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**Modelling the impact of financial liberalization
on indicators of the internal macroeconomic
equilibrium of EU countries****Modelowanie wpływu liberalizacji finansowej
w zakresie wskaźników równowagi makroekonomicznej
wewnętrznych krajów UE**

Abstract: The hypothesis about the positive impact of financial liberalization on economic growth proposed by R. McKinnon and E. Shaw raised some questions regarding testing this hypothesis, development and evaluation of mechanisms of its influence. Over time, the interpretation of the concept of financial liberalization has evolved considerably, both qualitatively and quantitatively (by the number of effects that it causes). Most researchers still are unanimous that an effective external financial liberalization should be preceded by internal and necessary series of conditions of economic, financial and administrative system which have to be reached, so that the state did not experience any disruption. Therefore, a model of the impact of financial liberalization on indicators of the internal macroeconomic equilibrium in European countries is built in this paper. This will help to discover how the macroeconomic equilibrium changes in the countries, analyze the importance of financial liberalization and its impact on various economic indicators and so on.

Keywords: financial liberalization, macroeconomic equilibrium, economic growth, macroeconomic indicators

Abstrakt: Hipoteza pozytywnego wpływu liberalizacji finansowej na wzrost gospodarczy zaproponowana przez R. McKinnon i E. Shaw podniosła pewne pytania dotyczące testowania tej hipotezy, rozwoju i oceny mechanizmów jej wpływów. Z biegiem czasu interpretacja pojęcia liberalizacji finansowej ewoluowała jakościowo i ilościowo (przez liczbę efektów). Większość naukowców jest jednoznaczna, że skuteczna liberalizacja finansowa powinna być poprzedzona niezbędnymi badaniami stanu systemu gospodarczego, finansowego i administracyjnego tak, by państwo nie doświadczyło żadnych zakłóceń. Stąd, w tym artykule, przedstawiono model wpływu liberalizacji finansowej na wskaźniki wewnętrznej równowagi makroekonomicznej w krajach europejskich. Pomoże to dowiedzieć się, w jaki sposób zmienia się równowaga makroekonomiczna w krajach oraz dokonać analizy znaczenia liberalizacji finansowej i jej wpływu na różne wskaźniki ekonomiczne.

Słowa kluczowe: liberalizacja finansowa, równowaga makroekonomiczna, wzrost gospodarczy, wskaźniki makroekonomiczne

Introduction

Apparently, R. McKinnon and E. Shaw^{1,2} were the first who assumed that the lack of financial constraints could accelerate financial development and

¹ R. McKinnon, *Money and Capital in Economic Development*, Brookings Institution, Washington 1973, p. 200.

economic growth in general through stimulation of productivity and mobilization of savings. The link between financial and economic growth researches are exploring through traditional savings and investment curves, and conclude that financial liberalization contributes both to an increase in the quantity and improves the quality of investments. Other researchers have agreed with this conclusion. However, over time the positive image of financial liberalization was "shadowed" by the financial fragility and instability that liberalization is able to lead to. R. McKinnon and E. Shaw have hypothesized, that financial liberalization accelerates economic growth, while today, more often some of its effects are being questioned. I believe, the very hypothesis is correct, but the restrictions that liberalization sets and realities with which it faced in the process of globalization of the world, deprived its cogency. Thus, regarding the consequences of financial liberalization researchers are not unanimous.

Financial liberalization served to enhance the integration between some countries and accelerated the rate of economic growth, but at the same time financial crises have become more frequent and their negative consequences became more substantial.

Financial liberalization can be expressed with the KAOPEN index, which was developed by H. Ito and M. Chinn³. The average values for the 35 surveyed countries (EU+ neighbours) of the KAOPEN index during 1970-2005 years is shown on Fig. 1 .

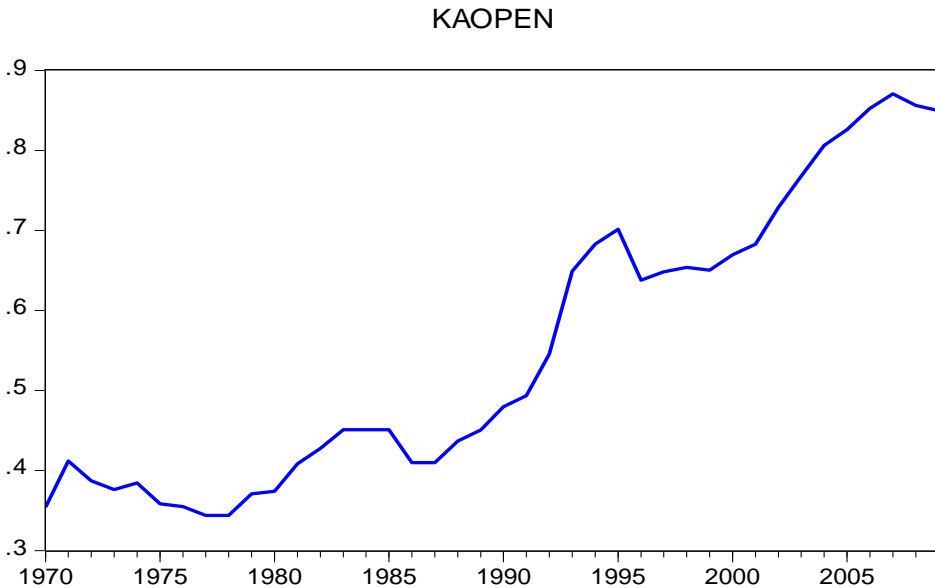


Fig. 1. Averaged values of the KAOPEN index for 35 European countries

² E. Shaw, *Financial deepening in economic development*, Oxford University Press, New York 1973, p. 260.

