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Внешнеэкономические шоки: подходы и типологии

Аннотация

В статье представлены основные виды современных внешних шоков, которые влияют на экономическую среду. Исследование основано на методологии экономического мейнстрима и нового кейнсианства. Основными методами анализа в статье являются сравнительный анализ и классификация. В результате исследования формируется авторская иерархическая типология внешних шоков экономической конъюнктуры на основе синтеза теоретических подходов реального делового цикла, кейнсианства и нового кейнсианства.

Ключевые слова: внешние шоки, экономические шоки, экономический кризис, реальный деловой цикл, новое кейнсианство.

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External economic shocks: approaches and typologies

Abstract

The article discusses the main types of external shocks that affect the economic environment. The study is based on the methodology of the economic mainstream of new Keynesianism. The key methods of analysis in the article are comparative analysis and classification. As a result of the study, the author's hierarchical typology of external shocks of the economic environment is formed, based on the synthesis of the theoretical approaches of RBC, Keynesianism and new Keynesianism.

Keywords: external shocks, economic shocks, economic crisis, real business cycle, new Keynesianism.

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External economic shocks: approaches and typologies **Introduction**

Within the framework of the modern macroeconomic consensus, it is customary to consider economic crises as a result of external shocks' impact on the economic environment that bring the economy out of a stationarity. Today, the impact of various external shocks on the countries' economies are being actively studied [9 ; 21]. Nevertheless, sufficiently exhaustive typologies of these shocks are still not formed: most of them consider either neoclassical types of shocks formed within the framework of the real business cycle approach (RBC), or primitive typologies such as demand shocks and supply shocks. In this case, the author undertakes to structure the typologies of external shocks currently available in economic science and integrate them into a single typology. The main aim of this paper is to compile a typology and hierarchy of economic external shocks. To achieve this aim, the following tasks will be implemented: (1) defining the concept of an external shock based on a review of the available paradigms for the analysis of external shocks, (2) analyzing modern macroeconomic approaches to the causes of crises, (3) systematizing the review of external shocks' types in the form of an author's comparative matrix and hierarchical typology.

Paradigms for External Shocks Analysis

In modern economics, there are two fundamental approaches to the study of shocks and cyclical fluctuations: *deterministic* and *stochastic*.

According to the *deterministic concept*, cycles have a clear and predetermined nature and have certain predictable time intervals. Within the framework of this paradigm, it is assumed a possibility (with some certainty) to predict future economic cycles - how the economy will behave in 5, 10, 50, etc. years. The most famous approaches within the deterministic paradigm are *technological determinism* and *institutional determinism*.

A classic example of technological determinism in Russian economics is the theory of Sergey Glazyev, which is based on the concept of "teknologicheski uklad" (technological mode, technological state or technological structure) as a process in the form of a sequential replacement of large complexes of technologically related industries [14]. The life cycle of "teknologicheski uklad" covers about a century, while the period of its dominance in the development of the economy is from 40 to 60 years, and the reasons for long-term fluctuations in the economy and economic depressions are changes in technological structures, which are accompanied by depreciation of capital, the formation of financial bubbles and the strengthening of the role of the state in stimulating the economic activity.

An example of an institutional deterministic concept in Russian economics can be the articles of R. Frolov, who believes that "the real driving forces of the global crisis are the deepest institutional contradictions of the global system of reproduction of fictitious capital" [38]. A distinctive feature of this concept is also an eclectic character, in which technological progress is understood as a co-evolution of transformational and transactional technologies, i.e. institutions are material and non-material technologies.

