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Energy Prices and Households' Incomes Growth Proportions in Russia's Case Context

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ABSTRACT

The article describes the past and future energy and natural resources policies in Russia. The authors consider the main trends and prospects in the state energy policy. The article shows the relationship between the National Welfare Fund growth and the decline in consumption. The authors argue the ability of raw materials revenues to solve problems of social financing. The analysis relies on the VAR and VECM-model to test the generated hypotheses. The model explores changes in energy prices in proportion to changes in individual factors of social and savings policies, taking into account the random component. We take the two most important elements of population income - these are social payments and wages. The article provides an opportunity to reflect on the ability of the innovative distribution of oil and gas revenues to change current social policies. The study complements our knowledge of the lack of social financing and the need to increase the real level of income.

Keywords: Energy Prices, Oil Revenues, Social Benefits, Wages
JEL Classifications: E21, E25

1. INTRODUCTION

Raw materials production is a potential way to finance social needs. But often, raw materials revenues are allocated to other needs. Considering the distribution of oil revenues, we can see that the relatively high oil prices in 2018 allowed to replenish the Russian National Welfare Fund (NWF) up to 4 trillion rubles. It represents about a third of all potential revenues of the country. In 2019, it expects to increase the volume of the NWF by another 3 trillion and to reach 7% of GDP. Other extractive countries also accumulated their funds in petrodollars. The accumulated reserves are transformed into investment projects, while in Russia the funds are directed to cover the federal budget deficit in case of its occurrence. The increase in Urals oil prices allows the accumulation of the NWF based on an excess over $ 40 per barrel. After the NWF reaches 7% of GDP, funds will be directed for investment goals. The main goal of the NWF is to provide an "airbag" in case of a financial crisis. While other extractive countries build up their national funds by investing.

The United Arab Emirates, Kuwait, Norway, Saudi Arabia are the largest oil producers. Russia has a similar saving's practice in oil sales case, like Saudi Arabia (Tarek N. A., Anwar A. G., Lester C. H., 2018). However, Saudi Arabia has a rather opaque fund structure. The United Arab Emirates has several sovereign funds. The largest fund is the Abu Dhabi investment authority, which invests in stocks, bonds, financial companies, insurance funds, agricultural traders. Kuwaiti Sovereign Fund also consist of oil revenues, realizes investment goals in the country's economy, in infrastructure projects. The State Pension Fund of the Global Fund (GPFG) represents all oil export revenues coming into the fund, where the costs do not exceed 3%.

Russia has an individual development path, depending on many factors, including endogenous and exogenous factors, which do not allow to develop an investment strategy for the NWF quickly.

In Russia, the following practice of the distribution of oil revenues has historically developed. While direct payments were accepted in the middle of 2000, there was a direct correlation between budget formation and oil export revenues in budget policy. Further, the Reserve Fund became a source of covering the budget deficit that arose during the 2009 crisis. It is worth noting that until 2018 there were two funds - the NWF and the Reserve Fund in Russia, but last year the Reserve Fund was abolished after the government completely spent funds on covering the federal budget deficit. The NWF is replenished due to rising oil prices according to the budget rule: the excess profits are allocated not to expenses, but to reserves. (in case when oil price is higher than $ 40).

Ehe volume of the NWF increased by 7.6% - from 3.75 trillion to more than 4 trillion rubles over the past year. Historically, the energy sector has always been a strategically important branch of the Russian economy. It brings a significant share of federal budget revenues. The electric power industry is a subsystem of the fuel and energy complex and is the basic infrastructure industry in Russia. It provides the country with energy and is exported abroad.

Electricity prices constitute themselves a natural monopoly and consist of transmission and distribution costs. Prices in the electric power industry are regulated by the state (Rotemberg, J.J., Woodford, M., 1996), since the cost of fuel is quite high and fixed assets become obsolete. Sales companies are forced to sell electricity to households not at market prices, but at government prices. The price difference can be more than doubled. And if the company has debts from consumers, then in order to cover its losses, the sales company inflates the price of electricity for the companies. Electricity pricing reform includes a gradual shift towards full household payments. Household expenditures for electricity consumption are usually classified as consumption expenditures and not included in the mandatory group. As a result of the reform, the cost of electricity consumption becomes mandatory. Social tension arises in society. Because the transformation of electric pricing is hitting household income. Social and property differentiation arises due to the low level of household income. The reform implies a serious decline in the living standards of most households due to low incomes. This does not correspond to the vector of mitigating social differentiation.

