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MANAGEMENT OF INSTITUTIONAL FACTORS OF ECONOMIC DEVELOPMENT

The article offers the authors' grouping of countries according to the compliance rate of GDP growth and the total factor productivity to determine the type of development of the country and prospects for the future. The need to improve the infrastructure and institutional business environment in order to enhance the economic performance is identified. An econometric analysis of the influence of components of economic freedom upon the development of machinery industry is carried out.

Keywords: *institutional factors; total factor productivity; the institutional environment; economic freedom; economic development.*

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УПРАВЛІННЯ ІНСТИТУЦІЙНИМИ ЧИННИКАМИ ЕКОНОМІЧНОГО РОЗВИТКУ

У статті згруповано країни світу залежно від темпів зростання ВВП і сукупної продуктивності чинників виробництва, щоб визначити тип розвитку країни та перспективи на майбутнє. Вказано на необхідність покращення інфраструктури та інституційного середовища бізнесу з метою підвищення ефективності економіки. Проведено економетричний аналіз впливу компонентів економічної свободи на розвиток машинобудування.

Ключові слова: *інституціональні чинники; сукупна продуктивність чинників виробництва; інституційне середовище; економічна свобода; економічний розвиток.*
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УПРАВЛЕНИЕ ИНСТИТУЦИОНАЛЬНЫМИ ФАКТОРАМИ ЭКОНОМИЧЕСКОГО РАЗВИТИЯ

В статье осуществлена группировка стран мира в зависимости от соответствия темпов роста ВВП и совокупной производительности факторов с целью определения модели развития страны и вытекающих задач на перспективу. Показана необходимость улучшения инфраструктурных и институциональных условий предпринимательской деятельности с целью повышения производительности экономики, проведен эконометрический анализ влияния компонентов экономической свободы на развитие машиностроения.

Ключевые слова: *институциональные факторы; совокупная производительность факторов; институциональные условия; экономическая свобода; экономическое развитие.*

Introduction. An effective solution to the most pressing economic and social problems of a country such as improving the quality of life, industrial upgrade, increasing the competitiveness of local producers and investment attractiveness of local enterprises is impossible without stable industrial growth.

Modern industrial growth quality causes changes in the technological basis of in social production and social arrangement of the economy thus fostering restucturing in the system of social relations, as well as the transformation of national and world

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economy nature. The world economy transformation takes place in the conditions of irreversible informatization, globalization and virtualization of economic links.

State will not be able to achieve the mission of intensive development without creating institutional environment that supports business development.

Literature review. The topic of industrial growth and quality has been represented in economic literature mainly in its reproductive and structural aspect.

The problems of economic growth in the context of production intensification, the reproduction features of economic resources and their impact on economic dynamics were studied by A.I. Anchishkin (1989), A.G. Granberg (1985), V.V. Ivanter and B.N. Кузын (2005), N.D. Kondratiev (2002), V.A. May (2000), K.I. Mikulsky (2005), P.M. Nureyev (2000), V.F. Saliychuk (2007), G.A. Feldman (1928), T.S. Hachaturov (1996), Y.V. Jaremenko (1999), E.G. Yasin (2003) and others. Scientists rend to link the quality of modern economic growth with the preferential growth of technology-intensive economic activities and production focused on a final product, but they underestimate the institutional instruments of industrial growth. Institutional problems of industrial development are discussed in the works of foreign scholars such as R. Coase (1998), B. Lundvall (1992), D. North (1997), R. Freeman (2006) and Russian scholars A.N. Oleinik (1997), V.M. Polterovich (2009), V.L. Tambovtsev (2005), A.I. Shinkevich et al. (2009) and others.

Definition of the target problem for the analysis. The object of this research is the institutional factors of the machinery industry development. Machinery industry is always a priority in the state policy on stimulating industrial growth.

The aim of this research is to find out what institutional components of economic freedom are necessary for the development of engineering positions with the optimal balance of liberalism and state intervention.