³ M.D. Chinn, H. Ito, *A New Measure of Financial Openness*, „Journal of Comparative Policy Analysis”, Vol. 10/2008, p. 309–322.

From the graph of KAOPEN dynamics can be seen that some European countries within the last 40 years went the full path of financial liberalization and financial liberalization occurred in several stages. These processes began in Western Europe and gradually moved east, north and south. The speed of spread in Europe was mostly caused by the political situation.

For determination of cycles of financial liberalization I use the Hodrick - Prescott filter⁴, which shows the positive trend of the KAOPEN for the past forty years and clearly shows four cycles (Fig. 2). It can be assumed that the first cycle 1970-1976 years, was associated with financial liberalization in Western European countries. Exactly this period, most scholars consider as the beginning of financial globalization in the world. At this time there was a shift from Bretton Woods to the Jamaican currency system that envisaged complete demonetization of gold and the transition to the Special Drawing Rights, that were developed by IMF. Developed economies of Europe, picked up this trend and demonstrated sustainable growth.

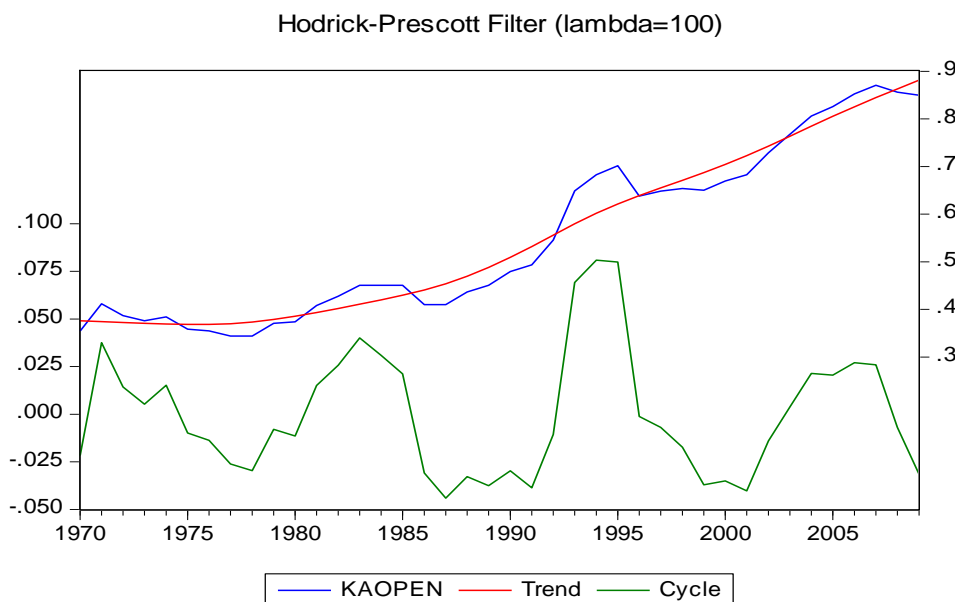


Fig. 2. The Hodrick - Prescott filter for the average value of the KAOPEN for 35 European countries

The second cycle of financial liberalization in Europe took place in the mid-80s, particularly in Scandinavia and Central Europe.

The third, most active cycle was caused by the collapse of the USSR, the fall of the Berlin Wall and the collapse of Yugoslavia, and the overthrow of number of dictatorships in European countries. A significant part of these coun-

⁴ R. Hodrick, E.C. Prescott, *Business Cycles: An Empirical Investigation*, „Journal of Money, Credit and Banking”, Vol. 29, No. 1/1997, p. 1-16.

tries embarked on the path of financial liberalization immediately which contributed to their economic transition and growth.

The last, fourth cycle of financial liberalization took place in 2000's in Eastern European countries. Generally this means that financial liberalization passed certain stages and served as a shock to many economies.

R. Goldsmith⁵, R. McKinnon⁶ and E. Shaw⁷ believe that financial liberalization should be based on the most efficient allocation of capital and savings at micro level that would facilitate economic growth in the long term. Although mentioned models of these scientists and their followers look logical and reasonable, a lot of empirical and theoretical studies appeared (see Review⁸), that questioned the effects of financial liberalization referring to the unsuccessful experience of some countries in Latin America, Africa and Asia.

