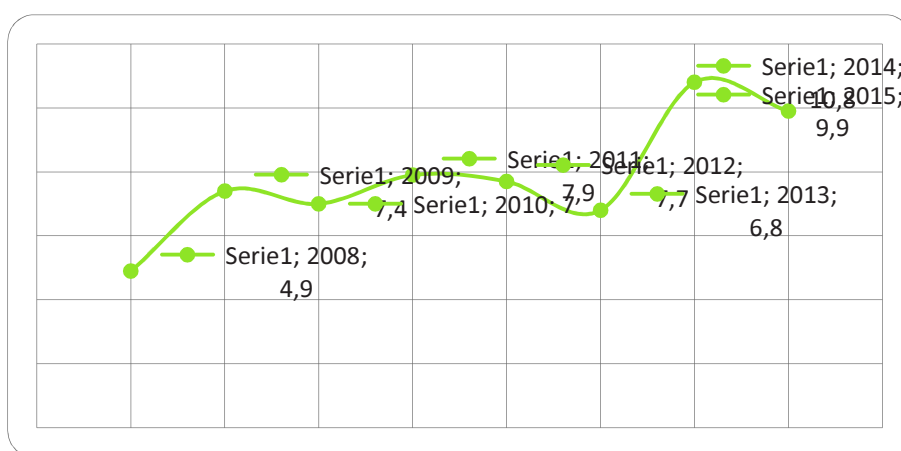

Figure 1. Expenditure on research and development by the Gazprom Group, RUB billion, net of VAT

Source: *Innovative activity*, http://www.gazprom.com/about/strategy/innovation/

Gazprom has large-scale investment plans. The presented analysis only takes account of major projects listed at the official website of Gazprom[15].

The top priority pipeline projects in Russia include the following:
 – Yamal megaproject – the development of the Bovanenkovskoye field worth USD 41 billion.
 – Sakhalin II – Russia's first LNG plant with an annual capacity of 9.6 million tonnes, launched in 2009.
 – Vladivostok LNG project – the construction of the LNG plant with an annual capacity of 10 million tonnes, commenced in February 2013.
 – Baltic LNG terminal – with a minimum daily flow capacity of 9 million m³ of gas.

---

[14] *Gazprom's aerospace technologies to be used for Europe – Western China transport route*, 06/02/2017, http://www.gazprom.com/press/news/2017/june/article335185/, (03.07.2017).
[15] Gazprom's Projects, http://www.gazprom.com/about/production/projects/deposits/, (03.07.2017).

It must also be emphasised that the extraction, production, transport, storage and sale of gas are only some of the operations of the Gazprom Group. The corporate potential is enhanced by the production of petroleum, the condensate of gas and other hydrocarbons as well as the generation and sale of energy and heat.

The above-mentioned projects and activities do not exhaust the whole potential of the Gazprom Group. As a matter of fact, this national champion is a 'state in the state', functioning in spheres such as: banking (Gazprom-Bank), media (Gazprom-Media, e.g. 3 TV stations, 5 radio stations, 6 newspapers, 2 multiplexes, a film production company), airlines (Gazprom-Avia), health care or football (the Zenit team – Russia's multiple champion). Moreover, in the summer of 2007, the State Duma adopted an act allowing security units of Gazprom to use military weapons, the same as those used by the Russian army[16].

The 'state of Gazprom' also has assets such as plants producing bricks or mineral water and pig farms. Another similarity of the Gazprom Group to a state (such as Russia) is suggested by reports of high corruption at the consortium management[17].

3. National Welfare Fund

In February 2008, the Ministry of Finance of the Russian Federation divided the Stabilisation Fund into: the Reserve Fund (with USD 125 billion in assets) and the National Welfare Fund (with capital of USD 32 billion), supporting the public pension system. It was necessary as, in spite of reforms and annually increasing funds for social security, in 2007 the average pension in Russia was USD 135, still below the government's subsistence level of USD 156[18]. Assets of the National Welfare Fund come from profits from oil and natural gas sales. It reflects solidarity and the materialisation of the idea of taking care of future generations. The Russian authorities adopted a pragmatic approach in this case although injecting all profits from exports of raw materials into the Russian economy would trigger hyperinflation, it was therefore very unlikely. Assets from the Fund are sometimes used on an *ad hoc* basis, e.g. they allowed to rather quickly overcome the 2008 crisis, which significantly alleviated its consequences in comparison with those of the 1998 crisis.

