ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ПРИ БЪЛГАРСКАТА АКАДЕМИЯ НА НАУКИТЕ

Година XXVI

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CONTENTS

ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES
ГОДИНА XXVI, 2017, 5

Stefan Petranov[1]

NEGOTIATION OF SOCIAL SECURITY FLOORS: PROBLEMS AND POSSIBLE SOLUTIONS

This paper examines the process of negotiating social security floors (SSF) in Bulgaria and analyzes its problems. The focus is placed on finding the adequate balance between the role of SSF to accumulate sufficient means in the social funds and the impact of these floors on employment. Five different systems of SSF are presented aimed at offering specific rules for their change over time. These rules ensure the lack of motivation for informal practices and for reduction of employment, and at the same time meet the need for adequate revenues for the social funds. All five systems are based on sound economic arguments, they are practically oriented and are easy to use. They may be used separately or together – in combination.
JEL: J32; J38; J46; J50

1. Introduction

Social security floors (SSF) were introduced in Bulgaria in 2003 with the purpose of bringing social security contributions to a greater extent in line with actual wages. The reason was that prior to their introduction, it was a common practice that employment contracts were formally concluded at the level of the minimum wage (or close to it), while there were additional informal remunerations with no social security payments related to them.

SSF act as an absolute minimum in terms of social security contributions.[2] In the event that the official wage is higher than the corresponding floor, social security payments are determined by the wage. In the event that the official wage is lower than the floor, then social security payments are determined by the relevant floor. SSF are determined in accordance with the economic activity and group of professions to which they relate, with 765 SSF determined every year (85 economic activities and 9 groups of professions). The specific values of SSF are agreed upon after negotiations between nationally represented employers' organizations and trade unions and are finally approved administratively by the

[1] *Stefan Petranov is from Sofia University "St. Kliment Ochridski", e-mail: spetranov@yahoo.com.*
[2] Social security contributions are paid by employers (60%) and employees (40%).

state authorities.[3] If no agreement is reached between the social partners, the Ministry of Labour and Social Policy places the proposal for SSF to the state authorities.

Historically, the SSF system has played and continues to play a positive role in lightening the informal economy, stimulating fair competition between producers, securing social rights for many individuals, bringing higher revenues in the social funds and limiting their deficits. At the same time, however, SSF play a dual role. On one hand they are a component of the social macro-economic policy, and on the other hand, they are also an instrument for intervention in the labour market. Such a dual role results in some contradictions and problems in the negotiations or in the administrative determination thereof when no agreement is reached between the social partners. These problems affect both procedures and negotiations, and also the characteristics of the labour market, including the most important one of them – employment.

The present paper analyzes the process of negotiating SSF in Bulgaria and highlights its problem areas. Moreover, it suggests sustainable solutions for objectifying the negotiations for SSF which are based on sound economic principles.

The paper has the following structure. Section 2 presents the formulation of the problem. Section 3 examines the negotiation procedure for SSF from administrative and organizational perspective and highlights some practical problems in the process. Section 4 raises the question of considering SSF as a tool for intervention in the labour market in theoretical and empirical aspect. The next Section 5 justifies the features that an operating SSF system should have, if such a system should take into account both the need for adequate revenues into social funds and the need for not creating incentives for informal practices and job cuts. There are five systems suggested in Section 6 possessing the desired characteristics. They reflect the vision of the dualistic nature of SSF and allow for flexibility in determining the floors. The main results are summarized in Section 7.

2. Defining the problem

While being already an established practice, the procedure for determining SSF is not well regulated and often creates problems. One of them is that in a number of cases the state administration approves SSF (after negotiations or without any negotiations) that do not correspond to the economic fundamentals in terms of the increase of producers' labour costs. This in turn creates motivation for reducing the official employment, and, respectively, for increasing the informal practices.

In this regard, the Council of the European Union (2013) made a specific recommendation to Bulgaria "... to review the social security floors to ensure that the system does not make hiring of low-skilled workers more expensive." From this perspective, raising the question for the impact of the SSF system on formal employment, and also on informal employment makes sense. This is reasonable, because if SSF raise the costs of labour it may result in

[3] Ultimately by the Parliament within the Budget of the state social security.

reducing formal employment. At the same time it may generate motivation for both employers and employees to switch to informal relations.

There is certain contradiction in the SSF system as it is currently in Bulgaria. The potential conflict results from the dual role played currently by SSF. At the time of their introduction back in 2003, SSF had a minimal impact on the labour market and on the industrial relations. At that time, the minimum wage was very low (BGN 110 per month[4]) and informal economy was widespread, manifested in the fact that many employees were not socially secured or were socially secured based on the minimum wage, though informally receiving significantly higher wages. During the first several years SSF have been perceived as a component of the social policy, as an instrument of macroeconomic policy, serving to combat the informal economy. SSF system was considered a tool to raise adequate revenues for the social funds and not as a tool for intervention in the labour market.

During this initial period SSF were relatively far from the actual wages. In such an environment, social dialogue flew smoothly and SSF increased annually at a high rate – 6-7% catching up with actual wages. This trend continued in the next few years, when the country was on the upside of the economic cycle and realized the highest growth rates in its recent history. SFF easily increased by 12-25% on an annual basis due to the continuing effect of catching up and because of rising actual nominal wages under the conditions of economic boom - growing employment, low unemployment, high rates of growth in Real GDP, high inflation.

However, this trend could not be maintained for a long period – sooner or later the economic growth slows dawn and the catch-up effect depletes. This happened in 2009 when the Bulgarian economy turned out to be "overheated" and triggered by the international financial crisis the country experienced its greatest recession since the economic decline of 1997. In 2009 the real GDP declined by nearly 5%, while SSF increased compared to 2008 by 26.6% on average.

Since then, during the years of subsequent crisis of stagnation, with practically zero or very low economic growth, it became clear that the SSF system was important not only as an element of the macroeconomic social policy, but also as an instrument for labour market interventions. These two sides of the same coin have always been available but the crisis sharpened the impact of SSF on employment.

When SSF levels become high enough, their uniform application causes a lack of flexibility in terms of labour costs. If SSF exceed productivity of labour there is no benefit for employers to hire workers, this leading to the dismissal of workers or to switching to informal employment. In other words, the level and dynamics of SSF can have an effect both on the formal employment and on the informal economy. The recommendation made by the Council of the European Union should be perceived in this very context.

The current SSF levels are a result of a significant increase over an extended period of time. During the period 2003-2014 the minimum wage increased from BGN 110 to BGN 340 – a

[4] Bulgarian Lev (BGN) is pegged against the euro at the rate of BGN 1.95583 for EUR 1.

growth of 209%, and the average SSF increased from BGN 180 to BGN 485 – a growth of 169%. These growth rates were well above the growth rate of productivity.[5] Such a differential between the growth rate of SSF and productivity causes concerns because it leads to increase of production costs and ultimately to loss of competitiveness for the Bulgarian producers. And there are already signals for this - in a number of activities for low-skilled employees wages are below their corresponding SSF. Moreover, the unemployment rate for low-paid groups of workers is very high – in 2015 it is 15.1% in rural areas and 21.6% for individuals between 15-24 years old compared to 9.1% on average (National Statistical Institute, 2016).

Under these circumstances it is reasonable to examine whether SSF have reached the limit where they might have a negative impact on the official employment. This is the reason why the SSF system should be subject to an in-depth discussion in terms of its role as a model of industrial relations for the labor market, which may have an impact on employment, on the structure of remuneration, on redistribution of income and on the motivation for the application of "gray" practices. This is not only pure theory. According to a detailed econometric study for the period 2003-2012 (Petranov, Ivanova, 2017) the increase of SSF during this period, ceteris paribus, results in an increase of informal employment. Hence there is a need for rationalizing the SSF system with the purpose that it doesn't create motivation for job cuts and gray practices.

The impact of SSF on the employment raises the question of finding a system of SSF designed to minimize incentives of employers and employees to be engaged in informal practices. Such a system would be beneficial in terms of formal employment as well. This is because the two phenomena (decrease/increase of formal employment, increase/decrease of informal employment) are connected, the connection being mainly in the most vulnerable groups – young and low-skilled workers and workers in rural areas.

3. The process of negotiating SSF in Bulgaria – best practices and existing problems

The process of negotiating SSF is annually launched by the Ministry of Labour and Social Policy. A working group is established involving representatives of the social partners – trade unions and employers' organizations, Ministry of Finance (MoF), Ministry of Labour and Social Policy (MLSP), National Social Security Institute (NSSI), National Revenue Agency (NRA), National Statistical Institute (NSI). The administration of the process of negotiation is performed by MLSP. Recommended guidelines for the conduct of the negotiation process are prepared based on the projected budget indicators for the next year.

The number of economic activities for which SSF have to be negotiated tends to grow over time. The reason for that is the need for more detailed reflection on the specifics of different economic activities on one side and on the other side the organizational arrangements by trade unions and employers' organizations in sectors that do not correspond exactly to the

[5] For the same period Nominal GDP increased by 139% (data source: National Statistical Institute).

statistical classification of economic activities by the NSI. In 2014, negotiations covered employees in 85 economic activities and 9 qualification groups of professions.

SSF are related to another arrangement on the labour market - the minimum wage. It is the lowest possible social security floor since it is valid for all economic activities and qualification groups of professions. So the minimum wage is an external limiting factor in terms of all SSF.[6]

Currently the procedure for determining SSF is not regulated by any formal regulations or by any agreed upon rules adopted by the participants in the process. There are good practices gaining ground over time that help its implementation – working groups are formed, deadlines are complied with, mutual compromises are considered. Poor formalization of the procedure can be seen somewhat as an advantage because it is a complex process with possible conflicts by its very nature and it would be difficult to be formalized entirely in details. But the flip side of the coin is that the lack of regulation may create also a motivation for opportunistic behavior by participants in the process.

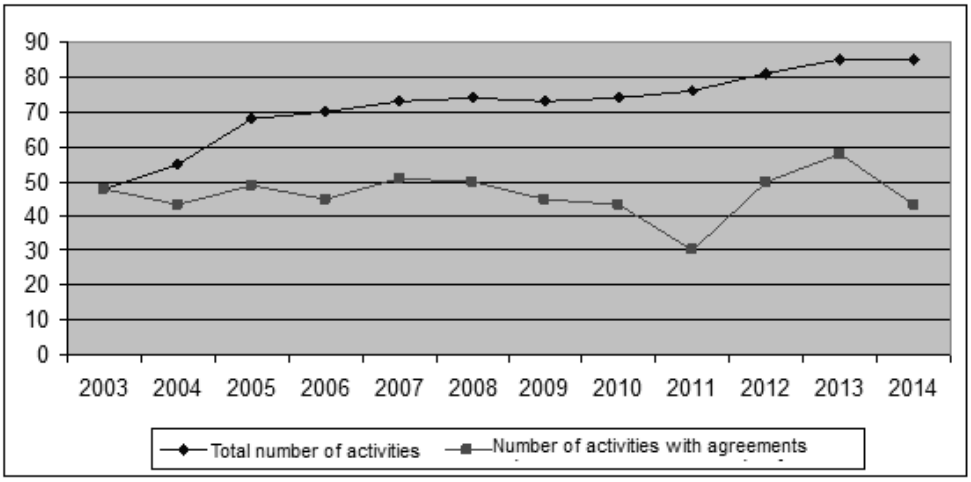
Here are some problem areas. There are economic activities that have no nationally representative employers' organizations, however, they have nationally representative trade unions. The opposite is also present – activities in which there are is no nationally representative trade unions, but there are nationally representative employers' organizations. There are activities where both trade unions and employers' associations are missing. Also, there are cases in which trade unions and employers' organizations in certain activities come to an agreement, but other trade unions and other employers' organizations registered for the same activities do not come to an agreement. This raises the question about the representativeness of the negotiations when there is more than one organization on any side of the agreement. There are even cases of negotiation between organizations that are not nationally representative or negotiations between illegitimate organizations.

The listed above problems are reflected in Figure 1. It shows the total number of economic activities subject to negotiation and the number of activities for which agreements have been concluded over time. As evident from the graph, with the exception of 2003 when there was a collective agreement by general decision, in the years thereafter there is a steady tendency of reducing the number of activities with agreements in relative terms and in some cases even as an absolute number. For example, for 2014 legitimate agreements were concluded in 43 economic activities out of 85, i.e. 50.5%.

[6] There are also some specifics concerning self-employed, individual farmers and individual tobacco growers. For them SSF are below the minimum wage. There is also an upper limit (maximum amount of social security contributions) for all individuals.

Figure 1

Total number of economic activities and number of economic activities with agreements



Data source: MLSP.

Besides the above issues, there is the behavior of the government institutions as an arbitrator of last resort, who is authorized to determine the SSF in activities for which no agreement has been reached. This behavior is not bound by any rules which leads to the potential problem that such increases of SSF might be unfounded. It has been the practice up until now that in the event of no agreement, either the average growth rate of all activities with agreement is imposed or there is no change at all. And here is the problem – since it is clear that there is no way one growth rate (defined in an administrative way) to be suitable for half of the economic activities where no agreement is reached. It is difficult a priori to believe that a growth rate from one sector will be suitable for another sector or that the zero rate is necessarily the most appropriate without conducting analysis of the objective economic fundamentals for the relevant economic activity.

Since the very beginning of SSF existence there has been no case of reducing the floor for any economic activity or a qualifying professional group even in periods of recession, even for industries which have been badly hit by a crisis. This shows up to now a lack of flexibility of this institution of the labour market, which is definitely a disadvantage. The lack of possibility SSF to be reduced in times of crisis may lead to a loss of competitiveness for companies and consequently to loss of jobs or shift to informal practices. This is definitely not beneficial to the employees or to the state[7] and therefore, it is advisable that the possibility of decreasing SSF is explicitly available particularly for industries in crisis.

[7] In a recent report based on a representative survey among employees (Ministry of Labor and Social Policy, 2014) the authors conclude that "As a result of the high unemployment rate a significant part of the employees are ready to work on a minimum wage but to keep their jobs and to receive income".

The lack of legal regulation allows for freedom in the negotiation process which is a good thing because it gives an opportunity for all the specifics of the different activities and all viewpoints to be reflected. However, it is worth considering the possibility of a "soft" regulation of the process of negotiating SSF. There is already practical experience gained during more than a decade with some good and some not so good aspects. It can serve as a basis and be reconsidered so as to create a specific "soft" regulation of the process[8]. This would help improve its efficiency.

4. Impact of SSF on employment and informal economy in Bulgaria

Generally, the impact of the SSF system on official employment and informal economy in Bulgaria is relatively poorly studied. There are a few studies published but they arrive to different conclusions. Some of the views are that SSF have no material impact on employment and informal economy. For example, the conclusion of a detailed analysis of the labour market for the period 2003-2011 published by the Ministry of Finance (2013) was that "... At the aggregate level, there is no significant negative impact of the increase in the social security floors on the number of employees who are at the minimum floor". According to an extensive survey of the Ministry of Labour and Social Policy (2014) it was found out that "At national level, the majority of both employers and employees do not perceive SSF as a factor influencing negatively formal employment and labor market". Even more - "Based on their personal experience and observations, employers at national level definitively reject the theses of the negative impact of SSF on hiring young people, on hiring and firing low-skilled workers, as well as on hiring and firing highly qualified persons." In addition, the study of the Bulgarian Chamber of Commerce (2014) concluded that "The effects of different SSF differ with respect to economic activities and qualification groups of professions, and by years and there is no clear tendency outlined."

At the same time there are opposite views, as well. Results of a survey conducted by the Institute for Market Economics (2009) show that SSF negatively affect employment. The study of Petranov, Ivanova (2017) referred to in Section 2 shows through the use of econometric models that SSF have statistically significant impact on the size and dynamics of informal employment. Increasing SSF leads to an increase in informal employment, after controlling for other significant factors. Another survey on the opinion of employers and employees conducted by the Bulgarian Industrial Capital Association (BICA, 2014) shows the perspective of employers. According to them ".... determination of the size of the SSF must be economically justified, must be based on the indicators of real economic activity of enterprises. This should take into account the industry average levels of annual profit growth, growth in productivity of labour and the average income for the previous period."

[8] For example, a number of publications in the economic literature, examining the nature of the negotiation process in collective labor negotiations in different countries, pay attention to the nonlinear relationship between the degree of centralization and employment. According to this relationship highly centralized systems and highly decentralized procedures lead to higher employment compared to procedures with intermediate (branch) level of negotiation. See. e.g. Calmfors L., Driffill J. (1988).

Particularly employers from micro and small companies suggest "... consideration of introducing differentiation of the size of SSF according to the size of enterprises, where small enterprises shall have lower social security floors."

While SSF are an instrument that is different from the minimum wage, they still have common features. Therefore, theoretically, numerous studies on the impact of minimum wages on employment and informal economy can be taken into consideration. The economic literature on the subject is rich enough. The dominating view is that the minimum wage has positive effects expressed in increasing productivity of low-paid workers (Acemoglu and Pischke, 1998) or in improved motivation of workers (Manning, 1995). However, above a certain level the negative effects prevail, because employers can not formally hire low-productive workers who then become unemployed or start working in the informal sector (Neumark, Wascher, 2003, Abowd, Kramarz, Margolis, 1999). These results were confirmed by empirical research in countries whose labour markets are similar to the Bulgarian one. For example, Fialová, Schneider (2011) demonstrated through econometric models that the increase in the minimum wage for the period 1999-2007 in the new EU Member States resulted in an increase in the number of informal workers employed without official contracts. A study of the labour market in Estonia for the period 1995-2000 (Hinnosaar, Rõõm, 2003) found out that increasing the minimum wage reduces the number of workers affected by this change (working on the minimum wage) and increases the number of those who do not comply with the official regulations.

Despite of the fact that there are arguments for the opposing view, the reports presented by Ministry of Labor and Social Policy and Ministry of Finance with respect to SSF serve as grounds to impose the idea that at this stage SSF in Bulgaria may easily be and should be increased. This is due to the institutional position of these reports on one side and on the other side to the practice since the very beginning of SSF application.

Given the initial role of SSF as an element of social policy, this is an understandable position, however one-sided. Believing that SSF do not affect the employment ultimately means believing that production costs do not affect in any way the competitiveness of companies. This, of course, can not be true. Because when production costs rise, companies are losing competitiveness and reduce their sales which leads to reduction in employment in one way or another. In terms of the economy of the enterprise, social security costs are no different than that any other expenses – for electricity, gas, rents, interest, raw materials, etc. Assuming that the size of SSF is not important as to employment means that the prices of electricity, gas, the rents and interest, the prices of raw materials are not important for the enterprises.

The question for the influence of SSF on employment (formal and informal) is currently incorrectly focused – it is considered on the base whether there is or there isn't such influence with the purpose of justifying another increase in SSF. However, at this stage, after a long period of time during which SSF were increasing faster than productivity, it cannot be automatically assumed that there is no influence of SSF on employment. Technically, it might be difficult to identify such influence, because it is combined simultaneously with the impact of other relevant factors. But the fact that the identification of such influence is technically difficult does not change the fact that SSF, as a component of production costs, inevitably have their impact on the economic viability of enterprises

and thus on employment and informal economy. The influence of SSF could be revealed by an in-depth and detailed analysis carried out using a suitable apparatus and sufficiently reliable data.

The proper understanding of SSF is that they affect employment, however, differently for different producers. At one end of the spectrum there are companies that can influence the prices of their goods and services (e.g. Financial institutions) or whose prices are regulated based on their costs (e.g. water supply and sewerage companies, companies from the sector of production and distribution of electricity, heat and gas, public administration or healthcare). As to these producers, due to their market power, it is relatively easy to directly transfer any increase in costs (including SSF) on consumer prices without substantially changing the results for the producers. I.e. increasing SSF in this case does not affect or affects producers a little, but ultimately converts into higher consumer prices. Quite naturally companies of this type would most likely answer very objectively in a survey that "... they do not perceive SSF as a factor affecting negatively formal employment and labour market."

At the other end of the spectrum there are companies that operate in sectors with a highly competitive market structure that allows only very small profit margins. They are highly sensitive to all costs and any possible increase in SSF can lead to inability to cover costs. This in turn means stopping the activity which will result in a corresponding reduction in formal employment or retaining the business, however partially switching to informal practices. The latter means again reduction of formal employment and an increase in the size of the informal economy.

Of course, there are sectors where market structure is neither monopolistic or oligopolistic, nor perfectly competitive, but intermediate. Enterprises in these sectors have relatively good profit margins and generally can absorb some increase of SSF at the expense of their own financial results. But even in this case enterprises' reaction may not be unambiguous. Some companies may respond to increased SSF by reducing other labour-related costs – on the job training, qualification, working clothes or food vouchers. Other companies may streamline their operations and cut some low-skilled or under-productive workers in an attempt to maintain their profit level by limiting labour expenditures. Some may try to meet the cost increases by applying informal practices to a certain extent. And, of course, some companies may accommodate increased costs at the expense of their profits, which will reduce however the taxes paid by them.

As evident from the above arguments, the increase in SSF, ceteris paribus, may lead to different results depending on the competitive structure of markets and the response of producers. Results can be inflation, job losses, increase in the informal economy, reduced benefits for workers, reduced profits for producers or a combination of all these in varying mixes. Obviously, such results excluding the latter case, are hardly desirable in terms of public interest.

That fact that the increase in SSF increases producer's costs and this could negatively affect inflation or employment does not mean that SSF should not be increased. It means that SSF may be increased, but this must be done carefully, according to the needs and the objective economic fundamentals.

The main purpose of the SSF system is to accumulate adequate means for the social funds supporting the pension and healthcare system. But the cost of maintaining such systems inevitably increases over time - cost of living for pensioners increases because of inflation, salaries of medical staff, prices of medicines, overheads of hospitals also increase over time. Therefore, SSF should be increased. In terms of the economy of enterprises, SSF may be increased as production costs for electricity, gas, rent or raw materials typically increase over time. This should be done after taking into account the economic fundamentals and the diverse aspects of this complex process, so that there are no (or minimum) negative effects from the reduction of formal employment or from expansion of informal economy. This is the very way that the question on the influence of SSF on employment and informal economy should be considered. The focus should not be on whether or not there is such a negative relationship (arguments above show that it exists). The focus should be how to account for such a relationship in a combination with other relevant factors, so that the increase in SSF does not lead to incentives for increase of the informal economy and therefore not to undermine the competitiveness of enterprises and official employment.

5. What are the desirable features of a SSF system?

Under the current regulations SSF by economic activities and qualification groups of professions should be agreed upon between social partners. And this is the best option possible - nothing can replace free negotiation in which all specifics of any moment and in any economic activity can be taken into account.

Nevertheless, and without limiting the freedom of negotiation, it would be useful to have a system that takes into account objective economic realities and thus providing the basis for achieving an agreement in negotiations.

To be good enough and workable a system of negotiating SSF must meet certain requirements, which are a logical result from the purpose of SSF, from conclusions made in the studies on the influence of SSF and from the analysis provided in this paper. Ideally, such a system would have the following characteristics:

1) *The system should take into account the potential impact of SSF on formal and informal employment.* As shown by the arguments in Section 4 of this paper, too large increase in SSF can generate motivation for informal practices. Increasing SSF with the sole purpose of collecting more funds without taking into account any possible effect on reducing formal employment or increasing informal employment, would have a negative outcome, because it can lead to job cuts and/or to expansion of the informal economy.

2) *The system should ensure sufficient financial means for the social funds.* This is the original purpose of the existence of SSF. There is no point in any system for negotiation of SSF if this condition is not met.[9]

3) *The system should take into account existing differences across local labour markets.* This requirement is needed due the fact that in recent years there have been tangible differences between local labour markets – wages and unemployment rates vary considerably in different places. These differences should be taken into account – there is no way the same levels of SSF are suitable for both Sofia and Vidin given the existing considerable differences in the basic characteristics of the regional labour markets.[10]

4) *The system should take into account the difference in the economic capacity of large and small enterprises.* This is a direct result from the findings of the survey conducted by BICA (2014), referred to in Section 4 of this paper. These findings suggest that employers insist on different treatment (more relaxed) in terms of SSF of small enterprises and micro-enterprises. The arguments are that these enterprises typically are exposed to more market risks, have more difficult access to credit and innovation and have lower efficiency.[11]

5) *The system should be based on objective, publicly available statistical data generated with the appropriate frequency by institutions that do not participate in the negotiation process.* If the system uses data collected and interpreted by one of the parties in the negotiation process, it is possible that such data is manipulated and the objective basis of negotiations is distorted. Also, if the system is based on non-existent data or data for which collection is difficult or is not done with the appropriate frequency, then such a system will remain only on paper just as a good intention.

6) *The system should be relatively simple to be understandable and easy to interpret and use.* A complex system can cover many details, but at the same time it will require more

[9] This means that SSF should be regularly updated at rates that are close to the rate of increase of the expenditures of these systems. Pensions have a dynamics that is legally set – the so called "Swiss rule" while the expenditures of the health care system have no such legal regulation. At the same time pensions are the largest expenditure of the social systems (pensions and compensations are about three times larger than the expenditures for health care). This is why for the purposes of this paper it is assumed that the role of the SSF system to secure means for the social funds will be adequately implemented, if SSF increase according to the "Swiss rule."

[10] For example, according to data from the National Statistics Institute (NSI) differences in average gross wage at the end of 2014 by regions are considerable: the highest average gross wage is in Sofia Capital (BGN 1131), while the lowest is in Vidin (BGN 597). Also according to NSI data the unemployment rate for persons aged between 15 and 64 for 2015 is 4.4% for Sofia Capital and 18.6% for Vidin.

[11] Unfortunately, this requirement is inconsistent with the next one, according to which the system should be based on objective statistical data available, because at this stage there is very little data collected and publicly available which take into account the size of enterprises. Therefore, the systems proposed in this paper comply with all listed requirements, except this one. Nevertheless, this requirement is retained in the text, because the scope of data collection may change in the future, and also because consideration of this aspect is important and deserves attention.

data and this can lead to difficulties and confusion. In order to be general enough while traceable and verifiable, a system should not be very complicated.

6. Possible versions of the system

6.1. Productivity is at the root

In terms of microeconomic theory in the short run labour costs must correspond to productivity of labour.[12] In particular, the marginal revenue per unit of additional labor should be equal to the marginal cost per unit of labor. In this very case there is the optimum amount of production in terms of competitive markets and maximum employment.[13] The marginal revenue per unit of labor in turn is the product of marginal physical productivity of labor and the price of production.[14] Several important conclusions can be drown from this result.

First, if labour costs, including social security contributions, change over time in line with labor productivity, other things being equal, this will not lead to a negative effect on employment. I.e. in terms of labour costs there will be no motivation for employers to cut jobs because labour costs are growing faster and go ahead of productivity. Accordingly, there will be no motivation for shifting to informal practices.[15]

Second, if productivity per unit of labour increases faster than unit labour costs, then, other things being equal, this will increase the demand for labour, because companies will benefit from increasing the employment. Conversely, if productivity per unit of labour increases more slowly than unit labour costs, this will reduce the demand for labor and will create motivation for the expansion of the informal economy.

Finally, increased labour demand can be met either by possible increase of labor supply and higher employment or by wage increases. In the latter case it should be borne in mind that in the medium and long term, companies may react also by replacing labour with more productive physical capital.

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[12] This result stems from a conceptual model describing the companies as institutions seeking to maximize their profits, which is a natural behavior for private companies. Other participants in the labor market, such as state-owned companies or public administration may not be covered precisely enough by this model.

[13] This is a standard result from the microeconomic theory on labour demand and can be found in many different publications. See for example Borjas (2010).

[14] Marginal revenue per unit of labor MRP_L is defined as the increase in total revenues generated by the increase in labor by one unit, i.e. $\Delta TR/\Delta L$. If Q stands for the amount of production, MR for marginal revenue, and MP_L for marginal physical productivity of labor, the following equation shall be in force: $MR = \Delta TR/\Delta Q$, $MP_L = \Delta Q/\Delta L$. $MRP_L=\Delta TR/\Delta L=(\Delta TR/\Delta Q) \times (\Delta Q/\Delta L)=MR \times MP_L$. The statement in the text is obtained by recognizing that marginal revenue equals the price of production and hence real labour costs should be equal to the marginal physical productivity of labour.

[15] This does not mean that the gray economy will disappear but that there will be no motivation for informal practices caused by SSF. Other factors motivating gray practices that are not connected with SSF may remain in force.

As evident from the above it appears that if SSF should not create motivation for informal practices then SSF have to be changed in parallel with the marginal productivity of labour. This clear conclusion gives grounds to suggest a SSF system based on the dynamics of the marginal productivity of labour. In order for such a system to be put into practice, however, it is necessary to make one more step.

Marginal productivity of labor is purely a theoretical concept and practically is not measured by the statistical authorities. Average productivity of labour is usually published instead. Such is the practice of the National Statistical Institute in Bulgaria (NSI) and therefore connection should be sought between marginal and average productivity of labour. This can be done by using the production function apparatus as follows:

Let Q indicates the amount of production, K the amount of capital, and L the amount of labour input in the production process. Let the production function has the following form[16]:

$$Q = AK^{\alpha}L^{\beta},\ \alpha + \beta = 1$$

For the marginal productivity of labor we have:

$$\frac{\partial Q}{\partial L} = AK^{\alpha}\beta L^{\beta-1} = \frac{\beta AK^{\alpha}L^{\beta}}{L} = \beta\frac{Q}{L}$$

I.e. marginal productivity of labor can be estimated as the average productivity of labour is multiplied by a parameter which is a number between zero and one.[17] The fact that the marginal productivity of labour is less than the average productivity of labour is due to the law of diminishing marginal productivity and to the fact that the increase in production volumes is not the result only of the increase in labour productivity, but of other factors as well involved in the production process (improvement of organization and management, investments, improved infrastructure, improved efficiency of intermediate goods such as energy, materials and resources).

Given the above conclusions, a logical SSF system based on productivity of labour would be[18]:

(6.1) $TM_{ijk}^{t+1} = \beta_i TII_{ik}^{t-1}$, where

[16] This is the so called Cobb-Douglas production function, which is widespread and most commonly used in analytical economic research.

[17] The possible values of this parameter are estimated on the basis of specific empirical data. Econometric estimates published in the economic literature show parameter values which generally fall in the range 0.5-0.7.

[18] Here growth rates of SSF are equal to growth rates of marginal productivity of labour. The later are a fraction of the average productivity of labour on the basis of the production function.

TM_{ijk}^{t+1} - annual growth rate of SSF for economic activity i, for group of professions j[19], for region k, in the year t+1;

$TП_{ik}^{t-1}$ - annual growth rate of average productivity of labour for economic activity i, region k, in the year t-1;

β_i - a parameter that is subject to empirical econometric estimation.

The formula so suggested requires certain clarifications. First, in terms of the chronological index. According to the current organization of the process of negotiating, SSF which will be valid for the year t+1, are negotiated in the middle of year t and can therefore be based only on reported data from year t-1.

Second, about the parameter β. It can be uniform for all SSF, if empirically estimated at a macro level (ie $\beta_i = \beta$) or it can be different for different sectors, if it is empirically estimated from sectoral production function models.

Finally, in terms of data on labour productivity. NSI practice is to publish indicators of labour productivity based on gross product and on gross value added at current and constant prices, on an annual and quarter basis. NSI data are calculated based on production activity (numerator) and indicators of labor input in the production process (denominator). The result of the production activity is measured by Gross Domestic Product (GDP) and Gross Value Added (GVA) and the labour production factor in the calculation of the relevant index is measured by the number of employees in resident production units of the national economy and by the time worked by them – man-hours worked.

The indicator of labour productivity based on value added[20] is more appropriate in this case. Furthermore, it is more appropriate to report labour on the basis of man-hours worked because the amount of labor input in the production process is measured more accurately thereby. Current prices should be used in terms of price base because SSF are nominal values.

The annual growth rates of labour productivity can be calculated based on annual data, which is available for the previous year in the middle of a given year – NSI publishes the data 435 days after the end of the relevant year. However, they can also be calculated based on quarterly data, taking the first quarter of the current year (when negotiating SSF) and the

[19] In this case the formula is designed so that SSF for various qualification groups of profession increase at the same rate. This is not necessarily required, it is possible that within an economic activity SSF for individual groups of professions change at different rates, but the important thing is that the growth of the average SSF corresponds with productivity growth in the sector.

[20] It is this indicator that is most frequently used in European practice in collective employment negotiations. Another possible indicator – productivity based on gross product - is less suitable in this respect, because it takes into account the production at market prices - ie includes taxes, excise duties and subsidies. An increase in excise duties or taxes, for example, would, other things being equal, result in an increase in productivity of labour under this indicator. Obviously there is no increase in productivity in the sense given to this concept in economic theory.

last three quarters from the previous year. Quarterly data are published 70 days after the end of the relevant quarter. In the second case decisions can be taken based on more recent data at the expense of some more calculations.

The formula suggested can be used in different perspectives, where the availability of disaggregated data in sector and regional perspective affects the possibilities of its application. The frequency of publishing data is different for different facets and therefore requires appropriate modifications of the suggested formula. There are four possible subversions.

The first is when the formula is applied at the macro level. In this case, it uses only the growth rate at national level and is modified as follows:

(6.1a) $TM_{ij}^{t+1} = \beta TП^{t-1}$

According to this modification, the change of SSF should be at a rate equal to a fraction from the growth rate of labor productivity at the national level.

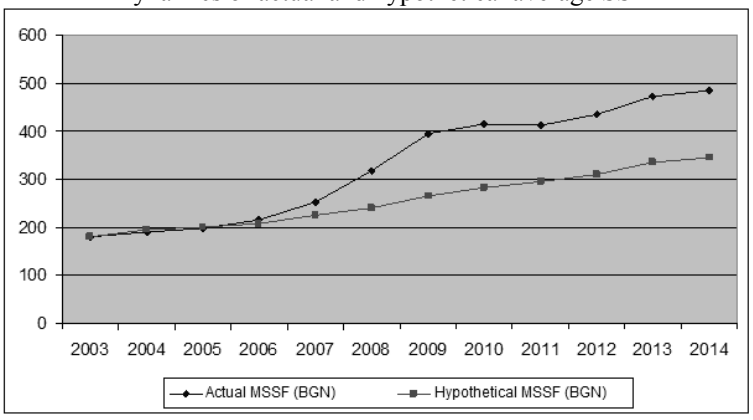
What does this actually mean? The following example may be considered an illustration of this approach. NSI data show that productivity of labour at a macro level based on gross value added per man-hour worked in 2013 and 2012 are respectively BGN 11.1 and BGN 11.0. Let's assume that after the relevant econometric procedures, the beta parameter is estimated to be 0.7. Then it turns out that SSF for 2015 should be increased compared to SSF for 2014 by a growth rate of just over half a percent. The calculations are as follows:

$$TM_{ij}^{2015} = \beta TП^{2013} = \beta \frac{11.1}{11.0} = \beta 0.91\% = 0.7x0.91 = 0.637\%$$

Another illustration is the dynamics of the hypothetical SSF, which would have resulted if this formula has been applied as of the beginning of the introduction of SSF. Figure 2 gives an idea of what could happen. It shows the dynamics of the actual SSF (average by economic activities and qualification groups of professions for the relevant year) and the hypothetical average SSF that would result under the above rule.

