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AUTHORS	Oleksii Lyulyov, Hanna Shvindina
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Oleksii Lyulyov, Ph.D. Associate
Professor of the Department
of Economics and Business-
Administration, Sumy State
University, Ukraine.

Hanna Shvindina, Ph.D., Associate
Professor of the Department of
Management, Sumy State University,
Ukraine.



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Oleksii Lyulyov (Ukraine), Hanna Shvindina (Ukraine)

STABILIZATION PENTAGON MODEL: APPLICATION IN THE MANAGEMENT AT MACRO- AND MICRO-LEVELS

Abstract

The problem of instability of industries, clusters and states influences the countries' economies. Unavoidable changes became an attribute of the strategic planning at every level. As a result, an effective tool is needed to evaluate stability at different levels in such a way that will make it possible to manage the changes. In this paper the concept of Macroeconomic Stabilization Pentagon (MSP) was analyzed for its applicability for the EU countries of low-an-middle-income economies including Ukraine. The data analysis brought new understanding of the assessment of the public policies' effectiveness. The model has proven its efficiency not just in the sphere of public administration, but also for the micro level management. The authors proposed the Microeconomic Stabilization Pentagon to be implemented in the research at the level of enterprises.

Keywords

stabilization, stability, instability, development,
macroeconomic stabilization pentagon, index
methodology, microeconomic stabilization pentagon

JEL Classification

E63, F63, C21, L20

INTRODUCTION

The modern tendencies in the development of the national economy of Ukraine are characterized by high degrees of uncertainty and changeability, which explain the relevance of qualitative and quantitative criteria of stability at macro- and micro-levels. A clear identification of negative trends in the dynamics of the criteria will allow well-timed responding to internal and external challenges reducing the degree of uncertainty and losses.

Various definitions of stability criteria have been proposed. Many researchers have been concerned with the issue of stabilization in the banking industry (Vasilyeva et al., 2016; Yehorycheva et al., 2017), financial markets (Slav'yuk et al., 2017) or with risk-related behavior of banks during the turbulent period (Djalilov et al., 2015). The definitions "stability" and "instability" are highly interrelated. Researchers choose to investigate stability at macroeconomic level (Clarida et al., 2000; Orphanides, 2004). The research of instability is presented in academic literature with case studies of Argentina (Dornbusch & De Pablo, 1989) or Turkey (Ismihanet et al., 2005). The third dimension of research is a multidisciplinary sphere of sustainable development concept, which deals with the research of stability at macro level. The concept of sustainable development links environmental and socio-economic issues and is used as a framework for the development at different levels, in particular, for the balancing of macroeconomic development (Hopwood et al., 2005; Lyulyov et al., 2015) and the management at micro-level (Hall et al., 2010).

The most crucial issue is the selection of indicators of macroeconomic and microeconomic stability. There are still unanswered questions: in what way these indicators should be selected and what selection criteria should be implemented to evaluate development at different levels?

Indicators of sustainable development are widely used in international practice, in particular, they include 50 indicators for the following three criteria (United Nations, 2007):

- indicators cover the relevant for sustainable development issues in most countries;
- indicators provide information that is not available from other core indicators;
- indicators are operable, meaning they can be calculated by most countries with data that is either readily available or could be made available within reasonable time and costs.

As for macroeconomic stability, S. Kalra (2012) emphasized the following criteria for the selection of indicators to calculate the leading macroeconomic indicators: country specific, economic significance, cyclical behavior.

The research was devoted to the integral index system construction to measure the development level and to identify the changes in such areas as fiscal economy, sustainable development economy, growth economy, organizational theory and so on.

The paper aims to generalize approaches to the assessment of macroeconomic stability and to evaluate stability at different levels.

The paper is structured as follows: section 1 briefly reviews the literature on modeling the macroeconomic stability. Section 2 contains theoretical framework of microeconomic stability offered by authors based on the generalization of the previous studies. Section 3 presents the research methods. The results of empirical data analysis are presented in section 4. Finally, the last section is devoted to the discussion and conclusions.