R. McKinnon and H. Pill on the example of the intertemporal choice model⁹ show how short-term deviations from the a stable and rational behaviour can cause failures in the financial market. In particular, they pay attention to the fact that banks are not effective informational channels between borrowers and depositaries because they overestimate optimistic expectations about reforms in the process of financial liberalization among residents, international investors and authorities.

It can be assumed that banks do it, first of all, in order to obtain higher profits, which is due to higher economic and financial activity as a result of high expectations (people in general by nature are prone to high expectations). The country's economy or separate sector overheats, creating overproduction or a financial "bubble". When the economy cannot grow anymore, collapse, recession, financial crisis and capital flight happens.

Though here, probably, should be noted that the "syndrome of excessive borrowing" R. McKinnon and H. Pill consider in conjunction with successful internal reforms, international capital flows and possible collapse of the financial market.

Model

For modelling the interdependence between financial liberalization and internal macroeconomic equilibrium indicators I have developed a dynamic vector auto regression model that takes into account the impact of previous values. Such simulation does not require separation of variables into exogenous and endogenous, all variables that are included in the model are treated as interdependent.

Let's explore the VAR (p) model where endogenous variables are the index of financial liberalization - KAOPEN; INF_DEF - GDP deflator; LEN_I - discount rate; REAL_I - real interest rate; UNEM - unemployment; GOV_DEBT - public debt. Modelling is carried out on the basis of annual data from 1997 to 2009, covering 208 observations in 35 European countries.

⁵ R. W. Goldsmith, *Financial Structure and Development*, Yale University Press, New Haven 1969, p. 561.

⁶ R. McKinnon, *Money and Capital in Economic Development*, Brookings Institution, Washington 1973, p. 200.

⁷ E. Shaw, *Financial deepening in economic development*, Oxford University Press, New York 1973, p. 260.

⁸ F. Broner, J. Ventura, *Rethinking The Effects of Financial Liberalization*, CREI and Universitat Pompeu Fabra, „Working Paper” No. 16640/2010, p. 49.

⁹ R. McKinnon, H. Pill, *Credible Economic Liberalizations and Overborrowing*, „American Economic Association”, Vol. 87. No. 2/1997, p.189–193.

The choice of these indicators of internal macroeconomic equilibrium for modelling the financial liberalization impact is caused by their importance for the economy and the fact that these indicators were identified as significant by Granger causality tests¹⁰.

Infinite-order vector auto regression VAR (p) model looks like:

$$x_t = \Pi_1 x_{t-1} + \dots + \Pi_p x_{t-p} + C_t + e_t, \quad t=1, \dots, T, \quad (1)$$

$$e_t \sim IN_p(0, \Omega)$$

where:

$x_t = [KAOPEN_t, INF_DEF_t, LEN_I_t, REAL_I_t, UNEM_t, GOV_DEBT_t]$ – vector of endogenous variables; C_t - vector of deterministic components; e_t - disturbances vector.

Parameters of model I estimate using the method of maximum likelihood.

The choice of p order is determined through the estimate of logarithm of a likelihood function, modified likelihood ratio statistics, Akaike's and Schwarz information criterion. In a result of research of different VAR models was found that the optimal order of $p = 2$. Therefore, let's consider the VAR model containing two lagged values of the endogenous variables.

In particular, the evaluation the result obtained

$$\begin{bmatrix} KAOPEN_t \\ INF_DEF_t \\ LEN_I_t \\ REAL_I_t \\ UNEM_t \\ GOV_DEBT_t \end{bmatrix} = \begin{bmatrix} \mathbf{1.086993} & -0.007649 & -0.000582 & -0.009726 & 0.001506 & 0.001250 \\ -2.226767 & -1.701546 & 2.046296 & -2.145718 & \mathbf{-0.690972} & -0.050038 \\ -3.169631 & 0.641605 & 0.387616 & 0.662029 & -0.275156 & \mathbf{-0.057564} \\ -0.830101 & \mathbf{2.756944} & -2.093204 & \mathbf{3.210825} & \mathbf{0.428872} & -0.008921 \\ -0.361623 & 0.517190 & -0.342314 & 0.562025 & \mathbf{1.331796} & \mathbf{0.056327} \\ -7.755042 & 2.125349 & -1.516736 & 2.631646 & 0.314605 & 1.522766 \end{bmatrix} + \begin{bmatrix} KAOPEN_{t-1} \\ INF_DEF_{t-1} \\ LEN_I_{t-1} \\ REAL_I_{t-1} \\ UNEM_{t-1} \\ GOV_DEBT_{t-1} \end{bmatrix} + \begin{bmatrix} \mathbf{0.234246} & 0.025080 & -0.022315 & 0.027675 & -0.000707 & -0.001052 \\ -0.179208 & 0.240776 & -0.104494 & 0.175967 & \mathbf{0.625950} & 0.045498 \\ \mathbf{2.381069} & \mathbf{1.839481} & \mathbf{-1.9225351} & \mathbf{8.999430} & \mathbf{0.225598} & \mathbf{0.057850} \\ 2.476197 & 1.597076 & \mathbf{-1.807686} & 1.720789 & -0.411191 & 0.013510 \\ 1.270846 & -0.697742 & 0.626672 & -0.823592 & -0.422996 & -0.056997 \\ 5.953550 & -4.431182 & 3.902372 & -4.951355 & -0.358892 & -0.569034 \end{bmatrix} \begin{bmatrix} KAOPEN_{t-2} \\ INF_DEF_{t-2} \\ LEN_I_{t-2} \\ REAL_I_{t-2} \\ UNEM_{t-2} \\ GOV_DEBT_{t-2} \end{bmatrix} + C_t + e_t,$$