Figure 2

Dynamics of actual and hypothetical average SSF



The figure shows that, if the suggested rule was followed during all of the years of existence of the SSF, even at relatively high beta coefficient (in this case 0.7), the growth of SSF would be significantly lower than it currently is. I.e. during the period concerned SSF have been increasing too fast with respect to the marginal productivity of labour.

The second option is to implement the formula in a sectoral perspective. Then it shall be modified to:

(6.1b) $TM_{ij}^{t+1} = \beta_i TП_i^{t-1}$

According to data available, published by the National Statistics Institute, in this case the formula is applicable to the so call A3 format, ie economic activities are aggregated into 3 sectors - agriculture[21], industry[22], services[23]. This means that the growth rate of productivity of a sector to which a certain activity belongs will be the reference indicator for the increase of SSF in the relevant activity. Beta coefficients β_i may be specific to each sector or a single beta coefficient may be used, i.e. $\beta_i = \beta$ which is estimated at macro level and which will basically be the average between the sectoral coefficients.

The third option is to use the formula in the same form as in (6.1b), but at a more disaggregated sectoral nomenclature. I.e. the formula is

(6.1c) $TM_{ij}^{t+1} = \beta_i TП_i^{t-1}$,

but now the sectoral index refers not to the nomenclature A3, but to A10 which includes all economic activities aggregated into 10 sectors - agriculture, industry, construction and seven separate activities in the field of services. In this case, however, the data available require the use of productivity of labour based on GDP, and not based on gross value added as this is the data published by NSI in nomenclature A10.[24]

Fourth option, another option in principle, is that the formula is used both in sectoral and regional perspective. Then it shall take the following form:

(6.1d) $TM_{ijk}^{t+1} = \beta_i TП_{ik}^{t-2}$

In this case the formula is applicable across regions and across economic activities aggregated in format A3. Now reference for the increase of SSF in a given sector and in a given region will be the growth rate of labour productivity for the sector and the region concerned.

[21] Includes the following activities under NACE - agriculture, forestry, fisheries.
[22] Includes the following activities under NACE - mining, manufacturing, production and distribution of energy and fuel, water supply, sewage, waste management, restoration, construction.
[23] Includes all activities under NACE, which are classified as services.
[24] In fact, NSI does not publish data for productivity, but data for GDP, for number of employees and man-hours worked. From this data labor productivity can be calculated.

The reason for the chronological index for the rate of productivity growth to be t-2 instead of t-1 is that this kind of data (by sectors and by regions) is published 24 months after the relevant period.[25] Individual sector beta coefficients for each sector or a common beta coefficient estimated at national level can be used both in this modification of the proposed formula, as well as in the previous one.

Of course, the proposed formula has advantages and disadvantages in the light of the desired characteristics described in Section 5.

Advantages. First of all, the proposed version meets at most the requirement to provide SSF such a dynamic, which does not create incentives for informal practices and job cuts. The dynamics of SSF, corresponding to the marginal productivity of labour, other things being equal, retains employment, generates no need for job cuts and dismissal of workers and thus minimizes incentives to switch to informal practices.

Another advantage of the system is that it can take into account the differences in sectoral and regional aspect. Where productivity is low - the relevant SSF are lower and vice versa. A third advantage is that the system is based on publicly available and regularly published data included in the calendar plan of NSI.

Finally, in terms of the need for maintaining social funds. The growth rate of labor productivity in current prices may be decomposed into two components – the growth rate of physical labour productivity and the growth rate of production prices, i.e.

$$TП = TPP + TP$$

It follows from the above that

$$\beta TП = \beta TPP + \beta TP$$

I.e. if the product between beta coefficient and inflation of production prices added to the product of beta coefficient and the growth rate in physical productivity is equal or at least close to the "Swiss rule" then changing SSF according to (6.1) will secure adequate means for the social funds. In order this to happen the above sum should be equal or close to half of the sum between consumer prices inflation and the growth rate of the average social security income.[26]

The growth rate based on the "Swiss rule" and the growth rate based on the above formula are usually different, but the question is where do such differences come from and to what extent do they differ. It turns out that the differences in the long run are not very significant. In the "Swiss rule" it participates the consumer price index while in the other formula it participates the producer price index but the dynamics of these two indexes in the long term should not be substantially different. Also, in the"Swiss rule" it participates the growth of the average social security income while in the other formula the growth of physical

[25] Actually NSI does not publish data for productivity in such breakdown, but data for gross value added, for number of employees and man-hours worked. From this data labor productivity can be calculated.

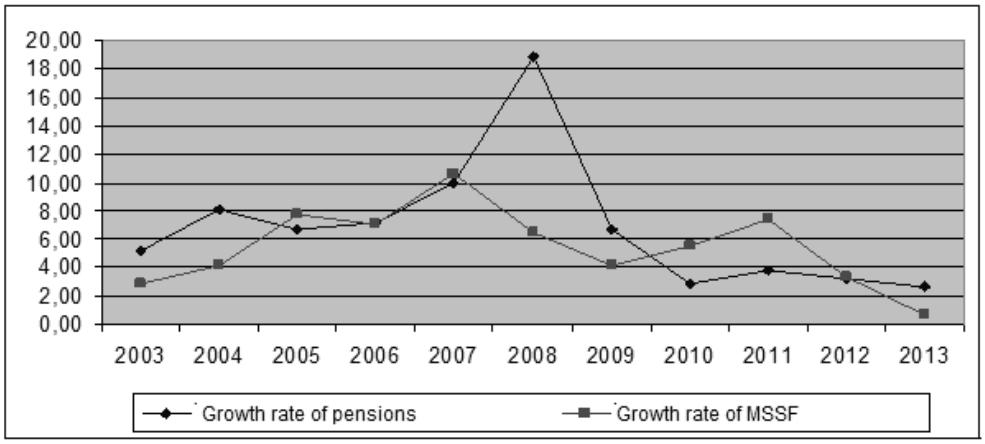
[26] This is the so called "Swiss rule". Social security income is the amount of income on the basis of which individuals pay their social security contributions.

productivity of labor is included. They practically do not coincide, but under ideal conditions productivity growth should be carried over to wage growth and hence to growth of the average social security income, so they should have similar dynamics.

The extent to which the two amounts are identical can be seen on Figure 3. It shows what would be the growth rate of pensions in the period 2003-2013 in case the "Swiss rule" applies for all the years of the period and also what would be the growth rates of SSF in case they are based on labor productivity at national level, according to the proposed formula with a beta coefficient of 0.7.

Figure 3

Contingent growth rates of pensions and SSF (%)



Source: Authotrs'calculations.

The figure shows that the two lines have a similar profile and practically coincide for the period 2005-2007. For the rest of the period, their values are similar, with the notable exception of 2008 when there is an extremely high rate for updating pensions – over 18%. It is due to the sharp rise in the average social security contributions (by 25%) and high inflation of consumer prices (almost 12%).[27] This was the last year of the boom phase of the business cycle when the economy was already overheated. For the period under consideration, the average annual growth rate for pensions is 7.0%, and this of SSF is 5.7%, but if the impact of the "unusual" 2008 is isolated, these rates would have been very close to each other. This empirical evidence gives grounds to believe that the proposed system of SSF can securely support the social funds.

Disadvantages. Of course there are disadvantages of the system. They are mainly in two directions. One is the time lag for changes in SSF. SSF in force in a given year will be based on data for labor productivity from previous years. Some variations of productivity compensate each other over time in the long run, but in the short run this may cause

[27] In reality the Ministry of Finance didn't follow the "Swiss rule" for this particular year despite the fact that this rule is stipulated in the Social Security Code.

problems. This has to be taken into account especially in times of deep recession occurring sharply when companies have difficulties with sales and have to struggle for reducing costs, while at the same time they should increase SSF because of positive indicators from previous years. This was the very situation in Bulgaria in 2009 and 2010.

Another disadvantage of the system concerns the data availability. Differentiation of the dynamics of SSF by sectors and regions is possible, but the sectors are rather aggregated - nomenclature A3 and A10, and the regional perspective is possible with a substantial lag of two years.

6.2. According to the needs of the pension system

SSF system can be constructed entirely based on the needs of the pension system. In this case, the rule would look like this:

(6.2) $TM_{ijk}^{t+1} = 0.5TCPI^{t-1} + 0.5x\frac{EM_{ijk}^{t-1}}{EM^{t-1}}TASI_{ijk}^{t-1}$, where

TM_{ijk}^{t+1} - annual growth rate of SSF for economic activity i, for group of professions j, for region k in the year t+1;

$TCPI^{t-1}$ - annual growth rate of the harmonized consumer price index in the year t-1;

$TASI_{ijk}^{t-1}$ - annual growth rate of average social security income for economic activity i, for group of professions j, for region k in the year t-1;

EM_{ijk}^{t-1} - number of employees in economic activity i, for group of professions j, for region k in the year t-1;

EM^{t-1} - total number of employees in the year t-1.

With such a system, the growth rate of SSF for an economic activity, for a given group of professions in this activity, and for a given region, is determined by the consumer price inflation and by the growth rate of the average social security income. The logic of this option is that social security floors increase at the exact rate at which pensions do under the "Swiss rule". This is evident from the very definition – consumer price inflation is directly reflected in the growth rate of SSF and the average social security income for the country is a weighted average of the average social security income by economic activities, groups of professions and regions.

The data that are necessary for the implementation of this approach are available on a monthly basis – the harmonized consumer price index and the average social security income are published 40 days after the end of the relevant month. This means that when negotiations on SSF take place (usually in July-August of the current year) it will be

possible for the current state of the economy – as of May or June of the current year to be practically taken into account in the negotiations.

Furthermore, there are another two important facts which deserve to be mentioned. Data on the average social security income is available in the most detailed nomenclature by economic activities and groups of professions, so that there is no need of aggregation in this case. In addition, data on the average social security income is available also in a regional aspect.

Here is an illustration of this approach with a calculation of the SSF for 2015. Working with annual data the increase should be based on the inflation rate and the growth rate of the average social security income in 2013 (since the decision should be taken in the middle of 2014). In this case the growth rate of the average SSF will be 2.68%:

$$TM^{2015} = 0.5TCPI^{2013} + 0.5TASI^{2013} = 0.5x0.39\% + 0.5x4.96\% = 2.68\%$$

This is the rate by which pensions have been indexed from 1.7.2014 according to the "Swiss rule". SSF will grow differently for different activities, professions and regions – above or below this average rate. But overall, the average growth rate will be 2.68%.

This approach can also be applied using monthly data for the period June 2013 – June 2014 instead of using the annual data for 2013, for estimates to fully take into account the most recent data.

The proposed approach (6.2) has its advantages and disadvantages just as the first proposal (6.1). Here they are.

Advantages

The option provides growth rates of SSF, which fully meet the rates at which pensions are indexed. Moreover, data for possible implementation of this option are publicly available in the most detailed nomenclature in breakdown by activities, professions and regions. This highly facilitates the application of the approach in detail that corresponds explicitly to the details by which SSF are negotiated. Another advantage is that the frequency of data available allows for conducting the negotiations for SSF in a way that takes into account the most recent state of the economy.

Disadvantages

There are mainly two disadvantages. On one hand, this is the lack of a direct connection with productivity of labour. Indirect connection may be present through the growth rates of the average social security income, which should be affected by the increase in labor productivity through wage formation. But as far as this relationship is indirect, it may not always be manifested, because other factors may also have influence. The extent of this mismatch is illustrated in Figure 6.2, which shows the difference in the growth rate of pensions and growth rate of productivity of labour (in the figure, these are the growth rates of SSF as there SSF are supposed to change according to productivity).

Another disadvantage, compared to the first proposed option (6.1), is that SSF, negotiated during the current year and effective next year, are determined on the basis of data from the

previous year or at best, based on data from the second half of the previous year and the first half of the current year.

6.3. A combined approach

A natural way to combine the advantages and mitigate to some extent the deficiencies of the approaches proposed in the previous two sections is to make a combination of them. In other words, it is possible to change SSF according to the following formula:

$TM = x_1 TM1 + x_2 TM2$, $x_1, x_2 \geq 0, x_1 + x_2 = 1$, where

TM – growth rate of SSF;

TM1 – growth rate of SSF, calculated on the basis of labor productivity (i.e. under any of the proposed options 6.1a-6.1d),

TM2 – growth rate of SSF, calculated on the basis of pensions' growth rate (i.e. 6.2);

x_1, x_2 - weighting coefficients expressing the relative preference for SSF to be changed according to labor productivity or according to growth rates of pensions.

The idea of this approach is to propose SSF dynamics which combines changes consistent with both labor productivity and the need for maintaining adequate revenues for pension system. Any of the components in the formula may be more or less important depending on the size of the weighting coefficients. If the x_1 coefficient is greater than x_2 (for example, 2/3 compared to 1/3), this would mean that greater importance is placed on SSF changing in accordance with labor productivity.

The formula, based on this approach can be presented analytically in the following way, the notations being the same as proposed in the above options.

(6.3) $$TM_{ijk}^{t+1} = x_1 \beta TII_{ik}^{t-1} + x_2 (0.5 TCPI^{t-1} + 0.5 \frac{EM_{ijk}^{t-1}}{EM^{t-1}} TASI_{ijk}^{t-1})$$

The formula can be applied to all cases - by activities and regions that are eligible for the above options (6.1) (with its modifications 6.1a-6.1d) and (6.2). If it is applied using data for 2013, provided that the weighting coefficients are respectively two thirds and one-third, the following growth rate for the average SSF for 2015 is obtained:

$$TM^{2015} = \frac{2}{3} 0.546\% + \frac{1}{3} 2.68\% = 1.27\%$$

<u>*Advantages.*</u> This formula combines the advantages and somewhat mitigate the disadvantages of the previous two systems. The most important characteristics of the economy relevant to the processes considered are taken into account – labor productivity, inflation, average social security income. It enables SSF dynamics to take into account both the dynamics of labor productivity and the needs of the social funds. Furthermore, an

adequate social policy may be carried out by choosing weights that attach more or less importance to any of the components.

Disadvantages. The disadvantage is the one applying to both systems - (6.1) and (6.2). Namely, that the formula is based on data from the past. Another disadvantage is that the labor productivity dynamics and the needs of the pension system are reflected, however not entirely, but only partially in an amount corresponding to the respective weighting coefficient.

6.4. A look into the future

One of the disadvantages of the previous three systems is that they are based on data from the past. According to these systems, SSF, which are valid for a given year, are based on economic indicators that have been formed an year ago or half an year ago at best. This is inevitable - if a system rests on objective data, then there is no other way except it being built on retrospection. Here the logic relies on the inertia of the economic system, on the fact that changes happen slowly and that possible deviations are smoothed over the long run.

The only way to overcome this problem is to propose a SSF system which dynamics is consistent with forecasted economic variables[28]. I.e. when negotiating and deciding, in a given year, on the changes of SSF for the next year, these changes should be consistent with economic indicators forecasted for the next year. Then, if the forecasts prove accurate enough, there will be full correspondence between the effective SSF for the current year and the actual current condition of the economy.

Such an approach is possible. But its application would be limited since on a regular basis official forecasts are prepared and published for a small number of economic indicators - mainly macro-indicators. For this purpose, medium-term forecast, prepared annually for the needs of the state budget could be used. Based on the data for the forecasted value of GDP, the following formula could be suggested:

(6.4) $TM_{ijk}^{t+1} = \beta TFGDP^{t+1}$, where:

TM_{ijk}^{t+1} - annual growth rate of SSF for economic activity i, for group of professions j, for region k in the year t+1;

$TFGDP^{t+1}$ - expected annual growth rate of gross domestic product in nominal terms for year t+1, according to the official forecast in the middle of year t;

β - a parameter that is subject to empirical econometric estimation.

This formula is an analogue to formula (6.1) but there are two differences. One is due to the desire to overcome the disadvantage of the lagging data – this formula is forward looking,

[28] The idea of SSF being based on forecasts has been proposed to the author by V. Karaivanov.

according to expectations, not backward looking, according to actual data. The second difference is that it is based on the forecast for GDP growth rather than productivity. However, these indicators would be equal or close to each other in case equal or close amount of labor has been put in production.

Using data for expected GDP growth for 2015 from the mid-term budget forecast approved by the Council of Ministers in 2014, the average growth rate of SSF in 2015, according to the proposed formula, may be calculated in the following way (with a beta coefficient of 0.7):

$$TM_{ijk}^{t+1} = \beta TFGDP^{t+1} = \beta x 5.1\% = 3.57\%$$

What are the advantages and disadvantages of this approach?

Advantages

The biggest advantage of this approach is that it is based on forecasts and thus there is full synchronization between the dynamics of SSF and the expected dynamics of the current economic system. Moreover, the calculations are quickly and easily performed based on available official data.

Disadvantages

A disadvantage is that the formula allows for calculation only of one indicator which is used as the average growth rate of SSF since no official forecasts for the expected change of GDP (or gross value added) are made in sectoral and regional breakdown. Another major disadvantage is the possible non-accuracy of forecasts. If there are significant differences between actual and expected values of GDP, this will not produce the desired synchronization between the dynamics of SSF and the dynamics of the economic system.[29] If this approach is adopted, a mechanism for subsequent adjustment in case of significant differences between forecasted and actual data will be needed to be put in place.

6.5. Future and past together

Both approaches to the SSF system (one based on actual data and one based on forecasts) have certain advantages and disadvantages. Naturally, the idea of how they might be combined in order to take the advantages of both approaches deserves consideration.

Using historical data is justified by the fact that the economy develops with inertia and results from previous periods affect those in the future. At the same time clearly it is advisable to use information about expectations. This can be done by integrating the two approaches into one formula:

$TM = y_1 TM1 + y_2 TM2$, $y_1, y_2 \geq 0, y_1 + y_2 = 1$, where

[29] Differences are inevitable between forecasted and actual values. But sometimes such differences can be quite big. For example, the forecasts on which Budget 2009 was based upon provided for economic growth, while the actual data showed very deep recession (-5.5%).

TM – growth rate of SSF;

TM1 – growth rate of SSF, calculated on the basis of forecasted data, option (6.4);

TM2 – growth rate of SSF calculated on the basis of historical data, one of the options (6.1)-(6.3);

y_1, y_2 - weighting coefficients expressing the relative preference for SSF to be in line with expectations for the future or with historical data.

Under this approach, based on the options suggested in the sections above, the general formula for SSF will look like this:

$$(6.5)\ TM_{ijk}^{t+1} = y_1 TFGDP + y_2 (x_1 \beta TII_{ik}^{t-1} + x_2 (0.5 TCPI^{t-1} + 0.5 \frac{EM_{ijk}^{t-1}}{EM^{t-1}} TASI_{ijk}^{t-1})),$$

all symbols being defined in the previous sections.

The application of the formula can be illustrated under the assumption that option (6.3) is selected for retrospection and that there is no particular preference between historical (actual) and forecasted data ($y_1 = y_2 = 0.5$). Then:

$$TM^{2015} = y_1 3.6\% + y_2 (\frac{2}{3} 0.546\% + \frac{1}{3} 2.68\%) =$$

$$= 0.5x3.6 + 0.5x1.27\% = 2.64\%$$

Advantages

The advantages of this approach are that it combines historical and forecasted data and thus fully utilizes the information available at the time of negotiations.

Disadvantages

Disadvantages of the approach are mainly related to the small amount of available forecasted data and the possible deviation of forecasts from the actual data, which are discussed in detail in the previous section.

7. Main findings and conclusions

The analysis in the paper leads to the conclusion that the existing SSF system should be considered from two pints of view. On one hand it is an element of the macroeconomic social policy aimed at lightening of the informal economy and bringing adequate revenue to the social funds. On the other hand it is also a tool for intervention in the labour market, which may have an impact on the level of employment, income distribution and motivation for informal practices.

The facts show that the SSF system has successfully performed its function as a component of the macroeconomic social policy. It has historically played and continues to play a positive role for lightening the informal economy, for stimulating fair competition among producers, for social security rights of many individuals, for collecting revenues for the social funds.

However, the other aspect of the SSF system – as an instrument of intervention in the labour market is not well studied at this stage, while there are indications that it is becoming more and more important. This requires the system to be subject to an in-depth discussion in terms of its role as a model of industrial relations for the labour market, which may have an impact on employment, on the structure of remuneration, on the redistribution of income and on the motivation for application of gray practices.

This paper fills this gap to a certain extent. It concludes that when SSF grow faster than productivity suggests, their negative impact on the labor market will increase. And it will be harder SSF to be used to combat the informal economy. Also, it will be harder good results to be achieved through the process of negotiations.

The impact of SSF on the labor market means that the lightning of the Bulgarian economy cannot be achieved only by the systematical increase of these floors. It will not be possible to achieve both significant lightening of the informal economy and positive effects on the labor market with a single instrument (SSF). In other words, it is not possible to "kill two birds with one stone." Other measures besides SSF will be needed to reduce the informal economy in Bulgaria.

The procedure for negotiating SSF can be improved. The analysis in this paper gives grounds to consider the possibility of a "soft" regulation of the process. Practical experience has already been gained for more than a decade with good and not so good aspects. It can serve as a basis to be reconsidered so as to create a specific regulation of the process to help improve its effectiveness.

The issue of the effect of SSF on employment and informal economy has been discussed in detail in the paper. It is claimed that this issue is currently wrongly focused - it is examined from the point of view whether there is such influence or not, with the purpose of justifying another increase in SSF. This is an understandable, however, one-sided point of view, based on the role of SSF as an element of macroeconomic social policy.

This is not a black and white picture. Proper understanding of SSF is that they certainly affect employment and hence the motivation for the use of informal practices. This influence is difficult to be technically identified, because it is combined with other factors while time series are relatively short. But the fact that the identification of this influence is technically difficult does not change the understanding that SSF as a type of expenditure inevitably have their impact on the economic viability of enterprises and thus on employment and on the informal economy. The influence of SSF could be revealed by an in-depth and detailed analysis carried out using suitable apparatus and sufficiently reliable data.

Increasing SSF, faster than productivity, ceteris paribus, can lead to different results depending on the competitive structure of the markets and on the response of the producers.

Results can be inflation, job losses, increase in the informal economy, reduced benefits for workers, reduced profits for producers or a combination of all these. Obviously, such results excluding the latter case, are hardly desirable in terms of a public interest.

The fact that the increase in SSF increases producer's costs and this could negatively affect inflation or employment does not mean that SSF should not be increased. It means that SSF may be increased, but this must be done carefully, taking into account the current condition of the economy. Increasing SSF should be done always with the idea that there should not be (or at least there should be minimum) negative effects in terms of reduction of formal employment or expansion of informal employment.

The paper presents five different SSF systems, which aim to propose such rules for changing SSF over time so as to ensure lack of motivation for informal practices or reduction of employment and at the same time compliance with the need for adequate revenues for the social funds. I.e. they embody the understanding of the dualistic nature of SSF and allow flexibility in determining the floors. All five systems are based on sound economic arguments, they are practically oriented and are easy to use. They may be used separately or together - in a combination.

The systems are not intended to set an "exact" rule for changing SSF but to offer evidence-based benchmarks. There is no point in creating a system for an "exact" rule for changing SSF. In the current legislation, SSF by economic activities and qualification groups of professions should be agreed upon in a negotiation process between the social partners. And this is the best possibility - nothing can replace the free negotiation where it is possible to take into account all specifics about any given moment of time and in any economic activity. However, without limiting the freedom of negotiation, it would be rational to have a system which takes into account economic fundamentals and thus provide an objective basis and orientation for achieving an agreement in the negotiations. Without such a system negotiations may prove to be very difficult.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 5

Ivan Todorov[1]

BULGARIA'S CYCLICAL POSITION AND MARKET (DIS)EQUILIBRIA

Bulgaria's potential output and cyclical position for the period 2010-2015 are estimated by a methodology based on a two-factor Cobb-Douglas production function. An IS-LM model of the Bulgarian economy is developed to study the condition of the different types of markets (labor market, goods market and money market). During the entire period 2010-2015 Bulgaria's output remained below its potential, while unemployment was above its natural level. The goods market and the money market were not balanced but fluctuated around their equilibrium levels. The conclusions of the study are in agreement with the Keynesian views about the disequilibrium character of the economic system and about the necessity of an expansionistic macroeconomic policy to stabilize the economy at its potential level in case of a deflationary gap (as in Bulgaria during 2010-2015).
JEL: E32

Introduction

After a period of a relatively high economic growth of 6-7% per annum before the global crisis, Bulgaria's economy contracted by 5.01 % in 2009 and recorded faint growth over the next years. This faint growth was accompanied by deflation trends, which is a dangerous combination and calls for a prompt and adequate response by Bulgarian macroeconomic policymakers.

The present research has three objectives:

- First, to estimate Bulgaria's potential output and determine the cyclical position of Bulgaria's economy for the period 2010-2015;
- Second, to set the equilibrium conditions for the different types of markets (labor market, goods market and money market) and check whether these conditions are satisfied in the period 2010-2015;

[1] *Ivan Todorov is Chief Assistant Professor, PhD, South-West University "Neofit Rilski", Faculty of Economics, Department of Finance and Accounting, 66 Ivan Mihailov Street, 2700 Blagoevgrad, Bulgaria, email: ivank.todorov@swu.bg*

- Third, to formulate recommendations on adequate macroeconomic policies for smoothing the cyclical fluctuations of Bulgaria's economy.

The first objective is accomplished by employing an approach to estimating Bulgaria's potential output based on a two-factor Cobb-Douglas production function (section one). The second objective is achieved by developing and applying an IS-LM model for exploring the (dis)equilibria in the different types of markets in Bulgaria (section two). The third objective is fulfilled in the conclusions section by recommending macroeconomic policies aimed at minimizing the cyclical fluctuations of the Bulgarian economy.

Empirical estimations of Bulgaria's potential output and cyclical position were made by Ganev (2004 and 2015), Gladnishki (2005), the World Bank (2005), Tsalinski (2007), the European Commission (2014a, 2014b and 2015), Ganchev (2010), the International Monetary Fund (2010 and 2014), the Economic Research Institute at the Bulgarian Academy of Sciences (2012), the Ministry of Finance of the Republic of Bulgaria (2014a and 2014b) and others.

IS-LM models of the Bulgarian economy were developed by Kacharnazov (2008) and Keppel and Orthofer (2009).

1. Estimating Bulgaria's potential output and determining the cyclical position of the Bulgarian economy

1.1. Assumptions and methodology of calculations

As in Gladnishki (2005), in this research Bulgaria's potential output is estimated by a methodology based on a two-factor Cobb-Douglas production function:

(1) $YPOT = A * K^{\alpha} * LPOT^{\beta}$

where **YPOT** is Bulgaria's potential output, **A** is total factor productivity, **K** is capital stock, **α** is the elasticity of output with respect to capital, **LPOT** is the potential (optimal) employment of labor resources and **β** is the elasticity of output with respect to labor.

1.1.1. Estimating the elasticity coefficients in the production function

The elasticity coefficients are estimated via an equilibrium approach, which is based on the income structure of Bulgaria's GDP and was used by Raleva (2013). According to this approach the whole mixed income is treated as a labor income. The labor income is calculated by adding to the compensation of employees **CE** one third of the sum of the net mixed income **NMI** and the net operating surplus **NOS**. The capital income equals two thirds of the sum of the net mixed income **NMI** and the net operating surplus **NOS**. The coefficients **α** and **β** are calculated as

(2) $\alpha = \frac{2}{3}(NOS + NMI)/(CE + NOS + NMI)$

(3) $\beta = [CE + 1/3\,(NOS + NMI)] / (CE + NOS + NMI)$

The sum of **α** and **β** is 1. The average values of **α** and **β** for the period 1997-2015 are respectively 0.35 and 0.65 and are used in estimating Bulgaria's potential output.

1.1.2. Estimating capital stock

Since the Bulgarian national statistics does not provide data on capital stock, one of the methodological problems, related to potential output estimation, is how to calculate the size of capital stock. Two approaches can be used to solve this problem – the perpetual inventory method (Ganev, 2005) and the constant capital-output ratio approach (Minassian, 2008; Raleva, 2013; Todorov, 2015). In this paper the constant capital-output ratio approach is employed.

The capital-output ratio **K/Y** is considered constant in economic theory. In empirical studies this ratio varies between 2 and 3. For Bulgaria the used values of the capital-output ratio are 2.5 (Minassian, 2008), 2.3 (Raleva, 2013) and 2.2 (Todorov, 2015). For the purpose of this study the used value of the capital-output ratio is 2.2. It is calculated as the average gross-capital-formation-to-change-in-real-GDP ratio for the period 1998-2008 (in accordance with the assumption of Harrod and Domar that the average and the marginal productivity of capital are equal). Hence, the actual real size of capital stock **K** can be determined by multiplying the real GDP **Y** by the capital/output ratio **K/Y,** whose value is 2.2:

(4) K = Y * K/Y = Y * 2.2

The estimated values of capital stock are shown in Table 1.

Table 1

Estimated values of capital stock

Year	Real GDP (Y) at prices of 2010, million levs	Capital/output ratio (K/Y)	Capital stock (K) at prices of 2010, million levs
2010	74 771	2.2	164 497
2011	76 203	2.2	167 647
2012	76 227	2.2	167 699
2013	76 884	2.2	169 144
2014	77 906	2.2	171 392
2015	80 724	2.2	177 592

Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

1.1.3. Measuring labor input and estimating potential employment

Two indicators can be used to measure labor input in the production function - the number of employed persons or the number of hours worked in an economy. In this paper the first indicator is employed.

The potential (optimal) employments of labor is calculated as

(5) LPOT = LF * (1 – NRU)

where **LPOT** is the potential (optimal) employments of labor resources, **LF** is the labor force and **NRU** is the natural rate of unemployment.

The natural rate of unemployment is a sum of the rates of structural and frictional unemployment:

(6) NRU = SUR + FUR

where **NRU** is the natural rate of unemployment, **SUR** is the structural unemployment rate and **FUR** is the frictional unemployment rate.

As an approximation for the structural unemployment rate **SUR** the long-term unemployment rate **LTUR** is used:

(7) SUR = LTUR

The long-term unemployment rate **LTUR** is the percentage share of the long-term unemployed **LTU** in the labor force **LF:**

(8) LTUR = (LTU / LF) * 100%

The frictional unemployment rate is calculated as a difference between the rates of outflows and inflows of employees under labor contract:

(9) FUR = OREULC – IREULC

where **FUR** is the frictional unemployment rate, **OREULC** is the outflow rate of employees under labor contract and **IREULC** is the inflow rate of employees under labor contract.

The outflow rate of employees under labor contract **OREULC** is the percentage share of the outflow of employees under labor contract **OEULC** in the labor force **LF:**

(10) OREULC = (OEULC / LF) * 100

The inflow rate of employees under labor contract **IREULC** is the percentage share of the inflow of employees under labor contract **IEULC** in the labor force **LF:**

(11) IREULC = (IEULC / LF) * 100

The natural rate of unemployment **NRU** can be expressed as

(12) NRU = LTUR + OREULC – IREULC = (LTE + OEULC – IEULC) / LF *100

The potential (optimal) employment of labor resources **LPOT** can be calculated as

(13) LPOT = LF * (1 – LTUR - OREULC + IREULC) = LF – LTE – OEULC + IEULC

The estimated values of the potential employment of labor resources and of the natural rate of unemployment can be seen in Table 2.

Table 2

Estimation of the potential employment of labor resources

Year	Labor force LF, thousands of people	Long-term unemployment LTUR, %	Outflow rate of employees under labor contract OREULC, %	Inflow rate of employees under labor contract IREULC, %	Natural rate of unemployment NRU, %	Potential employment of labor resources LPOT, thousands of people
2010	3 428	4.75	27.00	26.48	5.27	3 247
2011	3 341	6.30	27.71	28.70	5.32	3 164
2012	3 344	6.78	27.77	28.53	6.02	3 143
2013	3 371	7.43	27.59	28.90	6.12	3 165
2014	3 366	6.93	29.18	30.85	5.26	3 189
2015	3 337	5.60	31.09	32.67	4.02	3 203

Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

1.1.4. Estimating total factor productivity

For each year of the period 2010-2015 total factor productivity is calculated as

(14) $\mathbf{A_t = Y_t / (K_t^{0.35} * L_t^{0.65})}$

where $\mathbf{A_t}$ is total factor productivity in year **t**, $\mathbf{Y_t}$ is GDP in year **t** at prices of 2010 in millions of levs, $\mathbf{K_t}$ is capital stock in year **t** at prices of 2010 in millions of levs and $\mathbf{L_t}$ is the number of employed persons in thousands.

The values of total factor productivity are displayed in Table 3.

Table 3

Estimates of total factor productivity and Bulgaria's potential output

Year	Total factor productivity A_t	Potential GDP (YPOT), million levs at prices of 2010	Actual GDP (Y), million levs at prices of 2010
2010	6.04	77 457	74 771
2011	6.26	79 481	76 203
2012	6.30	79 713	76 227
2013	6.34	80 751	76 884
2014	6.33	81 388	77 906
2015	6.41	83 656	80 724

Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

In this research for the estimation of Bulgaria's potential outputs is used Equation (15), which is a concretization of Equation (1):

(15) YPOT = A* (Y * 2.2)$^{0.35}$ * [(LF * (1 – LTUR - OREULC + IREULC)]$^{0.65}$ = A * (Y * 2.2)$^{0.35}$ * (LF – LTE – OEULC + IEULC)$^{0.65}$

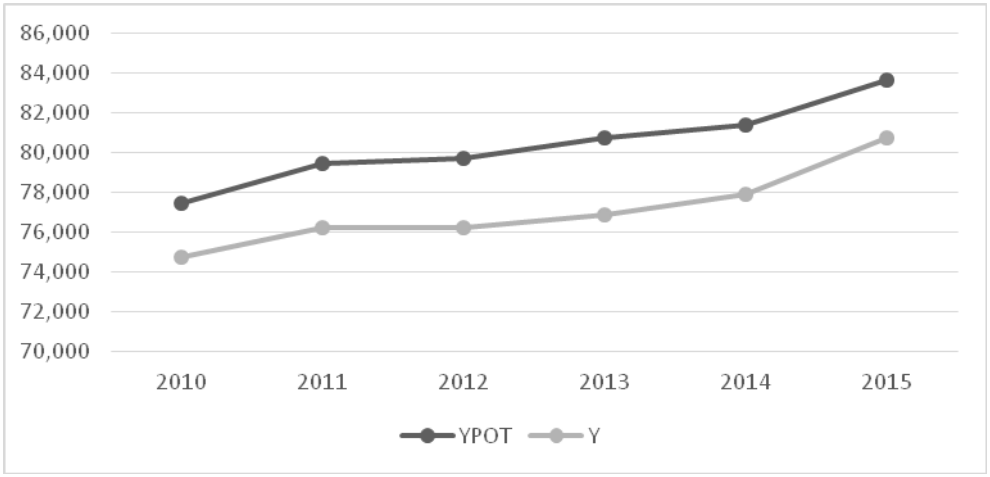
The values of the potential and the actual GDP of Bulgaria for the period 2010-2015 are shown in Table 3.