1. MODELS OF MACROECONOMIC STABILIZATION: PERSPECTIVES OF REPLICATION

One of the earliest papers was devoted to the role of macroeconomic factors in economic growth (Fischer, 1993) where it was shown that low inflation and small deficits are not necessary for high growth, but at the same time very high inflation is not consistent with sustained growth.

We should mention the research done by Sansak and Laura (2007) for Dominican Republic and Haiti, where the authors investigated macroeconomic instability as development indicator, which is built as a weighted sum of inflation rates and exchange rate volatility minus a fiscal balance as

a percent of *GDP*. The recent studies (Ahangari et al, 2014) about the impact on macroeconomics instability were targeted on the use of macroeconomic instability index based on the assessment of four factors: inflation rate, instability in the ratio of budget deficits to *GDP*, instability in the ratio of foreign debt to *GDP*, and instability of the exchange rate premiums (the ratio of the free exchange to official exchange rate). In their research the authors understand instability as “an increase or decrease in the values of a variable” (Ahangari et al., 2014).

Unlike other researcher who are focused on instability, Kolodko (1993) uses the positive essence of the same phenomena – “macroeconomic stabilization” and offers to understand it as “establishment of a macroeconomic system characterized by an equilibrium of flows and stocks alike” (ibid). The author emphasized that stabilization requires more than just a low inflation rate, but institutional and structural transformations. To overcome

the disadvantage of low operable econometric models, G. W. Kolodko proposed “macroeconomic stabilization pentagon” model (*MSP*). *MSP* Model consists of appropriately scaled parameters of the five criteria (Kolodko, 1993):

- index of changes in the *GDP* level,

$$r = \frac{\Delta GDP}{GDP} \cdot 100\%,$$

which expresses the development processes in the economy;

- unemployment rate *U* that should be as low as possible. It is correlated with the rate of inflation inversely, but stabilization should lead to the improvements on the labor market;
- rate of inflation or consumer price index (*CPI*), which must be reduced to a sustainable level;
- ratio of budget balance to *GDP* in percent, *G*. This index presents the required state budget to be balanced in terms of ratio revenue – expenditures, but if a total public debt reduction is preferred, this index should show a certain surplus;
- current account balance *CA*, which is presented as a ratio of current account balance to *GDP* in percent. This index should show a full and effective foreign debt service and,

at the same time, a gradual reduction and elimination of the debt within a certain time horizon.

Every criterion became a vertical of *MSP* Model, and therefore as a synthesis of his assumption, Kolodko presented the pentagon that consists of five triangles (Kolodko, 1993). The index of macroeconomic stabilization *MSP* is measured as (ibid):

$$MSP = a + b + c + d + e = \left[\begin{aligned} &(r \cdot U) + (U \cdot CPI) + (CPI \cdot G) + \\ &+ (G \cdot CA) + (CA \cdot r) \end{aligned} \right] \cdot k, \quad (1)$$

where $a = r \cdot U \cdot k$ presents triangle area called *real sphere triangle* that characterizes the relation between unemployment and dynamic inflation, it grows whenever the unemployment rate falls; $b = U \cdot CPI \cdot k$ defined as the *shortageflation triangle* which is dependent on the unemployment rate and the dynamics of inflation; $c = CPI \cdot G \cdot k$ is called the *budget and inflation triangle*; $d = G \cdot CA \cdot k$ which is defined as the *financial equilibrium triangle* and is showed as a result from the budget and the current balances; $e = CA \cdot r \cdot k$ is defined by the variability of the current account balance and the dynamics of the global product and called *external sector triangle*; and the value of coefficient *k* is determined as