$$\ln L_{max} = -1305,080 \quad \ln |\Omega^\wedge| = 0,011351.$$

Obtained estimations are the maximum likelihood estimates. Coefficients of t-statistic, ratio that are greater than 1.9 are shown in bold. The values of the logarithm of a likelihood function $\ln L_{max}$ and the logarithm of the determinant of

¹⁰ Y. Kyrlych, *Causality between Financial Liberalization and Macroeconomical Indexes in EU, Ecological and Economic Problems of International Trade and Investments: materials of the Second International Scientific Conference*, Edited by Prof. Dr. Ihor Hrabynskyi, Part. 1, Lviv, 22-23 October 2013, Ivan Franko National University of Lviv, Lviv 2013, p. 76-79.

the covariance matrix residues in $|\Omega^{\wedge}|$ have an informative character in comparison to other characteristics of the model.

Let us also analyze values of Wald statistics obtained from testing the joint significance of each regressor in all equations of the system. Statistics are distributed as χ^2 ¹¹, and their values are given in Table 1.

Table 1. Results of testing the significance of variables in the infinite VAR model

	KAOPEN	INF_DEF	LEN_I	REAL_I	UNEM	GOV_DEBT	Joint
χ^2 , Lag 1	321.7766	52.37620	307.8109	69.08831	289.7568	277.4966	1288.279
p - value	[0.000000]	[1.57e-09]	[0.000000]	[6.29e-13]	[0.000000]	[0.000000]	[0.000000]
χ^2 , Lag 2	20.69982	20.67573	43.80276	15.82409	61.68355	46.13641	186.8370
p - value	[0.002077]	[0.002098]	[8.09e-08]	[0.014730]	[2.05e-11]	[2.78e-08]	[0.000000]

Source: own estimates.

It should be noted that all lags are significant.

For testing the adequacy of model I calculate values of the coefficients of determination - R^2 , that for each equation of the VAR system are shown in Table 2.

Table 2. The determination coefficients of each equation of the VAR system

Equation	KAOPEN	INF_DEF	LEN_I	REAL_I	UNEM	GOV_DEBT
R^2	0.917080	0.505792	0.906498	0.558132	0.912652	0.969941

Source: own estimates.

For the analysis of reaction of macroeconomic indicators of internal equilibrium to the change in the indicator of financial liberalization in the VAR model impulse response functions will be explored, that show the dynamics of all variables within the system in response to change in one standard deviation of one of them.

Results

The behaviour of the KAOPEN index in real life can be also considered as impulse, because most financial liberalization processes usually occurred quickly and rapidly, particularly in Eastern European countries. This is also evident from the cyclicity of financial liberalization, which had four cycles (periods) within the last 50 years.

¹¹ M.D. Chinn, H. Ito, *New Measure of Financial Openness*, „Journal of Comparative Policy Analysis”, Vol. 10, 2008, p. 309–322.

Analysis of the impulse response function of the GDP deflator to the KAOPEN in this model (Fig. 3) shows a sharp decline in six periods by two basic points, but then a slight recovery and attenuation is observed. Considering that the GDP deflator is measured in percentages with reference to the base year, one could argue about its significant reduction. The GDP deflator shows the rate of inflation/deflation relatively to the base year and, unlike the consumer price level, is not based on a fixed consumer basket but depends on the purchasing power, investment opportunities and more. Therefore, this is an important indicator of internal equilibrium.

Based on this VAR model and impulse response function, it could be argued that the increase in financial liberalization by one standard deviation leads to a decrease in the GDP deflator, i.e. reduction of inflation by two basic points. In most European countries, exactly this happened in practice, that perhaps was caused by the macroeconomic policy of inflation targeting in conditions of the open market. So, we can assume that financial liberalization in Europe positively influenced the GDP deflator.