1.2. Results and inferences from the estimation of Bulgaria's potential GDP and cyclical position

Over the entire period 2010-2015 Bulgaria's output remained below its potential level (see Figure 1). The average value of the actual GDP for the period was 77 119 million levs, while the average value of the potential GDP was 80 408 million levs. The stabilities of the dynamics of potential output and actual output were alike (a coefficient of variation of 2.59% for potential GDP and 2.65% for actual GDP).

Figure 1

Potential and actual GDP at prices of 2010, million levs

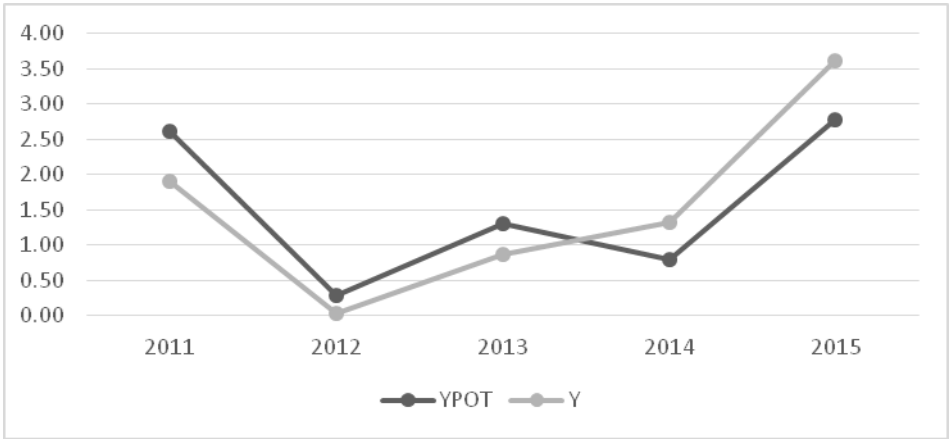


Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

The growth rates of actual and potential output compared to the previous year were comparable in size (average values of 1.55 and 1.56% respectively for the period 2011-2015). The direction of their movements was different only in 2013-2014 when the growth rate of actual output increased but the growth rate of potential output decreased (see Figure 2). The growth rates of potential GDP (with a coefficient of variation of 71%) were steadier than those of actual GDP (with a coefficient of variation of 86.73%).

Figure 2

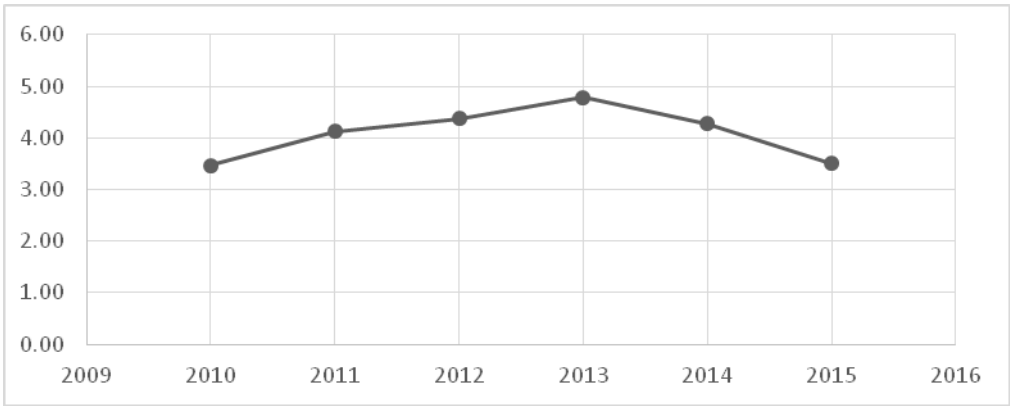
Rates of growth of potential and actual GDP compared to the previous year, percentage



Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

Figure 3

GDP gap (difference between potential and actual output), percentage share of potential GDP

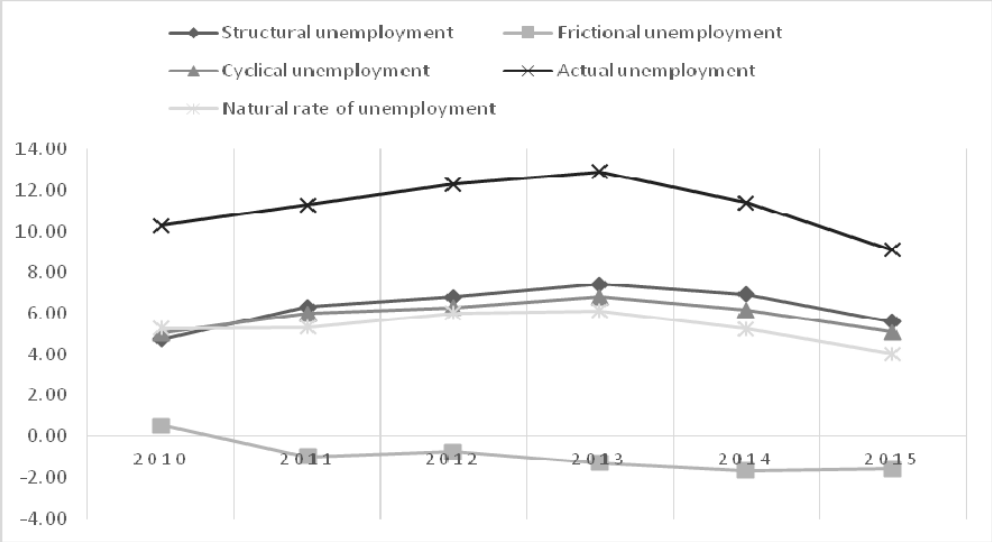


Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

The difference between potential and actual GDP, measured as a percentage of potential output (the so called GDP gap) increased during 2010-2013 and decreased in 2013-2015 (see Figure 3), but remained relatively high for the period 2010-2015 (an average value of 4.09%). The dynamics of the GDP gap was relatively stable (a coefficient of variation of 12.64% for the period 2010-2015).

Figure 4

Dynamics of the basic types of unemployment, percentage



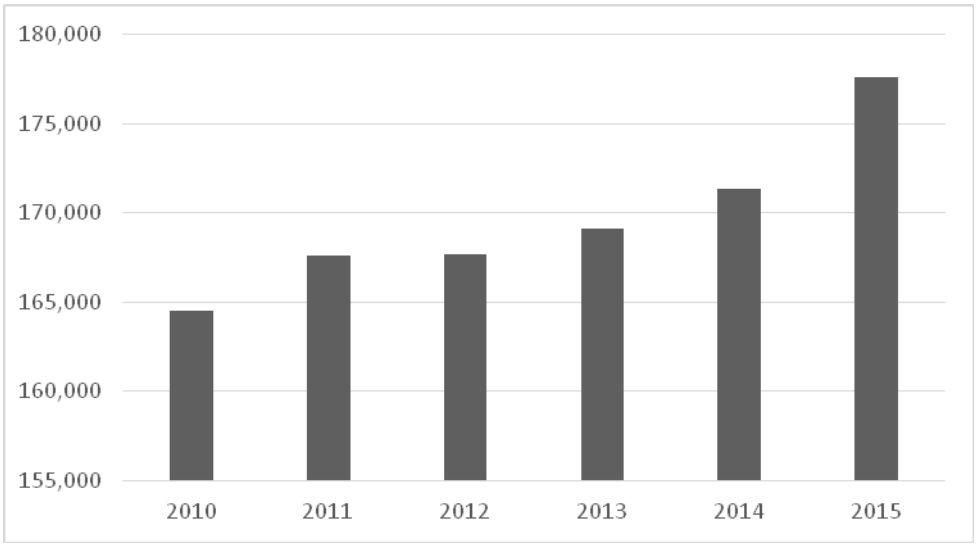
Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

The dynamics of the basic types of unemployment is interesting (see Figure 4). Over the entire period 2010-2015 the actual unemployment rate (an average value of 11.22%) was above the natural rate of unemployment (an average value of 5.33%), while structural and cyclical unemployment had an approximately equal contribution to actual unemployment (average values of 6.30% for structural and 5.88% for cyclical unemployment). The contribution of frictional unemployment to actual unemployment was small (an average of -0.96% for the analyzed period). The movements of the natural rate of unemployment, the actual unemployment rate, the structural unemployment rate and the cyclical unemployment rate were relatively steady (coefficients of variation of 14.10%, 12.20%, 15.52% and 11.82% respectively). However, the dynamics of frictional unemployment was unstable (a coefficient of variation of -83.83%). It may be inferred that a serious problem in the Bulgarian labor market is the existence of high structural unemployment. Increased investment in human capital formation is recommended in order to overcome the differences between the requirements of employers and the qualification of job seekers.

Capital stock rose in 2010-2015 (see Figure 5). The average capital stock for the period of investigation was 169 662 million levs, and its dynamics was stable (a coefficient of variation of 2.65%).

Figure 5

Dynamics of capital stock, million levs

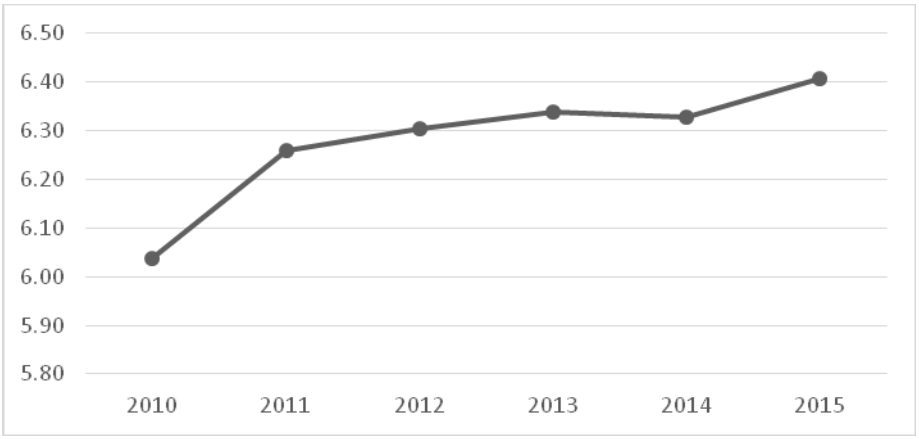


Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

A reason to be optimistic about the future development of the Bulgarian economy is the upward movement of total factor productivity (see Figure 6). Total factor productivity is the most important determinant of the long-term economic growth and the standard of living of a nation. Under the conditions of limited quantities of factors of production, the permanent improvement of production efficiency is the only way to continuously improve the welfare of a nation. The dynamics of the total factor productivity reflects the influence of all sources of real GDP growth which are not changes in employment and in physical capital accumulation, such as research and development and the formation of human capital. Total factor productivity increased from 6.04 in 2010 to 6.41 in 2015 and its average for the period 2010-2015 was 6.28 implying that economic efficiency has risen due to improvements in technology and/or organization of production. Total factor productivity is the main contributor to Bulgaria's economic growth under a currency board arrangement (Todorov and Durova, 2016).

Figure 6

Dynamics of total factor productivity



Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

2. The main types of markets and their dis(equilibria)

2.1. The labor market

The labor market is in equilibrium when the actual rate of unemployment **ARU** equals the natural rate of unemployment **NRU:**

(16) ARU = NRU

The actual rate of unemployment **ARU** is the share of unemployed persons **UP in the** labor force **LF:**

(17) ARU = UP / LF

The natural rate of unemployment **NRU** is a sum of the frictional unemployment rate **FUR** and the structural unemployment rate **SUR:**

(18) NRU = FUR + SUR

The frictional unemployment rate **FUR** is the share of the difference between the outflow of employees under labor contract **OEULC** and the inflow of employees under labor contract **IEULC** in the labor force **LF:**

(19) FUR = (OEULC – IEULC) / LF

The structural unemployment rate **SUR** is the ratio of long-term unemployed persons **LTUP** to the labor force **LF:**

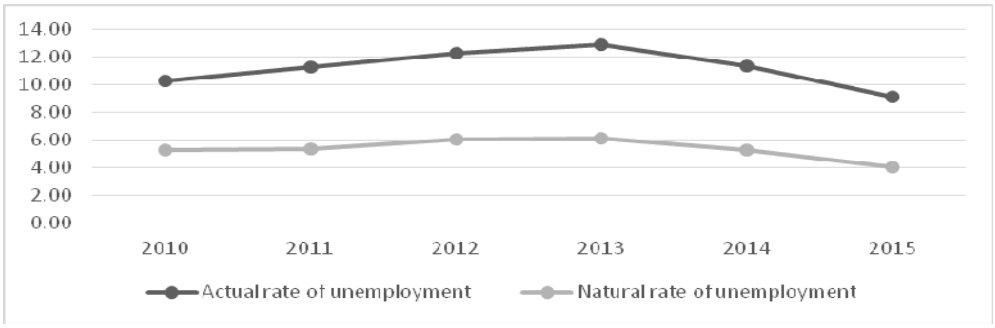
(20) SUR = LTUP / LF

If **FUR** and **SUR** are substituted in Equation (18) by the right-hand sides of Equations (19) and (20), then **NRU** can be calculated as

(21) NRU = (OEULC – IEULC + LTUP) / LF

Figure 7

Actual rate of unemployment and natural unemployment rate in the Bulgaria's labor market for the period 2010-2015



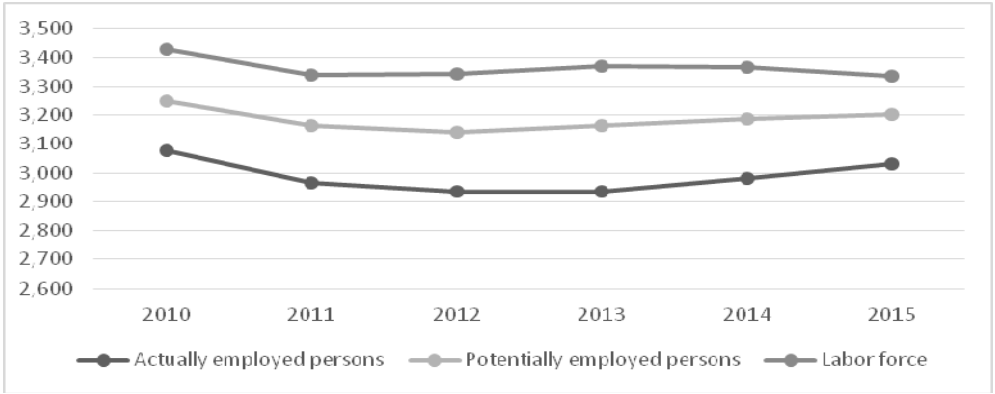
Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

The labor market equilibrium condition can also be expressed as an equality between the numbers of actually employed persons **AEP** and potentially employed persons **PEP:**

(22) AEP = PEP

Figure 8

Labor force, actually employed persons and potentially employed persons in Bulgaria's labor market for the period 2010-2015



Source: Own calculation on the basis of data from the website of the National Statistical Institute of Bulgaria www.nsi.bg.

The number of potentially employed persons **PEP** can be calculated as

(23) PEP = LF * (1 – NRU),

where **LF** is the labor force and **NRU** is the natural rate of unemployment.

Bulgaria's labor market was not in equilibrium during 2010-2015. Over the entire period 2010-2015 unemployment was above its natural rate, while employment was below its potential level (see Figures 7 and 8). Cyclical unemployment was present in 2010-2015, which presumed the implementation of expansive macroeconomic policies.

2.2. The goods market

The goods market clearance condition demands that actual national saving **ANS** equal equilibrium national saving **ENS**:

(24) ANS = ENS

Actual national saving **ANS** are a sum of private saving **PS** and government saving **GS**:

(25) ANS = PS + GS

In an open economy equilibrium national saving **ENS** are a sum of gross capital formation **GCF** and the current account balance **CAB**:

(26) ENS = GCF + CAB

Government saving **GS** equals the government budget balance **GBB** and private saving **PS** can be approximated by the change in private deposits (the deposits of non-financial corporations, households and non-profit institutions serving households) **ΔPD**, therefore Equation (25) can be modified to

(27) ANS = GBB + ΔPD

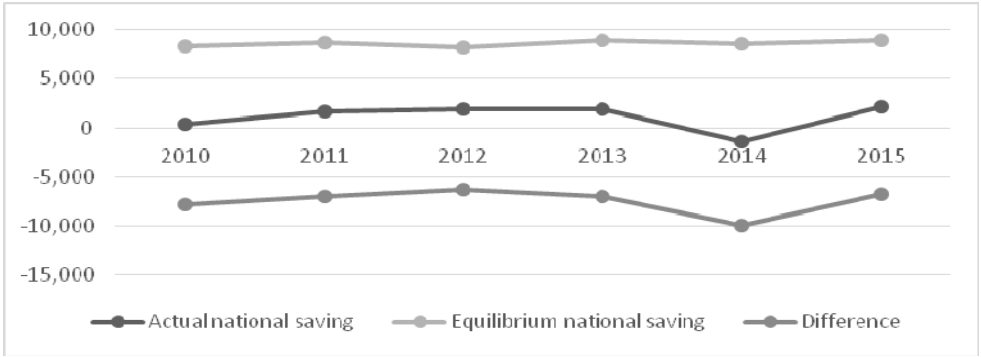
The goods market clearance condition can be expressed as

(28) GBB + ΔPD = GCF + CAB

Bulgaria's goods market was not in equilibrium over the years 2010-2015 (see Figure 9). Over the entire period actual national saving was below its equilibrium level, which agrees with the conclusion that employment and output were below their potential levels.

Figure 9

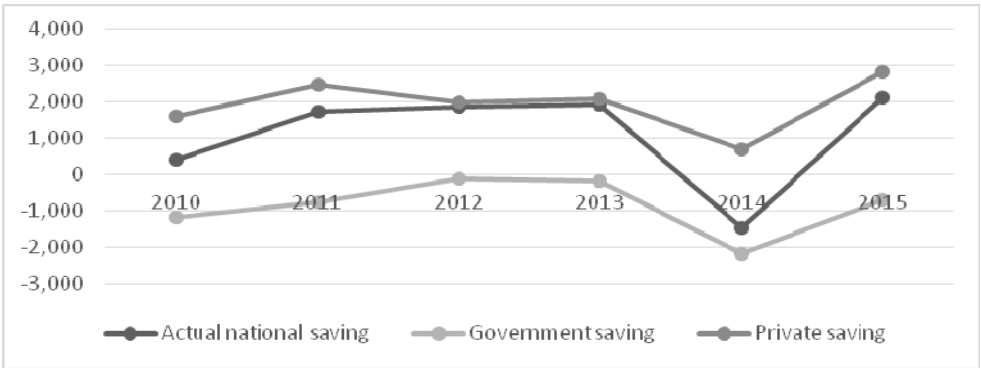
Actual and equilibrium national saving in Bulgaria over the period 2010-2015, million Euros at prices of 2010



Source: Own calculation on the basis of data from the websites of the Bulgarian National Bank www.bnb.bg and Eurostat.

Figure 10

Dynamics of actual national saving, private saving and government saving in Bulgaria for the period 2010-2015, million Euros at prices of 2010



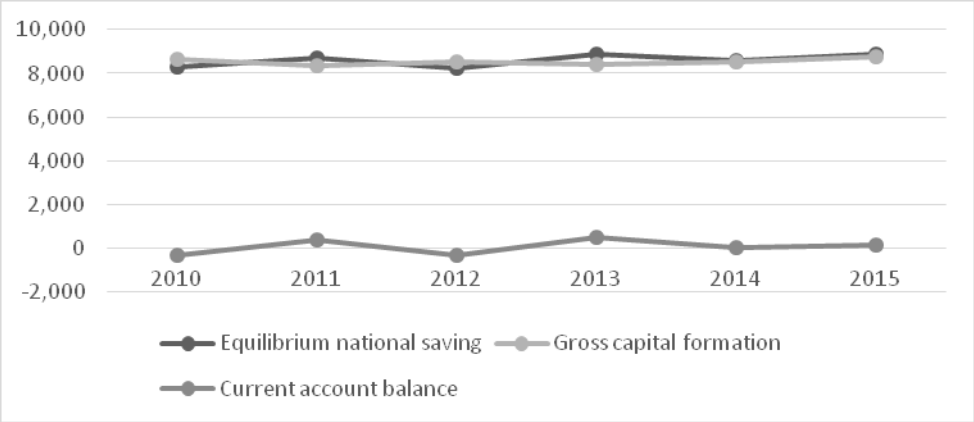
Source: Own calculation on the basis of data from the websites of the Bulgarian National Bank www.bnb.bg and Eurostat.

The dynamics of actual national saving depends on the government's fiscal policy and on private saving decisions. Over the entire period 2010-2015 government saving was negative (with an average of -852 million Euros at prices of 2010) but private saving was positive with an average of 1950 million Euros at prices of 2010 (see Figure 10). In 2010-2013 and in 2015 positive private saving compensated the government's budget deficits, but in 2014 Bulgaria's actual national saving was negative (–1.5 billion Euros at prices of 2010). The average actual national saving for the period 2010-2015 was positive (1098 million Euros at prices of 2010).

Equilibrium national saving depends on private investment activity and on foreign economic relations.

Figure 11

Dynamics of Bulgaria's equilibrium national saving, gross capital formation and current account balance for the period 2010-2015, million Euros at prices of 2010



Source: Own calculation on the basis of data from the websites of the Bulgarian National Bank www.bnb.bg and Eurostat.

Over the entire period 2010-2015 the dynamics of equilibrium national saving (average value of 8600 billion Euros) was determined by domestic investment activity (average gross capital formation of 8536 million Euros), while the impact of foreign sector was insignificant (average current account balance of 64million Euros) (see Figure 11).

Equilibrium national saving **ENS** can be expressed as a linear function of the real interest rate **r** and real GDP **Y**:

(29) $\mathbf{ENS_t = a_0 + a_1 * r_t + a_2 * Y_t + u_t}$

where $\mathbf{a_0}$ is an intercept term, $\mathbf{a_1}$ and $\mathbf{a_2}$ are regression coefficients and $\mathbf{u_t}$ is an error term.

Equation (29) can be estimated via the ordinary lest squares (OLS) method. For the OLS estimation of Equation (31) are used quarterly seasonally- and calendar-adjusted Eurostat data on Bulgaria's gross capital formation, current account balance and gross domestic product (in millions of Euros at prices of 2010 г.) and on the three-month money market interest rate for the period from the first quarter of 2007 to the third quarter of 2015. All data are deflated in order to be transformed from nominal into real.

The Augmented Dickey Fuller (ADF) Unit Root tests indicate that equilibrium national saving and the real interest rate are stationary at the 10% significance level but real GDP is not (see Tables 4, 5 and 6). The ADF test shows that the first differences of real GDP are stationary (see Table 7) at the 10% significance level. Equilibrium national saving and the real interest rate are integrated of order zero I(0), while real GDP is integrated of order 1 I(1). The three time series are not co-integrated because they are integrated of different

order. Since the three time series are not co-integrated and an Error Correction Model (ECM) cannot be specified, the process of modeling continues with the first differences of the three variables:

(30) $\Delta ENS = a_0 + a_1 * \Delta r + a_2 * \Delta Y + u_t$

Table 4

ADF unit root test on equilibrium national saving

Null Hypothesis: ENS has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.403984	0.0185
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ENS)
Method: Least Squares
Date: 09/09/16 Time: 13:49
Sample (adjusted): 2008Q1 2015Q3
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENS(-1)	-0.489921	0.143926	-3.403984	0.0022
D(ENS(-1))	-0.468874	0.138414	-3.387462	0.0023
D(ENS(-2))	-0.716840	0.089481	-8.011103	0.0000
D(ENS(-3))	-0.736396	0.101195	-7.276970	0.0000
C	1116.405	285.2579	3.913669	0.0006
R-squared	0.916091	Mean dependent var		88.03950
Adjusted R-squared	0.903182	S.D. dependent var		1005.236
S.E. of regression	312.7858	Akaike info criterion		14.47560
Sum squared resid	2543710.	Schwarz criterion		14.70689
Log likelihood	-219.3719	Hannan-Quinn criter.		14.55100
F-statistic	70.96463	Durbin-Watson stat		2.352058
Prob(F-statistic)	0.000000			

Source: Own calculations on the basis of Eurostat data.

Table 5

ADF unit root test on the real interest rate

Null Hypothesis: R has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.376330	0.0720
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(R)
Method: Least Squares
Date: 09/09/16 Time: 14:01
Sample (adjusted): 2007Q3 2015Q3
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R(-1)	-0.254830	0.075476	-3.376330	0.0021
D(R(-1))	0.482781	0.135380	3.566104	0.0013
C	1.963633	0.608217	3.228509	0.0031
@TREND(2007Q1)	-0.062906	0.019175	-3.280658	0.0027

R-squared	0.475052	Mean dependent var	-0.142491
Adjusted R-squared	0.420747	S.D. dependent var	0.447348
S.E. of regression	0.340470	Akaike info criterion	0.796235
Sum squared resid	3.361683	Schwarz criterion	0.977630
Log likelihood	-9.137883	Hannan-Quinn criter.	0.857269
F-statistic	8.747857	Durbin-Watson stat	2.257674
Prob(F-statistic)	0.000275		

Source: Own calculations on the basis of Eurostat data.

Table 6

ADF unit root test on real GDP

Null Hypothesis: Y has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.605115	0.9700
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(Y)
Method: Least Squares
Date: 09/09/16 Time: 14:20
Sample (adjusted): 2009Q2 2015Q3
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y(-1)	-0.206967	0.342030	-0.605115	0.5541
D(Y(-1))	-0.727656	0.287004	-2.535354	0.0229
D(Y(-2))	-0.657918	0.242516	-2.712883	0.0160
D(Y(-3))	-0.584071	0.203578	-2.869031	0.0117
D(Y(-4))	0.244829	0.171892	1.424320	0.1748
D(Y(-5))	-0.219559	0.186340	-1.178273	0.2570
D(Y(-6))	-0.336505	0.169369	-1.986812	0.0655
D(Y(-7))	-0.458441	0.151866	-3.018710	0.0086
D(Y(-8))	-0.337535	0.144272	-2.339575	0.0336
C	1663.007	3173.665	0.524002	0.6079
@TREND(2007Q1)	18.19309	6.823411	2.666275	0.0176

R-squared	0.997351	Mean dependent var	120.9020
Adjusted R-squared	0.995585	S.D. dependent var	1541.483
S.E. of regression	102.4251	Akaike info criterion	12.39225
Sum squared resid	157363.4	Schwarz criterion	12.92452
Log likelihood	-150.0992	Hannan-Quinn criter.	12.54552
F-statistic	564.7457	Durbin-Watson stat	1.906247
Prob(F-statistic)	0.000000		

Source: Own calculations on the basis of Eurostat data.

Table 7

ADF unit root test on the first differences of real GDP

Null Hypothesis: D(Y) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.299310	0.0012
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(Y,2)
Method: Least Squares
Date: 09/09/16 Time: 14:38
Sample (adjusted): 2009Q2 2015Q3
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y(-1))	-4.643720	0.876288	-5.299310	0.0001
D(Y(-1),2)	2.786251	0.720789	3.865557	0.0014
D(Y(-2),2)	2.035973	0.571243	3.564111	0.0026
D(Y(-3),2)	1.387080	0.444338	3.121676	0.0066
D(Y(-4),2)	1.590198	0.344113	4.621148	0.0003
D(Y(-5),2)	1.281036	0.286760	4.467272	0.0004
D(Y(-6),2)	0.870674	0.219101	3.973841	0.0011
D(Y(-7),2)	0.360677	0.136328	2.645654	0.0176
C	-256.6631	87.64684	-2.928378	0.0098
@TREND(2007Q1)	14.97021	4.179863	3.581506	0.0025

R-squared	0.998957	Mean dependent var	152.1089
Adjusted R-squared	0.998370	S.D. dependent var	2486.059
S.E. of regression	100.3758	Akaike info criterion	12.33944
Sum squared resid	161204.8	Schwarz criterion	12.82333
Log likelihood	-150.4127	Hannan-Quinn criter.	12.47878
F-statistic	1702.194	Durbin-Watson stat	1.974016
Prob(F-statistic)	0.000000		

Source: Own calculations on the basis of Eurostat data.

The results from the OLS-estimation of Equation (30) are displayed in Table 8.

Table 8

OLS-estimates of the parameters of Equation (30)

Dependent Variable: D(ENS,1)
Method: Least Squares
Date: 09/09/16 Time: 14:49
Sample (adjusted): 2007Q2 2015Q3
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.88175	136.4773	-0.131024	0.8966
D(R,1)	-524.2865	299.4413	-1.750882	0.0899
D(Y,1)	0.431693	0.087952	4.908288	0.0000

R-squared	0.443528	Mean dependent var	90.05183
Adjusted R-squared	0.407626	S.D. dependent var	987.9449
S.E. of regression	760.3800	Akaike info criterion	16.18961
Sum squared resid	17923511	Schwarz criterion	16.32429
Log likelihood	-272.2234	Hannan-Quinn criter.	16.23554
F-statistic	12.35403	Durbin-Watson stat	2.733361
Prob(F-statistic)	0.000113		

Source: Own calculations on the basis of Eurostat data.

At the 5% level the intercept and the real interest rate are not significant but real GDP is. At the 10% level the real interest rate also becomes significant. The estimated value of $\mathbf{a_1}$ (-524.2865) means that a 1% change in the three-month money interest rate will lead to a national saving change of 524.2865 million Euros in the opposite direction, provided that GDP is held constant. The estimated value of $\mathbf{a_2}$ (0.431693**)** indicates that a one-million-Euro change in GDP will lead to a 0.43-million-Euro change in national saving in the same direction, if the three-month money interest rate remains unchanged.

The coefficient of determination ($R^2 = 0.443528$) shows that 44.35% of changes in national saving during the period of investigation can be explained by changes in GDP and the interest rate. The probability of the F-statistic (0.000113) indicates that at the 5% level of significance the alternative hypothesis for the adequacy of the regression model is accepted. The acceptance of the alternative hypothesis does not mean that the model specification is the best possible but only that the regression model adequately reflects the relationship between dependent variable and independent variables.

The residual heteroskedasticity test (ARCH) confirms the null hypothesis for the absence of heteroskedasticity at the 5% level of significance (see Table 9). The residual normality test (Jarque-Bera) confirms the null hypothesis for the presence of normal distribution of residuals at the 5% level of significance (see Figure 12). The value of 2.733361of the Durbin-Watson statistic presumes the existence of serial correlation (autocorrelation) of

residuals. At the 5% level of significance the serial correlation LM test confirms the alternative hypothesis that residuals are serially correlated (see Table 10). The serial correlation of residuals is not unusual for time-series data. In the presence of serial correlation OLS estimates and based on them forecasts are inefficient but still unbiased and consistent. Since the regression model will not be used for forecasting, the serial correlation has not been removed from the model.

Table 9

Heteroskedasticity test (ARCH) on the residuals of Equation (29)

Heteroskedasticity Test: ARCH

F-statistic	1.941651	Prob. F(1,31)	0.1734
Obs*R-squared	1.945090	Prob. Chi-Square(1)	0.1631

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/09/16 Time: 15:12
Sample (adjusted): 2007Q3 2015Q3
Included observations: 33 after adjustments

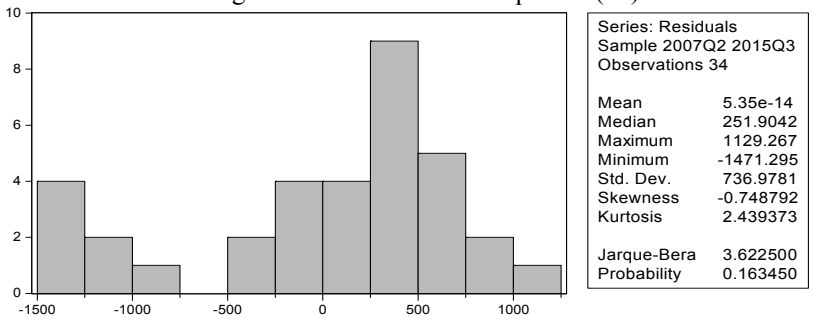
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	665373.8	143140.4	4.648399	0.0001
RESID^2(-1)	-0.241707	0.173461	-1.393431	0.1734

R-squared	0.058942	Mean dependent var	539658.4
Adjusted R-squared	0.028585	S.D. dependent var	647708.5
S.E. of regression	638383.9	Akaike info criterion	29.62996
Sum squared resid	1.26E+13	Schwarz criterion	29.72066
Log likelihood	-486.8943	Hannan-Quinn criter.	29.66048
F-statistic	1.941651	Durbin-Watson stat	2.214889
Prob(F-statistic)	0.173400		

Source: Own calculations on the basis of Eurostat data.

Figure 12

Histogram of the residuals of Equation (29)



Source: Own calculations on the basis of Eurostat data.

Table 10

Serial correlation LM test on the residuals of Equation (29)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	10.92799	Prob. F(2,29)	0.0003
Obs*R-squared	14.61191	Prob. Chi-Square(2)	0.0007

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/09/16 Time: 15:28
Sample: 2007Q2 2015Q3
Included observations: 34
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-28.01203	107.0088	-0.261773	0.7953
D(R,1)	296.9699	250.1303	1.187261	0.2448
D(Y,1)	0.380497	0.113159	3.362487	0.0022
RESID(-1)	-1.099789	0.235833	-4.663431	0.0001
RESID(-2)	-0.008930	0.171851	-0.051965	0.9589

R-squared	0.429762	Mean dependent var	5.35E-14
Adjusted R-squared	0.351109	S.D. dependent var	736.9781
S.E. of regression	593.6638	Akaike info criterion	15.74556
Sum squared resid	10220664	Schwarz criterion	15.97002
Log likelihood	-262.6745	Hannan-Quinn criter.	15.82211
F-statistic	5.463993	Durbin-Watson stat	2.029708
Prob(F-statistic)	0.002099		

Source: Own calculations on the basis of Eurostat data.