The methods of the research are systematic and comparative analysis of scientific literature and statistical information, correlation and regression analysis.

Presentation of the research material, including the description of the methodology and the key research findings. Many economists believe that the most preferred are low (2–4% per year), but stable economic growth rates (Anchishkin, 1989), as higher growth rates lead to a reduction in quality due to increased anthropogenic impact on the environment and increase in labor intensity.

The ratio of the total factor productivity (TFP) growth and GDP dynamics is shown in Figure 1 that demonstrates the different roles of intensification (increasing the efficiency of resource use) to generate the GDP growth. The degree of growth intensification, expressed as a rate of change of resource intensity of GDP determines its stability.

The countries represented in Figure 1 can be divided in 4 groups (Figure 2).

According to Figures 1 and 2, the so-called "innovative pause" is observed in developed countries. This happens due to the fact that the intensity of the secondary flow ("improvers", according to G. Mensch (1979)) of innovations is generated by the current basis of innovation, which significantly decreased (Granberg, 1985), and the new basic innovation is not yet "ripe", thus causing the global crisis.

The innovative pause gives Russia new opportunities to reduce the gap with developed countries, since the West is forced to look for new technologies, and developing countries can use the achievements, that already existed.

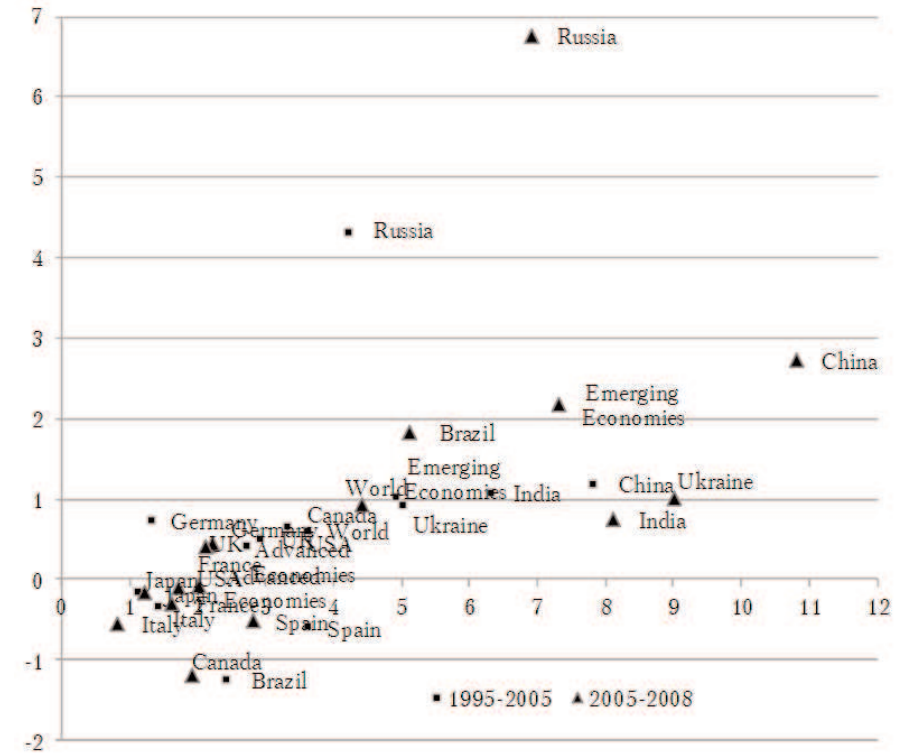

Figure 1. **The ratio of growth of total factor productivity (TFP) to GDP growth in the dynamics,** *compiled by the authors on the basis of the data by The Conference Board in New York*

GDP growth \ TFP growth	Increase	Decline
Increase	***Catching-breakthrough growth (borrowing efficient technologies)*** The World Emerging economies Brazil China Russia Ukraine	***Resource-intensive economy*** India
Decline	***Unjustified optimistic expectations about the future*** Spain	***«Innovative pause»* in stable growth*** Advanced economies USA UK Canada France

* A significant reduction in the inflow of technological innovation and over-optimistic expectations generated by the long preceding period of rapid growth.