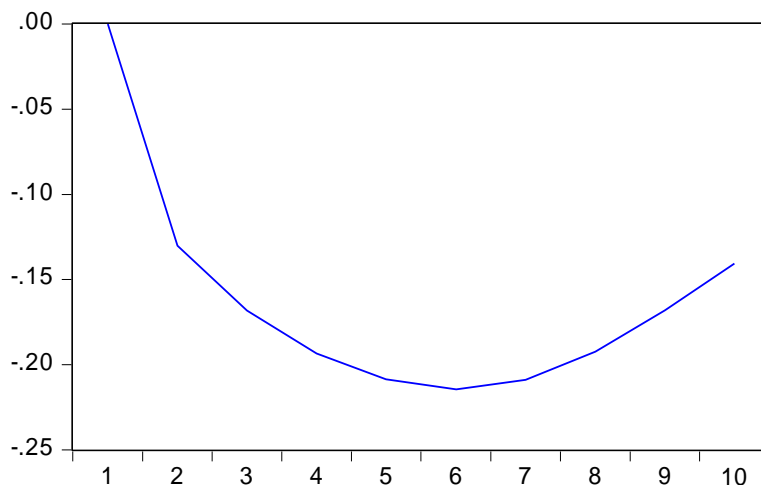


Fig. 3. The impulse response function of the GDP deflator to the KAOPEN

Modelling reaction of discount rate of surveyed countries central banks to change in one standard deviation of the KAOPEN shows a decline of two basis points in the first three periods (Fig. 4). Given that the financial liberalization in most countries, was usually held within five years, we can talk about the relevance of this indicator in the model. It is obvious that with liberalization of financial markets, capital can freely flow between countries, which almost always leads to the reduction of discount rates in order to attract investments and stimulate the economy, but the impulse response function shows, starting from the third period, the discount rate increase by one point and then attenuates. The opening of financial markets, trade increase, financial system depth growth, economic growth has prompted central banks to reduce discount rates in most European

countries. Let's emphasize that the majority of central banks of EU countries follows a policy of adjusting ECB to taking into account the risk of each country, although within the single currency area with full financial liberalization the space for independent decisions is limited.

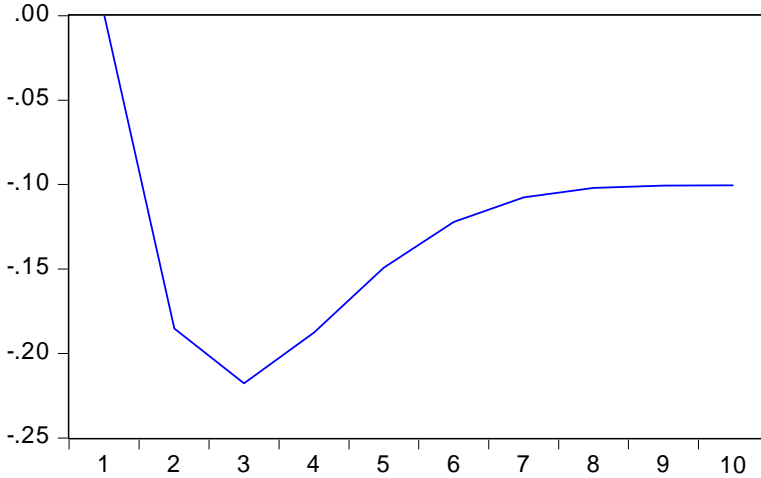


Fig. 4. The impulse response function of discount rate to KAOPEN

Let us consider further in a similar way - the reaction of response of the real interest rate to impulse in financial liberalization index expressed with the KAOPEN, which is similar to the inverse s-curve (Fig. 5).

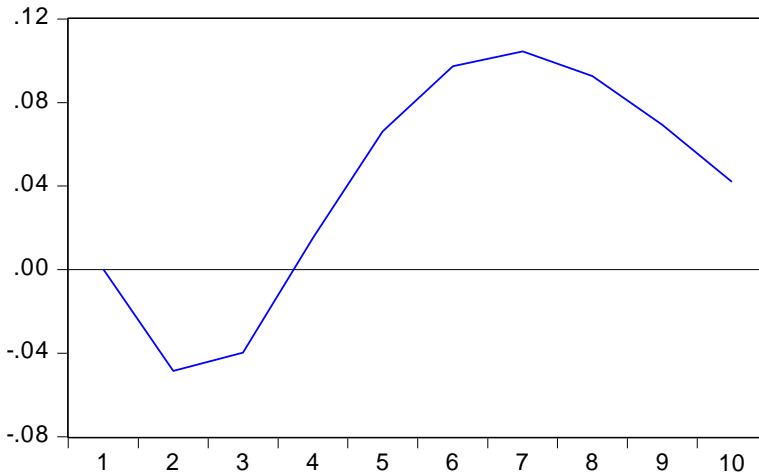


Fig. 5. Impulse response function of real interest rate to the KAOPEN

In the first three periods after the impulse of financial liberalization a decrease in the real interest rate can be seen and then - rapid recovery and growth, followed by "attenuation". This situation in Europe, primarily, can be explained by the fact that during the liberalization the real interest rate decreases on the background of inflation and discount rates reduction. It is caused by increased competition in the economy and financial sector that always leads to a decrease in the rate of profit. There is also some redistribution on the financial markets and structural changes in the economy that leads to a series of bankruptcies, emergence of new industries, capital flows, and increases in the real interest rates are relatively baseline. In practice, the economic and financial systems become more efficient, often the effects of financial liberalization increase migration of human resources in countries with higher rate of return. Virtually after joining the EU or accession to the FTA that can be considered a significant increase in the level of financial liberalization, many countries initially experienced some difficulties, but in the long run became the winners.