The National Welfare Fund, aimed to financially secure not only the current but, first of all, the future generations of the Russians, was reduced by USD 14 billion in 2014, in connection with the implementation of infrastructure projects planned. Furthermore, the costs of such investments in Russia tended to considerably

---

[16] Federal Act 'On amendments to the Federal Act "On supplies for federal and state uses" and to Article 12 of the Federal Act "On weapons"' of 24 July 2007, http://www.rg.ru/2007 /08/03/izmeneniya-postavki-dok.html, (03.07.2017).

[17] V. Milov, B. Nemcov, V. Ryzhkov, O.Shorina, *Putin. Corruption. Independent expert lecture*, Moscow, http://www.putin-itogi.ru/f/Putin-i-korruptsiya-doklad.pdf, (30.09.2014), p. 6.

[18] Social Security Administration, 2008, *International Update: Recent Developments in Foreign Public and Private Pensions*, http://www.ssa.gov/policy/docs/progdesc/intl_update/2008-03/2008-03.pdf, (03.07.2017), p. 1.

increase during implementation[19]. In 2015, due to the budget deficit caused by low prices of energy raw materials, assets of the Fund were further cut by ca. USD 40 billion – i.e. by more than half[20].

It is worth adding that the majority of resource-dependent countries create special funds for future generations. Norway is a good example.

4. The impact of energy raw material exports on economic growth in the Russian Federation – a review of the results of available studies

One of the researchers studying the phenomenon and nature of economic growth in Russia in 2000-2012 was Irina Korgun. According to her initial assumptions, the improved economic situation in Russia was determined by favourable conditions in markets in energy materials after 2000. Employing the method of least squares, she managed to confirm the hypothesis but only in part. The author also specified additional determinants of growth such as increased imports caused by delayed consumption (after the crises of the 1990s) and the liberalisation of the Russian market, average income convergence between Russia's population and those of other developing countries and the process of income convergence within Russia.

According to I. Korgun, intensive export of energy raw materials could also influence Russia's economic growth in another manner, through pressure towards rapid implementation of modern technologies and know-how. The author argues that the most accessible deposits in Russia are running out, whereas it takes investment of billions of roubles and the application of cutting-edge technology solutions to explore new ones. Furthermore, the researcher points to factors previously excluded from analyses but likely to have a significant effect on the perception of the quality of economic growth in Russia, e.g. redistribution policy concerning profits from exports of raw materials. For instance, increased state revenue could push up the compensation of employees in the budgetary sector, thus causing an outflow of skilled labour from other sections of the economy, which might in turn result in the so-called Dutch disease[21].

In this context, it is worth mentioning the findings from studies into the causes of buoyant economic growth of the BRICS countries (Brazil, Russia, India, China and the Republic of South Africa) in 1990-2010. The countries in question adopted, *inter alia*, strategies drawing on the assumptions of the ELG theory. Therefore, the researchers decided to verify to what extent their growth resulted from increased exports and how it was driven by other factors such as gross fixed capital formation, exchange rates, human capital and net foreign direct investment (FDI). The authors concerned managed to corroborate that all the aforementioned factors contributed

[19] E. Fischer, *Projekt budżetu federalnego na rok 2014 – cięcia zamiast reform*, Analizy, Ośrodek Studiów Wschodnich, 2013,http://www.osw.waw.pl/pl/publikacje/analizy/2013-10-02/projekt-budzetu-federalnego-na-rok-2014-ciecia-zamiast-reform, (03.07.2017).

[20] Kośka M., *Rosja sobie nie radzi, ale tego nie przyzna*, 2015, https://www.obserwatorfinansowy.pl /forma/rotator/rosja-sobie-nie-radzi-ale-tego-nie-przyzna/, (11.06.2017).

[21] I. Korgun, *Trade and growth. Some evidence from Russia for 2000–2012*, Technical Report, Hitotsubashi University, October 2012, pp. 2, 9-11.

to economic growth in the BRICS countries[22]. The outcome confirms the difficulty of proving the effectiveness of only applying the ELG strategy.

In another analysis, the researchers were successful in demonstrating strong effects of fluctuations in oil prices on the Russian economy in 1995-2008. Very importantly, at the same time the findings from analyses confirmed that in a situation of the lack of increasing petroleum prices the Russian economy had also shown significant growth potential. Furthermore, it appeared that – in line with the assumptions of the so-called Dutch disease – a rise in oil prices caused the appreciation of the rouble, which in turn had a downward effect on exports of products other than petroleum[23].