Figure 2. **The matrix of correlation of TFP and GDP growth,** *developed by the authors*

Judging by the position in Figure 1, Russia is well placed to implement the catching-breakthrough growth model (Gryaznova, 2006), as the country has the factors absent in other developing countries at the time of their economic recovery.

These factors are high-educated Russian population and the developed system of fundamental research. Around 3,500 organizations are engaged in RSD in Russia today (Guravleva, 2006). In 2005 the largest number of patents for inventions were given to Japan (300.6 ths), USA (about 150 ths), Germany (47.6 ths), China (40.8 ths), South Korea (32.5 ths), Russia (17.4 ths), France (11.4 ths), the UK (10.4 ths), Taiwan (4.9 ths) and Italy (3.7 ths). 8.9% of the total number of scientists around the world are working in Russia now. Russia ranks fourth by this indicator and is behind only the United States (22.8% of the research staff), China (14.7%) and Japan (11.7%) (National Research University, Higher School of Economics, 2012). We also can't contested the significant achievements in Russian machine-building (especially in the defense industry and space exploration).

The essence of the catching-breakthrough model is the simultaneous localization of foreign advanced technology and breakthrough in technology, based on the national scientific and technological potential. Naturally, the catching breakthrough model requires scientific justification of priorities of modernization and the creation of institutional and infrastructural conditions to increase, according to V. Polterovich (2009), "absorptive capacity of the country and the creation of development system and implementation of large-scale modernization projects".

Institutional determinants of industrial growth research. For the aims of the research we use those indicators that assess the business environment in the country and the investment environment in particular. There are indicators that quantitatively assess the investment climate and business environment in the world. They are called: the Index of Economic Freedom (Index of Economic Freedom, 2012, 2013) by Heritage Foundation; the Index of Economic Freedom by Fraser Institute (Economic Freedom Index, 2012, 2013), the indices by the European Bank for Reconstruction and Development (Transition Indicators); the index of business conditions by the World Bank ("Doing Business").

Among the mentioned indices in our opinion, the Economic Freedom Index, calculated by the Heritage Foundation represents the components better than others.

The sources of information for the calculation of the components of the index (freedom of business, labor freedom etc.) are the international indicators by the World Bank, World Development Indicators, the reports of the OECD, as well as other official sources.

In order to study the effects of certain components of the Index of Economic Freedom on the development of mechanical engineering abroad we selected the period from 2001 to 2007 as this period was less prone to cyclical fluctuations globally.

We tested the presence of the influence of components of the Index of Economic Freedom on the development of mechanical engineering by means of the statistical analysis of the observed set of sample data, using the methods of correlation and regression analysis. We used the value of the gross value added engineering and components IEF in a number of foreign countries.

To avoid multicollinearity of the explanatory variables, we used the simple regression of the form:

$$\ln(Y_{it}) = a_i \times O''_{it} + b_i + \varepsilon_{it}, \quad (1)$$

where Y_{it} – the dependent variable (the growth of the gross value added engineering) in i-country at t-year; O''_{it} – the explanatory variable (a component of the Index of

Economic Freedom) in *i*-country at *t*-year; a_i and b_i – the regression parameters; ε_{it} – the regression residuals.

To determine the strength of the impact factors of economic freedom on the development of mechanical engineering we will present the regression equation in its standardized form:

$$\ln(t_{y_i}) = \beta_i \times t_{x_i} + \varepsilon_i, \quad (2)$$

where t_{yi}, t_{xi} – the standardized variables; β_i – the standardized regression coefficient.

The results of the correlation and regression analysis for the components of the index of economic freedom on the gross value added engineering in a number of foreign countries are presented in Table 1.

As a component of the Index was not included the freedom of labor relations, as for the period from 2001 to 2004 this figure was not calculated.