Roughly similar is the reaction of the impulse response of the unemployment rate to the increase in financial liberalization, which in this case is measured as a percentage of the total work force (Fig. 6). Originally we see a decrease in the unemployment rate in the first three periods by 0.5%. Then a return to the initial value happens in the fifth period and a significant increase by 1% and attenuation. The initial reduction in the unemployment rate by 0.5% is driven by inflows of foreign direct and portfolio investments and entrance of foreign players on the domestic market in order to get their share, this animates competition, and thus increases employment. But over time thanks to investors the economy optimizes, becomes more effective which enables it to get rid of personnel and increases the unemployment rate. Important to emphasize that in this case very significant are the innovative and technological components of the economy, that enable to maintain employment levels due to the release of resources in labour-intensive industries and circulating them into capital-intensive ones. Highly developed countries of Europe do so, shifting production to less developed countries and substituting labor-intensive industries with capital-intensive, innovative and high-tech. A significant increase in unemployment can be seen in Eastern and Southern Europe. On one hand, financial liberalization significantly raised social standards in Europe, on the other - we have very high rates of unemployment. This raises a certain dilemma to stimulate unemployment, ie reduction of discount rates and stimulating the economy leads to higher inflation and government inaction in this situation only worsens the economic situation. A solution to this situation, the European Union sees in structural reforms.

Reduction of public debt in the first five periods and then its growth as an impulsive response to a change in one standard deviation of the KAOPEN is a quite expected result (Fig. 7). This only proves that financial liberalization opens up huge opportunities for borrowing, and many countries eventually began to abuse it. At the beginning of financial liberalization countries harmonized their debts, which, in turn, resulted in numerous debt crises in Europe. The solution to these debt crises, most countries see in fiscal consolidation, but the saving strategy leads to numerous protests and resistance of populations. Increase in borrowing is often caused by the desire of governments to raise the standard of

living for the population, to achieve economic development and so on. The issue of excessive borrowing and its unreasonable risk remains an open question, as is the experience of countries with very high public debt, that weren't damaged by the recent crisis, while some had significant losses.

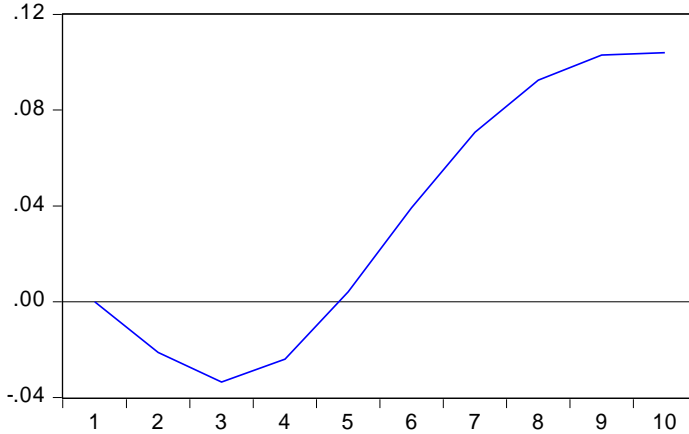


Fig. 6. Impulse response function of the unemployment rate to the KAOPEN

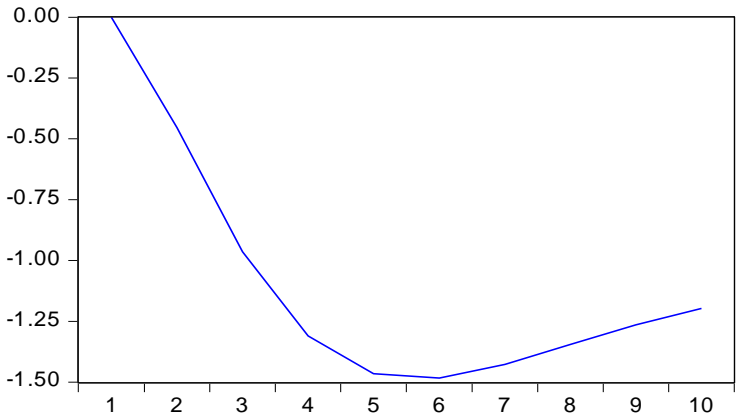


Fig. 7. Impulse response function of government debt to the KAOPEN

Decomposition of dispersion shows the relative importance of the factors by the effect on the change dynamics (dispersion of specific system variable) and helps to identify the contribution of each variable of the model to the description of residual variation of the vector auto regression (VAR).

The impact of financial liberalization expressed by the index KAOPEN in the VAR model is quite advanced, but eventually decreases. The KAOPEN va-

riance decomposition shows that the index of financial liberalization initially explains itself and over time its importance decreases, and after the fifth period it starts to be explained by public debt (Fig. 8). It once again proves that financial liberalization causes structural changes in the economy, but over time its effect becomes less significant.