According to the results of research carried out by S. Ledyaeva, in 1996-2004 Russia's economic growth was mostly driven by the following factors: the initial level of economic development, domestic investment and exports. The first 2 determinants played a crucial role in 1996–1999. But in the following years only exports were of key importance, which could have resulted from high oil and gas prices after 2000[24].

In addition, it is worth mentioning the findings from analyses conducted by F. Hasanov and E. Alirzayev. The authors investigated the applicability of the ELG theory assumptions in the economic policies of Russia, Kazakhstan and Azerbaijan in 2000-2012. The researchers found no confirmation of short-run Granger causality between an increase in non-raw material exports and economic growth in non-mineral sectors. The results were significant as each of the countries under examination had adopted a multiannual economic strategy based on strong development of non-extraction sectors[25].

The conclusions from all the studies referred to above can be summarised as follows: supporting raw material exports, particularly during the price boom, was the right policy choice for the Russian authorities and a positive correlation between increased exports and economic growth was especially observed in the short term.

Simultaneously, most researchers suggest that additional drivers of economic growth should be taken into account in the long term, demonstrating their significant effects on the relationship between exports of raw materials and economic growth in Russia.

---

[22] V. Polodoo et al., *Trade and Economic Growth – A perspective from BRICS nations and Implications for Developing World*, University of Mauritius, 2012, http://daadpartnership.htw-berlin.de/fileadmin/Workshops/2012_Mauritius/Papers/Polodoo_Trade_and_Growth_2012.pdf, (03.07.2017), pp. 8-9.

[23] A. Benedictow, D. Fjærtoft, O. Løfsnæs, *Oil dependency of the Russian economy: an econometric analysis*, Discussion Papers No. 617, Statistics Norway, Research Department, 2010, p. 29.

[24] S. Ledyaeva, *Determinants of Economic Growth: Empirical Evidence from Russian Regions*, 'The European Journal of Comparative Economics', Vol. 5, no. 1, 2008, p. 15.

[25] F. Hasanov, E. Alirzayev, *Export-Led Growth Hypothesis. Is that applicable for the oil-exporting countries of the former Soviet Union?,* Economics Education and Research Consortium (EERC), Working Paper, 2013, http://eercnetwork.com/Selected/Selected_WS34/Hasanov_Proposal.pdf, (03.07.2017), pp. 6, 10.

5. The impact of energy raw material exports on economic growth in the Russian Federation – the results of the analysis presented

The study described in the article was aimed to verify the impact of 2000-2013[26] gas exports on Russia's gross domestic product in real terms. The research process followed in the analysis presented was divided into 4 stages:
1) Analysis of the seasonality of time series,
2) Tests of the stationarity of time series,
3) Analysis of the relationship between gas exports and GDP using the classical linear regression model with random explanatory variables, for seasonal differences in logarithms of those variables,
4) Analysis of the relationship between gas exports and GDP using the Vector Error Correction Model (VECM).

Stage 1.

The analysis was based on quarterly data for the period 2000–2013, therefore the sample included 52 observations. Data concerning Russia's GDP were expressed in real terms. Therefore, data regarding gas exports needed to be in real terms as well. There are a number of methods for transforming data into real terms but for the purpose of this study the following 4 were selected:
a) the physical volume of gas exports expressed in billion cubic metres
b) revenue from gas exports expressed in USD, in nominal terms
c) revenue from gas exports transformed into real terms using Russia's GDP deflator, expressed in roubles in real terms
d) revenue from gas exports transformed into real terms using an import price index estimator.

The import price estimator was computed as follows:

$$IMP\_P = \frac{CPI}{REER} \text{ ; since}$$

$$\frac{CPI}{\dfrac{CPI * NEER}{CPI\_F}} = CPI * \frac{CPI\_F}{CPI * NEER} = \frac{CPI\_F}{NEER} = IMP\_P$$

where: IMP_P – the import price index in Russia, CPI – the consumer price index in Russia, CPI_F – the consumer price index in the foreign sector (trade-weighted average), REER – the real effective exchange rate ($REER = \dfrac{CPI}{CPI\_F} * NEER$),

NEER – the nominal effective exchange rate expressed in roubles against a basket of currencies, trade-weighted.

---

[26] Unfortunately, the Authors could not obtain relevant statistics for the period following 2013, therefore the study covered the years 2000-2013.