The stochastic paradigm (Frish-Slutsky paradigm) considers the cycle as a random process that is difficult to predict. Analysis of the reasons for the exit of the economy from the equilibrium state is connected with shocks. The most obvious and

simple definition of "shock" in the economy is given by A.D. Nekipelov as a drastic change in business conditions [28]. L.I. Lopatnikov offers a more detailed definition of shock as "sharp exogenous changes in the economic system" [20]. The author considers demand shocks and supply shocks as the most common and fundamental in the economy. The author also notes that major political and economic tasks can be solved with the help of shocks. G. Simon, the author of the concept of information shocks, argued that shocks are always possible in the economy and society – unforeseen events with unpredictable consequences [30]. This is due to the fact that firms, households and governments are forced to make decisions based on incomplete information.

A.A. Pesotsky in his research considers shocks as a threat to the current state of the economic system [26]. According to the author, a shock has the following essential features: a destructive effect on systemic connections, a short-term nature of the impact (while a long-term destructive process, according to the author, is a crisis caused both by a shock - a rapidly occurring negative process, and a measured decline in business cycle) and a radical nature associated with provoking fundamental changes in the economic system and its transition to a new state.

D. Farmer pointed to socio-political events as the most important economic shocks that are unpredictable and exogenous in relation to the economy, but have a radical impact on investment, employment and output in the short and medium terms (for example, surges in crime, uprisings, impeachments etc.) [37].

L. Grigoriev and A. Ivashchenko interpret shocks as spreads in the dispersion of macroeconomic series caused by economic cycles resulting from random events [15]. The authors believe that shocks cannot be considered outside the cycle theory and are presented as exogenous, important for analysis, more than macroeconomic fluctuations. Therefore, the suppression of shocks acts as an important benchmark for macroeconomic policy.

At the same time, a distinction is made between a shock (cause of the business cycle) and a transmission mechanism. Thus, according to O. Blanchard,

macroeconomic shocks are probabilistic in nature and are not associated with cycles, since their causes are associated with changes in the mood of consumers and investors (exogenous factors), which subsequently causes a reduction in demand for money, labor and raw materials (endogenous factors) [11]. Within the framework of the Frisch-Slutsky paradigm, a shock is an exogenous random event that is external to the economic system itself, but changes it (for example, natural disasters, unsuccessful government policies, wars, etc.) [22; 34]. This approach considers that shocks (impulses) do not appear at a predetermined time associated with the completion of a cycle, but arise spontaneously, which causes the completion of the previous cycle and the initiation of a new one: an economic shock is the cause of the transition from one cycle to another [27]. In this regard, we cannot predict shocks based on dynamic economic data, so cycles are a random process without precise patterns in their amplitude and frequency. As D. Romer notes, "since there is no regularity in the dynamics of output, modern macroeconomics no longer considers fluctuations as a combination of deterministic cycles of different lengths; attempts to isolate cycles of different lengths ... were discontinued due to their ineffectiveness"[29]. However, the mechanism of shock spread in the economy is quite verifiable, studied and theorized.

Within the modern macroeconomic mainstream, cycle theory is a simulation of dynamic stochastic general equilibrium [15]. This is achieved through the optimal response of rational and representative economic agents to current conditions in the economy and their assessment on an infinite horizon, taking into account possible present and future shocks. The theoretical core of the mainstream is the theory of the real business cycle, modified by the new Keynesianism. The central point of the theory is the assumption of the stochastic nature of cycles when the trajectories of changes in the main macro indicators are in equilibrium. As G. McCandless admitted, various types of shocks are an important part in the modern economic mainstream [7]. This theory, neoclassical in its essence, is the opposite of the Keynesian theory of the cycle, which lost credibility in the world in the 1970s against the backdrop of