The purpose of this study is to assess the affordability of electricity and household income, which makes it possible to determine whether households need social support when paying for electricity.

Table 1: Summary of empirical studies

Authors	Research	Model	Results
Gylfason et al. (1999)	Cross-sectional data for the period 1960-1992, 65 countries	Cross-sectional regression model	Relationship between the size of the primary sector and the average rate of growth of output across countries
Ross (2001)	The link between oil exports and authoritarian rule analysis by three mechanisms: The "rentier effect"–governments use their oil revenues to relieve social pressures that might otherwise lead to demands for greater account ability "Repression effect" - oil wealth and authoritarianism may also be linked by repression. "Modernization effect" - democracy is caused by a collection of social and cultural changes	The model to predict regime types and test it using a feasible generalized least-squares method with a pooled time-series cross-national data set	The results suggest that the antidemocratic properties of oil and mineral wealth are substantial: a single standard deviation rise in the Oil variable produces a 0.49 drop in the 0-10 democracy index over the 5-year period, while a standard deviation rise in the Minerals variable leads to a 0.27 drop
Gianella (2007)	Optimal size of the Stabilisation Fund, Fund's allocation by fiscal prudence	Case study method	Fiscal rule is the main instrument to change the relationship between oil prices fluctuations and the budget growth
Rodríguez and Monaldi (2012)	Discussions of the direct distribution approach	Case study method	Direct distribution allows to change the country's perceived inability to effectively manage it vast natural wealth
Pierru and Walid (2012)	Energy-related investment opportunities for social-oriented decision-making	Bivariate VEC models	Quantifing the risk premium associated with the crude oil price for public investment decision-making avoiding social cost
Natina Yaduma, (2018)	The natural resource curse theory deviating from the existing literature applying "green" versions of income	Cross-country and panel regression techniques, the genuine income measure of GDP method	Oil incomes is the curse in Non-OECD oil-producing economies and blessing to OECD countries
Hoag and Wheeler (1996)	Oil price shocks impact on employment	VAR models differed in the choice of the employment variable	Oil price shocks have significant impacts on Ohio coal mining employment
Guerrero-Escobar et al (2019)	Cross country analysis whether countries are oil importers or exporters or have some form of energy price control	Structural VAR model	Oil supply shocks appear to have contractionary effects in both advanced and emerging market economies
Keqiang et al(2016)	Relationship between the oil prices and major U.S. and Canadian macroeconomic variables (real oil prices, domestic output, inflation, wages)	Structural VAR model	Oil shocks have a stimulative effect on Canadian aggregate demand and reduce real wages

2. LITERATURE REVIEW

Researchers comprehensively study the relationship between natural resources and economic effects (Table 1). Natural resources are a major part of government financing in the commodity economy. If there was a positive relationship between natural resources and economic growth in previous years, then the end of XX presented the opposite evidence of economic development (Mohtar, R.H., Shafiezadeh, H., Daher, J.B.B., 2019). The assumption of a negative relationship between the level of countries' wealth of natural resources and their economic growth is called the "resource curse" hypothesis (Gelb, 1988; Auty, 1993; Humphreys, M., Sachs, J.D., Stiglitz, Joseph E., 2007) or the "paradox of plenty" (Karl, 1997).

There are surprisingly little research papers about oil prices effects on wages, social benefits. Pierru and Matar (2012) social costs as additional risk premium for reduction in consumption and income fluctuations. Segal, Paul and Sen (2011) notes there are different social delivery mechanisms in India but they are not often reach to the targeted population.

Fuel energy plays a leading role in the Russian economy and in the life of its society (An, J., Dorofeev, M., Zhu, S., 2020). It is important to study the national characteristics of the oil market (Mikhaylov, 2019). Decreasing oil prices below forecast levels are becoming a serious test for the Russian economy. This caused the devaluation of the Russian ruble. A significant part of budget revenues and about half of the federal budget revenues come from the oil and gas sector and depend on fluctuations in exchange prices on commodity markets. Therefore, the correct forecasting of oil and gas budget revenues is the most important component of budget risks (Nyangarika et al., 2019).