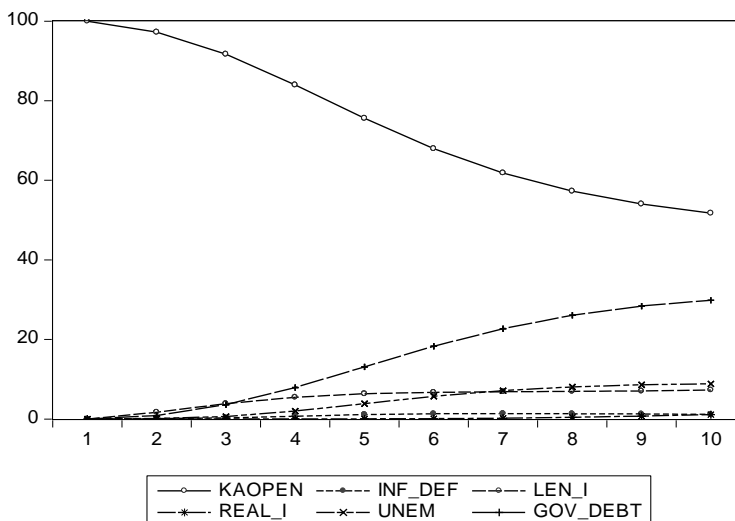


Fig. 8. Variance decomposition of the KAOPEN

On the other hand the variance decomposition of the GDP deflator in this model shows that changes in the GDP deflator initially virtually explain themselves, and eventually with them begin to affect changes in the unemployment rate (Fig. 9).

More important in the VAR model variance decomposition is the impact of indicators of the discount rate and the real interest rate (Fig. 10). Variance decomposition of the discount rate beginning from the fifth period can be explained by changes in the indicator of public debt by 35%, and partially (maximum 10%), by real interest rates and unemployment from the third period.

Variance decomposition of the real interest rate by 80% is explained by changes in the deflator, whose influence gradually decreases to 40%, as well as by changes in the discount rate by 20% in the first period; it grows up to the fifth period, then fades slightly at 40% (Fig. 11).