world shocks associated with oil prices and the supply of hydrocarbons. The central paper that laid the foundation for the theory of the real business cycle and the mainstream is the study by F. Kydland and E. Prescott "Time to create and aggregate fluctuations" [5]. To date, it can be argued that the theory of the real business cycle is an umbrella-like, fairly broad research program aimed at analyzing fluctuations in macroeconomic variables as dynamically balanced, taking into account all the shocks that have materialized. It is important to add the words of G. Mankiw, who rightly notes that the modern mainstream differs from the pioneers of the neoclassical theory of the real business cycle "by seeing the economy as a system of dynamic equilibrium that differs from the Pareto optimum due to price rigidity (and, possibly, other market failures)" [25]. As L. Grigoriev notes, the RBC theory includes a set of works on the cycle, which are based on the concepts of Dynamic Stochastic General Equilibrium (DSGE) [15]. G. McCandless notes that all current cycle models within the macroeconomic mainstream are DSGE models or RBC models in the broadest sense. The essence of these models is that the causes of fluctuations are still set as exogenous shocks with a stochastic nature, but the set of equations in the model has expanded significantly: economic crises occur both on the side of aggregate demand and on the side of aggregate supply.

Theories of the modern economic mainstream are developed and used in the economic research of macroeconomic policy and the study of shocks and in the domestic economy. L.A. Serkov draws on the real business cycle theory, arguing that fluctuations in real output growth arise only as a result of shocks affecting the level of technology [32]. The author considers exogenous shocks, such as monetary and tax policy shocks, as well as technological shocks, dialectically, as a cause and effect of the impact on the system, both from the outside and from the inside. According to the author, economic actors can adapt to shocks when they develop adaptive learning mechanisms. I.V. Danilova and O.A. Bogdanova believe that the root causes of shocks in the economy are stochastic exogenous "impulses" that deviate from the trend of economic development [16]. Such impulses can be unpredictable, related to

deficiencies in government regulation, be both permanent (eg, the result of Russia's accession to the WTO) or temporary (eg, sanctions). At the same time, the mechanisms of adaptation to shocks, according to the authors, are due to endogenous factors associated with the diversification of economic sectors and the level of income of the population. J.M. Sarkisyan states that a shock in the economy is a fluctuation in fundamental macroeconomic variables that have a significant impact on macroeconomic indicators such as GDP, employment, inflation, private consumption, etc. [31]. These changes change the trend of macroeconomic dynamics. According to the author, such a definition of shocks corresponds to the understanding of shocks as "impulses" in the theory of business cycles, which are characterized by a probabilistic nature. The author also refers to the fundamental causes of the shocks of fluctuations in supply and demand, and to the specific ones - a sharp reduction in investment and labor productivity. At the same time, according to the author, there are currently no adequate macroeconomic models for global shocks, both exogenous and endogenous. B.S. Bernanke, J. Boivin and P. Eliasz give a more radical definition of shocks as "primitive exogenous forces that are not correlated with each other, but have macroeconomic significance" [2].

Typologies of external shocks

Within the framework of the neoclassical theory of RBC, three types of shocks were mainly analyzed: *technological*, *monetary* and *external shocks*. H.M. Arnold suggests that technology shocks, rapidly replacing obsolete technologies, are a major factor in changing the competitive structure of markets [1]. As a result, more new firms appear than old ones disappear as innovative technologies become more productive and fill the entire production chain of the industry. J.-P. L'Huillier, G. Phelan and H. Wieman consider that technology shocks play an important role in the dynamics of the business cycle, as they cause investors to worry about future returns in the face of unpredictable scientific and technological progress [6]. As a result, the cost of attracting new investment increases, which leads to increased restrictions on

capital inflows and a slowdown in business growth. In models that account for monetary shocks, it was assumed that shocks cause small changes in interest rates from levels determined by monetary rules, which were supposed to be always strictly followed by the monetary authorities. In the RBC theory, another traditional type of shocks are external market shocks. In the model, they are treated as shocks to external prices or world interest rates.