Ramsey's Regression Specification Error Test (RESET) alludes to the presence of unsolved specification problems in Equation 29 such as non-linearity or omitted variables (see Table 11). The Granger Causality Test confirms the alternative hypothesis for the presence of a causal relationship at the 5% level of significance in the following directions (see Table 12):

- From the real interest rate to national saving;
- From real GDP to national saving;
- From national saving to real GDP.

The Granger Causality Test confirms the null hypothesis for the absence of a causal relationship at the 5% level of significance in the following directions (see Table 12):

- From national saving to the real interest rate;
- From real GDP to the real interest rate;
- From the real interest rate to real GDP.

Table 11

Regression Specification Error Test on Equation (29)

Ramsey RESET Test
Equation: EQ01
Specification: D(ENS,1) C D(R,1) D(Y,1)
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	3.245758	30	0.0029
F-statistic	10.53495	(1, 30)	0.0029
Likelihood ratio	10.23288	1	0.0014

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	4658283.	1	4658283.
Restricted SSR	17923511	31	578177.8
Unrestricted SSR	13265228	30	442174.3
Unrestricted SSR	13265228	30	442174.3

LR test summary:

	Value	df
Restricted LogL	-272.2234	31
Unrestricted LogL	-267.1069	30

Unrestricted Test Equation:
Dependent Variable: D(ENS,1)
Method: Least Squares
Date: 09/09/16 Time: 15:42
Sample: 2007Q2 2015Q3
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-509.9514	192.9467	-2.642965	0.0129
D(R,1)	-483.2556	262.1701	-1.843290	0.0752
D(Y,1)	0.549217	0.085012	6.460497	0.0000
FITTED^2	0.001134	0.000349	3.245758	0.0029

R-squared	0.588154	Mean dependent var	90.05183
Adjusted R-squared	0.546969	S.D. dependent var	987.9449
S.E. of regression	664.9619	Akaike info criterion	15.94747
Sum squared resid	13265228	Schwarz criterion	16.12704
Log likelihood	-267.1069	Hannan-Quinn criter.	16.00871
F-statistic	14.28089	Durbin-Watson stat	2.799710
Prob(F-statistic)	0.000006		

Source: Own calculations on the basis of Eurostat data.

Table 12

Granger Causality Test on Equation (29)

Pairwise Granger Causality Tests
Date: 09/09/16 Time: 15:56
Sample: 2007Q1 2015Q3
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
R does not Granger Cause ENS	33	10.8230	0.0003
ENS does not Granger Cause R		2.84882	0.0748
Y does not Granger Cause ENS	33	25.8671	4.E-07
ENS does not Granger Cause Y		22.3883	2.E-06
Y does not Granger Cause R	33	1.30172	0.2880
R does not Granger Cause Y		0.68546	0.5121

Source: Own calculations on the basis of Eurostat data.

If the regression coefficients $\mathbf{a_0}$, $\mathbf{a_1}$ and $\mathbf{a_2}$ are substituted in Equation (30) by their OLS-estimates, Equation (30) becomes

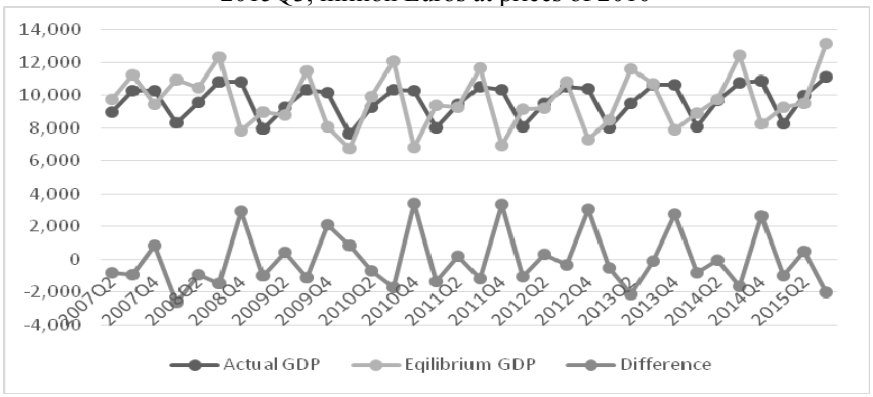
(31) $\Delta ENS = -17.88 - 524.29*\Delta r + 0.43*\Delta Y + u_t$

The equilibrium value of real GDP for the goods market in moment t $\mathbf{GMEY_t}$ can be calculated by transforming Equation (31) to

(32) $\mathbf{GMEY_t = (17.88 + \Delta ENS + 0.43 * Y_{t-1} + 524.29 * \Delta r) / 0.43}$

Equation (32) is the **IS** curve equation.

Figure 13
Actual and equilibrium values of real GDP for the goods market over the period 2007Q2 - 2015Q3, million Euros at prices of 2010



Source: Own calculations on the basis of Eurostat data.

In Figure 13 are displayed the values of actual real GDP, the equilibrium values of real GDP for the goods market (calculated by Equation 32) and their differences for the period 2007Q2- 2015Q3. It can be concluded that the goods market was near its equilibrium level in both periods 2010-2015 and 2007-2015.

2.3. The money market

The money market equilibrium condition demands that the real demand for money **MD/P** be equal to the real money supply **MS/P**:

(33) $\mathbf{MD/P = MS/P}$

where **MD** is the nominal demand for money, **MS** is the nominal money supply, and **P** is a price index (the GDP deflator).

The real demand for money **MD/P** can be presented as a linear function of the real interest rate **r** and real GDP **Y**:

(34) $\mathbf{MD/P = b_0 + b_1 * r + b_2 * Y + u}$

where $\mathbf{b_0}$, $\mathbf{b_1}$ and $\mathbf{b_2}$ are regression coefficients and **u** is an error term.

The money market equilibrium condition can be expressed as

(35) $\mathbf{MD/P = MS/P = b_0 + b_1 * r + b_2 * Y + u}$

Equation (34) can be estimated by the OLS method to obtain the values of the regression coefficients $\mathbf{b_0}$, $\mathbf{b_1}$ and $\mathbf{b_2}$. Under the OLS procedure are used nominal quarterly data on the monetary aggregate M3, GDP and the three-month money market interest rate, which are divided by the GDP deflator for the respective quarter.

It is already known from Section 2.2 that the real interest rate is integrated of order zero I(0), while real GDP is integrated of order 1 I(1). The monetary aggregate M3 is also integrated of order I(1) (see Tables 12 and 13).

Table 13

ADF unit root test on the monetary aggregate M3

Null Hypothesis: M3 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.763647	0.2159
Test critical values:	1% level	-4.107947	
	5% level	-3.481595	
	10% level	-3.168695	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M3)
Method: Least Squares
Date: 09/09/16 Time: 19:41
Sample (adjusted): 1999Q4 2015Q3
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M3(-1)	-0.222253	0.080420	-2.763647	0.0075
C	1556.289	442.9392	3.513550	0.0008
@TREND(1999Q3)	99.43456	36.25035	2.742996	0.0080

R-squared	0.111278	Mean dependent var	428.8706
Adjusted R-squared	0.082139	S.D. dependent var	705.9149
S.E. of regression	676.3021	Akaike info criterion	15.91690
Sum squared resid	27900456	Schwarz criterion	16.01810
Log likelihood	-506.3407	Hannan-Quinn criter.	15.95676
F-statistic	3.818938	Durbin-Watson stat	1.943395
Prob(F-statistic)	0.027376		

Source: Own calculations on the basis of Eurostat data.

The three time series are not co-integrated because they are integrated of different order. Since the three time series are not co-integrated and an Error Correction Model (ECM) cannot be specified, the process of modeling continues with the first differences of the three variables:

(36) $\Delta(M3/P) = b_0 + b_1*\Delta r + b_2*\Delta Y + u$

The results from the OLS-estimation of Equation (36) are displayed in Table 14.

Table 14

ADF unit root test on the first differences of the monetary aggregate M3

Null Hypothesis: D(M3) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.380004	0.0000
Test critical values:	1% level	-4.110440	
	5% level	-3.482763	
	10% level	-3.169372	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M3,2)
Method: Least Squares
Date: 09/09/16 Time: 19:50
Sample (adjusted): 2000Q1 2015Q3
Included observations: 63 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M3(-1))	-1.102006	0.131504	-8.380004	0.0000
C	488.9936	197.5865	2.474833	0.0162
@TREND(1999Q3)	-0.451651	4.988297	-0.090542	0.9282

R-squared	0.539572	Mean dependent var	22.14552
Adjusted R-squared	0.524225	S.D. dependent var	1042.675
S.E. of regression	719.2002	Akaike info criterion	16.04060
Sum squared resid	31034938	Schwarz criterion	16.14266
Log likelihood	-502.2790	Hannan-Quinn criter.	16.08074
F-statistic	35.15682	Durbin-Watson stat	1.984274
Prob(F-statistic)	0.000000		

Source: Own calculations on the basis of Eurostat data.

Table 15

OLS-estimates of the parameters of Equation (36)

Dependent Variable: D(M3,1)
Method: Least Squares
Date: 09/09/16 Time: 20:03
Sample (adjusted): 1999Q4 2015Q3
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	426.8034	87.19232	4.894966	0.0000
D(R,1)	58.52849	111.8706	0.523180	0.6027
D(Y,1)	0.148536	0.065668	2.261913	0.0273

R-squared	0.092959	Mean dependent var	428.8706
Adjusted R-squared	0.063220	S.D. dependent var	705.9149
S.E. of regression	683.2366	Akaike info criterion	15.93730
Sum squared resid	28475549	Schwarz criterion	16.03850
Log likelihood	-506.9936	Hannan-Quinn criter.	15.97717
F-statistic	3.125832	Durbin-Watson stat	2.232449
Prob(F-statistic)	0.051006		

Source: Own calculations on the basis of Eurostat data.

At the 5% level the intercept and the regression coefficient before real GDP are statistically significant. The estimated value of the intercept $\mathbf{b_0}$ (426.8034) indicates that in the hypothetical situation of a zero real GDP and a zero real interest rate Bulgaria would have a real equilibrium demand for money of 426.80 million Euros at prices of 2010. Such a situation could be explained by the need for a monetary exchange of goods and services even at zero values of real GDP and the real interest rate. The estimated value of $\mathbf{b_2}$ (0.148536**)** suggests that a one-million shift in GDP will change the equilibrium demand for money by 0.15 million Euros in the same direction provided that the three-month money market interest rate remains unchanged.

The coefficient of determination ($R^2 = 0.092959$) shows that 9.3% of the variations in the equilibrium demand for money during the period of investigation can be explained by changes in GDP and the interest rate. The probability of the F-statistic (0.051006) indicates that at the 10% level of significance the alternative hypothesis for the adequacy of the regression model is accepted. The acceptance of the alternative hypothesis does not mean that the model specification is the best possible but only that the regression model adequately reflects the relationship between dependent variable and independent variables.

The residual heteroskedasticity test (Breusch-Pagan-Godfrey) confirms the null hypothesis for the absence of heteroskedasticity at the 5% level of significance (see Table 15).

Table 16

Residual heteroskedasticity test (Breusch-Pagan-Godfrey) on Equation 36

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.512521	Prob. F(2,61)	0.6015
Obs*R-squared	1.057680	Prob. Chi-Square(2)	0.5893
Scaled explained SS	0.717245	Prob. Chi-Square(2)	0.6986

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/11/16 Time: 10:53
Sample: 1999Q4 2015Q3
Included observations: 64

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	459054.6	70473.73	6.513839	0.0000
D(R,1)	82639.45	90420.08	0.913950	0.3643
D(Y,1)	-33.54676	53.07682	-0.632042	0.5297

R-squared	0.016526	Mean dependent var	444930.4
Adjusted R-squared	-0.015719	S.D. dependent var	547940.6
S.E. of regression	552230.2	Akaike info criterion	29.32706
Sum squared resid	1.86E+13	Schwarz criterion	29.42826
Log likelihood	-935.4659	Hannan-Quinn criter.	29.36693
F-statistic	0.512521	Durbin-Watson stat	1.761145
Prob(F-statistic)	0.601540		

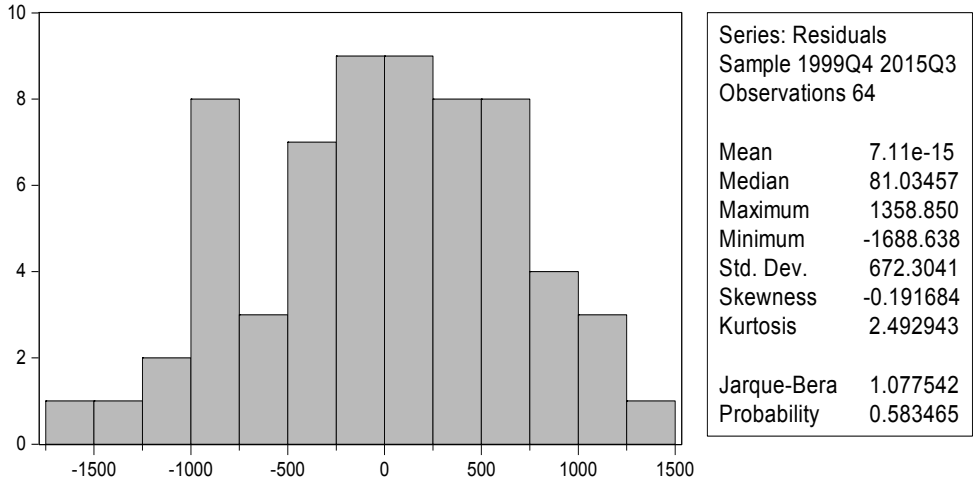
Source: Own calculations on the basis of Eurostat data.

The residual normality test (Jarque-Bera) confirms the null hypothesis for the presence of normal distribution of residuals at the 5% level of significance (see Figure 14).

The value of 2.232449 of the Durbin-Watson statistic presumes the lack of serial correlation (autocorrelation) of residuals. At the 5% level of significance the serial correlation LM test confirms the null hypothesis that residuals are not serially correlated (see Table 16).

Figure 14

Histogram of the residuals of Equation (36)



Source: Own calculations on the basis of Eurostat data

Table 17

Residual Serial Correlation LM Test (Breusch-Pagan-Godfrey) on Equation 36

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.722980	Prob. F(2,59)	0.4896
Obs*R-squared	1.530977	Prob. Chi-Square(2)	0.4651

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/11/16 Time: 11:08
Sample: 1999Q4 2015Q3
Included observations: 64
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.441351	87.63479	0.016447	0.9869
D(R,1)	17.73776	113.9170	0.155708	0.8768
D(Y,1)	-0.017990	0.067646	-0.265948	0.7912
RESID(-1)	-0.155307	0.135023	-1.150220	0.2547
RESID(-2)	-0.066343	0.136732	-0.485205	0.6293

R-squared	0.023922	Mean dependent var	7.11E-15

Adjusted R-squared	-0.042253	S.D. dependent var	672.3041
S.E. of regression	686.3607	Akaike info criterion	15.97559
Sum squared resid	27794370	Schwarz criterion	16.14425
Log likelihood	-506.2188	Hannan-Quinn criter.	16.04203
F-statistic	0.361490	Durbin-Watson stat	1.976567
Prob(F-statistic)	0.835023		

Source: Own calculations on the basis of Eurostat data.

Ramsey's Regression Specification Error Test (RESET) confirms the null hypothesis for the absence of errors in the specification of the regression model (see Table 18).

Table 18

Residual Ramsey's Regression Specification Error Test (RESET) on Equation 36

Ramsey RESET Test
Equation: EQ01
Specification: D(M3,1) C D(R,1) D(Y,1)
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.273036	60	0.7858
F-statistic	0.074548	(1, 60)	0.7858
Likelihood ratio	0.079469	1	0.7780

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	35336.21	1	35336.21
Restricted SSR	28475549	61	466812.3
Unrestricted SSR	28440212	60	474003.5
Unrestricted SSR	28440212	60	474003.5

LR test summary:

	Value	df
Restricted LogL	-506.9936	61
Unrestricted LogL	-506.9539	60

Unrestricted Test Equation:
Dependent Variable: D(M3,1)
Method: Least Squares
Date: 09/11/16 Time: 11:20
Sample: 1999Q4 2015Q3
Included observations: 64

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	281.8971	537.9469	0.524024	0.6022
D(R,1)	31.59316	149.7996	0.210903	0.8337
D(Y,1)	0.084374	0.244133	0.345608	0.7308

FITTED^2	0.000634	0.002323	0.273036	0.7858
R-squared	0.094085	Mean dependent var		428.8706
Adjusted R-squared	0.048789	S.D. dependent var		705.9149
S.E. of regression	688.4791	Akaike info criterion		15.96731
Sum squared resid	28440212	Schwarz criterion		16.10224
Log likelihood	-506.9539	Hannan-Quinn criter.		16.02046
F-statistic	2.077122	Durbin-Watson stat		2.214152
Prob(F-statistic)	0.112723			

Source: Own calculations on the basis of Eurostat data.

The Granger Causality Test (see Table 19) confirms the alternative hypothesis for the presence of a causal relationship at the 5% level of significance in the following directions:

- From real GDP to the equilibrium demand for money;
- From the equilibrium demand for money to real GDP;
- From the real interest rate to real GDP.

The Granger Causality Test (see Table 19) confirms the null hypothesis for the absence of a causal relationship at the 5% level of significance in the following directions:

- From the real interest rate to the equilibrium demand for money;
- From the equilibrium demand for money to the real interest rate;
- From real GDP to the real interest rate.

Table 19

Granger Causality Test on Equation (36)

Pairwise Granger Causality Tests
Date: 09/11/16 Time: 11:24
Sample: 1999Q3 2015Q3
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
R does not Granger Cause M3	63	2.50958	0.0901
M3 does not Granger Cause R		0.59526	0.5548
Y does not Granger Cause M3	63	3.31237	0.0434
M3 does not Granger Cause Y		30.5957	8.E-10
Y does not Granger Cause R	63	0.45843	0.6345
R does not Granger Cause Y		5.95006	0.0045

Source: Own calculations on the basis of Eurostat data.

(37) $\Delta(M3/P) = b_0 + b_1*\Delta r + b_2*\Delta Y + u$

If the regression coefficients b_0, b_1 and b_2 are substituted in Equation (36) by their OLS-estimates, Equation (36) becomes

(38) $\Delta(M3/P) = 429.80 + 58.53*\Delta r + 0.15*\Delta Y + u_t$

The equilibrium value of real GDP for the goods market in moment t $MMEY_t$ can be calculated by transforming Equation (38) to

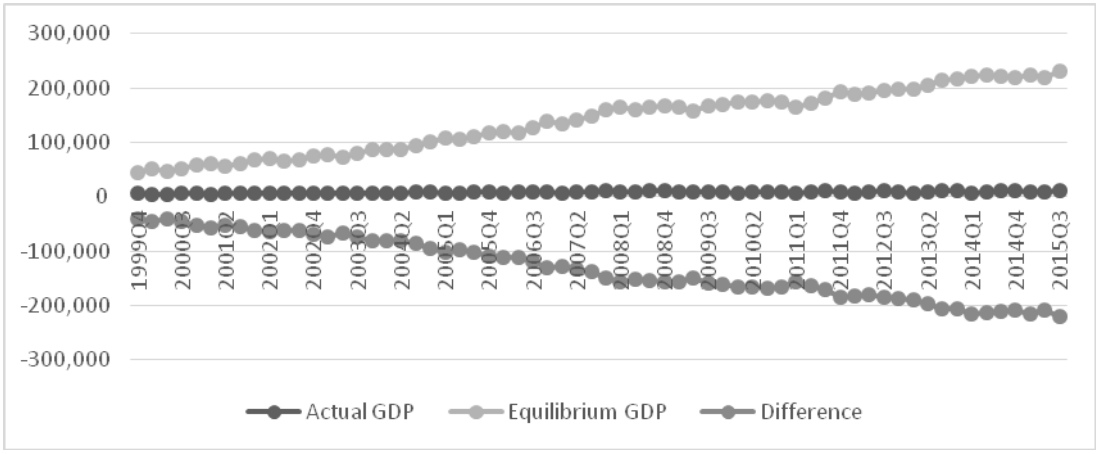
(39) $MMEY_t = (\Delta(M3/P) - 429.80 - 58.53*\Delta r + 0.15*Y_{t-1}) / 0.15$

Equation (39) is the **LM** curve equation.

In Figure 15 are shown the values of actual real GDP, the equilibrium values of real GDP for the money market (calculated by Equation 39) and their differences for the period 1999Q4 - 2015Q3. It can be inferred that the money market was much below its equilibrium level in both periods 2010-2015 and 1999-2015. The huge imbalances in Bulgaria's money market can be attributed to the bad condition of the Bulgarian economy (weak growth accompanied by deflationary trends) and to the lack of autonomous monetary policy in Bulgaria under a currency board arrangement.

Figure 15

Actual and equilibrium values of real GDP for the money market over the period 1999Q4 - 2015Q3, million Euros at prices of 2010



Source: Own calculations on the basis of Eurostat data

Conclusions

The research results confirm the Keynesian thesis of the disequilibrium character of the economic system. The lack of co-integration among macroeconomic variables indicates the absence of a stable long-term market equilibrium, which makes state intervention in the economy necessary. In case of a permanent and persistent deflationary GDP gap and deflationary trends policymakers should seek a combination of short-term demand-side stimuli and long-run supply-side measures.

The short-term demand-side stimuli ought to be fiscal because fiscal policy is the only macroeconomic instrument available under a currency board arrangement. Bulgaria's governments customarily implement more restrictive policies than European standards require and in this sense opportunities exist to stimulate aggregate demand through fiscal policy. Fiscal solutions ought to be sought in the following directions:

1) Improving the EU funds absorption rate. Considering the low absorption rate of EU funds in Bulgaria (about 30%) there are a lot of reserves in this area;
2) Introducing moderate progressive taxes on corporate profits and personal income. As shown by Tanchev (2016), progressive income taxation has a positive impact on Bulgaria's economic growth, while proportional income taxation has a negative influence on the real GDP of Bulgaria;
3) Lowering the rates of the Value Added Tax and the excise taxes on electricity and other energy sources used for manufacturing purpose. Such a measure aims at reducing production cost and prices and at encouraging consumption and production;
4) Balancing the government budget not by cutting expenditure but by optimizing it and by increasing revenue;
5) Transforming the tax system from a consumption-based one to a hybrid one, which is considered more stimulating to the economic growth (Stoilova, 2017);
6) Increasing the share of budget expenditure in GDP to the Euro area average. Maintaining fiscal parameters close to the Euro area average ought to facilitate the fulfillment of the Maastricht criteria for public finance.

The structures of Bulgaria's state budget have a lot of defects and create multiple problems, which require adequate management solutions. Whether Bulgaria's macroeconomic management possesses the necessary will and competence to find and implement these solutions is difficult to forecast.

The long-run supply-side measures are related to:

1) Improving the quality of legislation and institutions;
2) Building good public infrastructure;
3) Encouraging and investing in the formation of human capital;
4) Stimulating and investing in research and development (R&D) activities.

Bulgaria's institutional environment is characterized by high levels of bureaucracy and corruption and by sluggish and ineffective work of state administration. The lack of good legislation and quality institutions, the absence of quality infrastructure and the shortage of well-qualified and highly-productive labor force are the main obstacles to investment (local and foreign). Other factors, which impede investment, are the political instability and the absence of succession and continuity in macroeconomic policies of different Bulgarian governments.

Considering the slow and painful process of institutional transformation in Bulgaria, as well as the low share of investment in public infrastructure, human capital and research and development in Bulgaria's GDP compared to EU levels, the supply-side prospects of Bulgaria's economic growth cannot be good.

Bulgaria's ineffective money market, which remains much below its equilibrium levels in a period of economic stagnation, indicates the necessity of increasing the money supply in order to stimulate economic growth. A possible way to encourage growth is to improve the efficiency of financial markets in Bulgaria (Tsenkov, 2015).

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 5

Julijana Angelovska[1]

INTEGRATION OF MACEDONIAN, BULGARIAN AND CROATIAN STOCK MARKETS – VECM APROACH

At the end of March 2016, regional platform CEE link was established by three Balkan bourses from Macedonia, Bulgaria and Croatia. This platform provides investors from these countries possibility to buy and sell securities listed on the three bourses. The purpose of this paper is to investigate the linkages between Macedonian, Bulgarian and Croatian stock market indices. If they move together or there is common trend, then investors cannot gain portfolio diversification on this regional platform. Using Johansen Vector Error Correction Model (VECM) on data sample from January 3rd, 2005 to December 30th, 2015 the existence of long and short term relationships between the Macedonian and the Bulgarian and Croatian stock markets are detected. These findings can be limit to the benefits of equity portfolio diversification for Macedonian investors. Bilateral Co-integration test between Croatian and Bulgarian stock markets did not detect common trend that links these two stock markets. So investors from Macedonia cannot make diversification buying stocks on the Croatian and Bulgarian stock markets and vice versa, while Croatian and Bulgarian investors can diversify their portfolios by trading stocks listed on the Bulgarian and Croatian Stock Exchanges. The results are of particular interest for investors, portfolio managers and policymakers.
JEL: G15, F36, C32

Introduction

There is strong evidence on interaction among international stock markets and due to tendency of integration, investors are incapable to earn extra returns for long term investments. For investors, cross border diversification presents remarkable opportunity to maximise profits as well as minimise risks. Even though Macedonia, Croatia and Bulgaria shared common trends and passed through transition with similar characteristics, they had different timeline because of the inequality in the economic growth. Bulgaria and Croatia went through the process of transition faster and become EU members. Macedonian Stock Exchange is small and youngest among the Balkan countries. The real development of the Macedonian Stock Exchange started after 2005 when Croatian and Slovenian investors

[1] *Julijana Angelovska is Ph.D., Associate Professor, University of Tourism and Management Skopje, Faculty of Economics, Partizanski Odredi 99, Skopje, Republic of Macedonia.Mail: julijana.angelovska@yahoo.com.*

found opportunity to invest in the companies listed at the Macedonian Stock Exchange, due to their previous experience in their countries. Also funds from Croatia came to invest in Macedonia, so the stock prices were up producing the bubble that busted very soon. The domestic investors started to buy stocks, following the trend of raising stock prices produced mostly by foreign investors. In the following period after the crisis the foreigners become most sellers of the Macedonian shares contributing to fall of the stock prices. The index was down reaching the minimum in March 2009, maybe reflecting the world recession, and political situation in Macedonia. Croatian individual investors and funds are dominant foreign investors in Macedonia while Bulgarian investors have some modest trading.

The common platform linking the Bulgarian, Croatian and Macedonian stock exchanges, SEE Link was established on March 29, 2016. The goal of this platform is to increase liquidity and improve access for investors and local brokers, by creating a regional infrastructure for trading securities listed on the three bourses. The platform is of special interest to Macedonian investors as they will have an opportunity to trade stocks abroad through this platform. The Croatian and Bulgarian investors will have an easier way via their local brokers to trade in these countries. This put a question whether the investors from these countries can really gain diversification benefits of this infrastructure facilitating multilateral trading. Johansen's vector error-correction model (VECM) is used to formulate the relationship of the daily stock levels of the Macedonian, Bulgarian and Croatian stock markets. A set of time-series variables are said to be co-integrated if they are integrated of the same order and a linear combination of them is stationary. Such linear combinations would then point to the existence of a long-term relationship among the variables (Johansen and Juselius, 1990). An advantage of co-integration analysis is that through building an error-correction model, the dynamic co-movement among variables and the adjustment process toward long-term equilibrium may be examined.

This paper tests the hypothesis of equity market multilateral integration using a co-integration approach analysing multilateral integration between Macedonian, Bulgarian and Croatian equity market and as well bilateral co-integration between each of them.

The remainder of the paper is organized as follow. After reviewing some of the literature on international stock market integration in Section 1, Section 2 presents the methodology used. Section 3 provides description of data and analyses with the results regarding existence, level, degree and the speed of financial integration are reported in Section 4. The last section offers concluding remarks.

1. Literature Review

Conducting an assessment of the financial integration of the stock markets of two or more countries is important to policy makers, investment professionals as well as academics. The interest is partly based on prudence caused by possible spill over effects in case of integrated financial markets. There is vast literature on the issue of the relationship and integration of the stock markets. The co-movement among the world stock markets has long been under investigation. Even though the issue is actual for more than 40 years it

came to be more investigated after 90's. The methodologies that are used by the researchers to find out if there is relationship between stock markets of two or more countries before 90's are: factor analysis (Ripley, 1973), cluster analysis (Panton et al., 1976), unit root tests (Dwyer and Hafer, 1988), vector autoregression (Eun and Shim, 1989). Eun and Shim (1989) came to the conclusion that markets of various countries are indeed related. Based on univariate and multivariate approaches Jeon and Chiang (1991) suggested the existence of a common stochastic trend in the system of stock prices in the New York, London, Tokyo, and Frankfurt exchanges or they found that the four largest stock markets in the world share one long-run equilibrium relationship. Kasa (1992) also investigated more established stock markets—the U.S., Japan, England, Germany, and Canada and confirmed the existence of a single common stochastic trend that lies behind the long-run co-movement of these equity markets. These findings imply that the gains from international diversification for long holding period's investments have probably been overstated in the literature. The findings of Arshanapalli and Doukas (1993) are that before the stock market crash of October 1997 with the exception of the Nikkei index, France, Germany, and United Kingdom stock markets were not related to the U.S. stock market. However they agreed that the three European markets are indeed strongly co-integrated with the U.S. stock market for the post-crash period. The findings further showed that while the U.S. has a strong impact on the French, German, and United Kingdom markets, the opposite is not true and that Japanese stock market is unrelated to the performance of the major European stock markets. That the Japanese stock market is not fully integrated with other world stock markets was detected as well by Harvey (1991). Chan et al. (1992) examined the relationship among stock markets in Hong Kong, South Korea, Singapore, Taiwan, Japan, and the United States and found no evidence of co-integration, so they imply that international diversification among the markets is effective, as had been previously suggested by Grubel (1968) and Levy and Sarnat (1970). The daily co-movement of the U.S. market and various Asian markets that support the link between the well-developed stock markets and the Asian markets was observed by Aggarwal and Rivoli (1989) and Cheung and Mak (1992). The linkage between stock markets of developed countries and emerging markets of Asia and South America have been studied in e.g. DeFusco, Geppert and Tsetsekos (1996).

The financial integration within the European markets context was examined by many researchers. The long-run linkages among the Eastern European markets (Poland, Hungary, Czech Republic, Slovak Republic and Russia) and a group of developed markets (Germany, UK, France, Italy, Switzerland, US and Japan) was probably firstly examined by Linne (1988). Gilmore and McManus (2003) using the Johansen co-integration procedure found that there is no long-term relationship between the German and Central European markets, either individually or as a group. ChelleySteeley (2005) and Kearney and Poti (2006) examined the links among the various equity markets in the European markets. The linkage between Central and East European countries were under investigation also in Scheicher (2001) and Voronkova (2004). Vizek and Dadic (2006) using Johansen co-integration procedure and daily data for the 1997-2005 period found the existence of multilateral integration among equity markets of Central and Eastern Europe economies, and also found evidence of multilateral equity market integration between the entire group of CEE countries and German equity market. If there are any diversification possibilities for

investors, or integration between German and Bosnian equity markets was under research by Zaimovic and Arnaut-Berilo (2014). Papavassilou (2014) found the existence of long-term balance between the markets of Montenegro, the European countries and the USA. Syriopoulos and Roumpis (2009) had revealed the relationship between the financial markets of the Balkan countries, but their correlation with developed countries was even higher. The interaction between the Balkan country stock exchanges (such as Bosnia Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Slovenia) with Austria's stock exchange was investigated and it is found that there is a long-term and mutually positive interactive relationship between the stock exchanges of the above-mentioned countries; however, they are more sensitive to Austria's Stock exchange (Stoica and Diaconaşu, 2011). By using the multi-variate GARCH models, Horvath and Petrovski, (2012) found that the integration degree of the stock markets of the central European countries was much higher than the Balkan countries. On the other hand, the integration degree and correlation of the Serbian and Macedonian stock exchanges with the developed countries were at almost a zero level, while, the Croatian Exchange integration and correlation level with the developed countries markets was much higher than the Macedonian and Serbian stock markets (Horvath and Petrovski, 2012). Gradojević and Dobardžić (2013). also examined the regional stock market causalities and stock markets relationships of Serbian, Croatian, Slovenian, Hungarian and Germany stock markets and it was identified that the Serbian stock market had a partial impact on the Hungarian and Croatian stock markets, whereas the Serbian and Slovenian markets had mutual two-way causation. Samitas, Kenourgios and Paltalidis (2008) using Johansen Co-integration tests indicated that there was a meaningful and positive direction towards a strong relationship between the Greek-Romanian, Bulgarian and Serbian-Macedonian stock markets, whereas there was a strong and positive relationship observed between the German and the Croatian-Turkish stock markets with Albania. Also using Johansen Co-integration methodology Karagöz and Ergun (2010) concluded that there is a two-way relationship between the stock markets of the Balkan countries or the Turkish stock exchange had the lowest interaction and the British stock exchange being the most developed, had the highest effect on these stock markets. Angelovska (2016) using Johansen Co-integration analysis investigates the bilateral relationship between young and small Macedonian stock exchange and three Yugoslav Republics (Slovenia, Croatia and Serbia), and three world stock exchanges (USA, Germany and UK) for the time period covering January 3nd, 2005, through December 1th, 2009. The only evidence of co-movement of Macedonian stock indices before the 2007 is found for Croatian and Slovenian indices. Evidence of co-movement in stock indices is found for all included indices, expect for Slovenia after the outbreak of the Financial Crisis. This suggests that the integration between Macedonia and these economies has been intensified after the crisis (Angelovska, 2016). The existence of the long-run relationship between the emerging European stock markets and the mature markets of Europe and the US has been investigated in the existing literature and leads to conflicting evidence. This research will give contribution to the existing literature with regard to the existence of the long-run and short-run relationship of stock markets for the former Yugoslav countries Croatia and Macedonia and Bulgaria. The research is motivated by the latest establishment of CEE link platform. For the moment there are just tree countries included, but there is announcement that almost all Balkan countries to be

included. Specifically the research will be useful for the investors who will use the possibilities offered by the new infrastructure.