The Russian state traditionally declares a policy of high social obligations. Blokhin (2019) emphasizes they grew significantly until 2009. Their source of growth is oil and gas sector income redistributed in favor of low-income groups of the population.

The problem of poverty in the country is supposed to be reduced by 2 times by 2024. But Rzhanitsyna (2019) suggests it is impossible to accomplish this task without a wage increase. Therefore, the budget 2019-2021 does not provide a solution to the problem of poverty reduction, as wage growth rates are low.

A variety of empirical data shows heterogeneity, and its direction and intensity depend on the type of natural resources. Income from natural resources affects the demand of households and firms through different channels and mechanisms. Some authors study the physical availability of a resource. Other scientists are considering rental income. To identify the effect, the indicator used must be exogenous.

The main revenue management options are accumulating oil revenues as financial assets or investing in physical assets.

The current oil revenues management in Russia is consistent with its fiscal policy. Another problem is increasing the welfare of the population, for instance raising the level of wages, social benefits. There is no favorable trend from rising oil prices and the growth of the NWF in household finances. It is accepted that oil revenue management should be aimed at providing national wealth for future generations. But what to do when the current population is in poverty, and the NWF grows and the sustainability of budget oil revenues is maintained.

Scientists (Bertrand and Mullainathan, 2005, Moss, 2011) also highlight another research area of the relationship between oil and social policies - these are the so-called conditional cash transfers. This oil-to cash concept is aimed at poor households to raise welfare and to stimulate consumption. The program is part of a supervisory policy on the distribution of targeted transfers and improving the quality of social protection.

Energy plays a significant role in economic development. Hayek (2009) noticed that a free price system allows for economic coordination via the price signals that changing prices send. Price is seen as a label, a signal, a piece of information that is attached to the good and service traded.

A great number of studies (such as Cologni, A., Manera, M., 2008) have used VAR modelling in order to estimate the impact of oil prices on economic development. However, studies for Russia are more limited, possibly due to the lack of sufficiently long time series.

H1: Our hypothesis is changes in energy prices do not affect the increase in wages and social benefits.

H2: Our hypothesis is changes in energy prices negatively affect the level of wages and social benefits.

3. METHODOLOGY

The Russian economy can be described as transitional with a high dependence on raw material rent. There are important elements of economic policy, such as the competent distribution of budget funds, the formation of reserve funds with a budget surplus when budget revenues directly depend on the hardly predicted price of resources in these types of economies.

The 1998 Asian financial crisis led to a drop in oil prices below $ 10 per barrel, which later became one of the default factors in Russia.

Since 2002, there has been an increase in oil prices, reaching in mid-2008 a historic high of $ 143.95. The beginning of the global financial crisis of 2008 led to a reduction in prices - to 33.73 dollars per barrel. Since mid-2009, a slow rise in oil prices has become noticeable.

Government spending increased by 134% in 2018 compared to 2014. During the recession, the state increased spending on national defense due to the problem of Crimea by 52% in 2016 compared to 2014, but in 2018, spending fell by 26% compared to 2016. Cost reduction was necessary to reduce the budget deficit. Spending on social policy grew annually until 2017 and then began to decline. Health expenditures also declined annually until 2017 and had a slight increase in 2018. Ministry of Finance plan is to cut healthcare costs by 2021. The costs of servicing municipal and state debt grew annually until 2018, which is twice as high than in 2014. The dynamics entails negative consequences, which are characterized by a reduction in national savings. The increase in costs of servicing municipal and state debt is caused by the fact that the state using borrowed funds but the growth of the state itself begins to slowly decline for a long time, respectively, and in the near future, expenses will also decrease, this can lead to favorable economic consequences.

According to Gelb[1] (1988) there are next ways for absorbing windfall gains from natural resources (Chart 1):

World practice distinguishes two ways of managing commodity incomes: full saving of all commodity incomes or partial saving and partial financing of the budget deficit. Oil incomes significantly affect the state budget. As a result, budget spending begins to increase. In order to ensure the economic development, increase the welfare of the population, an increase in spending on social needs is required.