The standardized regression β-coefficients are obtained by processing the sample data by SPSS Statistics Data Editor.

Conclusions and prospects for further research. Comparing the standardized regression β-coefficients for each of the selected countries, we can draw the following conclusions:

1. The most important factors by strength on the development of the industry for most countries in the researched period were the freedom of trade and the freedom from corruption. The positive impact of free trade on the development of the industry can be an attributed feature of economic recovery after the 1998 crisis, as leaders in the industry are multinational companies.

Interesting is the fact that high dependence of the industry growth from the freedom from corruption was shown in advanced economies. At the same time, the figure for Mexico was not significant (t-test = 0.35).

Habib's and Zuravichi's (2001) research shows that the higher is the level of corruption of officials in a state, the less attractive it is for foreign investors. Accordingly, referring to the investment attractiveness of the sector we can state that the freedom from corruption positively impacts on the attractiveness of investment and development engineering.

2. There is a strong correlation with high significance between the indicators of the "Doing Business" and the growth of gross value added engineering in a number of countries (USA, Finland, Mexico) and at the same time this correlation is moderate or absent in other countries. The impact of fiscal freedom for the industry's growth is observed in some countries (USA, Germany, Finland, France, Italy, Mexico, Switzerland, Austria), moreover, its impact in Switzerland has a negative sign.

3. The interrelation of monetary freedom and growth of the industry was significant in most countries. Since the distribution of investment freedom indicators, financial freedom indicators and the protection of property rights indicators corresponds to a uniform distribution law in some countries (their values are constant in the given period of time), then the construction of correlation models of groups of countries is not possible.

In our opinion, this interrelation is not observed because of the lack of dynamics of indicators over a longer period. For example, the effect of minor changes in

Table 1. **The regression coefficients and their estimates calculated to determine the dependence of mechanical engineering in the selected countries on the components of the Index of Economic Freedom,** *developed by the authors*

Country	Economic freedom		Business freedom		Trade freedom		Fiscal freedom		Freedom from government		Monetary freedom		Investment freedom		Financial freedom		Property rights	
	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test	Coefficient â	t-test
S. Korea	0.8	2.9^{n}	1	10.4^{*}	-0.1	-0.3^{n}	-0.8	-3.2^{***}	-0.8	-2.7^{***}	–	–	–	–	-0.8	2.7^{***}	0.9	4.8^{*}
Germany	0.7	2.4^{n}	0.9	6.5^{*}	0.9	4.7^{*}	-0.4	-0.9^{n}	-0.8	-2.7^{***}	–	–	–	–	–	–	0.9	4.1^{*}
Finland	0.8	3.2^{***}	1	8.9^{*}	0.9	3.6^{**}	-0.9	-4.9^{***}	0.7	1.9^{****}	–	–	0.7	2.4^{****}	–	–	1	13.4^{*}
Japan	-0.1	-0.2^{n}	0.9	4.1^{*}	-0.3	-0.6^{n}	0.3	0.8^{n}	-0.2	-0.4^{n}	0.5	1.1^{n}	-0.5	-1.3^{n}	-0.4	-1.1^{n}	0.9	3.8^{**}
Sweden	0.7	1.9^{*****}	1	11.4^{*}	0.2	0.4^{n}	-0.2	-0.3^{n}	-0.9	-4.6^{*}	0.4	0.9^{n}	-0.1	-0.3^{n}	–	–	1	9.1^{*}
Switzeland	0.8	2.6^{n}	0.5	1.5^{*****}	-0.8	-3.5^{***}	0.7	2.1^{***}	-0.5	-1.3^{n}	–	–	-0.8	-2.6^{***}	–	–	0.9	5.8^{*}
Austria	0.7	2.2^{****}	0.9	3.7^{**}	0.8	3.2^{***}	-0.2	-0.4^{n}	-0.1	-0.1^{n}	–	–	–	–	–	–	1	16.7^{*}
Italy	0.7	2.2^{n}	1	8^{*}	0.9	5.8^{*}	0	-0.1^{n}	-0.8	-3^{***}	–	–	-0.6	-1.6^{*****}	-0.7	-2.4^{****}	0.9	5.2^{**}
Mexico	0.8	3.2^{****}	-0.7	-2^{n}	1	7.7^{*}	-0.8	-2.2^{***}	0.4	1.1^{n}	–	–	-0.1	-0.2^{n}	–	–	0.2	0.4^{n}
USA	0.9	5.1^{*}	1	9.1^{*}	0.8	2.8^{***}	-0.8	-1.7^{***}	-0.4	-0.9^{n}	0.7	2.5^{****}	-0.7	-2.5^{****}	–	–	0.8	3.3^{**}
France	0.6	1.8^{*****}	1	7.3^{*}	1	7.8^{*}	-0.8	-2.6^{***}	-0.1	-0.2^{n}	0.3	0.8^{n}	0.6	1.6^{*****}	–	–	0.8	3.5^{**}
UK	0.7	2.5^{n}	1	9.2^{*}	0.5	1.4^{n}	-0.9	-4.1^{***}	-0.4	-1^{n}	0.8	3.2^{***}	–	–	–	–	1	9.6^{*}