For a more detailed typology, it seems important to turn to other modern economic theories that also touch upon the issue of the impact of shocks on the economy. O.A. Bogdanova considers *institutional shocks* as radical changes in various "rules of the game" and mechanisms for enforcing them, which create uncertainty and unpredictability of standard behavioral reactions of economic entities [12]. At the regional level, such shock characteristics are identified as: causality (shocks of the market mechanism or economic policy), the depth and scale of changes, the forms of emerging systemic imbalances (structural, deviations of real parameters from forecasts, deviation from the historically established "path"), and the magnitude of time lags recognition and reaction from the state, firms and households. According to the author's theory, the mechanism of shock spread in the economy is: a change in institutional conditions and "rules of the game" under the influence of unexpected changes, a change in business conditions and a reduction in investment demand, a reduction in consumer demand of the population and a further decline in business activity. The author classifies a shock as a persistent phenomenon if its impact on macro- or mesoeconomic dynamics is significant and multiplicative, or as an apersistent phenomenon if the impact of the shock is short-lived (i.e., it is absorbed by the system). According to P.A. Minakir, shocks are a "trigger" for crises that do not always depend on the phases of economic cycles and phase transitions, thereby activating the accumulated contradictions in the depths of the economic system [23]. In addition, within the framework of the institutional approach, we can consider the position of E.A. Zapadnyuk, who connects shocks with the impact of exogenous forces on the structural ties of the economic system, which results in the

transformation of ties in the system [17]. In this regard, the author divides shocks into two types: destroying structural ties (slowing down growth) and strengthening the integrity of the economic system (accelerating development).

Articles within the framework of behavioral economics deserve special attention. D. Sornete emphasizes that shocks are an integral part of the modern financial market, which cannot be predicted due to a strong subjective factor [36]. This is confirmed by the concept of "behavioral finance" by R. Schiller - a section of "behavioral economics", where collective subjective actions in the financial market are recognized as practically unpredictable [10]. Shocks in the capital and money markets are transformed through investment mechanisms in the real sector. Since the early 2000s, there has been an active trend that analyzes Pigou-related shocks ("bad news" shocks) in the context of RBC models, but these models have not yet been verified [4]. Paul Krugman also notes the subjective nature of shocks and gives an example of currency crises: "at the beginning of a devaluation trend, large agents in the foreign exchange market wait until the monetary authorities spend part of the reserves to stabilize the exchange rate, and then carry out massive sales, creating a shock in the foreign exchange market" [18]. The concept of "economy of catastrophes" is analyzed by Y.M. Mirkin [24]. The author notes the supervolatility of this system, caused by exogenous shocks, which may be foreseeable, but are not "black swans". The author also lists global warming, the rapid growth of innovation, the destabilization of factor markets, and large-scale man-made disasters as examples of such exogenous shocks. The author uses the term "economics of fear" as a synonym for "economy of catastrophes", where the behavior of subjects plays a key role in preventing a systemic crisis under the influence of external shocks that are perceived as purely exogenous.

It is also possible to single out such a parameter as the attitude towards the system of the economy - *exogenous (external)* and *endogenous (internal)* shocks. For example, A.S. Kuznetsov, A.I. Kharitonchik, A.R. Berdigulova, K.S. Fedorov attribute to external shocks an invariant form of manifestation, which can have both

endogenous (economic) and exogenous (non-economic) nature [19]. Using the example of the Eurasian Development Bank economies, the authors highlight the growth of contradictions between the United States and China in the political and trade spheres as the first option; the second option is an unpredictable decline in oil prices due to a temporary increase in supply. A. Sinyakov and K. Yudaeva explain shocks as a result of the impact of external factors, such as world commodity prices and interest rates, on long-term equilibrium and the structure of the economy [33]. In their articles, they distinguish two types of shocks: external shocks associated with changes in world prices for raw materials (mainly oil) and internal shocks caused by changes in monetary policy, when fluctuations in exchange rates and interest rates disrupt the long-term equilibrium of the economy.