Let us analyze the data obtained. There is the strongest correlation between the volume of mining and wages and social benefits (–0.92 and 0.94) among all categories of cash income. This fact is predictable and confirms the exceptional raw materials dependence of the Russian economy. The correlation of social benefits is explained by the fact that they are mainly financed from the federal budget, which is very dependent on energy and resource rents.

There are 100 targeted articles reflecting the directions of social benefits in budget planning and accounting for budget execution at the federal level. Real accounting is carried out for significantly enlarged groups of social support or categories of recipients, which does not allow to evaluate the budgetary effectiveness of specific measures for specific categories of recipients. The publication of microdata on social support appears in online accesses with a large lag and is significantly aggregated for analysis. We note several negative periods of decline in household incomes. In 2014, real disposable income fell by 1 percent against the background of nominal growth compared to the previous period. In 2015, the decline was already 4%. Data on wage dynamics and forecasts is even more depressing. In 2015, real wages decreased by 9.5% compared to the previous year. Moreover, the official and observed inflation rate is different, which affects the forecasts of official structures and macroeconomic analytical centers. The expenditures of the population are oriented towards satisfying consumer demand for essential goods and fulfilling state monetary obligations. So, starting in 2013, consumer activity has been declining, consumer models of household behavior are not shifting towards savings. Relatively stable macroeconomic indicators and declining consumption indicators describe sluggish social policy. According to the Ministry of Finance the size of the fund exceeds $ 58 billion.

1 Gelb, Alan. 1988. Oil Windfalls: Blessing or Curse? Oxford: Oxford University Press. pp.53

According to statistics, it is likely that Russia will be trapped in an economic downturn, where an economic downturn and growing poverty will reduce savings.

Research on prices for electricity consumption has formed a separate direction in the scientific literature on energy resources, demand side management, which is opposed to supply side management. The progressive resource pricing method was first described by Feldstein (1972). The relationship between electricity consumption and income level was also noted in other scientific researches (Herriges and King, 1994; Kamerschen and Porter, 2004; Wang et al., 2012; Hara et al., 2015; Tumanyants, 2020).

4. MODEL AND RESULTS

We obtained the time series data from the Rosstat and Minfin websites and specify the inter linkage among energy prices, oil and gas revenues, wages and social benefits. We define:

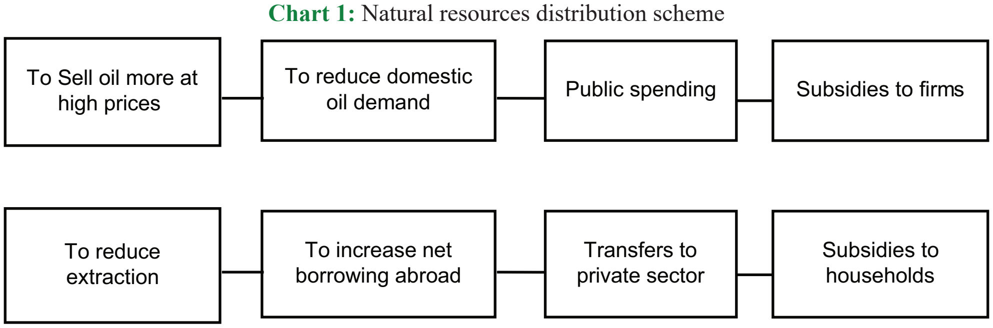
- EP_t – average annual energy prices
- $OGRt$ – annual oil and gas revenues
- W_t – average annual rated wage of employees
- SB_t – annual social benefits to the population and taxable cash income of the population.

Therefore, the following equation is formed (1):

$$EP_t = E_{t-p}+OGR_{t-p}+W_{t-p}+SB_{t-p} \quad (1)$$

The econometric basis of our empirical study is time series analysis. We initially selected a model of vector autoregression (VAR), pioneered by Chris Sims. The main advantage of this model is the possibility of simultaneous regression analysis of several explanatory variables, as well as freedom from restrictions imposed on systems of equations, which are the predecessor of the VAR model (2).