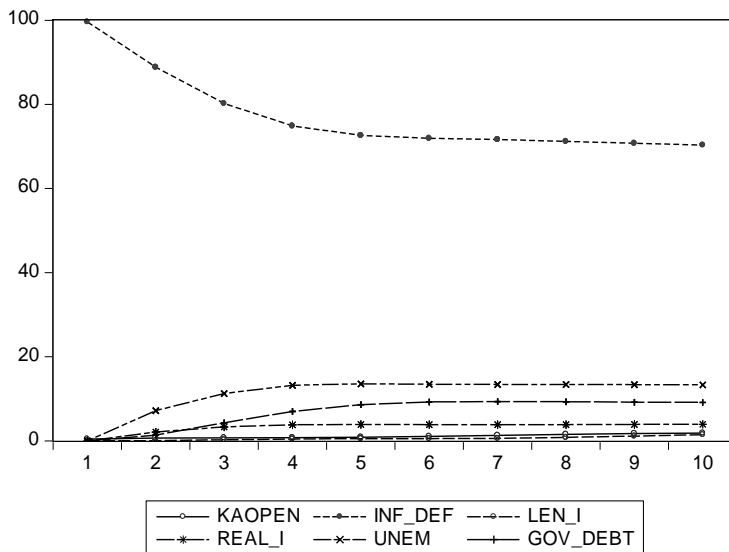


Fig. 9. Variance decomposition of the GDP deflator

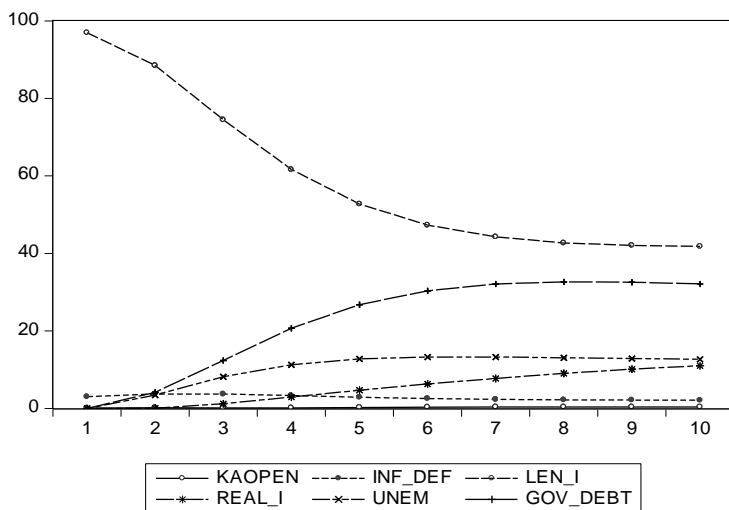


Fig. 10. Variance decomposition of the discount rate

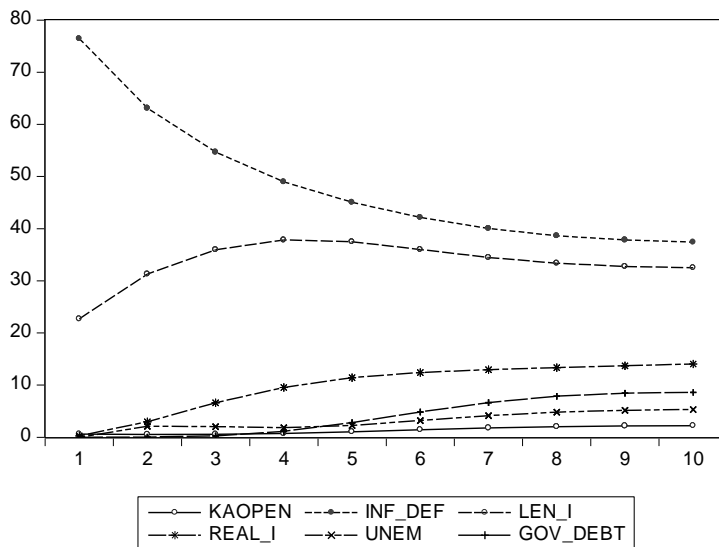


Fig. 11. Variance decomposition of the real interest rate

Variance decomposition of unemployment and public debt in the first period determines itself by 90% (Fig. 12). Over time, their impact is somewhat reduced, and the influence of other parameters remains unchanged or slightly increased, each of them do not exceed 10%, indicating the low impact of these parameters on changes in the variance decomposition of unemployment and public debt (Fig. 13).

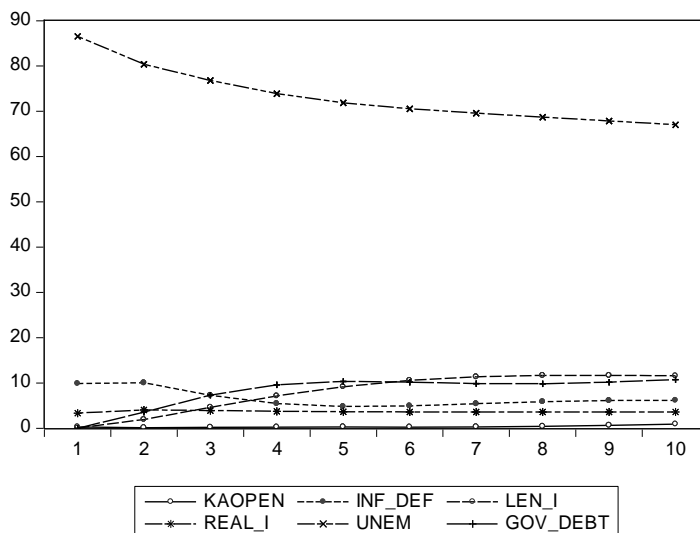


Fig. 12. Variance decomposition of the unemployment rate

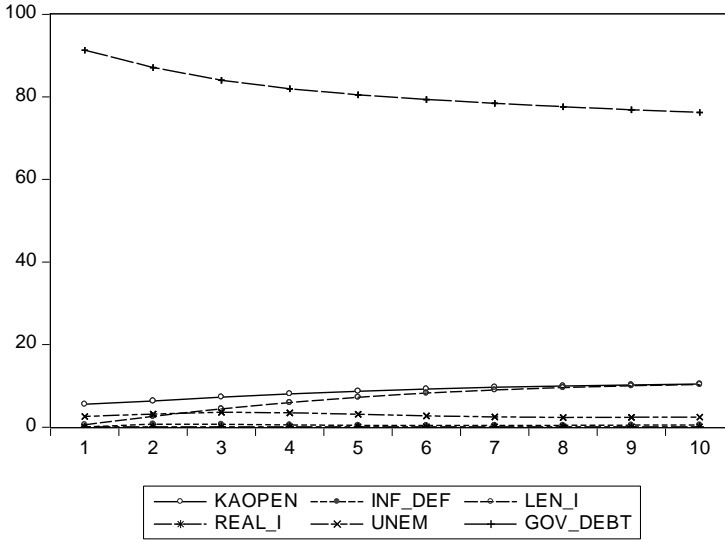


Fig. 13. Variance decomposition of public debt

Summary

Let us remember that financial liberalization can be internal and external. The sequence of its conducting is determined in each country individually, although most scholars agree that internal financial liberalization should be conducted first, and then - external. In practice, in most cases, they occur in parallel.

A financial liberalization policy in particular its component - free capital movement, aims to provide additional stimulation of domestic economic growth due to the inflow of external financial resources. In most cases, it plays a positive role, but often financial liberalization, especially if it occurs simultaneously with rapid privatization of financial institutions, that radically changes the environment of their operation, can have both positive and negative consequences on the state's economy.

Countries that had achieved financial liberalization and a stable exchange rate, should take into account the fiscal consolidation to avoid creating imbalances in the economy. Experience of leading European countries to mitigate the negative effects of financial liberalization have been used by post-socialist European countries that have adopted, in accordance with the Code of liberalization of capital movements, time constraints and defended their priorities.

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