An original and applied typology of shocks for this study is offered by D. Bevan, P. Collier, J.W. Gunning [3]. The authors propose to classify shocks according to whether they are considered to be in line with preliminary expectations and whether they cause a change in expectations. If the shock is considered to be consistent with prior expectations, these expectations are called "inclusive". This does not mean that the timing of the crisis event was predicted correctly. However, in such a case, the shock does not provide a reason to change expectations in the future, so expectations are necessarily "not revised". If a shock is inconsistent with previous expectations, it is considered "exclusive" and expectations may or may not be revised. For example, it is clear that the oil price shock for the Russian economy is seen as inclusive (at least since the 2008 crisis): fluctuations with high volatility in oil prices on the world market occur constantly, hence it is obvious that expectations will not be revised (however, this does not mean that we are able to accurately predict when this shock will occur). Hence, the emergence of a rather strict budgetary rule, according to which the revenues received from the sale of oil at prices above the established threshold per barrel are deposited in the National Welfare Fund.

The most detailed typology of economic shocks is presented by B. Patterson and S. Amati [8]. The authors propose a taxonomy of shocks: external and internal,

exogenous and endogenous, country and sectoral, financial and industrial, short-term and medium-term. The paper emphasizes that shocks can belong to several levels at once, as a result of which cyclical and then structural asymmetries may arise in the economy.

In Russian studies, special attention is paid to the shocks to which the Russian economy is subject. It is obvious that the raw material export orientation of the Russian economy makes it vulnerable to supply and demand shocks for oil and hydrocarbon products. A.L. Vedev, analyzing fluctuations in macroeconomic dynamics, narrows down the circle of the most significant exogenous and endogenous shocks that affected the Russian economy in 2020: the COVID-19 pandemic, falling oil prices and demand for Russian exports [13]. S. Smirnov argues that the reason for the decline of the Russian economy during periods of global crises is deeper than the reasons associated with the economies of the EU and China [35]. The author points to the excessive dependence of the Russian economy on external shocks, mainly market ones. This dependence is due to the hypertrophied development of the oil sector, which dominates in investments, budget revenues and exports, as well as a high degree of openness of the economy to the world economy. At the same time, from a formal point of view, the Russian economy should be fairly well protected from the impact of shocks, thanks to the high level of gold and foreign exchange reserves, low public debt and a stable positive balance of payments. A.M. Yusufova explores the exogenous shock of the coronavirus pandemic, which she defines as a sudden phenomenon that does not originate in the economy but radically changes the conditions of economic activity, including significant changes in aggregate supply and demand [39]. The article examines the impact of the pandemic on national and world economies as a sudden and large-scale restriction on the movement of factors of production (labor and capital in the form of material resources) between countries and regions. Thus, the author defines this shock as a "supply shock".

Having systematized the above concepts and types of economic shocks, the author proposes the following typology of shocks (see Table 1 and Picture 1):

- The sphere of occurrence: economic, political, social or natural;
- The scale of the shock: global or local;
- The direction impact: positive or negative;
- The branch of the economy: financial or industrial;
- The origin: exogenous or endogenous;
- The nature of the economic impact on the market: demand or supply shocks;
- The prior expectations' consistency: inclusive and exclusive.

Table 1.-Typology of economic shocks

Parameter	Shock type
<i>Sphere of occurrence</i>	Economic
	Political
	Social
	Natural
<i>Shock Scale</i>	Global (worldwide)
	Local
<i>Direction of impact</i>	Positive
	Negative
<i>Branch of the economy</i>	Financial
	Industrial
<i>Origin</i>	Exogenous
	Endogenous
<i>Nature of the economic impact on the market</i>	Demand
	Supply
<i>Consistency with prior expectations</i>	Inclusive
	Exclusive

Conclusion

In conclusion, external shocks in the economy can be defined as unexpected events that lead to a deviation from the trend line of economic indicators (most often, the gap between potential GDP (trend) and real GDP, potential unemployment and real). Based on the tradition of Frisch-Slutsky and systematizing research work in this area, the author's typology of shocks (see Table 1) and shocks' hierarchy (see Picture 1) were formulated.



Picture 1.- Hierarchical typology of economic shocks

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