2. Methodology

A great many economic variables are, or at least appear to be, I(1). Variables that is all individually I(1), and hence divergent, can in a certain sense converge together. Formally, it is possible for some linear combinations of a set of I(1) variables to be I(0). If that is the case, the variables are said to be co-integrated. When variables are co-integrated, they satisfy one or more long-run relationships, although they may diverge substantially from these relationships in the short run. For a long time it was common practice to estimate equations involving nonstationary variables in macroeconomic models by straightforward linear regression. It was not well understood that testing hypotheses about the coefficients using standard statistical inference might lead to completely spurious results. In an influential paper, Granger and Newbold (1974) pointed out that tests of such a regression may often suggest a statistically significant relationship between variables where none in fact exists. However, if economic relationships are specified in first differences instead of levels, the statistical difficulties due to nonstationary variables can be avoided because the differenced variables are usually stationary even if the original variables are not. An alternative approach would involve removing a linear time trend from the variables and specifying the empirical relationship between them using de-trended variables. Removing (separate) time trends assumes, however, that the variables follow separate deterministic trends, which does not appear realistic, given the awkward long-run implications. Dynamic econometric models based on linearly de-trended variables may, thus, be able to characterize short-term dynamics of economic variables but not their long-run relationships. The same is true for models based solely on first differences.

The principle behind these models is that there often exists a long-run equilibrium relationship between two or more variables. In the short run, however, there may be disequilibrium. With the error correction mechanism, a proportion of the disequilibrium in one period is corrected in the next period. The error correction process is thus a means to reconcile short-run and long-run behavior. It relates the change in y to the change in x and the past period's disequilibria.

The most common tests to determine the number of co-integrating relationships among the series in a VAR/VEC are due to Johansen (1995). If we have n I (1) variables that are modelled jointly in a dynamic system, there can be up to $n - 1$ co-integrating relationships linking them. Stock and Watson (2011) think of each co-integrating relationship as a common trend linking some or all of the series in the system. Engle and Granger (1987) consider the problem of testing the null hypothesis of no co-integration between a set of I(1) variables. They estimate the coefficients of a static relationship between these variables by ordinary least squares and apply well-known unit root tests to the residuals. Rejecting the null hypothesis of a unit root is evidence in favour of co-integration. In other words, the nonstationary time series in Yt are co-integrated if there is a linear combination of them that is stationary or I(0).

If two $I(1)$ series x and y are co-integrated, then there is unique α_0 and α_1 such that $ut \equiv yt - \alpha_0 - \alpha_1\ xt$ is $I(0)$. In the single-equation model of co-integration where y is the dependent variable and x is an exogenous regressor, the error-correction model in Equation (1) is an appropriate specification.

$$\Delta yt = \beta_0 + \beta_1 \Delta x_t + \lambda u_{t-1} + \varepsilon t = \beta_0 + \beta_1 \Delta x_t + \lambda\ (y_{t-1} - \alpha_0 - \alpha_1\ x_{t-1}) + \varepsilon_t \quad (1)$$

All terms in equation (1) are $I(0)$ as long as the α coefficients (the "co-integrating vector") are known or at least consistently estimated. The term u_{t-1} is the magnitude by which y was above or below its long-run equilibrium value in the previous period. The coefficient λ (which is expected to be negative) represents the amount of "correction" of this period-(t – 1) disequilibrium that happens in period t.

The VEC model extends this single-equation error-correction model to allow y and x to evolve jointly over time as in a VAR system. In the two-variable case, there can be only one co-integrating relationship and the y equation of the VEC system is similar to (1), except that we mirror the VAR specification by putting lagged differences of y and x on the right-hand side. With only one lagged difference (there can be more) the bivariate VEC can be written

$$\Delta yt = \beta y_0 + \beta y_{y1} \Delta y_t\text{-}1 + \beta y_{x1} \Delta x_{t-1} + \lambda y\ (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + v_t^y \quad (2)$$

$$\Delta xt = \beta x_0 + \beta xy_1 \Delta y_{t-1} + \beta xx_1 \Delta x_{t-1} + \lambda x\ (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + v^x{}_t \quad (3)$$

As in (1), all of the terms in both equations of (2 and 3) are $I(0)$ if the variables are co-integrated with co-integrating vector (1, $-\alpha_0$, $-\alpha_1$), in other words, if $y_t, -\alpha_0, -\alpha_1 x_t$ is stationary. The λ coefficients are again the error-correction coefficients, measuring the response of each variable to the degree of deviation from long-run equilibrium in the previous period. We expect $\lambda y < 0$ for the same reason as above: if y_{t-1} is above its long-run value in relation to x_{t-1} then the error-correction term in parentheses is positive and this should lead, other things constant, to downward movement in y in period t. The expected sign of $\lambda\ x$ depends on the sign of α_1. We expect $-\partial \Delta x_t / \partial \Delta x_{t-1} = -\ \lambda x\ \ \alpha_1 < 0$ for the same reason that we expect $-\partial \Delta y_t / \partial \Delta y_{t-1} = -\lambda y < 0$: if x_{t-1} is above its long-run relation to y, then we expect Δx_t to be negative, other things constant.

3. Data

The data used in this study consist of the daily closing prices of Macedonian, Bulgarian and Croatian stock markets. These three Stock Market Exchanges established the SEE Link Balkan Stock Exchange platform that will give access to members of the single market to those out by other countries participating in the project. The new platform is of particular interest for the Macedonian investors, because by the Law on foreign exchange operations in Macedonia, the residents, other than authorized banks, may not purchase securities abroad. This platform will give them access and opportunity to spread their investment scope to Croatian and Bulgarian stocks. Bulgarian and especially Croatian investors were trading on the Macedonian stock market, but with the platform they will be able to deal on these stock markets shares through their local brokers. As a Balkan countries Bulgaria, Croatia and Macedonia shared common trends and several economic characteristics: they

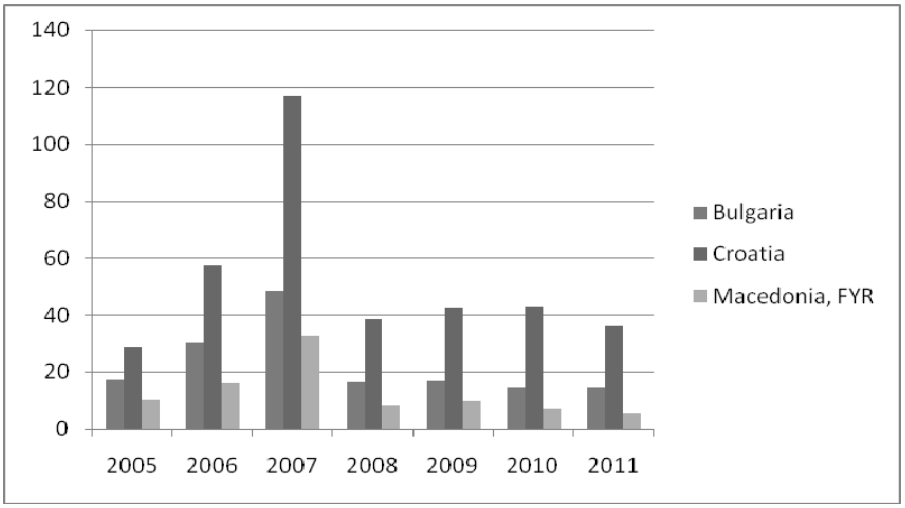
are small-open economies (their evolution is highly dependent on the global and European business climate and the sentiment on the international financial markets), underdeveloped, with a very high dependence on external financing and a poor functioning of labour markets (Radulescu, 2012). The financial system and institutions, especially capital markets development is a key component of transition from planned to market economy in transitional countries. The establishment of the stock exchanges in these countries in the process of privatization have been imposed by formation of more joint stock companies which made as necessity creating the market infrastructure for the transfer of newly created securities. As a result, a number of stock markets have been established in the region. Since then they displayed considerable growth in size and degree of sophistication. Even though these countries shared common trends and similar economic characteristics, they passed through transition with different timeline because of the inequality in the economic growth. Bulgaria went through the process of transition faster and become EU member. Bulgaria joined European Union in 2007 and Croatia in 2013, while Macedonia is still candidate member. The evolution of these stock exchanges is dependent mainly on the foreign capital flows. Macedonian Stock Exchange is very small and youngest among the Balkan countries. The development of the Macedonian Stock Exchange is connected with the foreign investors. After 2005, mostly Croatian and Slovenian investors found opportunity to invest in the companies listed at the Macedonian Stock Exchange, due to their previous experience trading shares in their countries. Beside the individual investors from Slovenia, Croatia and Bulgaria, investment funds from these countries came to invest in Macedonia, so the stock prices were up producing the bubble that busted very soon. The market capitalization of the listed companies as a per cent from the GDP is shown in Figure 1 presenting the similar tendency in the deep decline of market capitalization of listed companies in the region during 2008. The market capitalization as a per cent of GDP is still far away from the developed countries. The biggest stock market is Croatian, than Bulgarian and the smallest is the Macedonian stock market.

The stock market indices of interest are MBI10 of Macedonia, SOFIX of Bulgaria and CROBEX of Croatia. They are consisted of the most liquid shares so called blue chips stocks.

The high frequency data incorporated here include information on short-run market interactions that may be absent in lower frequency data. The sample covers a period from January 3rd 2005 till December 30th 2015, totalling 2868 observations each. January 3rd 2005 is the first day trading with the index MBI10.The data were obtained from DataStream database, meaning that indices are adjusted to the same trading days and can be used for performing the co-integration tests. The indices' movements are presented in Figure 2. The graph of the log indices shows that the movement of the three stock markets is in the similar way in timeline. Therefore it is interesting to investigate the hypotheses if they are co-integrated.

Figure 1

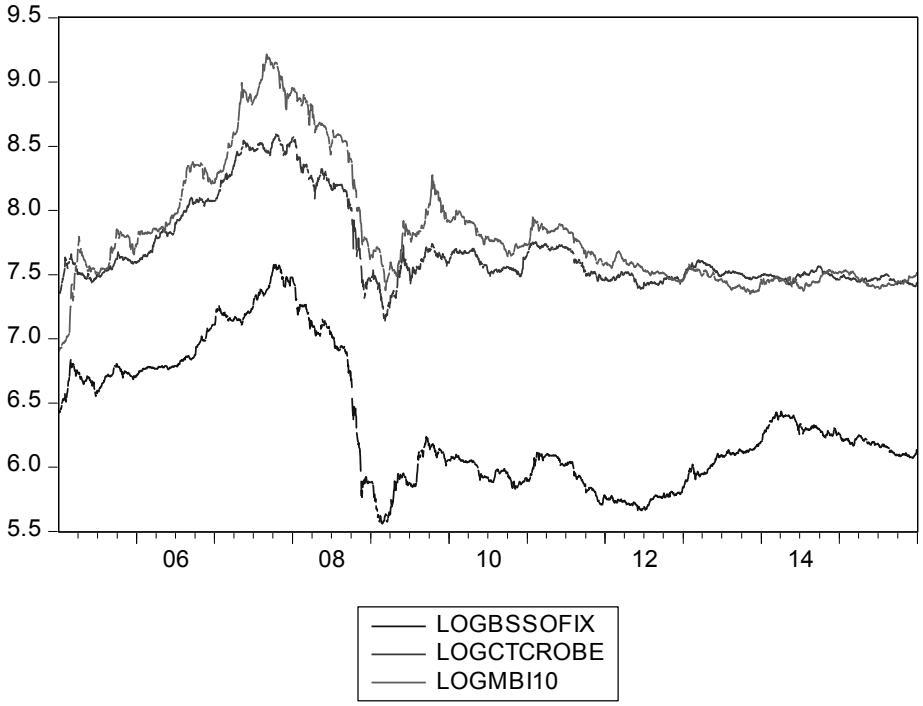
Market capitalization of listed domestic companies (% of GDP)



Source: World Bank.

Figure 2

Equity market developments



Source: Authors' calculations.

Table 1 reports descriptive statistics for the stock market returns that are of prime interest to international portfolio investors. All three stock return series show leptokurtosis and there is evidence of negative skewness in Macedonian and Bulgarian indices. Skewness is a particular feature of returns in Balkan emerging markets. Significant kurtosis and skewness (long left or right tail) indicate rejection of normality in stock return distributions. The mean of the returns is highest, but followed by highest volatility for the Macedonian stock market index. The Bulgarian stock market index is with negative mean of returns, while Croatian small positive. These two indices have similar volatility expressed in standard deviation of 1.23 and 1.21. The maximum return of 14.8 is reached on the Croatian Stock Exchange, than 8.1 and 7.3 on the Macedonian and Bulgarian Stok Exchanges. The returns time series of the Macedonian, Croatian and Bulgarian stock market indices are with high kurtosis.

Table 1
Descriptive statistics of the Macedonian, Croatian and Bulgarian stock returns in the period January 2005-December 2015

	MBI10	CROBEX	SOFIX
Mean	0.021133	0.002385	-0.010537
Median	0.000000	0.000000	0.000000
Maximum	8.089667	14.77896	7.292433
Minimum	-10.28315	-10.76363	-11.35999
Std. Dev.	1.319643	1.210376	1.233.284
Skewness	-0.125543	0.050701	-0.928028
Kurtosis	12.72241	21.36349	13.65912
Jarque-Bera	11303.31	40298.74	13993.77
Probability	0.000000	0.000000	0.000000
Observations	2868	2868	2868

Source: Authors' calculation.

4. Empirical Results

A vector error correction (VEC) model is a restricted VAR that has co-integration restrictions built into the specification, so that it is designed for use with nonstationary series that are known to be co-integrated. The VEC specification restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing a wide range of short-run dynamics. As the VEC specification only applies to co-integrated series, first the Johansen co-integration test must be performed prior to VEC specification. This allows confirmation that the variables-stock market indices are co-integrated.

Co-integration requires the variables to be integrated of the same order. So, as a first step the variables are tested for unit roots to verify their non-stationarity. The results from Augmented Dickey-Fuller (ADF) and the Phillips Peron (PP) unit root tests are shown in Table 2. The results of the ADF tests indicate that the null hypothesis of a unit root in the log levels cannot be rejected for the three time series of Macedonian, Croatian and Bulgarian stock market indices. At the same time a unit root in the first differences of the

three stock market indices is rejected at the 1% significance level. This means that the stock market indices in log levels are not stationary or they follow a process integrated of order one, while their returns are stationary. The Phillips Peron (PP) test results shown in Table 2 support the findings of the previous ADR test.

Table 2

ADF and PP unit root tests

	ADF test		PP test*	
	Level	Return	Level	Return
Macedonia-MBI10	-1.84	-31.32	-1.91	-35.01
Croatia-CROBEX	-1.25	-27.66	-1.41	-50.49
Bulgaria=SOFIX	-0.99	-15.51	-1.36	-51.53

Note: ADF - Augmented Dickey-Fuller test; MacKinnon critical values for rejection of hypothesis: 1%Critical value -3,436749, 5%Ceritical value -2,864254, 10% Critical value -2,568267
*MacKinnon (1996) one-sided p-values.

As the variables showed non-stationarity in their level forms, and stationarity in first difference, the co-integration test (Trace and Maximum Eigenvalue) between the three indices is performed and the results are shown in Table 3. The null hypothesis of no co-integration vectors is rejected in 1 co-integration relation, indicating that there is co-integration between the three indices.

Table 3

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.015145	56.36562	29.79707	43.72148	21.13162	0.0000
At most 1	0.003426	12.64414	15.49471	9.831127	14.26460	0.1969
At most 2	0.000981	2.813012	3.841466	2.813012	3.841466	0.1540

Trace test and Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

As co-integration between MBI10, SOFIX and CROBEX is found as precondition to VEC, the model can be developed. The co-integration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The co-integrating vector based on the largest eigenvalue is: $ut \equiv (1, 2.81, -1.4, 0.01)$ and this gives the co-integrating relation shown in Equation (4).

$$LM_t = 1.4*LC_t - 0.01*LS_t - 2.81 \quad (4)$$

The term u_{t-1} is the magnitude by which y was above or below its long-run equilibrium value in the previous period. Table 4 reports the coefficients of the equation 2 and 3.

Table 4

Vector Error Correction Estimates

Error Correction:	D(LOGMBI10)	D(LOGCTCROBE)	D(LOGBSSOFIX)
λ	-0.009960	-0.002400	-0.004542
	(0.00155)	(0.00157)	(0.00157)
	[-6.41015]	[-1.52816]	[-2.89368]
D(LOGMBI10(-1))	0.371121	0.025885	-0.048468
	(0.01888)	(0.01908)	(0.01907)
	[19.6568]	[1.35658]	[-2.54094]
D(LOGMBI10(-2))	-0.071841	0.042274	0.066609
	(0.01848)	(0.01867)	(0.01867)
	[-3.88795]	[2.26373]	[3.56799]
D(LOGCTCROBE(-1))	0.173188	0.101417	0.177341
	(0.01937)	(0.01958)	(0.01957)
	[8.93921]	[5.17960]	[9.06006]
D(LOGCTCROBE(-2))	0.022107	-0.091904	-0.077867
	(0.01977)	(0.01998)	(0.01998)
	[1.11812]	[-4.59946]	[-3.89814]
D(LOGBSSOFIX(-1))	-0.024336	-0.038445	0.096704
	(0.01917)	(0.01937)	(0.01937)
	[-1.26962]	[-1.98460]	[4.99366]
D(LOGBSSOFIX(-2))	0.062192	0.108056	0.093673
	(0.01893)	(0.01913)	(0.01912)
	[3.28545]	[5.64824]	[4.89794]
C	0.000143	1.76E-05	-8.84E-05
	(0.00022)	(0.00022)	(0.00022)
	[0.64959]	[0.07905]	[-0.39623]

Note: Standard errors in ( ) & t-statistics in [ ]
Source: Author'calculations.

The coefficient λ (which we expect to be negative) represents the amount of "correction" of this period-(t – 1) disequilibrium that happens in period t. In our case λ is –0.01, and it means that 0.01 of the gap between $LMBI10_{t-1}$ and its equilibrium value would tend (all else equal) to be reversed (because the sign is negative) in period t. The signs of the coefficient of LC*t (*LOGCROBEX) and *LSt* (LOGSOFIX) in the detected common trend show the direction of the Macedonian stock market dependence of the Croatian and Bulgarian stock market. So the coefficients in Equation (4) infer that the Macedonian stock market has a positive long-term relation with the Croatian and negative with the Bulgarian stock market. The validity of this model is supported by the significance of LMt (LOGMBI10) in the co-integrating relation [t= -11.3550], and insignificant [0.08297] of the LS_t (LOGSOFIX). We may also observe that the stock market of the Croatia has a significant effect in the co-integrating relation (4) in comparison with the Bulgarian stock market. Moreover, the fact that λ is small and insignificant in the cases of Croatia and

Bulgaria (Table 4) may further suggest that Croatia and Bulgaria are exogenous to changes in Macedonia. A significant λ in the case of MBI10 means that the Macedonian stock market responds quickly to changes in the both markets. As a conclusion of this result lead us to believe that the Macedonian stock market tends to follow the directions taken by the Croatian stock market and that their impact on Macedonian market is highly significant.

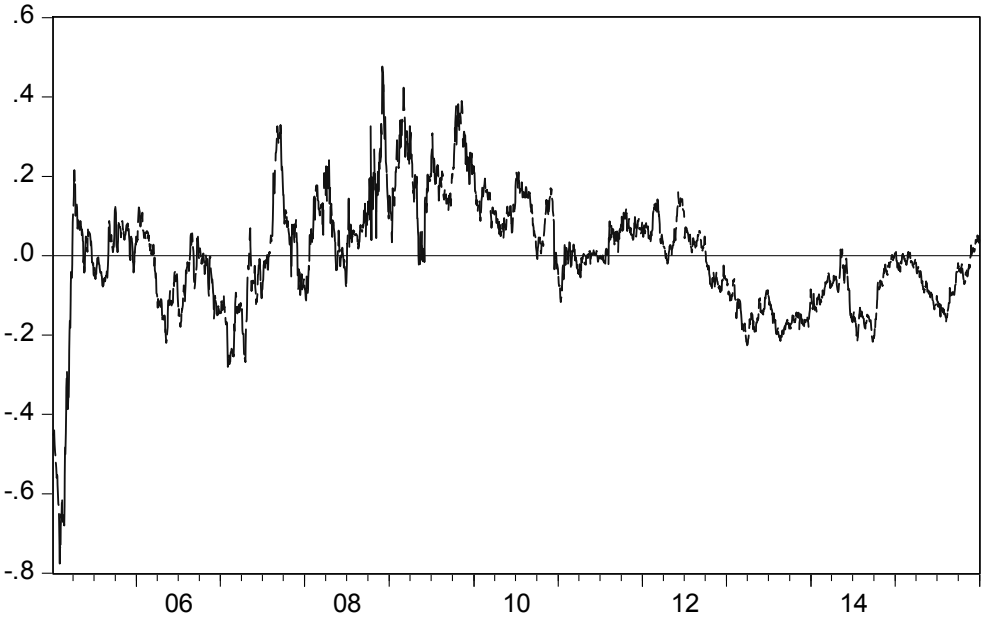
After elimination of the non-significant coefficients we substitute the coefficients (Equation 2) in the Equation (5). The short run adjustments of Macedonian stock market are mostly dependent of the Macedonian market trading in day (-1) and (-2), day (-1) trading on the Croatian stock market and the day (-2) on the Bulgarian stock market.

$$D(LM)=-0.01*u_{t-1}+0.37*D(LM(-1))-0.07*D(LM(-2))+0.17*D(LC(-1))+0.06*D(LS(-2)) \quad (5)$$

The graph in Figure 2 shows the co-integration relation of the Macedonian, Bulgarian and Croatian stock markets. It was less than the long run level during 2006 and 2007 and after 2012. So, during periods of financial turbulences these Balkan stock markets tend to become more integrated. But the long-run relationship exist even though during the period of investigation shown on the graph there are periods with the relationship less than the long run. The end of 2015 the graph shows again long-run level. From a perspective of Macedonian investors, this means that there are no possibilities to gain diversification benefits of investing in the Croatian or Bulgarian stock market. Long and short-run relationship of Macedonian stock markets is considerably influenced by the Croatian stock market and less by the Bulgarian market.

Figure 2

Co-integration relation: $LM_t = 1.4*LC_t - 2.94$



When testing bilateral relationship among the three stock markets it seems that Macedonian market is linking the Bulgarian and Croatian markets and there is bilateral co-integration between Macedonian and Croatian market and as well Macedonian and Bulgarian market. But bilateral relationship between the Croatian and Bulgarian stock market does not exist. Table 5 shows the co-integrating test (Trace and Maximum Eigenvalue) between the Croatian and Bulgarian stock market indices.

Table 5

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.003566	11.79811	15.49471	10.23627	14.26460	0.1969
At most 1	0.000545	1.561833	3.841466	1.561.833	3.841466	0.2114

Trace test and Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

So investors from Macedonia cannot gain diversification buying stocks on the Croatian and Bulgarian stock markets and vice versa, while Croatian and Bulgarian investors can diversify their portfolios by trading stocks from Bulgarian and Croatian Stock Exchanges.

Conclusion

To minimize the risk, stock portfolios can be diversified internationally because unsystematic risk across countries can be reduced. But co-movements do exist among the stock markets and this can eliminate the opportunity of diversification. The establishment of the new common platform SEE link will improve the access of the investors and local brokers between the three countries: Macedonia, Bulgaria and Croatia. The investors from Bulgaria and Croatia already traded on these markets and will get an easier access, but for the Macedonian investors this is an opportunity to spread their portfolio scope. Will this mean that the investors from these countries will have an opportunity to maximize their profit and minimize the risk? Investigation of the integration of the stock markets are of particular interest for investors, portfolio managers and policymakers. Using a Johansen's vector error-correction model (VECM) the relationship of the daily stock indices of the Macedonian, Bulgarian and Croatian stock markets was identified. There is common trend that links these three markets or they are co-integrated. Long and short-run relationship of the Macedonian stock market is considerably influenced by the Croatian stock market and less from Bulgarian. In particular, Macedonian stock market has a positive long-run equilibrium relation with the Croatian market and negative with the Bulgarian market. The Macedonian stock market responds quickly to changes in the both markets. Analysis showed that the Croatian stock market has a significant effect in the integration relation with the Macedonian stock market and comparison the Bulgarian stock market influence is statistically insignificant. This suggests that changes in the Croatian stock market has a

significant effect on the stock market in Macedonia. The interpretation of the results of the performed VECM model are that Macedonian stock market responds quickly to changes in the Croatian market or the Macedonian stock market tends to follow the directions taken by the Croatian stock market and that the impact on Macedonian market is highly significant. These results are expected. The economic background behind these results are connected with the presence of individual investors and institutional funds from Croatia on the Macedonian Stock Exchange. The presence of the Bulgarian investors as a players on the Macedonian stock market is less significant. They are trading on the Macedonian Stock Exchange since 2005. The findings of this research about detected common trends can be limit to the benefits of equity portfolio diversification for Macedonian investors or they cannot make diversification benefits of investing in the Bulgarian or Croatian stock market and vice versa. Bilateral Co-integration test showed that there is no common trend that links these two stock markets, so Croatian and Bulgarian investors can use this opportunity and diversify their portfolios by trading the stocks on Bulgarian or Croatian Stock Exchange.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 5

Plamen Tchipev[1]

MODERN FIRM THEORY AND ITS PRINT ON CORPORATE GOVERNANCE

A number of previous projects on corporate governance, accomplished with the participation of the author (Dimitrov et al. 2014; Mintchev et al. 2007; Tchipev, 2009 and others), pointed out the fact that the set of instruments, regulations and good practices of corporate governance are a product of a more or less ***predetermined*** *choice; of the firm specific creation and functioning in a certain economic system. Even more, the very firm, (called in general* ***corporation*** *or, sometimes,* ***company*** *with the same meaning) - being itself a subject of analysis and influence by the corporate governance is also a "datum". There are many hypotheses on the reasons and nature of these specificity, starting from the different legal system applied in the different countries, through the varieties of corporate finances systems, to the nature of the firm in general. The answers are not quite satisfactory. The current paper studies in a broader methodological frame the characteristics of the modern firm, which define the features, interact and determine the choice of a model or system of corporate governance.*

The analysis starts with the relation of the corporate governance to the institutional nature of the firm. The second section outlines the problems of defining the firm (the "paradox of the firm") in the standard neoclassical economics. The third section draws special attention to the criticism of the transaction costs approach *as defining the firm. The fourth section shows its contradiction with the other axioms of the classical and neoclassical economic paradigms and holds the thesis that the firm cannot be understood that way but only through its institutional nature. In the fifth section, with the help of the General Systems Theory, the firm is set in a wider frame of its relations with the market in general and the exchange of value (or utility, depending on the chosen explanatory model). The last section outlines the final conclusion that the firm (corporation) functions (through the value/utility mechanisms) as a* base unit of distribution*, which determines its contribution to the whole set of goods. Thus, the categories* ***firm and corporate governance*** *are in certain mutual order, and it creates the mentioned predetermination. The latter requires and suggests certain solutions for corporate governance adequacy. More concrete answers are also offered, for example to the question why the "stakeholders" cannot (and should not) be an object of the corporate governance.*

JEL: D21; D23; G30

[1] Plamen Tchipev is Prof. Dr. in Plovdiv University "Paisii Hilendarski" and ERI-BAS, e-mail: tchipev@iki.bas.bg.

Introduction

The results of many previous projects on corporate governance have shown that there is a need to identify, define and position as clearly as possible the characteristics of the modern firm in a broader methodological frame. These characteristics specify, interact and determine the choice of a model or system of *corporate governance*.[2]

There are many hypotheses on the reasons and the nature of these features, starting from the legal system applied in the different countries, through the corporate finances system, to the nature of the firm in general. The instruments, regulations and good practices of *corporate governance* are a product of a more or less *predetermined* choice, of the specificity of the firm creation and functioning in a *certain* economic system. The most obvious, but not only "datum", which encounter those who study and regulate the corporate governance, is the classical division between the national economic systems of those operating in a *constitutional* legal regime and others - in a *"common law"* regime.

The firm (generally a *corporation*, often called company) is an object of analysis and influence by the corporate governance. This *ex ante* predetermination requires studying of the character and nature of the firm as an economic agent. The problem is a actual and necessary stage of the work on corporate governance, since, on one hand, it forms the trajectories of development of the corporate governance system, and on the other, it predetermines to a great extent its chances for success.

The study of the character and nature of the firm requires a careful view and redefining of the existing approaches and theoretical paradigms explaining the firm. Special attention should be drawn to the critical rationalization of the transaction costs approach, which has a leading role in defining the firm today.

This forms the object of the current analysis – the modern corporation, and predetermines its goal – to try to study the features of its institutional nature, to reveal its role as a system-defining element according to the Systems Theory, and as such - predetermining the corporate governance. Subject of analysis are all those features, which build the corporation as a *specific* firm, as the most "objectified", separated, and independently existing to its "subject" (individual or group), which has structured and placed it in the economic, and more broadly, social space. The main problem of the analysis is how and why the corporate governance set appears predetermined to the company in which it's being applied.

Methodologically, the study is based on the institutional and evolutionary approach, together with the traditional methods of induction and deduction. Results are subject to development and does not claim comprehensiveness.

The analysis includes several sections. The first section studies the relation of the corporate governance to the theory of the firm. The second section outlines the *"paradox of the firm"* and shows how it emerges and which methodological peculiarities of the neoclassical

[2] *Corporate governance* is namely "governance", and not "a management", as the Bulgarian term (korporativno upravlenie) suggests. So, the proper meaning of the term is a rather mix of overseeing and control, and it is interdisciplinary placed in the economics, as in the law and in the managerial sciences as well.

(mainstream) economics are in its base. Special attention is placed on criticism of the transaction costs approach as defining the firm. Shown are its contradictions with the other postulates of the classical and neoclassical model. Reasoned is the thesis that the firm cannot be explained through this model but only through the institutional nature of the firm.

Further on, with the help of the *General System Theory*, the firm is placed in a wider frame of its relations with the market in general and the exchange of value (or utility, depending on the chosen explanatory model). The final conclusion is that both categories – firm and corporate governance are in certain mutual dependency, and that it creates the mentioned *predeterminetion, which on the other hand* requires and offers certain solutions for corporate governance adequacy. During the analysis more concrete answers are shown, like to the question why the "stakeholders" cannot (and should not) be an object of the corporate governance.

1. Corporate Governance and the Institutional Nature of the Firm

Corporate governance, which we chose as a starting point of the analysis for its role in the functioning of the firm, has a very important feature. It determines our objects of study – *the corporation*.

1.1. The Corporation – Object of the Analysis

Generally we talk about firm organization, firm management, etc., but we are indifferent to the vast variety of legal and economic characteristics of the modern firm. To a certain degree it means reducing it to a black box (if we use the systems theory language), since we implicitly assume that all firms have *equal* deepest nature as an economic subject.

It is misleading, the variety misleads. It goes out of the range of the simple variations and, after certain process of complication, changes the nature of the firm. Thus, the real, full, unfolded characteristics of the chosen here object of study are present only in the incorporated structures, which we will determine as *corporation*. They have an economic structure, unlike the sole-proprietor firms, family firms and partnerships[3], where the merger of the object and subject deprives them of development of economic structure.

Economic history is very indicative in this sense – the history of the firm is actually a history of its objectifying, of the separation of its subject – first formally, as a function, and later legally as well. The American institutionalism clearly underlines the genesis of this process, stating that the institutions of the capitalism are result, at least partially, of acquiring a status of "juridical persons" of collective social formations - the modern view on the sovereign *state* as first example (Bazzuli, Dutraive, 2002).

[3] Partnerships have no principle difference with the sole-proprietor firms – just few people gathered to act in cooperation.

The analysis of J. Commons is even clearer. He presents the formation of the firm as a gradual separation of ownership and sovereignty, and following delegating of power from the state to the economic organizations – *corporations are creations of the sovereign power of the state* (Commons, 1950).[4]

Applying the instruments of the evolutionary analysis allows the corporations to be considered as continuing to evolve and develop to new, more complex forms, unlike the historically oldest firms.

The corporate governance and the corporation, as a juridical form, as a specific person, are determined and mutually defined. This statement does not deny the role of other characteristics of the incorporated firm, for example joint ownership. However, the latter also requires and is determined by the *corporate governance*, since it harmonizes the interests of the multitude of owners. Thus, corporate governance becomes a criterion for maturity and development of the firm.

Ownership requires the presence of free people, law-based state, economic freedom, and by defining them it defines itself as a private ownership. In the same way, corporate governance defines and is self-defined through the corporation.

Corporate governance has a very important role for the functioning of the firm, which is the main reason for the choice of it as a starting point of the analysis.

The *corporate governance* approach to the analysis of the firm leads to the conclusion that the corporation has own and complex *actual* nature, i.e. it has structure, development, variety of functions, etc. Its characteristics, features, etc. are outlined as:

- Not reducible to intra-firm analysis, i.e. they are provoked by external, or higher level, systems;
- Accessible for analysis at another level of abstraction.

In other words, these are features that cannot be understood, evaluated, modelled and managed through analysis of the *firm (corporation)* but they need to be approached as a product of the whole system, in which they function.

The issue of the nature of the modern firm is old enough and well patinated in time to be able to hinder the scientific interest. Many acknowledged names of the economic and management science have studied it with different but not decisive success. The reason seems clear – the problem attacks the fundament of the economics, with the extreme inconvenience of making it from outside, from the economic system as a whole, and through the prism of the economic management.[5] Moreover, the firm is not just a problem of the economic management but it *defines* the very economic management as a research area. If the firm does not exist or is not an economic phenomenon, then the economic management equals with (or is part of) the economics.

[4] The goals of the study do not allow us to follow the historical side of the problem in dept.
[5] Management (en.); Betriebskunde (ger.); bedrijfseconomie (ned.); gestion d'entreprises (fr;).

This *ex ante predetermination* raises many questions about the feature of the firm as an economic agent – is this feature of the system nation-defined or not, does it have wider boundaries, does it depend on the principle feature of the firm or not, etc. To a great extent this predetermination defines the application of the corporate governance, and the latter determines also the reform in the real sector.