$$k = \frac{1}{2} \sin 72^\circ.$$

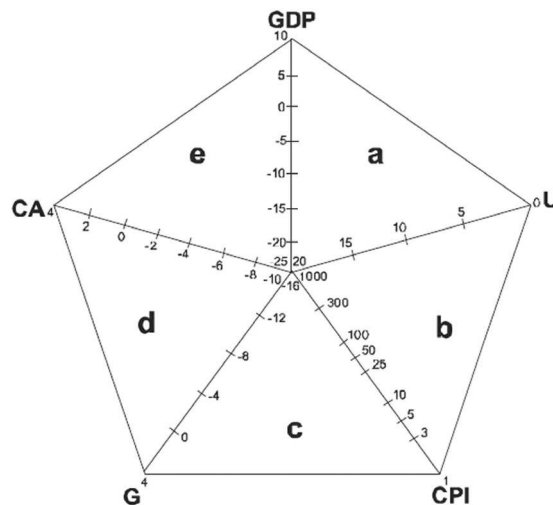


Figure 1. Macroeconomic stabilization pentagon (Kolodko, 1993)

The interpretation of the pentagon is carried out from the areas' analysis, pentagon shape and *MSP* value based on the above mentioned criteria. It is assumed that the level of economic development of a country is directly proportional to the pentagon area, while the shape of the pentagon reflects the economy's growth balance, and *MSP* value must be as high as possible in terms of development and stabilization of the economy.

For more detailed analysis of endogenous and exogenous factors of the impact on macroeconomic stabilization, the following equation is offered:

$$MSP = MSP_1 + MSP_2, \quad (2)$$

where $MSP_1 = a + b + c$ indicates the impact of endogenous factors on macroeconomic stabilization of a given country; $MSP_2 = d + e$ indicates the exogenous factors' impact.

It is assumed that *MSP* should be more than 1, that every triangle area is $0.200 \cdot (5 \cdot 0.200 = 1)$, and the maximum length of a triangle's side is 0.6485.

The research of macroeconomic stabilization based on MSP Model was further developed in the studies of (Żuchowska, 2013) for the countries of Central and Eastern Europe (*CEE*). This paper compared the macroeconomic situation in different countries and discovered that the Czech Republic and Slovenia showed the highest *MSP* level in the period 2008–2009, and Poland happened to be also among the countries with the highest *MSP*. The deepest declines in *GDP* took place in the Baltic States (Latvia had the lowest *MSP* level in 2008–2010). What is more interesting is that in the research findings no country in 2010 reached the level of 2007 (pre-crisis period). *MSP* indicator showed positive changes in the economic conditions only in 2010 for the *CEE* countries.

Another research on macroeconomic stability was conducted by G. Hurduzeu, M.-I. Lazăr (Hurduzeu & Lazar, 2015), in which the data were collected for Southern Area Countries (Portugal, Ireland, Italy, Greece, Spain) for the time period 2009–2013. The research revealed the similarities and differences between Italy, Portugal and Spain and showed the difference between Greece and Ireland. The high

unemployment was observed in these countries and identified as the main problem and source of macroeconomic instability. The authors assumed that MSP model is an applicable tool for comparative analysis for countries of the EU and its usage creates the preconditions for adequate policies of economic stabilization.

2. MODELS OF MICROECONOMIC STABILIZATION: THEORETICAL FRAMEWORK

The debates in organizational theory about organizational effectiveness have been started a while ago (Georgopoulos & Tannenbaum, 1957; Mahoney & Weitzel, 1969; Steers, 1975; Campbell, 1977) and they are still relevant (Matthews, 2011). The debates about the essence of effectiveness of the development of organization were presented in detailed review of (Astley & Van de Ven, 1983), where six main areas of discussions were: System versus Individual Action; Adaptation versus Selection Debates; Environmental Constraints versus Strategic Choice; "Natural" versus "Social" Environment discussion; Individual versus Collective Actions Organizational Behavior and Organization versus Institution Debates.

The second dimension of the discussions reflects the trends in the effectiveness assessment methodology, which still needs further development. Thus Steers (1975) generalized organizational effectiveness criteria in 17 different models and revealed certain problems in measuring organizational effectiveness that are relevant today. As it was mentioned by Steers, the evaluation criteria are relatively unstable over time, once successfully used, they may become misleading at later time. That is why multiple criteria models should be balanced.