Chart 1: Natural resources distribution scheme



The policy choice is main factor. And macroeconomics is the second one.

$$\Delta EP_t = a_0 + \alpha EP_{t-1} + \beta_2\,\Delta EP_{t-1} + \beta_3\,\Delta EP_{t-2} + \cdots + \varepsilon_t \quad (2)$$

However, using the VAR model does not provide consistent estimates if the variables are non-stationary time series. The situation improves if the time series used are cointegrated. In this case, it is necessary to carry out a vector model of error correction (VECM) analysis. Like the VAR model, this model allows to provide multivariate analysis. The VECM view takes into account the presence of cointegration relationships, which allows us to distinguish both short-term relationships and long-term trend relations. This can be valuable both for making patterns in the data more interpretable and for reaching to meet the assumptions of inferential statistics. ECM part of the equation is described as follows (3):

$$\Delta EP_t = \varphi + \delta t + \ddot{e}\hat{u}_{t-1} + \gamma_1 \Delta EP_{t-1} + \ldots + \gamma_p \Delta EP_{t-p} + \omega_0 \Delta X_t + \ldots + \omega_q \Delta X_{t-q} + \varepsilon_t \quad (3)$$

Our econometric model simultaneously describes the behavior of several jointly dependent variables X (oil and gas export revenues, wages, social benefits) through a change in own previous values (energy prices) and the values of the above jointly dependent variables.

It is generally accepted that the vector autoregression model involves a large number of parameters for estimation and the inclusion of a large number of lags. So, for a model with n variables and p lags, the number of coefficients estimated in each equation will be equal to (1 + np) and for the whole model t (1 + tp), and it will also be necessary to estimate (1 + t) tj2 parameters of the covariance matrix. This leads to the inefficiency problem in estimation and high forecast errors. Therefore, our VAR model includes three variables that allow us to evaluate our hypothesis. This point is especially relevant in the case of the Russian economy, whose macroeconomic indicators are characterized by a short data history in year equivalent. So, our VAR model is small in size and is not aimed at identifying transmission channels of various types of shocks (like Bernanke, B.S., Gertler, M., Watson, H. 1997, 2004), but at share of the change in energy prices, which can be directed to increasing wages and social benefits.

Estimation results for equation EP (4) (Table 2):

$$EP_t = -13.068 + 2.013EP_{t-1} + 0.43OGR_{t-1} + 0.26W_{t-1} - 1.276SB_{t-1} \quad (4)$$

Estimation results for equation OGR (5) (Table 3):

$$OGR_t = 645.36 - 0.185EP_{t-1} + 0.9OGR_{t-1} - 0.03W_{t-1} + 0.149SB_{t-1} \quad (5)$$

Estimation results for equation W (6) (Table 4):

$$W_t = 18633.238 + 111.836EP_{t-1} + 7.622OGR_{t-1} + 4.962W_{t-1} - 24.411SB_{t-1} \quad (6)$$

Estimation results for equation SB (7) (Table 5):

$$SB_t = 3225.937 + 24.877EP_{t-1} + 2.362OGR_{t-1} + 1.266W_{t-1} - 6.223SB_{t-1} \quad (7)$$

Table 2: VAR (EP) estimates

	Std. Error	t value	Pr(>|t|)
EP_1	0.16832	11.962	7.68e-12
OGR_1	0.10521	4.087	0.000396
W_1	0.02461	10.568	1.04e-10
SB_1	0.12058	–10.586	1.00e-10
Const	423.70399	–0.031	0.975640
Residual standard error: 1342 on 25 degrees of freedom	Multiple R-Squared: 0.8877		Adjusted R-squared: 0.8697

Table 3: VAR (OGR) estimates

	Std. Error	t value	Pr(>|t|)
EP_1	0.15393	–1.204	0.240
OGR_1	0.09622	9.358	1.2e–09
W_1	0.02251	–1.377	0.181
SB_1	0.11028	1.355	0.187
Const	387.50101	1.665	0.108
Residual standard error: 1228 on 25 degrees of freedom	Multiple R-Squared: 0.8619		Adjusted R-squared: 0.8398