* coefficient is significant at the 1% level.
** coefficient is significant at the 2% level.
*** coefficient is significant at the 5% level.
**** coefficient is significant at the 10% level.
***** coefficient is significant at the 20% level.
^{n} coefficient is not statistically significant.

property rights protection on economic growth can't be tracked, still a relatively high level of this indicator exists in some developed countries (90 of 100).

4. There is a strong interrelation with a relatively high standard of the significance of the regression equation between the indicators of freedom from the government index and the growth of gross value added engineering in the US, South Korea, Finland, France, the UK and Mexico. Of interest is the fact that this interrelation was reversed. The freedom from government index includes the level of government spending as a share of GDP, and is calculated by the formula:

$$GE_i = 100 - \alpha \times (Expenditures_i)^2, \quad (3)$$

where GE_i – the government spending in country i; α – the differences between the points control ratio; $Expenditures_i$ – the rate of government expenditure in GDP in country i.

The authors of the index are guided by the research confirming that excessive government spending is the cause of chronic budget deficits, which negatively affects the dynamics of economic development.

At the same time it is noticed that if the methodology treats zero government spending as a benchmark, the countries with a low level of economic development and thus limited state investment capabilities may have artificially high ranks.

The dependence of growth of GVA engineering upon the freedom from government index (VAm_i (GE_i)) is expressed as:

$$\begin{gathered} Expenditures_i \to \max, \alpha \to \max, \\ GE_i(Expenditures_i \to \min, VAm_i(GE_i) \to \max. \end{gathered} \quad (4)$$

The detected dependence of the reverse engineering on the freedom from the government index can be explained by the role of infrastructure investment for industry development. Governments of many countries, including the United States and South Korea, adopted ambitious programs of development and modernization of infrastructure in the period under study. They were based on the assumption that investments in infrastructure were one of the most effective factors for economic growth (Russian Statistical Yearbook, 2001). This assumption does not contradict D.A. Aschauer's (1989) conclusions that, when disaggregating public expenditure and emphasing the component of infrastructure spending we can come to the conclusion that these costs have a positive effect on economic growth in the US and Japan, while the study of the effect of government spending on economic growth shows it vice versa.

As a result of this study we conclude that the nature of the influence of the components of economic freedom in the development of machinery industry abroad is ambiguous. The presence of certain components of economic freedom had positive impact on the development of engineering in a number of foreign countries in the period under study. It was found that the component of freedom from government negatively affects the industry development, it follows that the industry development is closely related to those variable components of economic freedom, which do not express the degree of liberalization of various sectors of the economy, but rather, the effect of economic mechanisms of investment, operating in a country. In our opinion, the choice of public policy at each stage should be guided not so much by the choice of a particular set of components of economic freedom as the creation of institutions that promote positive effects of the industry development in the long term.

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