The attempt to trace the relation of the corporate governance with the modern corporation convincingly shows that it depends on the character and the nature of the firm as an economic agent – what is it, how is it structured (and whether there is at all a structure), by whom (or what), how it changes in time and its interaction with the whole economic "environment", etc.

Our attempt also shows that the firm has a structure, differently specified functional characteristics in economic and not technological or strictly management sense. This constructs it as an ***institution***, as an individual *structural object* of the economic system, which like every institution has certain relations, bears and imposes an impact on the other objects, has certain reasons, and leads to certain consequences. In a nutshell, the firm has *development* (in the widest sense of the term *evolution*), and this development is interesting for the economic theory. The last conclusion contributes to the completeness of the determination of the goal and the object of this study – *to try to study the features of its institutional nature of the modern corporation*.

Thus defined, its characteristics situate the firm outside the main premises of the standard (dominant, mainstream, etc.) economic theory.

2. Problems with Defining the Firm in the Neoclassical Economics

2.1. The Paradox of the Firm

In economics the "paradox of the firm" is well-known – on one hand, the firm practically exists (and some!), on the other – the theory ignores it. The paradox appears from a certain theoretical trap due to the simultaneous action of two assumptions in the neoclassical theory.

1. First is the generalizing assumption that the economy is a process of market optimization, which includes also respective allocation of factors of production. *Ergo*, only the economic agents, which follow this process, i.e. have a rational behaviour, have a reason to exist.

Firms are such economic structures[6] that obviously do not use this mechanism in their *internal* relations, which places them automatically outside the neoclassical theoretical scheme. In best case, as far as the neoclassical economics deals with them, it deprives them of an *internal* structure, which practically ignores them.

[6] As mentioned, they are institutions, but we left the more neutral "structures" since the term is not axiomatically adopted in the standard neoclassical lexis.

2. Second assumption is about the *way* the mentioned concept is applied. The neoclassical economics requires ***alternative*** understanding of the optimizing action of the firm and the market.[7] Ronald Coase interprets them as *"what we find outside the firm is clearly alternative to what is in the firm"* (Coase, 1937, p. 388). There is a choice option of *"either-or"* type. In the conditions of the undoubted supremacy of the market, postulated by the neoclassical economics, its alternative – the firm – cannot substitute it, i.e. it (really) *is not* its alternative! Thus, its analysis already completely remains outside the theoretical field of application of the neoclassical analysis. We will get back in more details to the consequences of the application of these two principles in section 2.2. Here, however, we have to mention that the predeceasing classical political economy offers the opportunity of analysis of the firm.

Smith's concept of manufacture and labour distribution is exactly such case (Smith, 2016). *The manufacture is the first production form*, where the economic agent encompasses many persons, and has no legal regulation. The labour distribution is an ***intra*-structural** process in it, which makes it more competitive than the simple economic agents. This, in essence, is a beginning of a serious firm analysis. However, strangely enough, the neoclassical paradigm ignores it, emphasizing rather controversially on the egoistic nature and greediness of the human (Palmer, 2011). Similar is the fate of the thesis of the "invisible hand", which is separated of and opposed to the whole Smith's moral and economic system, as well as many other categories. Smith is alienated from his categorical system and dogmatized.

Of course, the reason for such "selective" reading of Smith lies in the deep disruption between the classical Smith's analysis and the neoclassical economics. The latter proudly proclaims this disruption with the labour theory of value. The disruption is presented as a revolution, the Marginalist one, which has to break up with the base theory of Smith-Ricardo political economy.

Things, however, are not so simple to the other categories of classical political economy. It turns out that some categories are quite valuable for the "revolutionised" political economy as well and should be kept. Above all is the *liberal credo*, which should be kept at all cost, and probably that is why, the new theory prefers to be called *neo*classical, though much later. During this "deep revolution" other odd things happen as well. Besides undervaluing, missing or preferring to neglect many of the classical threads of the analysis, the new theory encroaches some of its own – let's remember the fate of the *"marginal utility"*, the vanguard Austrian concept of alternative construction of value, which is later neglected by the neoclassical one.

Same happens also with the theory of the firm, which becomes a victim of the disruption between the two paradigms. Exactly this "unseen" disruption with all methodological principles and postulates of the classics is a proof for the inability of the neoclassical economics to consider the firm an ***uncompetitive*** mechanism of the market to solve the problem. This can be done only through the *evolutionary analysis*.

[7] Coase calls the market - *price mechanism,* and Williamson identifies the firm and the market as *hierarchy and market.*

2.2. Standard Theory of the Firm

As mentioned, the firm is not an object of own extended analysis, which by necessity imposes a more detailed analysis here of the dominating theory of the firm. We consider a standard theory the neoclassical paradigm, which dominates the economic theory today, and in all fairness is not particularly generous to the firm. First, we will discuss in more details the two concept assumptions (mentioned in the previous section), which lead the neoclassical economics to "omitting" the firm analysis.

The first assumption – about the necessity of a rational economic behaviour in the sense of the neoclassical economics – leads to ignoring the internal structure of the firm, since within it this principle is apparently not applicable. This means that the firm can only be a function, production function, which produces through *contracting* all activities and factors of production, ensuring their *effective* combination. Actually, it does not exist but only creates solutions for optimums, depending on external factors. This again is purely mathematical treatment of the production, solving one function. Defining the price is also nothing more than the cross point of two functions – that of production and that of demand.

Despite its constant mentioning by the economics, especially in micro analysis, the firm is practically not studied and does not exist as an economic phenomenon. Actually, the object of analysis is the market, a single one, where the firms, like the bodies in the Newton's classical dynamics, keep their status until the other participants derive or stop it. Maybe the only difference is that in the economy there are two sets of rules – one for the small (competitive) firms and another for the large (monopoly or oligopoly) firms.

Thus, the analysis of the costs is a matter of neither production nor technology. The firm simply increases them until MC equals MR, which is purely mathematical solution of function and has no relation to the development of the economy or society, as well as to the satisfaction of the consumers. For example, if the neo-natal intensive care units or the replacement of locomotives are too expensive due to price levels, they are simply eliminated, no matter of the consequences. Analogous is the logics of the size of the firm, the volume of production, which often leads to the opposite – increase of production (for example over-construction till the city practically suffocates) as long as it is in the range of the possible and allowed solutions of the production function.

Practically, in the original version the firm is reduced to production function optimizing the different factors by their marginal productivity. The optimization is done by the market, which in the postulate ideal case guarantees best ratio between costs and benefits.

This, by the way, is another point that the neoclassics has "borrowed" from Ricardo's classical theory. David Levine considers that the concept of the firm as a "technical production unit" corresponds to Ricardo's postulate, where the firm is "only an immediate production process and is not a unit of production and realization in the world of capitals" (Levine, 1977, p. 131).

Ironically, when the critical view to the standard, or more precisely - rather early neoclassical theory notices the lack of satisfactory theoretical reasoning of the firm, it finds out an insurmountable contradiction as well. If the market completely solves the questions of the optimization, then what is the reason for the creation of hierarchies (firms)? Is it not a

paradox that there are firms at all that should not offer a better solution to the optimization task than the market? Practically, the market is (should be) able to organize every production process as a series (total) of contracts.[8]

3. The Firm in the Transaction Costs Theory – Contributions and Weaknesses

3.1. Coase and the "Nature of the Firm" (1937)

The critical view, which opens one of the heaviest questions in the micro analysis, is the one of *Ronald Coase*. He easily "sees" that the firm is not only left without attention but also without a reason. Coase postulates his ideas in the frames of the neoclassical paradigm and that is why he declares that he tries to "clarify assumptions on which a theory is based" (Coase, 1937, p. 386). Moreover, Coase insists that they should be both "manageable" and "realistic", since the micro analysis uses either "manageable" or "realistic" assumptions, which make its criticism and respectively its task much deeper, more essential than usually perceived!

Thus, to him the firm is omitted in the "manageable" assumptions, i.e. those included in the model of distribution of the factors of production according to the price market mechanism. The few attempts to define are based on such set of assumptions, which aim to reflect more realistically the picture of the live economy, but are not bound to the "manageable" axioms.

The solution, proposed by Coase, is based on the assumption that the market causes *transaction costs (TC)*[9], which, roughly said, make the deals more expensive. That is why he defines the firm through the *necessity to minimize the transaction costs*. Since this assumption would lead to the presumption of the unlimited scale of the firms, transaction costs are subordinate also to the requirement to grow in parallel with the growth of the firm. Thus, the latter end the process by forming an optimal size of the firm. This is not a problem assumption, since it corresponds to the general idea of the behaviour of the costs in the neoclassical analysis.

According to Coase, his solution should necessarily use both basic "Marshall" marginal analysis concepts – marginal analysis and substitution.[10] It situates it inside the neoclassical paradigm. Coase wants *to add* missing link in these assumptions, in order to make the existence of the firm *possible*, and not to destroy the neoclassical paradigm! To some extent this explains why O. Williamson, though considered a neo-institutionalist, actually applies neoclassical approaches.

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[8] Thus, the missing firm theory in the standard approach is not an omission but a logical assumption.

[9] Coase calls them costs for "organization" or use of the price mechanism. Williamson is the one who codes the transaction costs as a term.

[10] The margin and the substitution – "the substitution at the margin" (Coase, 1937, p. 386).

3.2. Oliver Williamson and Transaction Cost Economics

O. Williamson builds an entire theory from the assumptions of Coase. With the *Transaction Costs Economics (TCE)* Williamson reconfirms the theoretical existence of the firm, making contributions, with which actually he just further enriches the nomenclature of these costs and formalizes their analysis. He assumes that:

- Many people have opportunistic behaviour, which, together with the transaction-specific investments in human and physical capital, makes a vertical integration (i.e. growth of the firm).
- Though it is necessary, information is rarely effectively processed.
- Evaluation of *Transaction Costs Economics* is a problem of a comparative institutional analysis.

Moreover, Williamson introduces also new reasons – if the transactions are non-specific, then the market can minimize the transaction costs directly, without a firm. Random and non-standard transactions would profit from some integration between the agents (Williamson, 1973).

Concerning the firm[11], it becomes completely economically justified, with repeating transactions, which include specific investment at high uncertainty. Thus, a situation arises, when the firm is not indifferent to the transactions it makes! The firm can have justified existence with one type of transactions and unjustified – with another activity. It means that *it can emerge independently from the requirement of effectiveness*. It just turns on and off certain transactions from its activity, unrelated to the optimization mechanism.

Williamson interprets this as an addition to the effective functioning of the market, but actually this denies the very idea of market optimization, since if we have many efficiencies (and corresponding structures in the economic space) in reality we deny the neoclassical paradigm about the market as an *ultimate* optimizing procedure. This means that the optimization (if one continues at all to observe such economic behaviour) will happen between better and more effectively organized hierarchies. This replaces the very nature of the market economies.

The opposite assumption – that optimization of economic agents of both market *and* hierarchy type is possible – would mean creation of a *principle* advantage for one side in the optimization process, where all resources will be collected in one agent and the system would block (Jensen, and Meckling, 1976).

Though with different logics, the criticism of Stanley Fischer is very close exactly on this point: “most of all it could be rationalized through adopting suitably specified transaction costs” (Fischer, 1977).

[11] Determined by him as transaction-specific governance structure (Williamson, (1979).

3.3. Institutional Criticism

Besides the main weakness, which we mentioned as "paradox of the firm" regarding the two assumptions in the neoclassical theory – market optimization and ***alternative*** treatment of the firm to the market, there is also a neglecting of the intra-structural analysis of the firm. It is not possible for the economic agent to have structure, internal organization, respective separation of the functions, of ownership from control, and eventually to be an object of *corporate governance*.

Evolutionary political economy would assume (if optimization really acts in the way predicted by the mainstream theory) that exactly the market could generate the firms. That they are just a juridical form (continuation) of the economic agent, represented by the physical person! Why at all the hierarchies (firms) are considered antipodes of the markets? The answer to these questions is a subject of another discussion, but the breaking up with the classics creates the principle inability for neoclassical economists to consider the firm a non-competitive mechanism of the market, which would solve the problem.

Another reason is that the ***internal structure cannot be modelled as a result of the market mechanism***. We have to note that the micro analysis postulates a competitive, oligopoly or monopoly structure, and then models different market answers, but does not produce *different* structures from the functioning of the price mechanism. This is impossible and that is why the used methodology is the second serious obstacle to the real analysis of the firm.

Formalizing some more or less reliable structures, Williamson, and later the whole school of his followers, opens an endless field for speculative analysis on which structure is "more effective" or not, what will happen if we change a small premise, etc. In reality the dynamics of the structures is as big as the dynamics of the price mechanism, and respectively the attempts to "reduce" it are also pointless. Thus, the method opposes the postulates that created it.

There is one more very serious contradiction to the transaction costs concept concerning the functioning of the market mechanism. Adopting these costs, as the work of the neo-institutional school shows, is an endless process of finding newer and newer ones. This means that there can always be a more specific one, and its introduction to a concrete market model could rearrange the whole model. This methodological loop clearly shows the presence of a contradictory assumption somewhere in the very subject. In our opinion, this contradiction is in the very nature of the transaction costs.

4. Contradictions of the Transaction Costs Concept

The assumption of the transaction costs is based on an internal contradiction with another founding principle of the economic system, which is an object of analysis here. First, let's look in detail at the nature of the concept.

4.1. The Nature of the Transaction Costs

Coase bases his concept on quite clear logics, unfortunately, however, too simplified. There are costs due to the necessity to find the "relevant prices". There are also costs for the very "contract". This means that he assumes an additional element to the normal production costs (the latter include also a component for marketing, image presentation, etc.). This component emerges from the very action of the market, the "exchange mechanism", as Coase calls it. This suggests that these are over-costs, imposed and adopted only because of the exchange process. Coase even analyzes this case in a footnote (Coase, 1937, p. 394), where he mentions that turning the economy into one big firm is conceivable. If we give up on the "consumer choice", we can completely eliminate the market costs.

We put aside that it is a direct opening of the door to arguments on the nature of the central planning, which even then is object of heavy debate. More importantly, Coase himself has no doubts that the transaction costs *are not production costs* but costs caused in the exchange phase, and that they can be *optimized* and realized in a normal (or if you prefer capitalist) economy.

We will leave for a moment this debate and will remind one of the biggest merits of the classical economics.

4.2. The Exchange in the Classical Economics

There are some important lines, where the classical economics breaks up with mercantilism. One of them is the relation between the creation of value and the exchange. According to this assumption, the exchange cannot create value. There are many producers; respectively they create goods with certain level of value according to some socially permissible logics in one way or another (the opportunities for Smith are several!). This logics excludes the possibility for creation of even a minimum value in the exchange process, since it would make the closing of the processes and their distinguishing from one another impossible.

If, despite all, the theoretical model allows creation of value *in* the exchange act, i.e. *non-equivalent exchange*, then some very heavy problems of backward loop appear.

On one hand, there is no reason for the exchange acts to stop because of the possibility of making the goods more expensive due to their continuous circulation. This would lead to liquidation of the consumption, i.e. the product will not be consumed. We are not far from the monetary fetishism – the treasure in the hands of the Moliere's miser Harpagon who only counts his coins without using them.

On the other hand, soon the production costs share will become too small in the total volume of trade costs and the production phase of the economic process will *also* become pointless.

Such assumption is not just an abstract construction but suggests two quite specific cases of real economies for its realization.

The first real possibility for it to work is in a very early and primitive phase of market (capitalistic) economy, where the market sector is literary "sunk" in *non-market* ways of production (feudal or family-common) and whose agents function as ***net donors*** for the market system. Roughly, this is the whole period of the *pre-manufacture* economy, when traders, actively functioning on market principle, buy goods from different "suppliers", who for many reasons cannot reach the market and get their evaluation. The whole British economy in the colonies has functioned on this principle, selling to the villagers via market the cheap textile produced from the cotton bought from the same villagers. This is the infinite power of such model, drawing from the uneven position of the participating agents. It is also its absolute weakness – the moment the genius of Mahatma Gandhi finds a simple way of counteraction by encouraging non-cooperation of his fellow-citizens to not buy British goods but to manufacture them themselves, the model stops functioning, and this eventually leads to independence of India.[12]

Second possibility for existence of economy, which derives (or adds, as is the modern term) value in the exchange process, is if it is realized in *non-equivalent foreign trade*. Actually, it is the base of the economic model of ***mercantilism***. It can and really has certain explanatory function, but only as far as it includes economic agents external to the system. This model, however, is also practically dying out, since the globalization of the world economy makes the non-equivalent trade, in the traditional sense of the term, harder. And yes, of course, at the end the second case of non-equivalent exchange is also reduced to the previous one, because it suggests that one agent in the exchange relation is traditional, or *non-capital* oriented in the mentioned sense.

As a whole, the *classical economic paradigm* solves the mentioned problem by postulating that the economic activity is derived into phases – production, exchange and consumption.[13] In the first phase goods are created (and value, since the classical model is based on the labour theory of the value). In the second phase the goods are exchanged, and in the third phase they are destroyed (consumed). A circle, circular model of the economy is formed. And with two sectors and a market, which binds them. It is the famous two-sector[14] economy model, conveniently placed in every textbook on microeconomics, suggesting that it is an achievement of the neoclassics. Actually, it is defined by the postulates formulated by the *classical political economy*.

If we go back to the opposite assumption that value is created also in the second phase, we see that it turns the model into a non-structured mass of economic acts, deprives it of cyclic recurrence and gives it a random and chaotic character.

[12] The space here does not allow us to go into details, but the non-market "sunkness" suggests promising directions for analysis, raising interesting questions like is market economy functioning in pure form possible without the simultaneous presence of pre-market (non-market) forms such as the different feudal, traditional and other productions, which are more or less non-capital oriented, i.e. they are *more "oeconomicus" than "chrematistics"*, if we use Aristotle's distinction.

[13] The radical political economy adds the distribution as well, but in the liberal economy it is given in the logics of the first two stages, and in my opinion its differentiation is not necessary.

[14] The third sector – the state – comes much later, and not always.

4.3. Neoclassical Model and the Equivalent Exchange

The fact that the new (marginal) doctrine keeps this point, though it broke most of the elements of the replaced classical paradigm, shows the strength and significance of the postulate of the *equivalence* and *neutrality* of the exchange. However, in the neoclassic theory, this assumption is difficult to be found out because of the *implicit* way of defining the fundaments of this theory. That is why Weintraub determines it as "meta-theory". "The neoclassical economy is meta-theory. I.e. a bouquet of unclear rules or assumptions for creating satisfactory economic theories. It is a research program, which generates economic theories. Its fundamental axioms are not open for discussion and thus they determine the shared views of those who call themselves neoclassical or just economists without any adjectives" (Weintraub, 1993).

Still, the careful consideration of the nature of the neoclassical model gives enough reasons to state that it also keeps the requirement for the exchange acts (mostly barter) to not increase the value or utility of the exchanged goods.

Most of all, the mentioned circular model, on which this economics builds its logics, reveals this principle.

To the same conclusion leads the (barter) defining of the exchange in the neoclassical economics – equivalent process, which really starts with different evaluations of the two involved agents for the utility of "own" respectively "others'" exchanged good. The process continues till the two contractors equalize the marginal utility they derive from the exchange act. Then, the exchange is complete, the exchanged relation is objectified in a price, and the two agents are in their optimal state of maximum satisfaction. The neoclassical economics not only requires this but also proclaims it as a sublime goal and most significant achievement of the economy, namely the *optimal (optimised)* satisfaction of the needs of maximum economic agents.

In the exchange of *goods for money* the logical chain is complicated from the assumption that the money has no decreasing marginal utility (Austrian school). Generally, however, the process has no difference, since the Austrians simultaneously assume that the money reflects the marginal utility of previous (other) transactions.

The other big debate concerning the application of money (whether it is neutral or not to the market) also deserves attention. In our opinion, it has no relation to the discussed problem, since it concerns the question whether the relative prices of goods change or not with a change in the money supply, but it does not doubt the logics of each exchange act.

The additional argument, that the neoclassical model in its principles also includes the neutrality of the exchange, is in the analysis of the situation – exchange of labour for utility of goods or money. In this case, the pure microeconomic tracing of the process shows that the marginal utility of the refusal of freedom and control over time, which the workers do, equalize to the marginal utility of the goods received in the exchange (or purchasing power).

Moreover, it is added with the macroeconomic requirement of inviolability of the general contribution of each factor of production to the social product. The neoclassical economics

breaks up with the logics of Ricardo and Marx that in the production process there is a redistribution of income and product between the owners of the different factors (from the labour to the capital) and insists that each factor receives exactly as much as its contributes to the manufactured product, which on the other hand is determined by its marginal productivity.

Thus, the assumption that in the exchange of labour for money the principle of equivalent is violated would renew in another form the problem, of which the neoclassical economics tries to set free. This argument has rather auxiliary significance, but also underlines the neutral character of the exchange, which in fact is the goal of this diversion in the history of the economic theories.

4.4. Transaction Costs and the Principle of Neutrality of the Exchange

If we return to the problem of the transaction costs, we will see some interesting facts. Most of all, there is no doubt that their adoption violates the principle of neutrality of the exchange phase concerning the total product. Roughly, adding the *market-derived costs*, the logics of Coase, Williamson and others actually ***adds value***, or if we keep to the subjective terms – utility to the created product. And on a completely standard principle, like any other cost. Hence, the agent (in this case the firm since it is the target of Coase) can form also profit, etc.

Now, having in mind that (1) the neo-institutional analysis literary swarms with different types of such costs, and (2) they have claims to approximate the model to the reality, and (3) these costs are made to reveal the whole information necessary for the deal, including all possible consequences from one or other outcome on the contract, with the uncertainty, etc., it becomes clear that this assumption is not just contradictory. It undermines the very logics of the market mechanism. The market starts to function as ***one of the sides in the deal***, it becomes an *economic agent*! And:

- It is clear in advance which side;
- Can change the side during the deal;
- Can even influence both sides simultaneously.

No wonder that the "features" of the concept have deserved the opinion that "(t)ransaction costs have well-deserved bad reputation as a theoretical instrument…" (Fischer, 1977).

This concept contradicts also to other initial premises for the market, like immediate action, free and equal access of all agents to information, etc. Each of them deserves own attention and interest. Unfortunately, the space in the current paper does not allow us to go into details.

As mentioned, it has the characteristics to be true only in the case of merger of the whole economy into one firm. It has extremely unsuitable side, besides the ideological implications, to lead to denial of the market in general, like mechanism for organizing the economy, which is the least contradiction to the practice.

*

The analysis here aims to examine whether the assumption of presence of transaction costs can solve the problem of the lack of logical determination for existence of the firm in the frames of the neoclassical paradigm.

Constructed as an optimization game between manufactures and consumers, the neoclassical mechanism practically expands its activity only between the different firms, implicitly reducing them to points, to simple variables in mathematical sense, or to black boxes in the systems theory.

The base of this paradigm error is, of course, the mechanical approach, which is dominant in the marginal revolution (and unfortunately till now!). It "atomizes" the economic subjects, on the example of the Newton physics, for which the objects are just "bodies", which move evenly, rectilinear and infinite (if some other power does not influence them), but for which we do not know (and do not care of) nothing more. Thus, the possibility for analysis of their internal structures not only disappears but there is also contradiction between firms and markets, which drags the necessity of *Transaction Costs Economics*.

The most interesting is that the criticism against the *"atomization"* is not at all new for the neoclassical economics. It practically accompanies its whole history – the problems with the firm are only another consequence of this methodological defect.

When the question of the nature, structure and functioning of the economic agent, its development, etc., arises, it becomes clear that they cannot be considered outside the principles, on which certain scientific paradigm is created. And that these concrete principles do not allow denial of the application of the transaction costs concept.

For our task it means that transaction costs theory cannot explain the question of the existence of the firm. The problem of whether and why the firm is more effective on the market is the next misinterpretation in the neoclassical economic theory.

As mentioned, the answer is somewhere else – in the institutional nature of the firm. When it is not just "addressed" but really studied, it will become clear that it is not alternatively opposed to the market but its product and continuation. This will open the way for searching for the answer to the question why it exists. This gives opportunity for further analysis of the firm.

4.5. The Paradox of the Firm – Second View

If we go back to the problem we started with, we can generalize the following:

1. On one hand, there is a paradox of the existence of the firm, which is insoluble without a change of the frames of the *assumptions of the standard theory*.
2. On the other hand, such change would hardly be possible in the frames of the neoclassical theory. The assumption, which is actually an explicit requirement, of a general optimization of every real economic situation, is sacralised, as mentioned in

section 2.2., and its revision is impossible without threatening the very fundament of the model.

3. The attempt of Coase and the neo-institutionalists contains, to say the least, assumptions, which contradict to the entire logics of the model and really lead to other insoluble situations.
4. In the frames of this paradox, the firm remains somewhat undetermined, with unclear and blurred boundaries – its existence does not match in any way, including as optimizing mechanism, since it cannot be such in the presence of a functioning market, nor can it be ignored.
5. The wide application of the term in microeconomics actually envisions the individual firm, as strange as it may seem, since only this way the problem of the "non-optimal internal structure" can be ignored.
6. Thus, besides the original theoretical problems, the researcher faces some purely practical ones as well. Such are the *corporate governance* problems:
   - How is the *corporate governance* situated concerning the firm?
   - Which its features come from and depend on the nature and type of the firm?
   - How can we improve them, so we can reach the best standards of *corporate governance*?

5. An Attempt for a More Systematic Approach to the Firm

The sharpness and depth of the mentioned questions, problems and contradictions require directly asking the question what are the reasons for existence of the firm. The answer to this question imposes the search for a different approach, more complex, based on the system theory.

As a first step of such approach, it is mandatory to make an attempt to see whether the firm and the market are really antipodes (the second assumption discussed in section 2.1.).

5.1. The Firm as an Antipode to the Market?

The counter-position firm-market is the main deviation, which leads us to paradoxes and traps in the analysis of the economic system. If in the marginal period it remains non-focused so the actual object of analysis is a firm reduced only to the activity of its owners, a subject (according to the result in the previous section), Coase and Williamson overcome this. The analysis is generalized for the firm in general, but it is thrown in another direction – the firm is placed in a counter-position to the market.

Moreover, the internally contradictory question what is more effective, better optimized – the market or the firm – raises. Thus, first the nature of the firm is replaced and respectively the way to its analysis is closed.

Even more paradoxically, the market is also given a meaning and significance, which contradicts to its actual function. What is it about?

The next sections discuss somewhat forgotten but proven universal methodological approach to analysis.

5.2. The Market as a Connection, Relation between the Firms

The firm is neither less effective nor more effective than the market. They are incomparable in this way. It is obvious and even axiomatic – let us just remember some key moments of the *General Systems Theory (GST)*.

Ludwig von Bertalanffy defines the system as "elements in standing relationship" (Banathy, 1997). This means, in short, that every system has at least two groups of functioning components – elements and connections between them.

There are also multitude characteristics of each element, among which one stands out and is called systematic. It makes the element belonging exactly to a *certain* system and not to *any* other system, and respectively the system is exactly defined. The qualities processed by a certain elements can be infinite in number, respectively one element can participate in infinite number of systems, which can be arranged and interacting, forming sub-systems, etc.

GST has many applications in the form of dozens of different areas of systematic analysis (some of which with a dozen of sub-areas), starting from archaeology, biology, etc. and reaching the system theory in management, etc. Unfortunately, however, especially in the area of the economic theory, it is completely missing.

That is why it is not strange that the simple question – which are the elements and connections between them, making them participants in the *economic* (exactly economic and only economic) system, is also missing. Respectively, for an answer is used implicit, axiomatic and non-differentiated knowledge, which places the *individual firm* instead of the element (the economic atom), as mentioned. The relations (connections) between them are not discussed at all, or only the most general are mentioned – competition, cooperation, etc. Actually, the real relation between all elements of the economic system is the **market**.[15]

The market is not a *mechanism for efficiency*. It does not make the firms more efficient. They participate with the efficiency they have ensured through innovations (Schumpeter), corporate governance (Coase), etc. Really, some of them drop off the market but others remain, even if they are not among the most effective ones. Moreover, the whole neoclassical (and classical) analysis supposes many firms with different efficiency, in any given moment. If by some reason this number decreases to a certain level (oligopoly) or is concentrated in only one form (monopoly), this is stigmatized (and completely justifiably) as destroying the market.

[15] Here immediately rises the question what happens in those economic systems, which are not based on the market. The short answer is that they are not economic, but distribution systems. The socialism is the perfect example of this – with both its successes and failures (see more in Tchipev, 2000).

The market is ***exchange of values***. It does not generate value, and does not determine it, as the perception for the mechanics of interaction of demand and supply suggests. And it is intelligible. If it was not the case, through a not very sophisticated manipulation of the demand we would reach an incredible concentration of value in very few hands.[16] As mentioned in details in section 3.4.3, in both classical and neoclassical model the main quality of the market is to exchange equivalent values.

The modern analysis of the exchange often leads the neoclassical economics also to another "omission", namely that the exchange is barter in the original marginal model. Exactly in this form the action of the market, described by Menger, is most eloquent – the two contractors increase or decrease the supplied by them quantity of goods until they reach the feeling that they have acquired maximum utility from the deal for themselves, i.e. until they have evened the marginal utility of both goods, as the early fathers of the subjective political economy would put it (Menger, 1950).

Of course, in the extended form of exchange – *goods for money*, the mechanism is principally identical, but then the active process of comparison is more simplified, since the evaluation is made directly in money, which marginal utility is considered unchanged concerning the consumption.

The result of this analysis of the market action is negative for the Austrian subjectivists, who do not manage to achieve the initial goal – to create alternative theory of the value. Very soon it is understood by the Lausanne school, and the marginal utility is replaced with the indifference curves. They seem quite more distant from the final subjective evaluations of the Austrians.[17] The marginal utility is pushed to the corner of the contemporary theory, and the question of the value is practically reduced to a scientific problem – there is a point of intersection between two independent functions, which presents a price, and by default it is always fair, as long as there is no external interference. We will leave this thread of analysis for now and will return again to GST so we can see what the role of the second component of GST is.

5.3. The Firm as an Element of the Economics System

The second side of the system approach of Bertalanffy is the element. The initial notion here is also implicit and to some extent misleading. On one side (the demand) is the individual[18] as an economic agent, and on the other side it is logical to have the same type of contractor. The analysis in both places uses the concept of costs, and compares one production volume with another, more optimal one, and even extremely slowly replaces labour with capital. Still, there are no different real combinations, different sets or

[16] This of course is the tendency today, but there are many infringing mechanisms outside our interest here.

[17] In reality, they are also based on the evaluation of utility, but indirectly.

[18] In reality, often there are talks about "households" but nowhere microeconomics analyzes the collective, whether family or other, consumption. The idea that exactly the individual preferences of one consumer to books and of another to beer are "equalized" is missing. This is what makes the use of the indifference curves, which compare whole ready "sets" with equal utility, so attractive.

structures, which would play the role of economic agent. Thus, in reality this agent is reduced to optimizing individual or hardly to some "household", which members are merged into one producing entity.

In reality, the whole economic activity of the "modern" society is realized in and through more or less complex firms. So, there is no doubt that the firm plays the role of the element of the economic system (in other words the economic agent). Assuming this we reach the main question – how does the firm function in this quality?

5.4. The Firm and the Problem of the Value

Now we have to continue the interrupted analysis of the value. There are some problems, which always concern this concept. Since the market is a mechanism for exchange of "values", "utilities" or whatever we call it, the issue of their formation needs to be addressed.

Historically there are many explanations of how the basic ratios between the exchange relations are determined for the different goods. A short view on the concepts of theories[19], which are not just or only "market", like labour and work time in Marxism or even purely consumption value (without the interference of demand and supply), is found in Tchipev (2007).

More detailed view would reveal interesting things, but this problem also remains outside the direct goal of the current study. However, we have to say that at the end in the neoclassic, as well, the question of the business structure of the prices is placed outside the issue of the utilities, outside the economic problems. In the early Austrian stage of the subjective theory, the evaluation of the marginal utility is openly "non-market", since it is generated *from outside* – from the "preferences" of the consumers, which are psychological quantities! Only after the actual "marginalization" of the marginal utility, this tautological functionality, greatly conveyed by Marshall, is reached – that it is unclear which blade of the pair of scissors makes the price, the upper or the under!

Whether we will use the category of the classicists – *value*, or from the neoclassical language – *utility*, the question of what determines the differences (exchange relations) for the different goods remains. Still, what defines this (sometimes unimaginable!) difference in the utility? How is the latter determined for new goods? Why are we not allowed to

[19] Starting with Aristotle, the search for the "Holy Grail" of the economic theory continues already for 2500 years. The Middle Ages and the early years of the mercantilism determine the value by the consumption qualities and even the "utility" of the goods (like Davanzati and his Lecture on Money, 1588). Nicholas Barbon writes that "the value of all wares arises from their use". In 18th century Ferdinando Galiani not only studies the utility, but implicitly describes even the term of the diminishing marginal utility, without formulating it. The classicists (from Petty to Marx) defend the thesis that all exchange relations of goods can be explained with the "natural" price, dominated by labour. In parallel, the "utilitarian" scientific logics continues its existence already till the famous John Law (who bankrupted France in 1720). He interweaves the two explanations of the value – the one of the utility and the one of the demand, but the real revolution is the work of Menger and Jevons, of course (see more in Tchipev, 2000).

evaluate (and consume) the goods produced at price lower than the level of their *average variable costs*?

Obviously, since the market exchanges equivalent values between the firms, the latter have significance for the "construction"[20] of the values. What is that significance?

The firm creates *delimitation* of the process, sets limits.[21] It cuts the value/utility, which is formed in the scale of the whole economy, regionally, nationally and (nowadays) even globally. It determines the limits of optimization, the profit centre, the object of cost-benefit comparisons, etc. It is also determining the sizes of the firm. It grows until it is optimal. Moreover, with its actions and increase or decrease, it determines also the structures of the market – how from competitive it becomes oligopoly and vice versa; with applying anti-trust measures it returns to competitive status.

Of course, this interpretation changes our perception of the value as well. Like the one on the market, it is also implicit, intuitive as for something "solid", essential, which "is being created" and might be poured, accumulated, etc. somewhere "inside" the product. The Marxism even defines a separate term for labour – *abstract* one – which creates value invariantly, independently from its specific good-bearer, as an *abstract embodiment* of the worker's effort, creating only the conditions of own exploitation.

In reality, the value or utility is a *principle/mechanism* of distribution, ***and not a substance, which is in the goods***. And of course, it is ***distribution*** of goods, prosperity (wealth), economic status in the broader sense of the term.