At the first stage of research, the TRAMO/SEATS procedure was used to verify whether there were seasonal fluctuations in the time series analysed. Seasonality was statistically confirmed as early as the first series (the physical volume of gas), which implied that there would be seasonal fluctuations in the other series as well. Natural gas as a product is characterised by seasonal variations in use.

In such a situation, it was necessary to 'de-season' data. Having taken the logarithms of the time series, the Authors analysed their stationarity, i.e. the degree of the integration of the time series was tested using the ADF test.

As a result, it appeared that only the series expressed as the physical volume of exported gas was the outcome of a stationary process. As regards the other processes, it was impossible to reject the hypothesis that they resulted from integrated processes.

Stage 2.

Since the vast majority of the series proved to be integrated in the first degree (thus non-stationary) it was not possible to simply use the classical least squares method in further research and, on that basis, infer on the relationships between them. In order to address the problem, two methods were employed. Firstly, in the linear regression model with random explanatory variables the relationships between seasonal increases in logarithms were analysed. Secondly, the relationships between the logarithms of the original variables were examined with the use of the vector error correction model (VECM) and structural analysis tools such as the impulse response function and inference on Granger causality.

Stage 3.

The stage in question involved the estimation of the following linear regression equation with random explanatory variables:

$$GDP\_RUS_t = \alpha_0 + \sum_{i=1}^{p}\alpha_{1,i}GDP\_RUS_{t-i} + \sum_{j=0}^{q}\alpha_{2,j}Gas_{t-j} + \sum_{k=0}^{s}\alpha_{3,k}GDP\_EU28_{t-k} + \varepsilon_t$$

where: GDP_RUS – real GDP in Russia, Gas – gas exports from Russia transformed into real terms (with four versions of transformation into real terms tested), GDP_EU28 – real GDP in the EU-28.

The sum of structural parameters was 0.07. The result can be interpreted as an indication of the following relationship: if the growth rate of gas exports increases by 1 percentage point, the growth rate of real GDP will increase by 0.07 percentage point.

The subsequent analyses of effects of gas exports on Russia's real GDP in 2000-2013 with the use of the other combinations of gas exports (expressed in USD, in real roubles and in the form of deflated import price index estimate) showed no relationships (the sum of structural parameters was not significantly different from zero).

Stage 4.

The stage concerned consisted in analysing the relationships between gas exports and Russia's GDP, with the application of the vector error correction model.

Table 2. Results of calculations based on the Granger causality test of specific variables for the 12 models (two-way causality testing)

Direction of the relationship tested	p-value
4 two-variable models	
Gas_vol --> GDP_Ru	0.0102
GDP_Ru --> Gas_vol	0
Gas_USD -->GDP_Ru	0.1614
GDP_Ru --> Gas_USD	0
Gas_RUR -->GDP_Ru	0.1555
GDP_Ru --> Gas_RUR	0
Gas_ToT-->GDP_Ru	0.2109
GDP_Ru --> Gas_ToT	0
4 three-variable models – GDP of the EU-28 as the endogenous variable	
Gas_vol --> GDP_Ru and GDP_UE	0.0011
GDP_Ru --> Gas_vol and GDP_UE	0
GDP_UE --> GDP_Ru and Gas_vol	0.0001
Gas_USD --> GDP_Ru and GDP_UE	0.0372
GDP_Ru --> Gas_USD and GDP_UE	0
GDP_UE --> GDP_Ru and Gas_USD	0
Gas_RUR --> GDP_Ru and GDP_UE	0.2168
GDP_Ru --> Gas_RUR and GDP_UE	0.0005
GDP_UE --> GDP_Ru and Gas_RUR	0.0001
Gas_ToT --> GDP_Ru and GDP_UE	0.0812
GDP_Ru --> Gas_ToT and GDP_UE	0.0007
GDP_UE --> GDP_Ru and Gas_ToT	0
4 three-variable models – GDP of the EU-28 as the exogenous variable	
Gas_vol --> GDP_Ru	0
GDP_Ru --> Gas_vol	0.0123
Gas_USD -->GDP_Ru	0.5489
GDP_Ru --> Gas_USD	0.1406
Gas_RUR -->GDP_Ru	0.3669
GDP_Ru --> Gas_RUR	0.3072
Gas_ToT-->GDP_Ru	0.3731
GDP_Ru --> Gas_ToT	0

Explanation of the symbols used in the table:
Gas_vol – the physical volume of gas
Gas_USD – revenue from gas exports expressed in USD
Gas_RUR – revenue from gas exports in real terms expressed in RUR
Gas_ToT – revenue from gas exports transformed into real terms using an estimate
GDP_Ru – Russia's real GDP
GDP_UE – GDP of the EU-28
Source: Own study based on the calculations performed.