Later researchers (Quinn & Cameron, 1983) succeeded in presenting a spatial model with shifting criteria of effectiveness depending on the life cycle of organization. The main idea of the model is that organization adopts the primary criteria of effectiveness in order to survive, and the objectives shifted from the simplest goals to more complex ones via development.

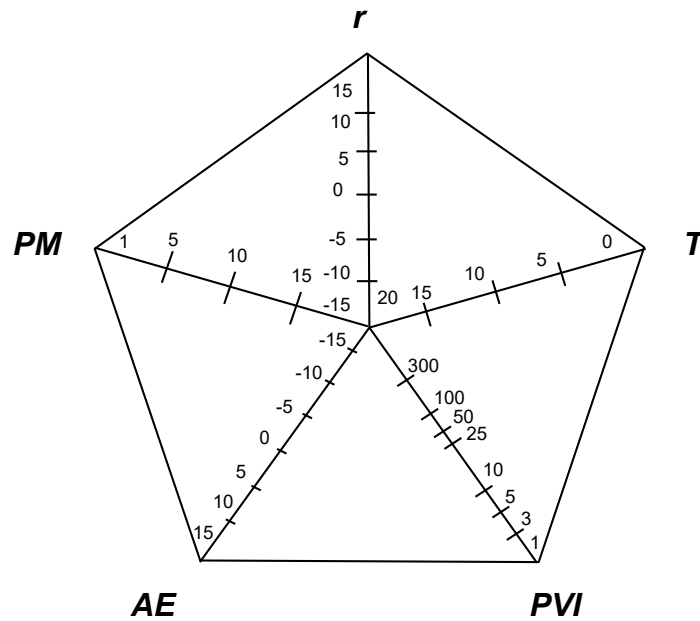


Figure 2. Microeconomic stabilization pentagon (proposed)

Our assumption is that the organizational system evolves and repeats in its evolution the phylogenesis of the macroeconomic system (Lamarckism theory). In other words, if instability processes take place at every level of the country, they must be reflected in the same patterns of the entity.

In our opinion, *MSP* Model, which is used at the macro-level, can be reproduced at the micro-level.

Using the logic of the research on macroeconomic stabilization we recreate the framework of stabilization model for the enterprise level by analogy. We assume that microeconomic stabilization must be reflected in the following five criteria-verticals.

The first index. The achieving and maintaining of stabilization for an organization means to accumulate resources and attract customers. Those processes must be reflected in an index of revenue changes,

$$r = \frac{\Delta R}{R} \cdot 100\%, \text{ where } R \text{ means revenue.}$$

Secondly, the rate of employee turnover *T* is an indicator of stabilization of the organization if the index grows, the organization becomes less sustainable, because it loses opportunities to attract and retain qualified personnel.

The third index is price volatility *PVI* that reflects market oscillations on the one hand, and efforts on differentiation, on the other hand. We assume that when the firm reduces its dependence on other market forces, price volatility drops. However, some price changes always take place; therefore, price volatility must be reduced to sustainable level.

The fourth group. The organization should demonstrate its capabilities to accumulate resources in terms of ratio revenue – expenditures, and this bal-

Table 1. The optional alternatives for the indices of the pentagon model t

Verticals of pentagon model for microlevel stability analysis	Proposed sub-indices	Optional sub-indices
Vertical 1	Revenue changes index	Market share changes
Vertical 2	Employee turnover	Employee loyalty
Vertical 3	Price volatility	Sales changes
Vertical 4	Administration expenditures to total costs in percentage	R&D costs to total costs in percentage
Vertical 5	Profit margin	Accounts receivable

Table 2. Sub-indices and the *MSP* index for the lower-middle-income economies of the EU countries for time period 2000–2015 (calculations based on Eurostat data)