If in the basis of this distribution are the costs, (and they are always present[22]), this sets the basic structure of the exchange relations. From that moment on, the mechanisms are different in the different epochs. Aristotle suggests only production time. Smith suggests labour, as well as costs, as well as demand, etc. All deviating upward or downward factors can participate (and actually ***do*** participate) – from the differential fertility or location (Ricardo) through the "spphisticated" labour (Marx) to the subjective "satisfaction" (Menger) or the entrepreneur's contribution (Schumpeter). They change more or less this structure (somewhere even unrecognizably). Basically, it appears to me that everything about the value is debated in debt.

The new approach here is perception of the firm as a generator of value in (certain?) limits, creating a grid of "values" that pulse, increase, shrink and exchange equivalents in accordance with the market principles. This idea, in another context and not so explicitly, has been presented in Tchipev (2007). It represents an evolutionary economic logics. It does not assume necessarily a balanced, optimal, etc. state – the different firms can progress

[20] "Construction" is free enough term, unlike "creation" for example, which immediately imposes the idea of "production" of the value.

[21] Evolutionary, as the cell sets the beginning of the living organism by delimitating itself from the environment forming a cell wall, the firm also delimitates itself from the environment and the other firms through its limits of optimization, creating the structure of the economy.

[22] Even in the neoclassical model, where the supply curve cuts the production volumes under the levels of the average variable costs, thus excluding those supply volumes that do not cover the variable costs (labour, resources, materials, etc.).

or regress, without any relation to the economy as a whole (as it is in reality). Of course, when the status is strongly monopolized the firms can (and actually begin to) compete franticly, which can threaten nature, resources or climate, not counting the dehumanization.

Each of these and many other threads of the analysis can be studied separately, but our focus is on the corporate governance. That is why the last section will focus on that.

Conclusions

Applying the systematic approach to the firm, we can draw some conclusions on *corporate governance*. The first conclusions come from and require the application of the frames of the institutional, particularly evolutionary, paradigm. According to the conducted analysis, the firm is a complex developing institution, which takes different forms in time, acquires and complicates certain structure of supervisory and control governance and since the developing of the modern economy of market relations, confirms as its most mature form - *the corporation*. In the concrete case, functioning of the corporate governance of the latter complies with the specifics and essential characteristics of the firm within the economic system, taken in its highest degree of generalization.

These characteristics construct the firm (corporation) as a basic unit of distribution of determine its contribution (and that means of its *share*) in the whole multitude of goods, through the *mechanisms of value/utility*. The same can be interpreted also as "creation" of the latter.

And here, we reach a key moment, quite controversial perhaps. If the corporation is "the cell" of value/utility, that is logical to set also its main goal – maximization or optimization of this value. This means keeping the "the right" for claiming the "residual value" (Fama and Jensen, 1983) for itself – the corporation, which personalization is only and exclusively within the circle of its shareholders. This excludes the possibility of any other "stakeholders" to be subjects of profit, and respectively of *corporate governance*. This resolution of the problem with the scope and structure of *corporate governance* is entirely objective, since it refers to the characteristics of the very corporation as an economic agent.

Finally, the existence of the corporation is completely possible not just with the market, but within the framework of the market, under certain conditions. These conditions include acknowledgment of the institutional nature and characteristics of the firm, i.e. refusal to reduce it only to production function. Thus, a way for the real analysis of its nature, characteristics, development etc. is open. Further, many more consequences and serious changes in the assumptions of the theory can be outlined which are not a subject of analysis here and which integration in the frames of the dominant neoclassical economic theory seems impossible.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

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Maryna Tatar[1]
Olena Sergienko[2]
Sergii Kavun[3]
Lidiya Guryanova[4]

COMPLEX OF MANAGEMENT MODELS OF THE ENTERPRISE COMPETITIVENESS FOR STEEL INDUSTRY IN THE CURRENCY INSTABLE ENVIRONMENT

The complex of models of metallurgical enterprises competitiveness management in unstable currency environment is built based on the metallurgical enterprises competitiveness level evaluation and industry trends of their development. The degree of the exchange rates impact on the metallurgical enterprises competitiveness by the methods of reduction, integrated assessment models, and econometric panel data is estimated. The exchange rates dynamics is investigated based on fractal models and forecasts are made by using a wide range of forecasting models. The system of exchange rate factors is improved and their impact on the metallurgical enterprises competitiveness is assessed on the bases of an integrated evaluation, econometric dynamic models and fuzzy sets.
JEL: C13; C15; C51; C63; L61

1. Introduction

The intensification of the international competition in the market of steel products, the unstable political situation in Ukraine, the sharp devaluation of the national currency, the European integration processes, the tense trade and economic relations with Russia which is one of the main suppliers of metallurgical enterprises production generate a wide range of both competitive opportunities and threats to metallurgical enterprises competitiveness.

Special attention should be given to increasing the enterprises' competitiveness of the branches that form Ukrainian industrial sector, in particular metallurgical industry. So far

[1] *Maryna Tatar is from Finance Department, National Aerospace University "Kharkiv Aviation Institute", Ukraine, e-mail: marina.tatar@yandex.ua.*
[2] *Olena Sergienko is from Higher Mathematics Department, Kharkiv Educational and Scientific Institute of the University of Banking, Ukraine, e-mail: ser_helen@mail.ru.*
[3] *Sergii Kavun is from Department of Information Technologies, Kharkiv Educational and Scientific Institute of the University of Banking, Ukraine, e-mail: kavserg@gmail.com.*
[4] *Lidiya Guryanova is from Department of Economic Cybernetics, Kharkiv National University of Economics, Ukraine, e-mail: g_lika@list.ru.*

since metallurgical industry is export-oriented and provides more than 30% of foreign exchange earnings to country, and therefore may suffer significant losses due to unfavorable exchange rate dynamics, the research of precisely those environmental factors that affect the formation of foreign exchange rate is of primary importance.

The basis of metallurgical enterprises competitiveness in volatile currency environment is determination of the mechanisms of the exchange rates effect on the enterprises competitiveness and evaluation of such effects. Currency environment is a set of environmental factors, which affect the exchange rates state and their change over time. Enterprises cannot influence the exchange rates changes, but can react to such changes. Thus, the determination of currency environment impact degree on the enterprises competitiveness made possible to conclude that exchange rates changes affect the metallurgical enterprises competitiveness both negative and positive.

Therefore, the hryvnia devaluation allows metallurgical enterprises to receive additional income when they exchange the foreign currency, which has risen, into the national one, which has cheapened. At the same time hryvnia devaluation in the short term leads to higher prices for imported resources, rise in prices of foreign advanced technology, the growth of receivables and in the long term leads to the fall in production and sales.

2. Literature review

The problem of the enterprises competitiveness is investigated by such scientists as G. Azoev (1996) [0], P. Belenky (2007) [3], A. Voronkova (2009) [27], Y. Ivanov (2003) [0], O. Parshina (2008) [17], M. Porter (2008) [18], O. Tishchenko (2003) [0], A. Trydid (2002) [26], A. Wint (2003) [28], R. Fathutdinov (2000) [10] and others. The problems of foreign exchange rates influence on the competitiveness are reflected in the papers of J. Belinska (2009) [4], O. Bereslavska (2009) [5], V. Danich (2004) [8], A. Zadoya (2009) [29], F. Zhuravka (2006) [30] and others. However, foreign approaches to enterprise competitiveness assessment require adaptation to the characteristics of domestic economic entities. The actual problem is the reliable assessment of the metallurgical enterprises competitiveness, which is based on objective data of their financial and economic activity and in view of exchange rates influence are studied in papers by Ambastha A., Momaya K. (2004) and Belenky P. (2007). Not enough attention is paid to analysis of the exchange rates dynamics; there is a shortage of methods of quantification of its impact on the metallurgical enterprises competitiveness. The approach to assessing the exchange rates influence on the metallurgical enterprises competitiveness is improved. The main feature of this approach is the use of panel data models that makes possible to quantify the degree of the exchange rates influence on the metallurgical enterprises competitiveness, to analyze industry trends of enterprises competitiveness and to form alternatives of metallurgical enterprises competitiveness in terms of exchange rates changes are considered in work by Goncharova T.S. (2008).

3. Common fundamentals

The complex of models of management decisions formation for ensuring the enterprises competitiveness in volatile currency environment is proposed with the aim of determining the currency environment impact on the metallurgical enterprises competitiveness and management of competitiveness in volatile currency environment (Brumnik, R., Klebanova, T., Guryanova, L., Sergienko, O., Kavun, S., Nepomnyaschiy, V., 2014; Depperu D., Cerrato D., 2005; Kavun, S., Čaleta, D., Vršec, M., Brumnik, R., 2013). Managing competitiveness in the work presented in the form of the convoy:

$$Upr = \{R,\ P,\ S,\ K\}, \tag{1}$$

where R is a set of available resources for enterprise competitiveness spheres; (development potential); P is a set of influence factors of environment; S is a set of available strategies of enterprise development; K is a set of criteria for achieving development goals.

Under this model, the formation of competitiveness management strategies is made, namely:

1) development strategy, which provides timely develop orientations of the company depending on the state and trends of its development, the effectiveness of which is determined by combined expected results;

2) recognition of situations strategy, which involves the development of information and mathematical tools of evaluation, analysis and forecasting of external and internal environment, efficiency of which is determined by the degree of reliable quality information in terms of threats;

3) situations management strategy, which involves the formation of complex solutions which are adequate to the situation and aimed at supporting sustainable enterprise development, localization of negative trends, crisis response, the effectiveness of which is determined by the degree of its utility. The purpose of this model is the choice of alternatives that meet the conditions of effectiveness.

This complex of models is shown in Fig. 1. Let us consider in more detail the implementation of each modules and models, which are presented in Fig. 1.

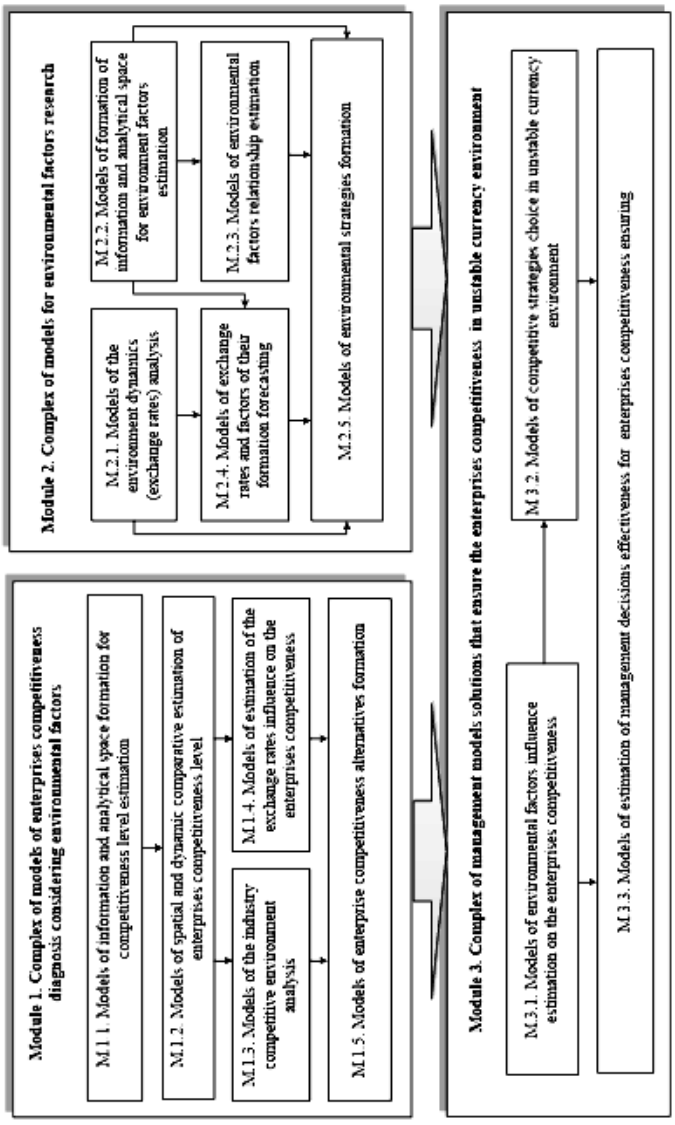
Consequently, the general optimal task of the competitiveness management is:

$$\begin{aligned}
&\int_0^T M_X[F(R_s, P_i)]dt + M_X[(\bar{I}_{iT} - I_{iT})] \to \min \\
&R_S \le f(\{I_{k_it}\}); \\
&P_i \le f(\{F_{it}, E_{it}\}); \\
&S \in MS;
\end{aligned} \tag{2}$$

where $M_X[F(R_s, P_i)]$ is the total integral resources for implementation of appropriate strategy in terms of external and internal environment factors; $M_X[(\bar{I}_{iT} - I_{iT})]$ is deviations of general integral index of competitiveness from the optimal criterion values.

Figure 1

Complex of models of management decisions formation for ensuring the enterprises competitiveness in volatile currency environment



Source: developed by the authors on the basis of the material Sergienko O., & Tatar M. (2011).

Module 1. Complex of models of enterprises competitiveness diagnosis considering environmental factors, which includes the construction of five interrelated models. Models of information and analytical space formation for competitiveness level estimation (M.1.1) on the bases of implementation of expert methods, correlation and regression analysis, statistical and robust estimation [19], which make possible to carryout the data research in the main areas of Ukraine metallurgical enterprises competitiveness, analyze the representativeness of the selection and create a justified indicators system according to paper Martynenko, M. (2015).

This module (M.1.1) includes searching, collecting and processing of data information space according to the main areas of the enterprise and exchange rate formation factors, analysis of the sample's representativeness and the formation of indicators system on the basis of paper Luchko O.D. (2007). The purpose of this block is the formation of a representative statistical database of research.

Indicators that evaluate the analyzed local areas best of all are selected by the logical method based on the analysis of indicators used in existing methods and techniques. While forming the information space of parameters they were tested so that not to be interrelated and interdependent.

Also, it was necessary to meet the general requirements put forward to information space, namely: unique features of indicators, lack of redundancy; completeness i.e. the possibility of adequate description of various processes, facts, events of the subject that is studied by using these indicators; reliability i.e. the correspondence of the selected items of semantic information to their real value; consistency i.e. lack of homonymy have been considered by Buckley P.J. (1988). In addition, the possibility of calculating the indicators by using the available information concerning the financial activities of metallurgical enterprises was taken into account developed by the official website of the National Bank of Ukraine and State Statistics Committee of Ukraine.

Models of spatial and dynamic comparative estimation of enterprises competitiveness level (M.1.2) include the calculation of the local components of enterprise competitiveness and complex total competitiveness index of metallurgical enterprises competitiveness based on integrated rating evaluation methods that are discussed in details in the articles Sergienko O. & Tatar M. (2012) Spatial and dynamic assessment and analysis of enterprises competitiveness indicators and Complex analysis of branch trends of metallurgical enterprises' competitiveness.

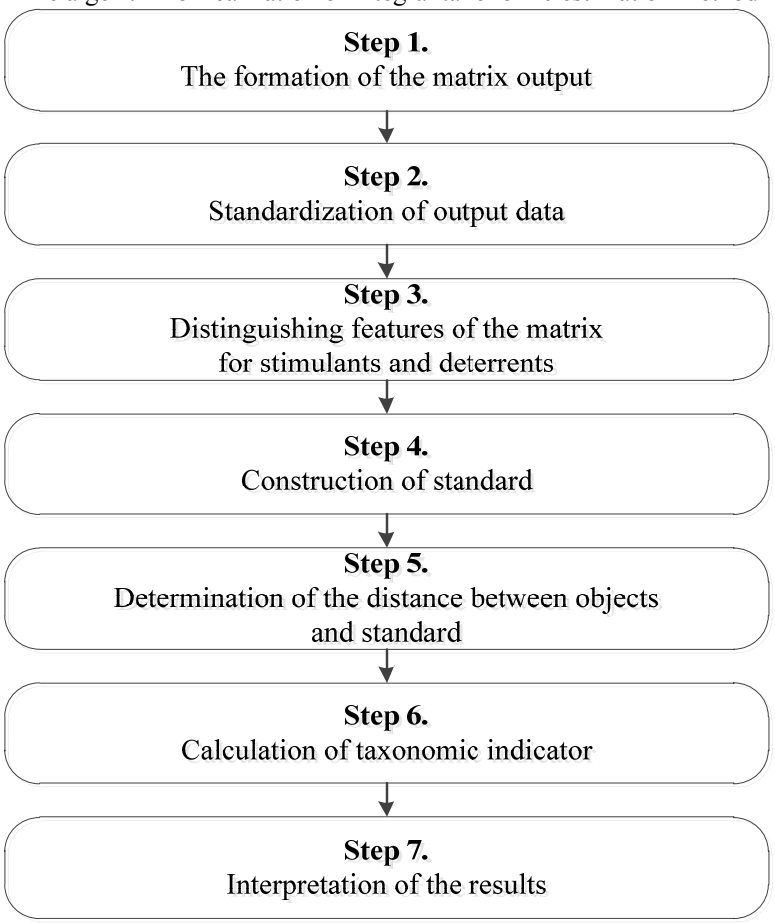
The algorithm of the integrated rating evaluation method is presented in Fig. 2. The first step is the matrix formation of output data. As the indicators of competitiveness are non-uniform, the second step involves the standardizing of their values by the formula:

$$z_{ij} = \frac{x_{ij} - \bar{x}_j}{S_j}, \tag{3}$$

where j = 1, 2, ..., m; $\overline{X}_j$ – average value of the j-th index; S_j – standard deviation of the j-th index; Z_{ij} – standardized value of the j-th index for the i-th company.

Figure 2

The algorithm of realization of integral taxonomic estimation method



Source: developed by the authors.

The third step carried out the differentiation characteristics of the observations matrix on stimulants and deterrents. The basis for characteristics division into two groups is the impact of each indicator on the level of enterprises' competitiveness. Characteristics that have positive, stimulating effect on competitiveness level, are stimulant, others are deterrents. Thus, such parameters as depreciation of fixed assets, the rate of defects, number of claims, the rate of staff turnover, loss of working hours per employee, etc. were

classified and determined as deterrents. Next steps (4 and 5) provide for the construction of standard's point and determination of Euclidean distance between objects and the standard.

Step 6 involves direct calculation of the integral taxonomic indicator of the competitiveness level by the formula:

$$I_i = 1 - \frac{C_{i0}}{C_0}, \tag{4}$$

where $C_0 = \overline{C_0} + 3 \times S_0$; $\overline{C_0} = \frac{1}{w}\sum_{i=1}^{w} C_{i0}$; $S_0 = \sqrt{\frac{1}{w}\sum_{i=1}^{w}\left(C_{i0} - \overline{C_0}\right)^2}$.

The system of enterprises competitiveness indicators is presented in Table 1.

Table 1

The system of enterprises competitiveness indicators

Symbol	**Indicator**	**Symbol**	**Indicator**
I_1 (products competitiveness)		I_5 (labor effectiveness)	
X_{1_1}	growth rate of prices;	X_{5_1}	turnover rate of outflow;
X_{1_2}	spoilage coefficient;	X_{5_2}	update ratio of staff;
X_{1_3}	amount of the claim;	X_{5_3}	staff turnover rate;
X_{1_4}	percentage of losses to the shaft;	X_{5_4}	proportion of university graduates;
X_{1_5}	number of quality certificates	X_{5_5}	indicator of worker's skills;
I_2 (production activity effectiveness)		X_{5_6}	loss of working hours per employee (absenteeism, simple, absence of permission);
X_{2_1}	capital productivity;	X_{5_7}	investment in employees
X_{2_2}	the profitability of production;	I_6 (investment and innovation activity effectiveness)	
X_{2_3}	labor productivity;	X_{6_1}	effectiveness ratio of investment capital;
X_{2_4}	depreciation of fixed assets;	X_{6_2}	share of long-term financial investment in assets;
X_{2_5}	rate of assets	X_{6_3}	capital investments;
I_3 (financial state)		X_{6_4}	number of scientific research;
X_{3_1}	coefficient of autonomy;	X_{6_5}	income (economical effect) on the use of innovations, inventions, useful models
X_{3_2}	absolute liquidity ratio;	I_7 (position in the stock market)	
X_{3_3}	asset turnover ratio;	X_{7_1}	average market price of common shares;
X_{3_4}	inventory turnover ratio;	X_{7_2}	net income (loss) per ordinary share;
X_{3_5}	turnover ratio of receivables;	X_{7_3}	dividends per ordinary share
X_{3_6}	accounts payable turnover ratio;		
X_{3_7}	rate of financial return		
I_4 (sales effectiveness)			
X_{4_1}	return on sales;		
X_{4_2}	growth rate of the market;		
X_{4_3}	payback ratio of distribution system;		
X_{4_4}	effectiveness ratio of advertising and sales incentives;		
X_{4_5}	number of conducted advertising and fashion companies		

Source: developed by the authors.

The following local components of competitiveness for each of the 12 enterprises in dynamics for 6 years (2008 – 2013) are calculated. Many metallurgical enterprises of Ukraine from 2008 to 2013 worked most consistently over the past few decades, which ensure the continuity of the initial data. But since 2014 with the beginning of disintegration processes and military conflict in the East of Ukraine, where the majority of metallurgical enterprises are located, the situation has changed significantly. There are problems with the availability of real data of metallurgical enterprises which are located in the East of Ukraine which leads to the fact that competitiveness assessment of some enterprises has become difficult. The integrated model of indexes for enterprise competitiveness level estimation is:

$$I_{it} = \begin{cases} I_{1\_it} = (X_{1\_1}, X_{1\_2}, X_{1\_3}, X_{1\_4}, X_{1\_5}) - products\_competitiveness; \\ I_{2\_it} = (X_{2\_1}, X_{2\_2}, X_{2\_3}, X_{2\_4}, X_{2\_5}) - production\_activity\_effectiveness; \\ I_{3\_it} = (X_{3\_1}, X_{3\_2}, X_{3\_3}, X_{3\_4}, X_{3\_5}, X_{3\_6}, X_{3\_7}) - financial\_state; \\ I_{4\_it} = (X_{4\_1}, X_{4\_2}, X_{4\_3}, X_{4\_4}, X_{4\_5}) - sales\_effectiveness; \\ I_{5\_it} = (X_{5\_1}, X_{5\_2}, X_{5\_3}, X_{5\_4}, X_{5\_5}, X_{5\_6}, X_{5\_7}) - labour\_effectiveness; \\ I_{6\_it} = (X_{6\_1}, X_{6\_2}, X_{6\_3}, X_{6\_4}, X_{6\_5}) - investment\_and\_innovation\_activity\_effectiveness; \\ I_{7\_it} = (X_{7\_1}, X_{7\_2}, X_{7\_3}) - position\_in\_the\_stock\_market \end{cases} \quad (5)$$

where X_{i_j} is the first level indicators of evaluation system of enterprise competitiveness local components; $I_{1\_it} - I_{7\_it}$ is local components of competitiveness for *i*-th enterprise ($i = 1 \div 12$) at the appropriate period of time *t* ($t = 1 \div 6$); I_{it} is the complex general indicator of the competitiveness for *i*-th enterprise ($i = 1 \div 12$) at the appropriate period of time *t* ($t = 1 \div 6$).

The calculation results of complex general indicator of Ukraine metallurgical enterprises competitiveness are presented in Table 2 and are based on the results of work Sergienko O. & Tatar M. Tools of research of evaluation and analysis of the enterprises competitive position (2011), Spatial and dynamic assessment and analysis of enterprises competitiveness indicators (2012). In order to avoid impact on the image of the analyzed enterprises they were impersonal.

The obtained values of local indicators and complex general indicator of the enterprises competitiveness for integrated assessment methodologies vary from 0 to 1, and the closer is the competitiveness values to 1, the higher is the level of enterprise competitiveness.

The analysis of complex general indicator of the enterprise competitiveness by using hierarchical and agglomerative methods of cluster analysis made possible to identify clusters of enterprises with high, average and low levels of competitiveness and to determine the enterprises, which are representants of each cluster and give the most meaningful information about cluster on the basis of the center of gravity. The distribution of metallurgical enterprises by clusters and representants of each cluster are presented in Table 3 and are based on the results of articles Sergienko O. & Tatar M. Tools of research

of evaluation and analysis of the enterprises competitive position (2011), Spatial and dynamic assessment and analysis of enterprises competitiveness indicators (2012).

Table 2

Complex general indicator of the Ukraine metallurgical enterprises competitiveness

Enterprise	Year					
	2008	2009	2010	2011	2012	2013
Ent_1	0,5707	0,6707	0,7753	0,4591	0,5583	0,5748
Ent_2	0,6569	0,6770	0,7932	0,6056	0,7793	0,7066
Ent_3	0,6237	0,5699	0,6938	0,5433	0,6053	0,6416
Ent_4	0,5580	0,6172	0,6550	0,4005	0,4671	0,4840
Ent_5	0,4463	0,5119	0,6076	0,4471	0,4776	0,3691
Ent_6	0,4370	0,5443	0,6241	0,3292	0,4503	0,5088
Ent_7	0,3006	0,2777	0,4190	0,1956	0,3564	0,3027
Ent_8	0,5903	0,5346	0,5435	0,3847	0,5294	0,5214
Ent_9	0,4836	0,4790	0,5289	0,3987	0,4533	0,4873
Ent_10	0,0701	0,0574	0,0420	0,1219	0,0776	0,1029
Ent_11	0,7044	0,6358	0,7649	0,5674	0,6006	0,6753
Ent_12	0,5597	0,5657	0,5854	0,4450	0,4294	0,4476

Source: developed by the authors.

Table 3

Distribution of metallurgical enterprises by clusters

Enter-prise	Year						M (H)	M (A)	M (L)	Cluster
	2008	2009	2010	2011	2012	2013				
Ent_1	H	H	H	A	A	H	0,66	0,33	0	H
Ent_2	H	H	H	H	H	H	1	0	0	H
Ent_3	**H**	**H**	**H**	**A**	**A**	**H**	**0,66**	**0,33**	**0**	**H (representant)**
Ent_4	**A**	**A**	**A**	**L**	**L**	**A**	**0**	**0,66**	**0,33**	**A (representant)**
Ent_5	A	A	A	L	A	A	0	0,83	0,16	A
Ent_6	A	A	A	L	L	A	0	0,66	0,33	A
Ent_7	L	L	L	L	L	L	0	0	1	L
Ent_8	A	A	A	L	A	A	0	0,83	0,16	A
Ent_9	A	A	A	L	A	A	0	0,83	0,16	A
Ent_10	**L**	**L**	**L**	**L**	**L**	**L**	**0**	**0**	**1**	**L (representant)**
Ent_11	H	H	H	A	A	H	0,66	0,33	0	H
Ent_12	A	A	A	L	L	A	0	0,66	0,33	A

Note: H - enterprises with a high level of competitiveness; A - enterprises with an average level of competitiveness; L - enterprises with low competitiveness; M (H, A, L) - probability of falling into the cluster.

Source: developed by the authors.

The distribution of metallurgical enterprises by clusters makes possible to form the general strategies of the industry development and enterprises competitiveness increase of each cluster and identify the reasons why companies move from one cluster to another. In addition, the distribution of metallurgical enterprises by clusters makes possible to

implement the series of management solutions for the respective characteristics of cluster adapted to a particular enterprise.

Models of the industry competitive environment analysis (M.1.3). Within the analysis of the competitive environment of the metallurgical industry was determined the degree of influence of local components of competitiveness on the complex general indicator of the enterprises competitiveness on the basis of panel data models building which allow us to combine both spatial data type and time series data. Taking into account that complex general indicator of the enterprises competitiveness cannot be negative, and that the values of competitiveness vary in the range [0; 1] and at maximum values of local components of competitiveness I_{k_it} cannot go beyond the specified range, the simple model of panel data without free member is constructed and rationing of this model is made. This model is:

$$I'_{it} = a_1 \times I'_{1\_it} + a_2 \times I'_{2\_it} + a_3 \times I'_{3\_it} + a_4 \times I'_{4\_it} + a_5 \times I'_{5\_it} + a_6 \times I'_{6\_it} + a_7 \times I'_{7\_it}, \quad (6)$$

where $I'_{it} = \frac{I_{it} - \overline{I_{it}}}{\sigma_{I_{it}}}$, $I'_{kit} = \frac{I_{kit} - \overline{I_{kit}}}{\sigma_{I_{kit}}}$, I'_{k_it} is standardized meaning of local components of competitiveness for k-th component of competitiveness ($k = 1 \div 7$) for i-th enterprise ($i = 1 \div 12$) in the appropriate time period t ($t = 1 \div 6$); a_k – ($k = 1 \div 7$) factor (model parameters) for the corresponding local component of enterprise competitiveness; $\overline{I_{k\_it}}$ та $\overline{I_{it}}$, are average values for the relevant local component of competitiveness and complex general indicator; $\sigma_{I_{it}}$ та $\sigma_{I_{k\_it}}$ is corresponding standard deviation.

Therefore, as a result of the following calculation we have received such model as:

$$I'_{it} = 0{,}15 \times I'_{1it} + 0{,}25 \times I'_{2it} + 0{,}26 \times I'_{3it} + 0{,}14 \times I'_{4it} + 0{,}27 \times I'_{5it} + 0{,}19 \times I'_{6it} + 0{,}30 \times I'_{7it}. \quad (7)$$

To analyze the sectoral features of the enterprises' competitiveness we propose to analyze the elasticity of indicators competitiveness for each company and the industry overall. This analysis will determine the degree of change in a complex integral index of enterprises' competitiveness in case of the appropriate local integral index change. It is known that elasticity is the value used to determine the response of one variable on another, i.e. this is percentage by which one variable changes in response to a one percent change in another variable. Elasticity of local indicators of competitiveness for the industry overall is presented in Table 4.

Table 4

Elasticity of competitiveness indicators for industry

Local indicators	Year						Mean
	2008	2009	2010	2011	2012	2013	
I_1 (products competitiveness)	0,12	0,10	0,08	0,15	0,09	0,10	0,11
I_2 (production activity effectiveness)	0,19	0,16	0,12	0,14	0,11	0,10	0,14
I_3 (financial state)	0,24	0,21	0,18	0,20	0,24	0,25	0,22
I_4 (sales effectiveness)	0,11	0,09	0,07	0,08	0,13	0,07	0,09
I_5 (labor effectiveness)	0,19	0,22	0,19	0,23	0,24	0,29	0,23
I_6 (investment and innovation activity effectiveness)	0,17	0,19	0,16	0,24	0,16	0,16	0,18
I_7 (position in the stock market)	0,38	0,39	0,34	0,42	0,39	0,40	0,38

Source: developed by the authors.

An average increase of production activity effectiveness for the analyzed years by 1% leads to an increase in complex general indicator of competitiveness by 0,14%. The rate increase of financial state by 1% will lead to the increase of complex general indicator by 0,22%, the improvement of labor effectiveness by 1% leads to an increase in complex general indicator by 0,23%, etc.

In terms of statistical significance and adequacy of the model, we can conclude that position in the stock market; labor effectiveness and financial state have the greatest impact on metallurgical enterprises competitiveness. The analysis of elasticity of local components competitiveness for each company and industry as a whole is made. This analysis makes possible to determine the sensitivity of the complex general indicator of competitiveness to the changes in local components of metallurgical enterprises competitiveness.

Models of estimation of the exchange rates influence on the enterprises competitiveness (M.1.4) are developed and presented in Sergienko O. & Tatar M. (2013) Models of Assessing the Effectiveness of Competitive Strategies in the Impact of Exchange Rates and Predicting Models of Exchange Rates in the System of Competitive Enterprises. In order to determine the nature and density of the relationship between the US dollar (*USD*), euro (*EUR*) and complex general indicator of the enterprises competitiveness and relevant local components of competitiveness correlation coefficients are calculated (for example, $r_{USD\_I_2}$ is the correlation coefficient between the US dollar and production activity effectiveness). Correlation coefficients between exchange rates and enterprises competitiveness indexes are presented in Table 5.

Table 5 shows that for most metallurgical enterprises there is a direct link between the US dollar and the financial state of enterprises and inverse relationship between the US dollar and production activity effectiveness. The Euro has the biggest impact on production activity effectiveness (Kavun, S., Čaleta, D., Vršec, M., & Brumnik, R., 2013) as well as investment and innovation activity effectiveness of the majority of metallurgical enterprises.

Table 5

Correlation between exchange rates and enterprises competitiveness indexes

Enterprises	Currency	
	USD	EUR
Ent_1	$r_{USDI_2} = -0{,}83 \quad r_{USDI_6} = -0{,}98$	$r_{EURI_2} = -0{,}86$ $r_{EURI_6} = -0{,}99$
Ent_2	$r_{USDI_2} = -0{,}86$	$r_{EURI_2} = -0{,}91$
Ent_3	$r_{USDI_3} = 0{,}88$	$r_{EURI_2} = -0{,}86$
Ent_4	$r_{USDI_6} = -0{,}91$	$r_{EURI_6} = -0{,}87$
Ent_5	$r_{USDI_1} = -0{,}91 \quad r_{USDI_6} = -0{,}84$ $r_{USDI_7} = -0{,}88$	$r_{EURI_1} = -0{,}84$ $r_{EURI_7} = -0{,}87$
Ent_6	$r_{USDI_6} = -0{,}88$	$r_{EURI_6} = -0{,}82$
Ent_7	$r_{USDI_3} = 0{,}82$	-
Ent_8	$r_{USDI_5} = 0{,}85 \quad r_{USDI_6} = -0{,}88$	$r_{EURI_5} = 0{,}88$ $r_{EURI_6} = -0{,}86$
Ent_9	$r_{USDI_3} = 0{,}87$	-
Ent_10	-	-
Ent_11	-	$r_{EURI_2} = -0{,}82$
Ent_12	$r_{USDI_2} = -0{,}83$	$r_{EURI_2} = -0{,}82$ $r_{EURI} = -0{,}83$

Source: developed by the authors.

The models of causality between the local components of the enterprises competitiveness on the one hand and between exchange rates and metallurgical enterprises competitiveness based on Granger Test on the other hand are described in the works Sergienko O. & Tatar M. Spatial and dynamic assessment and analysis of enterprises competitiveness indicators (2012) and Tools of research of evaluation and analysis of the enterprises competitive position are built for assessment of the exchange rates impact. For example, for *Ent_1* results showed that the US dollar and Euro first of all impact the products competitiveness and financial state, which in its turn affects the investment and innovation activity effectiveness. The degree of the exchange rates impact on the metallurgical enterprises competitiveness is evaluated based on panel data models.