The model takes account of both short- and long-term relationships between endogenous variables and the feedback between them. The VECM has representations of vector autoregression (VAR). Therefore, it is possible to use structural tools such as the impulse response function (IRF) and the Granger causality analysis.

The orthogonal impulse response function (IRF) serves to analyse dynamic interactions between endogenous variables in VAR(p) processes. It describes the effect of a unit, orthogonal random shock in one endogenous variable (e.g. gas exports) on another endogenous variable. As regards Granger causality analysis, it allows to establish whether the presence in the model of one variable (e.g. gas exports) enables better forecasts of the vector of other variables (e.g. GDP).

Having estimated the models, the Authors performed relevant calculations with the use of the impulse response function and the Granger causality test [1968]. In the study presented, 12 models were estimated:

– 4 one-variable models (the explained variable – Russia's real GDP + 4 forms of gas exports)
– 4 two-variable models (the explained variable – Russia's real GDP + 4 forms of gas exports + GDP of the EU-28 treated as the endogenous variable)
– 4 two-variable models (the explained variable – Russia's real GDP + 4 forms of gas exports + GDP of the EU-28 treated as the exogenous variable).

The expected value confirming the hypothesis put forward was a positive value significantly different from zero. But such a result was only obtained in 4 out of the 12 cases. In the other cases, the function value was negative.

Similar results were obtained in the analysis of all the 12 models with the use of the Granger causality test, as described in Table 2.

6. Interpretation of the calculation results

Granger causality can be considered statistically significant where the p-value is below 0.1. In Table no. 2, such cases are marked in grey. According to the results shown in the Table, only in 5 out of the 12 models used it was possible to confirm Granger causality between gas exports, expressed in 4 forms, and Russia's GDP. Therefore, the results are not unambiguous. Furthermore, the results for three-variable models, shown in the middle part of the Table (GDP of the EU-28 treated as the endogenous variable) suggest that the growth rate of GDP of the 28 European Union Member States could also (Granger) cause growth in Russia's GDP in 2000--2013.

At the same time, it is worth mentioning the findings from a similar analysis carried out for the aggregated value of natural gas and crude oil. In the study in question, it was possible to confirm Granger causality between exports of natural resources and Russia's GDP in 11 out of the 12 cases[27].

---

[27] E. Molendowski, A. Gapys, *Importance of exports of energy materials to the economy of the Russian Federation in 2000–2015*, [in:] Trends in the World Economy, Global Economy at the Crossroads, vol. 8, Uniwersytet Szczeciński, Szczecin 2016, pp. 104-105.

Summary and conclusions

On the basis of the analysis presented, it is possible to conclude that the economy's reliance on exports of raw materials did not necessarily imply that the country concerned had worse economic development prospects. Thanks to increased raw material exports, the Russian economy only needed a few years to recover from the crisis of the 1990s and from the financial collapse of 1998. In 2000-2007, the annual growth rate of Russia's GDP was 7%, a significant part of foreign debt was repaid (sometimes before maturity dates), payments of social-security benefits became regular again and for more than a decade Russia enjoyed budget surpluses, the National Welfare Fund was set up. Assets from the Fund allowed to relatively quickly overcome another crisis in 2008. The most important role in the process was certainly played by favourable conditions in global markets in energy materials. Nevertheless, it seems basically impossible to indicate another determinant of economic growth capable of stimulating such rapid economic growth of Russia in such a short period, considering the base conditions.

In addition, the analysis also allowed to corroborate the adopted hypothesis that the manner of the redistribution of profits from natural gas exports was not reflected in sustainable social development in Russia. The indicators of the situation of the Russian population, in spite of a distinct improvement in the period covered, remained below satisfactory levels. An ageing population[28], low average life expectancy at birth[29], infant mortality at a rate twice as high as that for the EU-28[30], a low population growth rate[31], a high abortion rate[32]– those are the main problems of the Russian population.