Country	Indices	2000	2002	2004	2006	2008	2010	2012	2014	2015
Ukraine	<i>MSP</i> ₁	0.200	0.354	0.265	0.301	0.258	0.24	0.329	0.17	0.161
	<i>MSP</i> ₂	0.328	0.333	0.324	0.203	0.068	0.142	0.035	0.092	0.158
	<i>MSP</i> ₁	0.527	0.687	0.589	0.504	0.326	0.382	0.364	0.263	0.319
Latvia	<i>MSP</i> ₁	0.213	0.268	0.238	0.335	0.231	0.039	0.226	0.300	0.314
	<i>MSP</i> ₂	0.111	0.080	0.000	0.000	0.000	0.135	0.144	0.167	0.192
	<i>MSP</i>	0.324	0.348	0.238	0.335	0.231	0.173	0.370	0.467	0.506
Serbia	<i>MSP</i> ₁	0.148	0.211	0.105	0.110	0.183	0.078	0.060	0.086	0.141
	<i>MSP</i> ₂	0.198	0.137	0.000	0.009	0.000	0.068	0.000	0.064	0.101
	<i>MSP</i>	0.346	0.348	0.105	0.119	0.183	0.146	0.060	0.150	0.242
Lithuania	<i>MSP</i> ₁	0.199	0.272	0.289	0.364	0.312	0.146	0.236	0.323	0.347
	<i>MSP</i> ₂	0.094	0.117	0.057	0.000	0.000	0.200	0.197	0.309	0.170
	<i>MSP</i>	0.293	0.388	0.346	0.364	0.312	0.346	0.433	0.632	0.517
Poland	<i>MSP</i> ₁	0.147	0.108	0.099	0.231	0.314	0.249	0.267	0.321	0.358
	<i>MSP</i> ₂	0.084	0.134	0.089	0.129	0.066	0.084	0.123	0.161	0.199
	<i>MSP</i>	0.231	0.243	0.188	0.360	0.380	0.334	0.390	0.482	0.557
Armenia	<i>MSP</i> ₁	0.118	0.118	0.137	0.117	0.175	0.087	0.167	0.146	0.135
	<i>MSP</i> ₂	0.000	0.092	0.194	0.192	0.000	0.000	0.000	0.052	0.140
	<i>MSP</i>	0.118	0.210	0.332	0.309	0.175	0.087	0.167	0.198	0.275
Belarus	<i>MSP</i> ₁	0.265	0.314	0.377	0.445	0.423	0.401	0.342	0.361	0.353
	<i>MSP</i> ₂	0.155	0.192	0.127	0.170	0.057	0.000	0.160	0.076	0.138
	<i>MSP</i>	0.420	0.506	0.504	0.616	0.480	0.401	0.502	0.437	0.491
Croatia	<i>MSP</i> ₁	0.078	0.115	0.141	0.187	0.239	0.146	0.115	0.128	0.154
	<i>MSP</i> ₂	0.149	0.062	0.124	0.078	0.026	0.155	0.178	0.222	0.255
	<i>MSP</i>	0.226	0.176	0.265	0.265	0.265	0.301	0.294	0.349	0.409
Georgia	<i>MSP</i> ₁	0.259	0.224	0.233	0.225	0.157	0.129	0.247	0.252	0.236
	<i>MSP</i> ₂	0.088	0.078	0.073	0.000	0.000	0.000	0.000	0.000	0.000
	<i>MSP</i>	0.347	0.302	0.305	0.225	0.157	0.129	0.247	0.252	0.236
Moldova	<i>MSP</i> ₁	0.237	0.364	0.286	0.283	0.372	0.293	0.323	0.370	0.284
	<i>MSP</i> ₂	0.053	0.228	0.202	0.000	0.000	0.056	0.049	0.104	0.099
	<i>MS</i> ₁	0.290	0.592	0.489	0.283	0.372	0.350	0.372	0.474	0.383
Bulgaria	<i>MSP</i> ₁	0.127	0.166	0.271	0.322	0.359	0.237	0.249	0.268	0.323
	<i>MSP</i> ₂	0.159	0.220	0.144	0.000	0.000	0.154	0.192	0.195	0.206
	<i>MSP</i>	0.286	0.386	0.416	0.322	0.359	0.392	0.441	0.462	0.529
Romania	<i>MSP</i> ₁	0.203	0.249	0.295	0.324	0.325	0.242	0.292	0.380	0.381
	<i>MSP</i> ₁	0.139	0.162	0.060	0.000	0.000	0.079	0.100	0.202	0.192
	<i>MSP</i> ₁	0.342	0.411	0.356	0.324	0.325	0.320	0.392	0.582	0.573

Note: boldfont – the best values, bold and italic font – the worst values among the data per same year.

ance is reflected in the ratio of general administration expenditures to total costs in percentage, AE .