Table 4: VAR (W) estimates

	Std. Error	t value	Pr(>|t|)
EP_1	9.142	12.233	4.75e-12
OGR_1	5.715	1.334	0.194294
W_1	1.337	3.712	0.001035
SB_1	6.549	–3.727	0.000995
Const	23013.603	0.810	0.425774
Residual standard error: 72910 on 25 degrees of freedom	Multiple R-Squared: 0.9568		Adjusted R-squared: 0.9499

Table 5: VAR (SB) estimates

	Std. Error	t value	Pr(>|t|)
EP_1	1.8480	13.461	5.89e-13
OGR_1	1.1552	2.044	0.0516
W_1	0.2702	4.685	8.43e-05
SB_1	1.3239	–4.700	8.10e-05
Const	4652.0309	0.693	0.4944
Residual standard error: 14740 on 25 degrees of freedom	Multiple R-Squared: 0.9608		Adjusted R-squared: 0.9546

Table 6: Covariance matrix of residuals

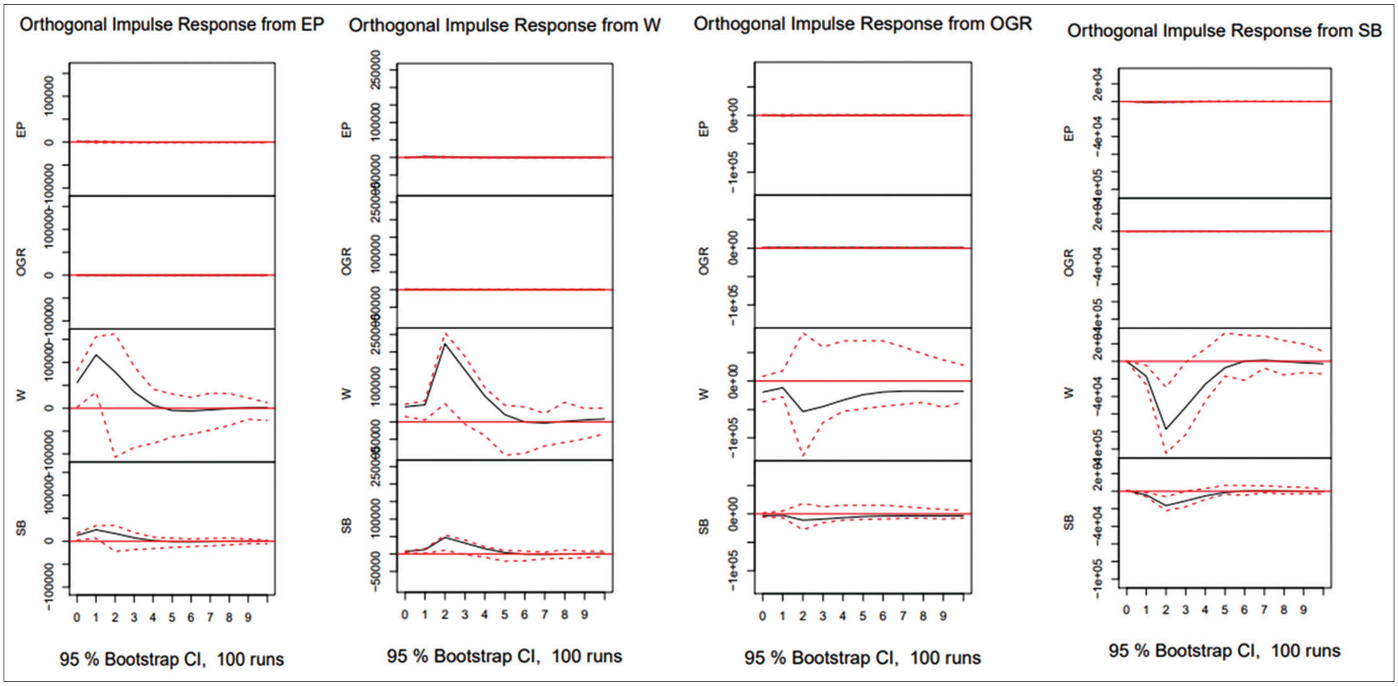
	EP_t	OGR_t	W_t	SB_t
EP_1	1801861	154491	74602026	17069774
OGR_1	154491	1507099	–17413801	–2319509
W_1	74602026	–17413801	5315760899	1056762489
SB_1	17069774	–2319509	1056762489	217210774

Table 7: Correlation matrix of residuals

	EP_t	OGR_t	W_t	SB_t
EP_1	1.0	0.094	0.762	0.863
OGR_1	0.094	1.0	–0.195	–0.128
W_1	0.762	–0.195	1.0	0.984
SB_1	0.863	–0.128	0.984	1.0

Analysis of variance shows the following energy prices, oil and gas revenues, social benefits as a percentage (Chart 2, Tables 6 and 7).