As follows from the analysis carried out, budgetary expenditure on social welfare increased until 2014 when it was cut in connection with a deteriorating budget situation. However, as demonstrated by detailed analysis of the available documents, the efficiency of financing social development was not high as funds were mostly allocated to social areas determined by the administration without taking account of the actual needs of the Russian population.

After 2008, the gas sector ceased to play such an important role in Russia's economy. It did not regain its position until the end of 2016. The ELG strategy showed

---

[28] J. Smirnova, *There are 7 billion people on earth at present. When will the population start to decrease? How long will the food, water and oil last?*, 'Forbes', 2011, http://m.forbes.ru/article.php?id=75837, (03.07.2017).

[29] Federal State Statistics Service (Rosstat), *Life expectancy at birth*, http://www.gks.ru/free_doc/new_site/population/demo/progn7.htm, (03.07.2017).

[30] Federal State Statistics Service (Rosstat), *Infant mortality*, http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#, (03.07.2017); Eurostat, *Infant mortality*, http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps 00027, (03.07.2017).

[31] Federal State Statistics Service (Rosstat), *Births, deaths and birth rates*, http://www.gks.ru/free_doc/new_site/population/demo/progn5.htm, (30.09.2014).

[32] State Duma Committee for Family, Women and Children Affairs, *The concept of the state family policy until 2025*, citizens' project, http://www.komitet2-6.km.duma.gov.ru/site.xp/050049124053056052.html, (30.09.2014).

signs of becoming exhausted even before the crisis related to the annexation of Cri-
mea (2014). The strategy could not be continued in the long term. After the imposi-
tion of sanctions on Russia receipts from the gas sector, considerably reduced as
a result of artificially maintained low world prices of blue fuel, were still used as an
instrument of improving the budget situation. It was reflected, *inter alia*, in one-
time tax (a rise by 36%) on the extraction of gas in 2015[33].

Therefore, it seems justified to conclude that Russia's application of the ELG
strategy, despite improved economic indicators, did not contribute to sustainable
development of the Russian economy. Assets kept on the accounts of the National
Welfare Fund are used at present instead of providing support for future generations,
deprived of gains from exhaustible natural resources. Neither did the imposition of
taxes on minerals translate into fairer redistribution of income, improved environ-
mental conditions or less aggressive extraction methods. The results of the analysis
indicate the need to modify the economic strategy of the Russian Federation, in or-
der to make better use of the opportunities offered by the extraction and export of
Russia's natural resources.

References

Benedictow A., Fjærtoft D., Løfsnæs O., *Oil dependency of the Russian economy: an econo-
metric analysis*, Discussion Papers No. 617, Statistics Norway, Research Department, 2010,.

Eurostat, *Infant mortality*, http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&
language=en&pcode=tps00027, (03.07.2017).

Federal Act 'On amendments to the Federal Act "On supplies for federal and state uses" and
to Article 12 of the Federal Act "On weapons"' of 24 July 2007, http://www.rg.ru/2007
/08/03/izmeneniya-postavki-dok.html, (03.07.2017).

Federal State Statistics Service (Rosstat), *Births, deaths and birth rates*, http://www.gks.ru/free
_doc/new_site/population/demo/progn5.htm, (30.09.2014),

Federal State Statistics Service (Rosstat), *Infant mortality*, http://www.gks.ru/wps/wcm/con-
nect/rosstat_main/rosstat/ru/statistics/population/demography/#, (03.07.2017).

Federal State Statistics Service (Rosstat), *Life expectancy at birth*, http://www.gks.ru/free_
doc/new_site/population/demo/progn7.htm, (03.07.2017).

Fischer E., *Projekt budżetu federalnego na rok 2014 – cięcia zamiast reform*, Analizy, Ośrodek
Studiów Wschodnich, 2013, http://www.osw.waw.pl/pl/publikacje/analizy/2013-10-02/pro
jekt-budzetu-federalnego-na-rok-2014-ciecia-zamiast-reform, (03.07.2017).

Gazprom Annual Report 2016, http://www.gazprom.com/f/posts/44/307258/gazprom-annual-
report-2016-en.pdf, (03.07.2017).

Gazprom's aerospace technologies to be used for Europe – Western China transport route,
06/02/2017, http://www.gazprom.com/press/news/2017/june/article335185/, (03.07.2017)

Gazprom's Projects, http://www.gazprom.com/about/production/projects/deposits/, (03.07.
2017).