The fifth vertical, which is presented by profit margin PM calculated as a ratio of net profit to sales in percentage (or net income to revenue).

Therefore, the microeconomic stabilization pentagon is presented in Figure 2.

The ranges of indices also differ, we assume that r has a range from -15% to $+10\%$, the turnover coefficient should not be more than 20% . As for PVI , it depends on industry and it may reach 50% or more, so we assume it ranges from 1 till 1000 (an analogy to MSP). The general administrative expenditures AE should not rise faster than general costs, therefore they should not be more than 15% , and it is expected that the costs will be reduced, therefore, the scale is reverse ($+15$; -15) as stabilization indicator grows whenever AE drops. The index of PM has a range from 1 to 10. The range is based on maximum – minimum- indexes of changes in the industry and should be identified through benchmarking.

The proposed model is open for the optional indices to be implemented (see Table 1).

The alternatives give the strategists opportunities to conduct data collection and analysis at micro-level depending on the degree of data access and objectives of the research. It is necessary to add that the inverse logic of indices should be taken into account, for example, the employee turnover is a negative phenomenon, but the employee loyalty is a positive one. It means that the scale of it should be rotated backwards for optional sub-indices. All decisions about the inclusion of certain parameters into the microeconomic stabilization pentagon should be taken by experts who are involved in the process of strategic planning.

3. RESEARCH METHODS

While effectiveness is in the center of any research of organizational theory and macroeconomic analysis, the main question pertains to the essence of effectiveness. For macroeconomic models the effectiveness means the reduction of instability, at

the same time for the business the understanding of effectiveness has been changing. The concept of organizational effectiveness is researched repeatedly regarding particular organizations, industries, clusters and countries.

This investigation is designed to integrate the methodology on modeling the effectiveness at the macro-level and micro-level. The effectiveness of the country's governance is strongly associated with the concept of macroeconomic stabilization presented above.

In the recent years the studies at the microlevel were directed to narrowing the number of relevant criteria of organizational effectiveness. Finding the MSP Model applicable for macrolevel and using reverse logic of the relations between macro and microsystems we offered to apply the mentioned model to the organizational development analysis.

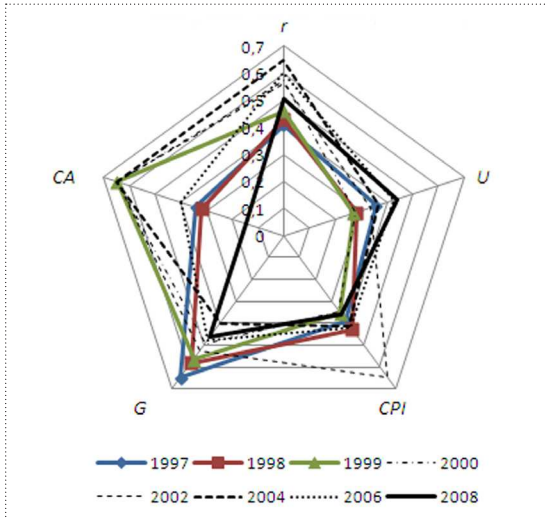
Following the logic of the research at macrolevel the theoretical framework was designed as a toolbox for the enterprise development assessment.

To achieve the research objective the MSP analytical model was replicated for target group of the countries, and the results proved applicability of the spatial analytical method.