Chart 2: Impulse response function of energy prices, oil and gas revenues, wages, social benefits



An impulse (shock) from energy prices to wages, social benefits at time zero has large effects the next period, but the effects become smaller and smaller as the time passes, but there is no effect to oil and gas revenues. The last one has large effects to wages and much less to social benefits. Wages itself has large effects to own values and smaller to social benefits which have the opposite direction.

Since there are cointegration relationships, we use the VECM model. The most famous estimator for VECMs is the maximum likelihood estimator of Johansen test. So we need to run the Johansen procedure to know that the variables are cointegrated. Johansen-Procedure conducts restriction tests on the Vector Error Correction Model by using VECM function from package urca and specifying the number of cointegrating relations. Johansen-Procedure consist of eigenvalue test type with linear trend. We find number of lambda which shows eigenvalues of our matrix. Firstly, we can see the results of maximal eigenvalue statistic (lambda max), without linear trend and constant in cointegration (Table 8).

Analyzing eigenvectors, normalised to first column we find there are at least 2 cointegration relations (Table 9).

Since the test statistic exceeds the 1% level significantly we reject the first, r=0, hypothesis. These are the cointegration relations. Eigenvectors, normalised to first column are presented in Table 10.

Alternatively, we can also extract the matrix in Table 11.

We see that the equations have insignificant errors correction term, as the error correction term must be negative (8-11) (Table 12).

$$EP_t=17.851ECT_1-0.111ECT_2-22.337EP_{t-1}-0.027OGR_{t-1}+0.282W_{t-1}-0.13SB_{t-1}-26.449EP_{t-2}+0.029OGR_{t-2}+0.129W_{t-2}+0.528SB_{t-2} \quad (8)$$

Table 8: Eigen lambda statistics

Eigen lambda values	8.112	5.686	3.493	2.465	1.543

Table 9: Rank matrix statistics

	Test	10pct	5pct	1pct
r≤3	7.64	7.52	9.24	12.97
r≤2	11.60	13.75	15.67	20.20
r≤1	22.70	19.77	22.00	26.81
r=0	45.01	25.56	28.14	33.24

Table 10: The eigenvectors

	EP.l1	OGR.l1	W.l1	SB.l1	Constant
EP.l1	1.0	1.0	1.0	1.0	1.0
OGR.l1	–0.002	0.023	0.008	–0.01	0.001
W.d	–0.013	–0.004	–0.033	–0.015	–0.006
SP.d	0.016	–0.028	0.110	0.026	–0.019
Constant	–18.799	–50.287	–159.858	45.722	–26.181

Table 11: The matrix

	EP.l1	OGR.l1	W.l1	SB.l1	Constant
EP.d	–21.53	–9.793	0.461	–3.325	1.17
OGR.d	–0.293	–13.032	–0.812	15.662	–1.313
W.d	–899.486	–522.372	41.993	–110.247	4.934
SB.d	–223.992	–108.711	9.269	–24.511	1.167

Table 12: The cointegrating vector (estimated by Johansen)