Hasanov F., Alirzayev E., *Export-Led Growth Hypothesis. Is that applicable for the oil-export-
ing countries of the former Soviet Union?,* Economics Education and Research Consortium
(EERC), Working Paper, 2013, http://eercnetwork.com/Selected/Selected_WS34/Hasanov
_Proposal.pdf, (03.07.2017).

---

[33] M. Kośka, *Rosja sobie nie radzi...,* 2015.

Kerr W., *Income inequality and social preferences for redistribution and compensation differentials*, 'Journal of Monetary Economics', no. 66, 2014.

Kerschner Ch. et al., *Economic vulnerability to Peak Oil*, 'Global Environmental Change', Universitat Autonoma de Barcelona, 2013.

Korgun I., *Trade and growth. Some evidence from Russia for 2000-2012*, Technical Report, Hitotsubashi University, October 2012.

Kośka M., *Rosja sobie nie radzi, ale tego nie przyzna*, 2015, https://www.obserwatorfinansowy.pl/forma/rotator/rosja-sobie-nie-radzi-ale-tego-nie-przyzna/, (11.06.2017).

Ledyaeva S., *Determinants of Economic Growth: Empirical Evidence from Russian Regions*, 'The European Journal of Comparative Economics', Vol. 5, no. 1, 2008.

Milov V., Nemcov B., Ryzhkov V., Shorina O., *Putin. Corruption. Independent expert lecture*, Moscow, http://www.putin-itogi.ru/f/Putin-i-korruptsiya-doklad.pdf, (30.09.2014).

Molendowski E., Gapys A., *Importance of exports of energy materials to the economy of the Russian Federation in 2000–2015*, [in:] "Trends in the World Economy, Global Economy at the Crossroads", vol. 8, Uniwersytet Szczeciński, Szczecin 2016.

Palley T. I., *The Rise and Fall of Export-led Growth*, Working Paper No. 675, Levy Economics Institute, New America Foundation, July 2011.

Polodoo V. et al., *Trade and Economic Growth – A perspective from BRICS nations and Implications for Developing World*, University of Mauritius, 2012, http://daadpartnership.htw-berlin.de/fileadmin/Workshops/2012_Mauritius/Papers/Polodoo_Trade_and_Growth_2012.pdf, (03.07.2017).

Smirnova J., *There are 7 billion people on earth at present. When will the population start to decrease? How long will the food, water and oil last?,* 'Forbes', 2011, http://m.forbes.ru/article.php?id=75837, (03.07.2017).

Social Security Administration, 2008, *International Update: Recent Developments in Foreign Public and Private Pensions*, http://www.ssa.gov/policy/docs/progdesc/intl_update/2008-03/2008-03.pdf, (03.07.2017).

Söderholm P., *Taxing virgin natural resources: Lessons from aggregates taxation in Europe*, 'Resources, Conservation and Recycling' 55, 2011.

State Duma Committee for Family, Women and Children Affairs, *The concept of the state family policy until 2025*, citizens' project, http://www.komitet2-6.km.duma.gov.ru/site.xp/050049124053056052.html, (30.09.2014).

Szarfenberg R., *Dochód podstawowy dla wszystkich*, Instytut Polityki Społecznej Uniwersytetu Warszawskiego, 2008, http://rszarf.ips.uw.edu.pl/pdf/BI_forall.pdf, (03.07.2017).

Tondani D., *Universal Basic Income and Negative Income Tax: Two different ways of thinking redistribution*, 'The Journal of Socio-Economics', no. 38, 2009.

Abstrakt

**Rola sektora gazowego w gospodarce Federacji Rosyjskiej
przed i po kryzysie z 2008 r.**

Artykuł jest prezentacją wyników analizy wpływu sektora gazowego, w tym zysków z eksportu tego surowca, na kondycję gospodarczą Federacji Rosyjskiej w latach 2000-2016. Okres ten obejmuje tzw. „złote lata" 2000-2007, w których ceny gazu osiągały

zawrotnie wysoki poziom; kryzysowy rok 2008 r. oraz późniejsze lata powolnego wychodzenia z kryzysu. W analizie przyjęto hipotezę, że sposób redystrybucji dochodów w Rosji nie przekłada się na zrównoważony wzrost społeczny. W części wnioskowej podjęto próbę weryfikacji skuteczności strategii wzrostu gospodarczego napędzanego przez eksport (export-led growth – ELG) na przykładzie Federacji Rosyjskiej.

Słowa kluczowe: Federacja Rosyjska, Gazprom, Strategia ELG