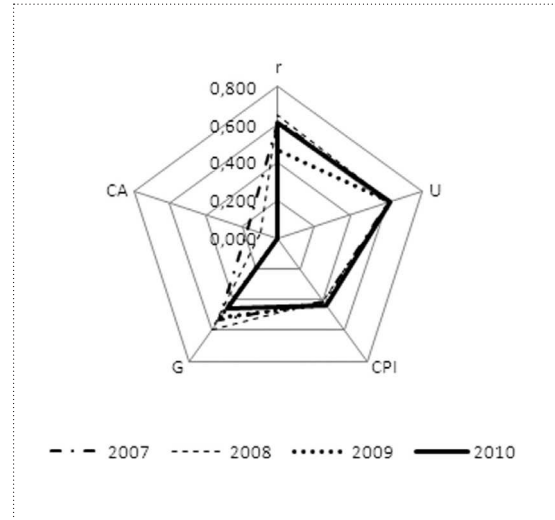
4. RESULTS: REPLICATION OF MSP MODEL FOR LOWER-MIDDLE-INCOME EU COUNTRIES

Despite the disadvantages of the Model mentioned in Żuchowska (2013), the main of which is the absence of optimal solutions, this approach is worth using. It can be used for the dynamics analysis, open for the analysis of trends in the economy and gives an understanding of interrelations between different phenomena in the economy. In addition, this model allows assessing the specific policy effectiveness, for example, the policy in a sphere of employment.

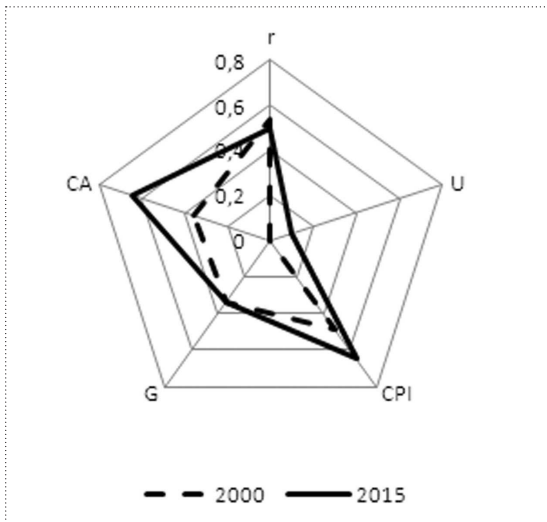
The MSP was calculated for the given lower-middle-income economies of the EU countries (see Table 2).



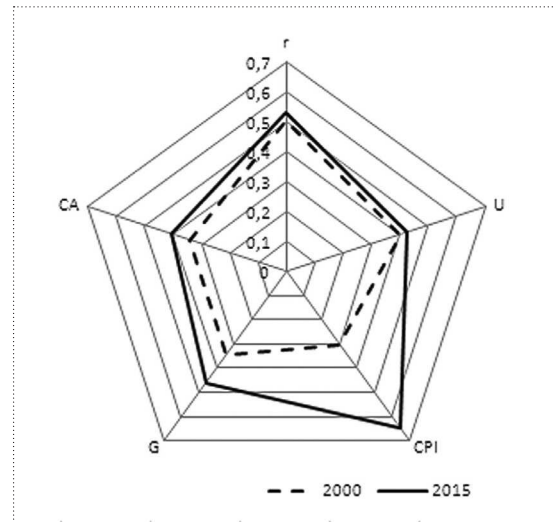
MSP Profile, Ukraine



MSP Profile, Belarus



MSP Profile, Croatia



MSP Profile, Romania

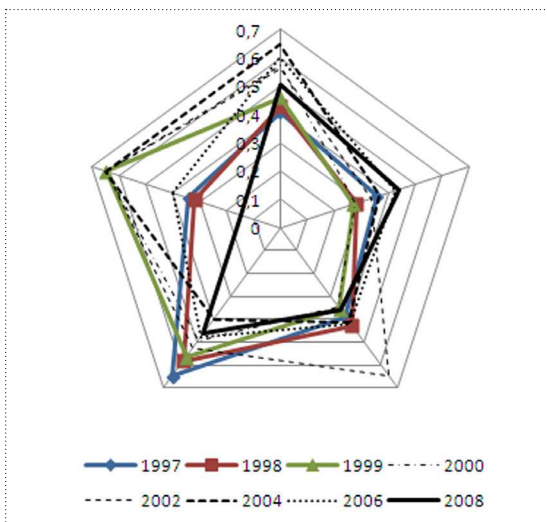


Figure 3. Comparison of *MSP* profiles of certain countries (based on our own calculations)