	EP	OGR	W	SB
r1	1.000	8.674	1.9516	–0.04
r2	0.000	1.000	–8.882	–0.935
r3	2.842	0.000	1.000	–3.67

$$OGR_t=43.736ECT_1-0.636ECT_2-41.74EP_{t-1}+0.687OGR_{t-1}+0.189W_{t-1}+0.776SB_{t-1}-33.954EP_{t-2}+0.593OGR_{t-2}+302W_{t-2}+1.109SB_{t-2} \quad (9)$$

$$W_t = 731.991ECT_{t-1} - 4.958ECT_{t-2} - 266.345EP_{t-1} - 0.759OGR_{t-1} + 2.74W_{t-1} - 8.226SB_{t-1} - 239.533EP_{t-2} + 2.822OGR_{t-2} + 2.639W_{t-2} + 7.831SB_{t-1} \quad (10)$$

$$SB_t = 60.744ECT_1 - 0.817ECT_2 - 60.667EP_{t-1} - 0.438OGR_{t-1} + 2.532W_{t-1} - 1.843SB_{t-1} - 54.56EP_{t-2} + 0.411OGR_{t-2} + 0.437W_{t-2} + 4.99SB_{t-2} \quad (11)$$

This study's econometric methodology firstly examines the stationarity properties of the univariate time series. Augmented Dickey-Fuller (ADF) test is employed to test the unit roots of the concerned time series variables (Dickey and Fuller, 1979).

The unit root tests are directed to clear how the effects of the variables have changed or not over the years. Both the ADF and LR are measured and the null hypothesis of this test states that there is no unit root in the variables and that these are stationary. In our case p-value of less than 5% means we can reject the null hypothesis that there is a unit root (Table 13).

We use Phillips and Ouliaris Unit Root test for rejection the null hypothesis of no-cointegration the value of the Phillips and Ouliaris Unit Root test statistic is: 0.2651. We need to reject the null hypothesis of no cointegration if the computed value of the statistic is greater than the appropriate critical value. We don't reject at the 5% level as the computed value of PU is smaller than 40.1220.

There are two different likelihood ratio tests in Johansen's procedure: the trace test and the maximum eigenvalue test. The first one tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors and the second one is other way round.

The results are described as Table 14.

We choose the criteria as correlograms do not appear to be useful in case of more than one parameters. One of the generally accepted approaches to solving the problem of determining the lag depth involves estimate the model of vector autoregression for different values of the time lag p and next, use informational criteria (Akayke Akaike, H.,1981, Bayesian, Hannen-Quinn criterion) to (Schwarz, G., 1978) justify the choice of the lag depth.

The influence of exogenous and endogenous factors on energy price determination was considered as a non-linear dependence based on the selection of pre-built models according to the information criteria of Akaike, Hannen-Quinn.

Table 13: Unit root tests

Test	Test statistic	P-value
LR test	2.64	0.1
Augmented Dickey-Fuller test	-3.156	0.128
Phillips and Ouliaris test	0.265	40.122

Table 14: Lag order selection criteria

AIC	rank = 3	lag = 1 (p)
BIC	rank = 3	lag = 1 (p)
HQ	rank = 3	lag = 1 (p)

The information criteria of Akaike (AIC), Hannan-Quinn (HQ), were used to select the optimal number of lags. We found information criteria and final prediction error. According to the results, variables with lag values were included in the model.

5. CONCLUSION

We are studying the possibility of the social policy transformation towards direct financing methods due to energy prices rising. This model explains the relationship between the average short-term energy price growth in proportion to the change in independent factors – oil and gas revenues, social benefits and wages, taking into account the random component.

But the relationship is barely noticeable, despite the fact that oil revenues are more than 40% of the budget. This confirms the need to adjust the oil revenue distribution policy in relation to social financing, as well as the need to study the social policy in the context of the oil revenue distribution. Based on this, two directions can be identified. The first is the improvement of the oil revenue distribution and its orientation towards increasing the incomes of the population. The second is the change in the savings management of the National Wealth Fund.

In Russia, deputies regularly declare the need to transform the raw material model of the economy. In the summer of 2019, deputies of the State Duma introduced a bill regarding the establishment of guarantees for the restoration and protection of the savings of citizens of the Russian Federation. The main goal of the bill is to create a National Savings Fund in the Russian Federation. It is planned that the National Savings Fund will be part of the federal budget and will distribute additional oil and gas revenues in equal shares among residents.

The issue of the distribution of oil rents is raised among scientists and politicians from year to year. In 2018, the Communist Party initiated a bill to include pensioners, officially employed and unemployed citizens in the distribution of oil rents. According to the bill, it is proposed to distribute 20% of the annual income from the extraction of natural resources among citizens, and then raise this indicator by two percent annually.

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