The computing was done taking into account the scale of *MSP* sub-indices dynamic as follows:

- 1) index of changes in the *GDP* level, *r* has a diapason from 25% to 10%;
- 2) unemployment rate *U* range is from 0% to 20%;
- 3) rate of inflation or consumer price index (*CPI*) ranging from 1% till 1000%;
- 4) ratio of budget balance to *GDP* in percent, *G* changes are assumed to be from -15% to 4%;
- 5) ratio of current account balance to *GDP* in percent, *CA* has a range from -10% to 4%.

If the values of indices are larger or smaller than boundary values, then they are taken as minimum or maximum values.

The calculation of the *MSP* indicator and its sub-indices MSP_1 and MSP_2 let us identify the areas of progress in stabilization or destabilization of the national economy and the level of the government impact. The comparison of pentagon areas reveals the best experience of the countries which overcame the problems of macroeconomic stabilization, the unemployment problems and inflation in particular, and won the leading positions.

The main findings can be presented as follows. The data analysis (see Table 2) showed different velocities of changes in macroeconomic stabilization of the national economies of the target countries. For instance, the highest level of *MSP* was observed in Ukraine during the time period 2000–2008, besides exogenous factors (triangle area d and e) played significant roles in the forming of stabilization. At the same time, under the conditions of the crises of 2007–2010, Belarus was the most stabilized country due to endogenous factors (triangle areas a, b and c). In addition, despite the high level

of macroeconomic stabilization of Ukraine in pre-crisis period, the rates of its reduction are from 0.527 in 2000 to 0.326 in 2008 that indicated the absence of appropriate coordination of economic policy in the sphere of stabilization of exogenous factors.

Romania and Croatia have the best values of the level of macroeconomic stabilization, but it is worth mentioning that these countries became the members of EU in 2007 and 2013 respectively. It is necessary to admit that both Croatia and Romania demonstrated one of the lowest levels of macroeconomic stabilization: in 2002 Croatia had $MSP=0.176$, but after the EU integration the value grew rapidly – in 2015, it is 0.255. The same tendencies were observed for the economy of Romania: from 0.203 in 2000 to 0.381 in 2015. In total, the stabilization of endogenous factors increased by 87%.

We should indicate some unusual findings for the economy of Belarus, which has one of the highest levels of macroeconomic stabilization. Moreover, Belarus became the leader among all the countries in 2005 when its stabilization level was 0.711.

The profiles of the mentioned countries are presented in Figure 3.

The replication of the model brought new insights into the understanding of the link between public policies and the stabilization processes in the countries. Thus, if the stabilization were observed in economic systems similar to Ukraine after the implementation of new policies or improvement of the existing ones, the replication of the successful strategic ploys may become the source of macroeconomic and microeconomic positive transformations.

CONCLUSION

The article consists of two research sessions, one of them is the construction of a theoretical framework while the second one is the analysis of empirical data based on the replication of the accepted methodology. The analysis was made for 12 countries of lower-middle-income economies, including Ukraine and the findings serve as a basis for the development of public policies. The main findings of the *MSP* model proved that the model is applicable for the analysis of the national economy. This model may be used as a tool for the assessment of public policies' effectiveness, especially in the field of unemployment and inflation process regulations.

The proposed microeconomic pentagon model may be used for profiling enterprises' activity and for revealing the main stabilization factors to make them manageable in the short- and long-run perspective.

The main reason to recreate the *MSP* model at the micro-level was the assumption that the stability-in-stability oscillations take place at every level of economic system and therefore must be synchronized or at least interrelated. The microeconomic stabilization model may become a useful framework for organizational development assessment in order to find adequate strategies. Further development is needed to investigate the prospects and problems of using the proposed framework at the enterprise level.

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