The elasticity of enterprises competitiveness depending on exchange rates is analyzed in order to quantify the impact of exchange rates changes on the enterprises competitiveness. The results showed that if US dollar increases by 1% the products competitiveness

decreases by 1,01%; production activity effectiveness increases by 1,81%; financial state increases by 2,88%, investment and innovation activity effectiveness decreases by 1,4%, because hryvnia devaluation leads to the fact that Ukrainian companies are less attractive to foreign investors and so on. In general, US dollar increase by 1% leads to general competitiveness level increase by 0,88%, Euro increasing leads to general competitiveness level decreasing by 0,80%.

The complex of models, which is built in this paper, is the basis for development of management decisions. The results, which are obtained in this module are necessary for the implementation of Module 3.

Models of alternatives formation of enterprise competitiveness (M.1.5). The quantitative assessment of exchange rates impact on the metallurgical enterprises competitiveness makes possible to ensure the validity and quality of management decisions for improving the metallurgical enterprises competitiveness in terms of action of external and internal environment factors, with consideration for the totality of interrelated financial and economic processes.

Module 2. Complex of models for environmental factors research. The research of exchange rate factors is as very important as determination of the exchange rates impact on the metallurgical enterprises competitiveness because the factors in their totality determine exchange rates changes while factors changes manifests themselves before the exchange rates changes. Therefore, the implementation of five interrelated models is proposed for a complex research of environment factors.

Models of analysis of the environment dynamics (exchange rates) (M.2.1) include the fractal nature of market determination based on Herst Statistics and models are developed in article Predicting Models of Exchange Rates in the System of Competitive Enterprises by Sergienko O., Tatar M. (2013). By means of this Herst Index one can get an idea on preconditions of exchange rates future behavior. The results of calculations and fractal dimension for exchange rates are made in *Fractan* and presented in Table 6.

Table 6

Results of R/S analysis

Indexes	Currency	
	for USD	For EUR
Herst Index	1,5361 ± 0,3475	1,2060 ± 0,1414
Fractal dimension	0,4639 ± 0,3475	0,7940 ± 0,1414
Correlation dimension	3,205	3,331
Phase space dimension	4	6
Correlation entropy	0,004	0,077
Phase space dimension	1	>=7

Source: developed by the authors.

Herst's fluctuations in the range of $0 < H < 0,5$ means that series of values is anti-persistent and the closer is the indicator to 0, the more volatile is series and the more recession-ups it has. When $H = 0,5$ the series is a random motion (Brownian random motion). If Herst

Index is $0,5 < H < 1$ the number is persistent or trend steady, i.e. if the number increases (decreases) in the previous period, it will maintain this trend for some time in the future.

If $H > 1$, as in our case, it means that there is a steady trend, the process with fractal time and temporary break point of derivative. It shows that we have independent amplitude jumps, which are distributed by Levi during the time specified by jump size and grow with it (Hurst Statistics).

The conducted analysis of the daily behavior of exchange rates for 12 years confirmed the hypothesis of nonlinearity and fractal nature of currency market. In general, there are rather distinct trends in high volatility of exchange rates that makes it difficult to predict them and leads to currency risk increase.

Models of formation of information and analytical space for environment factors estimation (M.2.2). The information and analytical space is discussed in research by Brumnik, R., Klebanova, T., Guryanova, L., Sergienko, O., Kavun, S., & Nepomnyaschiy, V. (2014) and calculated on the basis of site data of the National Bank of Ukraine and State Statistics Committee of Ukraine for exchange rates factors is formed where exchange rates factors are combined into three groups: creating, regulatory and warning (Table 7).

Table 7

System of exchange rate factors in Ukraine

Symbol	**Factors**	**Symbol**	**Factors**
1. Creating		Fiscal	
Macroeconomic		X_{4_1}	Taxes
X_{1_1}	GDP, million UAH	X_{4_2}	Impost
X_{1_2}	Exports of goods and services, million USD	X_{4_3}	Licensing (export), number of documents
X_{1_3}	Imports of goods and services, million USD	X_{4_4}	Licensing (import), number of documents
X_{1_4}	Current transfers, million USD	Stock	
X_{1_5}	Foreign investment in Ukraine, million USD	X_{5_1}	Number exchanges, all registered
X_{1_6}	Foreign investments from Ukraine, million USD	X_{5_2}	Structure of concluded transactions on the exchanges, million UAH
X_{1_7}	Foreign exchange reserves (reserve assets), million USD	X_{5_3}	PFTS Index
Market		X_{5_4}	Total trading volume of PFTS Stock Exchange, million UAH
X_{2_1}	Volume of foreign currency purchase million UAH	X_{5_5}	Exchange turnover of USE, million UAH
X_{2_2}	Interest rates of banks in national currency on credits, %	X_{5_6}	Number of transactions concluded on the USE and its affiliates
X_{2_3}	Interest rates of banks in national currency on deposits, %	3. Warning	
X_{2_4}	Industrial production index, %	Provocative	
X_{2_5}	Volume of industrial products (works, services), million UAH	X_{6_1}	Inflation
X_{2_6}	Share of enterprises that	X_{6_2}	Producer price index of industrial

	implemented innovations, %		products, %
X_{2_7}	Rate of growth / decline of real wages, % to previous year	X_{6_3}	Reduction of foreign investments (% of GDP)
2. Regulatory		X_{6_4}	Cash in circulation outside deposit-taking corporations (M0), million UAH
Banking		X_{6_5}	Expectations of inflation
X_{3_1}	Money supply (M2)	X_{6_6}	Understanding between economic and political structures
X_{3_2}	Discount rate, %	X_{6_7}	Public confidence in the governing structures
X_{3_3}	Weighted average interest rate on all instruments, %	X_{6_8}	Presence / absence of a clearly defined program of economic recovery
X_{3_4}	Return on assets (ratio of net income to average total assets), %	Destructive	
X_{3_5}	Return on equity (ratio of net income to average capital), %	X_{7_1}	External debt, million USD
X_{3_6}	Value large exposures to capital, %	X_{7_2}	Unemployment rate, % of the economically active population
X_{3_7}	Ratio of liquid assets to total assets, %	X_{7_3}	Deficit / surplus of consolidated budget, million UAH
X_{3_8}	Value of non-performing loans to total gross loans, %	X_{7_4}	Degree of depreciation, %
		X_{7_5}	Instability of management structures
		X_{7_6}	Security / insecurity of private capital

Source: developed by the authors.

Therefore, the model of information space of exchange rates factors is:

$$\begin{cases} F_1 = f(X_{1\_1}, X_{1\_2}, X_{1\_3}, X_{1\_4}, X_{1\_5}, X_{1\_6}, X_{1\_7}) - \textit{macroeconomic}; \\ F_2 = f(X_{2\_1}, X_{2\_2}, X_{2\_3}, X_{2\_4}, X_{2\_5}, X_{2\_6}, X_{2\_7}) - \textit{market}; \\ F_3 = f(X_{3\_1}, X_{3\_2}, X_{3\_3}, X_{3\_4}, X_{3\_5}, X_{3\_6}, X_{3\_7}, X_{3\_8}) - \textit{banking}; \\ F_4 = f(X_{4\_1}, X_{4\_2}, X_{4\_3}, X_{4\_4}) - \textit{fiscal}; \\ F_5 = f(X_{5\_1}, X_{5\_2}, X_{5\_3}, X_{5\_4}, X_{5\_5}, X_{5\_6}) - \textit{stock}; \\ F_6 = f(X_{6\_1}, X_{6\_2}, X_{6\_3}, X_{6\_4}, X_{6\_5}, X_{6\_6}, X_{6\_7}, X_{6\_8}) - \textit{provocative}; \\ F_7 = f(X_{7\_1}, X_{7\_2}, X_{7\_3}, X_{7\_4}, X_{7\_5}, X_{7\_6}) - \textit{destructive} \end{cases} \quad (8)$$

where X_i is first-rate indicators of exchange rates factors; F_i is local integral factors of the exchange rate dynamics.

The obtained statistical characteristics of indicators are the basis for classification of the exchange rate factors by cluster analysis methods in a neutral state (2001 – 2003 years),

unfavorable (2004 – 2008 years), and aggressive state (2009 – 2013 years). Models of environmental factors relationship estimation (M.2.3). The interference of exchange rates and factors of their formation based on ECM - modeling (models adjustment error) is determined. The equation co-integration (long-term) interconnection of exchange rates and factors of their formation is:

$$\begin{cases} D(USD) = -1{,}33 \times (USD_{(t-1)} - 0{,}48 \times F_{2(t-1)} + 0{,}51 \times F_5(t-1) - 1{,}40 \times F_{7(t-1)}) - 32{,}65 \\ D(EUR) = 0{,}28 \times (EUR_{(t-1)} + 1{,}49 \times F_{2(t-1)} - 4{,}96 \times F_{3(t-1)} + 10{,}83 \times \\ \times F_{4(t-1)} + 2{,}81 \times F_{7(t-1)}) - 65{,}54 \end{cases} \quad (9)$$

Taking into account the lag period of 1 the destructive exchange factors make the greatest influence on US dollar and fiscal and banking factors – on euro are based on the calculations obtained in the paper Sergienko O., Tatar M. (2013) Predicting Models of Exchange Rates in the System of Competitive Enterprises.

Models of exchange rates and factors of their formation forecasting (M.2.4). The important element of metallurgical enterprises competitiveness management is forecasting of changes in currency environment. The forecasting of exchange rates (based on adaptive models, neural networks, ARCH and GARCH-models); exchange rates factors (using VAR-analysis) and the factors status (based on discriminant analysis methods) are made in this paper. The results have shown that US dollar and euro will grow. The dynamic simultaneous equations systems for predicting the dynamics of creating, regulatory and warning factors are:

- for creating factors:

$$\begin{cases} F_1 = -1{,}30 \times F_{1(t-1)} - 0{,}89 \times F_{1(t-2)} + 0{,}08 \times F_{2(t-1)} + 0{,}29 \times F_{2(t-2)} + 0{,}11 \\ \\ F_2 = 1{,}67 \times F_{1(t-1)} + 2{,}42 \times F_{1(t-2)} - 0{,}64 \times F_{2(t-1)} - 1{,}38 \times F_{2(t-2)} - 0{,}19; \end{cases} \quad (10)$$

- for regulatory factors:

$$\begin{cases} F_3 = -0{,}89 \times F_{3(t-1)} - 0{,}64 \times F_{3(t-2)} + 1{,}11 \times F_{4(t-1)} - 1{,}90 \times F_{4(t-2)} - 1{,}89 \times F_{5(t-1)} - \\ - 1{,}51 \times F_{5(t-2)} + 0{,}14 \\ \\ F_4 = -2{,}23 \times F_{3(t-1)} - 0{,}34 \times F_{3(t-2)} + 4{,}64 \times F_{4(t-1)} - 3{,}34 \times F_{4(t-2)} - 1{,}95 \times F_{5(t-1)} - \\ - 4{,}26 \times F_{5(t-2)} + 0{,}21 \\ \\ F_5 = -1{,}34 \times F_{3(t-1)} + 0{,}10 \times F_{3(t-2)} + 2{,}65 \times F_{4(t-1)} - 3{,}21 \times F_{4(t-2)} - 1{,}88 \times F_{5(t-1)} - \\ - 2{,}93 \times F_{5(t-2)} + 0{,}24; \end{cases} \quad (11)$$

- for warning factors:

$$\begin{cases} F_6 = 0{,}27 \times F_{6(t-1)} - 0{,}39 \times F_{6(t-2)} - 0{,}52 \times F_{7(t-1)} + 0{,}20 \times F_{7(t-2)} - 0{,}04 \\ F_7 = -0{,}03 \times F_{6(t-1)} + 0{,}28 \times F_{6(t-2)} - 0{,}36 \times F_{7(t-1)} + 0{,}04 \times F_{7(t-2)} - 0{,}04; \end{cases} \quad (12)$$

The analysis of future trends in exchange rate factors with consideration for lag delay in periods 1 and 2 has shown macroeconomic factors growth with simultaneous deterioration of warning factors indicating that the economic system moves off dynamic equilibrium. Forecasting of exchange rates factors based on discriminant analysis techniques allowed us to obtain predicted state of exchange rate factors, which can be interpreted as aggressive. The models make possible to pre-form the enterprises competitive strategies under the exchange rates influence.

Models of environmental strategies formation (M.2.5) provide the implementation of matrix models, expert analysis, decision theory, that makes possible to generate pre-competitive strategies of metallurgical enterprises development and enable the company's management to respond to unfavorable exchange rate dynamics and factors of its formation. It will help increase the competitiveness and efficiency of enterprise activity overall.

Module 3. Complex of management solutions models that ensure the enterprises competitiveness in unstable currency environment provides the implementation of three models.

Models of environmental factors influence estimation on the enterprises competitiveness (M.3.1). The evaluation of the exchange rate factors impact on the enterprises competitiveness based on selected states of exchange rate factors and their numerical characteristics is made using the method of fuzzy logic. The function of membership for each exchange rate factor and the output index is built based on certain linguistic variables, which take into account state of exchange rate factors.

The ranges of environmental conditions based on the minimum and maximum values for each cluster are shown in Table 8. Their combination is the basis for administrative rules and determines the strength of their influence.

Table 8

The range of environmental conditions

Indicators	State of the environment		
	Neutral	Unfavorable	Aggressive
Macroeconomic	0,4051-0,5275	0,2652-0,4654	0,1458-0,2552
Market	0,0390-0,6436	0,3600-0,5302	0,4310-0,6313
Banking	0,3112-0,5160	0,1290-0,5141	0,1794-0,4800
Fiscal	0,2023-0,3295	0,1546-0,2091	0,1037-0,1592
Stock	0,4785-0,6754	0,3865-0,5287	0,2017-0,2748
Provocative	0,6919-0,9297	0,2904-0,5136	0,4608-0,5124
Destructive	0,5028-7427	0,5837-0,6448	0,1519-0,3296

Source: developed by the authors.

These membership functions of linguistic variables to fuzzy sets for the output variable are given in Table 9.

The results have shown that the impact of exchange rates factors predictive values on the enterprises competitiveness is equal to 0,272. It means that it belongs to the fuzzy set «acceptable level of influence» with a probability of 0,9, that is that the company under exchange rate factors will move lower in the cluster.

Table 9

Constructing membership functions of linguistic variables to fuzzy sets (detail)

№	Output variable	Linguistic variable	Membership function
1.	Macroeconomic (F_1)	Aggressive state	$\mu(x) = zmf(0.2;\ 0.509)$
		Unfavorable	$\mu(x) = gaussmf(0.14; 0.375)$
		Neutral	$\mu(x) = smf(0.251;\ 0.557)$
…	…	…	…
8.	The level of impact on the competitiveness	adjustable	$\mu(x) = zmf(0.05;\ 0.2)$
		allowable	$\mu(x) = gaussmf(0.149; 0.209)$
		critical	$\mu(x) = smf(0.26;\ 0.4)$

Source: developed by the authors.

When we predict the exchange rates, we can predict a change in the competitiveness levels in the future due to changes in exchange rates. Thus, if the US dollar increases by 1% (in short-term period) the competitiveness level will increase by 0,88%. If according to one of the possible scenarios the predicted US dollar will rise in 30 days on average 0,22%, the competitiveness level will increase by 0,19%.

Models of competitive strategies choice in unstable currency environment (M.3.2). The analysis, evaluation and forecasting of the exchange rates and factors of their formation impact on the enterprises competitiveness are carried out for determining the effective management methods of metallurgical enterprises competitiveness in unstable currency environment according to the results Sergienko O. & Tatar M. (2013), Models of Assessing the Effectiveness of Competitive Strategies in the Impact of Exchange Rates. The structural form of the proposed model of competitive strategies of metallurgical enterprises is:

$$\mathrm{SC}_{\mathrm{it}} = \{I_{it}; F_t; E_t\}, \tag{13}$$

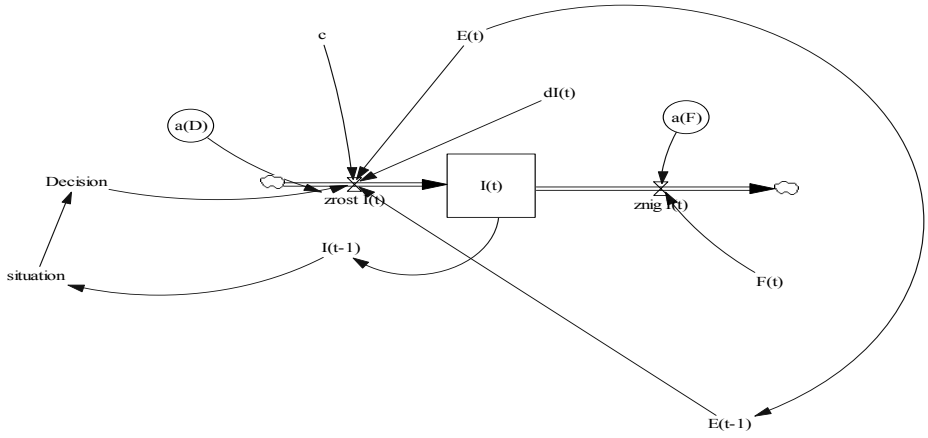
where SC_{it} is competitiveness of enterprise management strategy under the exchange rate and the factors of its formation impact; I_{it} is the complex general indicator of competitiveness of the i-th enterprise in the t-th period of time; F_t is the exchange rate factors impact on the competitiveness of enterprises in t-th time; E_t is the predicted exchange rate in the t-th period of time.

Depending on the metallurgical enterprises competitiveness level, the exchange rate and the factors of its formation impact and predicted dynamics of the exchange rate three classes of situations were formed: favorable; neutral; unfavorable. Depending on the aforementioned situations, the behavior of individuals who make decisions will be different, which explains the need to consider several management decisions alternatives: 1) the manager has not taken a decision (no response); 2) standard (typical) decisions (identified in the survey of enterprises managers); 3) innovative, creative solutions.

Models of estimation of management decisions effectiveness for enterprises competitiveness ensuring (M.3.3). Three-component dynamic simulation model is built in order to assess the effectiveness of management solutions and is based on the aggregation of research results by Sergienko O. & Tatar M. Tools of research of evaluation and analysis of the enterprises competitive position (2011) and Models of Assessing the Effectiveness of Competitive Strategies in the Impact of Exchange Rates (2013) (Fig. 3).

Figure 3

Three-dynamic simulation model of effectiveness of management decisions estimation



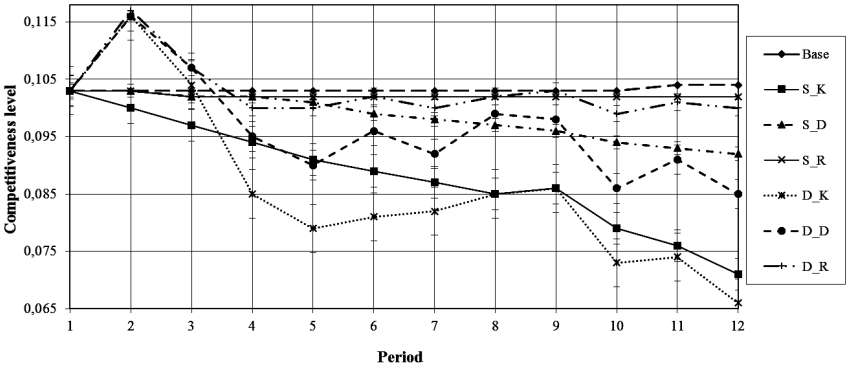
Source: developed by the authors.

Simulation experiments were conducted for enterprises-representants of each cluster. The conditions of the base experiment (*Base*) provided conditional exchange rate stability, absence of the exchange rate influence factors, absence of management decisions for improving competitiveness. Under these conditions, *Ent_3* will increase competitiveness level a bit, even in the absence of aimed specific management decisions. In the adjustable level of the exchange rate factors influence (*S_R*) the enterprise competitiveness level in an average period will be on 1,6% below the level of the basic experiment, in the allowable level (*S_D*) – on 6,7%, in critical level (*S_K*) – on 13,4 %. Thus, under these conditions, in the absence of any management influence the competitiveness of enterprise will decrease very much (Fig. 4).

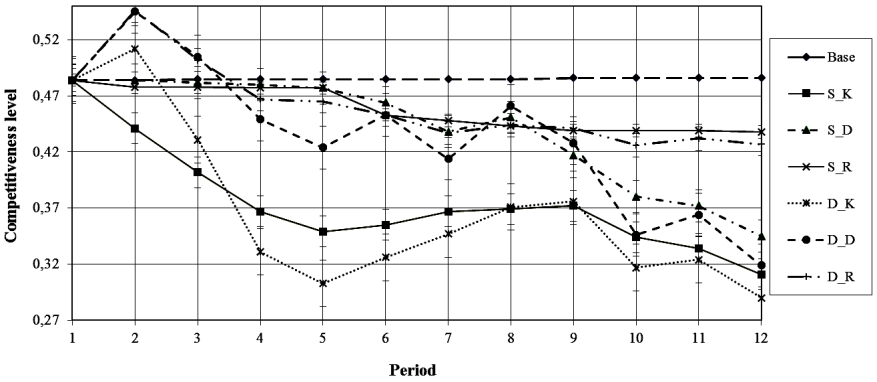
Figure 4

The results of simulation experiments of exchange rate influence factors on the enterprises competitiveness based on decisions

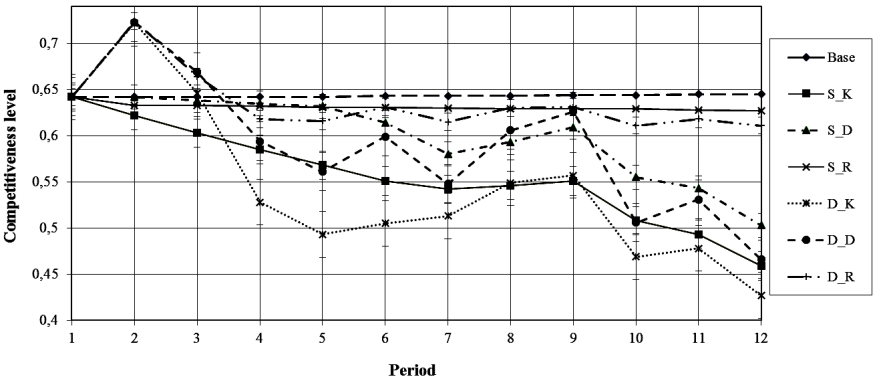
a) for *Ent_3*



b) for *Ent_4*



c) for *Ent_10*



Source: developed by the authors.

Simulation experiments that reflect results of management decisions (*D*), which are adopted by the enterprise in accordance with the class of situation are showed that the enterprise competitiveness level will increase substantially in the second and third period (months) and then will decrease.

4. Results and suggestions

Therefore, the complex of models, which was built, can improve the system of management in general by means of adequate and timely solutions to the following tasks:

- the diagnostic of metallurgical enterprises competitiveness and its industry trends of development using modern tools of economic and mathematical modeling of statics and dynamics makes possible to get enterprises with high, average and low competitiveness level and determine the impact of local components on the complex general indicator of the enterprises competitiveness;
- the assessment of the exchange rates impact on the metallurgical enterprises competitiveness on the basis of panel data models makes possible to reveal the local components of the enterprises competitiveness where the exchange rates affect is the greatest;
- the forecasting of exchange rates, factors of exchange rates and their state which allowed us to identify future changes in the currency environment and to direct management on the development of enterprises capacity for adaptation to the sharp fluctuations in exchange rates, which will increase the metallurgical enterprises competitiveness;
- the assessment of exchange rate factors impact on the metallurgical enterprises competitiveness using fuzzy logic methods led to the conclusion about the need to introduce measures to minimize the unfavorable currency environment impact on the metallurgical enterprises competitiveness.

5. Conclusion

Thus, implementation of complex of management models of metallurgical enterprises competitiveness in unstable currency environment based on the evaluation of the metallurgical enterprises competitiveness level and industry trends of development will ensure the validity and quality of management solutions for improving the metallurgical enterprises competitiveness. There is possible in terms of factors of external and internal environment with consideration for the totality of interrelated financial and economic processes. The proposed complex of management models of metallurgical enterprises competitiveness in unstable currency environment can be applied in modified version in other countries taking into account the specifics of these countries, their level of development, and level of competition in the metallurgical industry in these countries, etc.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

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Miroslava Rakovska[1]
Petya Fileva[2]

PHASES OF THE DEVELOPMENT OF LOGISTICS SERVICE PROVIDERS: THE CASE OF BULGARIA

This paper describes the phases of the development of a sample of logistics service providers (LSPs) based upon their service capabilities. Data was collected from 136 Bulgarian LSPs. Scores of 40 service capabilities were subjected to hierarchical cluster analysis using Ward's method, and as a result, three distinct clusters of service capabilities were derived. On the basis of the differences in service capabilities the resulting groupings were labelled as: Typical transport providers, Transport providers in development, True third-party logistics providers. The clusters were characterised in terms of the LSPs' resources and some aspects of the customer service provided by the LSPs. The use of cluster analysis for understanding the phases of the development of LSPs will be useful for researchers who want to test the existence of these phases in their countries and for managers who could formulate a strategy based on their companies' level of development.
JEL: L89; M19

Introduction

The topic of logistics service providers (LSPs) attracts growing attention both of the academics and the practitioners because LSPs play a special role in the economy. Companies perform diverse logistics activities. They can use external organizations to execute some of those activities, which is known as "logistics outsourcing" (Lambert, Stock, and Ellram 1998, p. 34). Copacino (1997) states that the main reason for logistics outsourcing is the constant increase of logistics costs as a result of globalization. Razzaque and Sheng (1998), Song et al. (2000) and Mello, Stank, and Esper (2008) cited a number of other drivers for outsourcing logistics activities: opportunities to focus on core

[1] *Miroslava Rakovska is* Associate Professor, PhD, Department of Logistics, University of National and World Economy, 8-dekemvri str., Students Town, Sofia 1700, Bulgaria, +359 888 704178, email: mirar@unwe.bg.
[2] *Petya Fileva is* Part-time Assistant Professor, PhD, Department of Logistics, University of National and World Economy, 8-dekemvri str., Students Town, Sofia 1700, Bulgaria,+359 888 182881, email: petya.fileva@gmail.com.

competencies and reduce inventory and lead time; expanding into unfamiliar markets; a need for expertise and upgraded IT capabilities; and many others. Firms increasingly use LSPs to improve their effectiveness and efficiency. Recent research shows a reduction of 9% in logistics costs, 5% in inventory costs and 15% in fixed logistics cost (Langley, 2015).

However, 22% of the shippers report they will return at least some of their logistics activities in-house. Some of the reasons to perform insourcing are (Langley, 2013): logistics is a core competency; loss of control over the outsourced function(s); cost reductions would not be experienced; difficulties to integrate the IT system with the LSP's system; issues with the assessment and control of the LSP; inefficient relationship management; loss of the ability to drive innovation in logistics. Some studies point out that part of the problems comes from the low customer service level, provided by the LSP (for example, Wang and Regan, 2003; Wilding and Juriado, 2004; Razzaque and Sheng, 1998). Apparently, the development of LSPs is determined by the increasing customer requirements concerning the service provided by them. Customer service is viewed as part of the product offering which adds value for the customers (Dimitrov et al., 2010).

There has been little research on the phases of the LSPs' development. Most of the authors consider that this development is a result of the shifts in the demand of logistics services. Originally, the activities that manufacturing and trading companies outsourced were related to transportation and warehousing. Other basic activities were added later and nowadays companies expect to receive modern and integrated services, related to order fulfilment, including reverse logistics and waste management, integrated information flow management between supply chain members, logistics network development, customer relationship management, etc. (Ying and Dayong, 2005). Thus, the provision of different logistics services is due to the fact that, on one hand, customers expect the LSPs to meet their requirements, and on the other, LSPs have to develop appropriate capabilities to meet the demand in order to stay competitive. Van der Veeken and Rutten (1998) consider that service capabilities represent the process of products delivery "in a way that creates added value to customers", and encompass all aspects of service provision, e.g. the different logistics activities performed by LSPs for their customers.

The purpose of this research is to identify the phases of the development of LSPs on the basis of their service capabilities and to gain an understanding of the different patterns of resources and customer service aspects that stand behind these phases. To achieve this purpose the article uses cluster analysis of quantitative data, which represent measures of service capabilities, resources and customer service aspects of 136 Bulgarian LSPs. The development phases are produced on the basis of 40 service capabilities. The specifics of the resources and customer service aspects of the LSPs in the resulting groups are discussed to provide theoretical and policy implications.

This article is structured as follows: Section 2 reviews the literature in relation to logistics service capabilities, LSPs and their development. Section 3 outlines some characteristics of the context, in which the Bulgarian LSPs function. Section 4 discusses the research methodology. The results of the survey are presented in section 5. The article ends with a conclusion.

1. Literature review

1.1. Logistics service capabilities

Outsourcing is broadly applied by companies as a strategy. The „make or buy" decision was firstly considered in manufacturing (Korbankoleva, 2010, p. 76). Subsequently outsourcing, including logistics one, becomes one of the key drivers for the development of the supply chain management concept as the last stage of the logistics evolution (Rakovska, Dragomirov and Vodenicharova, 2014, p. 8). The U.S. International Trade Commission (2005) defines logistics services as "a complex web of activities designed to ensure the efficient movement of raw materials, intermediate inputs, and finished goods between suppliers, manufacturers, and consumers". Dimitrov, Velichkova and Rakovska (2008) support the assertion that all physical and management services that are related to logistics activities and can be performed by other companies should be defined as logistics services.

Due to the wide variety of logistics services, many authors tried to classify them. Vasiliauskas and Barysien (2008) group the services, on one hand, into physical and administrative, and on the other, based on the service complexity. Physical services that require basic assets and some organizational skills, like storage, receiving and expediting, have the lowest complexity. More complex services, like cross-docking or operating vendor management inventories in stores or stock-keeping facilities, require advanced organizational skills. Administrative services that are more complex, like forecasting, inventory management, implementation of logistics strategy, etc., require well-developed management skills of the LSPs. Gudehus and Kotzab (2009) also classify the logistics services into physical and administrative, but in addition to the basic logistics services like transportation, warehousing and handling services, the authors define another group of services - value-added services, and assert that LSPs need the basic services, so that the value-added services can be sold to the customers. This view is shared by other researchers too. Andersson (1997) considers that value-added services are related to the physical handling of the material flow, but separates them from the basic logistics services, administrative services (inventory management, customer service, etc.) and IT services (EDI, for example). Berglund (2000) suggests that value-added services are all types of activity, which traditionally are not part of the transportation and warehousing services that LSPs offer. He defines value-added services as "services that add extra features, form or function to the basic service". Bowersox and Closs (1996) argue that by definition value-added services are unique to the specific customer and extend over the firm's basic service offering. They clarify that in the context of value-added services LSPs can perform different activities to stimulate their businesses: providing unique product packaging to their customers, offering information services, creating customized labels, placing price labels on products, and so on. On the other side, Van Hoek (2000) asserts that most of the value-added services are more related to manufacturing and distribution than to transportation and warehousing.

A number of authors attempt to classify the value-added services. Lundberg and Schönström (2001) divide them into two basic categories. The first one includes product related services such as repackaging or customizing the product. The second category encompasses specialized services, which are not directly related to the physical handling of

the product. Such services, for example, are insurance or control of the information flow. Bowersox and Closs (1996) specify five major categories of value-added services: customer-focused services, promotion-focused services, manufacturing-focused services, time-focused services and basic services. Customer-focused value-added services involve alternative ways to distribute products, including picking, packing and repacking services to facilitate distribution of a standard product, but with a unique configuration requested by the customer. Promotion-focused value-added services involve variety of services aimed to stimulate sales, for example, shipping gifts and promotion materials related to promotion activities. Manufacturing-focused value-added services involve basically postponement activities. Such activities allow delaying the product finalization until the customer order with the product specification is received. Although outsourcing postponement operations could be more costly than incorporating them in the manufacturing process, it helps to reduce the risk related to manufacturing products that are still not demanded. Time-focused value-added services include sorting, mixing and sequencing inventory before the delivery to the manufacturing facilities. These activities eliminate unnecessary work and increase the speed of handling. An example of such kind of services is the just-in-time delivery. Small sized and frequent deliveries require tough schedules which bring to the forefront the role of the logistics service providers for the successful just-in-time implementation by their customers (Rakovska, 2013, p. 208). Basic value-added services involve inventory management, order processing, invoicing, reverse logistics, etc., i.e. activities related to the order fulfilment.

On the basis of the literature review, it can be concluded that all logistics services, except the basic ones related to transportation, warehousing and handling, can be viewed as value-added services as they make the service package more valuable to the customers. Two main value-added groups can be distinguished – services, which are directly related to the physical goods flow and services, which are related to the administration of the goods flow (Table 1). In addition, the first group of services related to the physical goods flow can be divided into two separated subgroups: 1) technological operations (cutting, drying and other production customization activities, assembly, installation), that add value to the product itself, changing the product and its functions; and 2) services such as labelling, consolidation, adding promotional materials, etc., that do not change the product itself but rather prepare it as per customer requirements. Some after sale activities such as spare parts delivery, recalled products handling, etc., can also be included in this group.

Table 1

Services provided by LSPs

Basic logistics services (physical)	Value-added services			
	Services, directly related to the physical goods flow		Services, related to the administration and management of the goods flow	
	Services that do not change the product itself	Technological operations that change the product itself	Administrative services	Management services
Transportation Road Rail Maritime Inland waterways Air Intermodal Multimodal/ Combined „Door-to-door“ Courier services Express delivery Transportation of goods with special requirements (fresh, frozen, dangerous goods, out-of-gauge, etc.) Warehousing Receiving, handling, storage Storage of goods with special requirements (fresh, frozen, dangerous goods, out-of-gauge etc.) Bonded warehousing	Cross-docking Packing, repacking Labelling/ relabeling Consolidation/ deconsolidation Kitting Quality control/ product testing After sales service (spare parts, recalled products, etc.) Exhibition of products	Product assembly/ disassembly Installation Production customization (like dyeing, cutting) Product repair Recycling	Freight forwarding Cargo insurance Customs clearance Financial services (invoicing, factoring, logistics costs audit, etc.) Tracking and tracing Administration of the orders of the customers' customer IT services Call-centre services	Consultancy Inventory management Procurement (of non-critical items or packaging, for example) Delivery planning and management Development and implementation of individual logistics solutions Development and implementation of supply chain management solutions

Source: Authors' interpretation

1.2. Logistics service providers

Coyle, Bardi, and Langley (2003, p. 425) define a logistics service provider as "an external supplier that performs all or part of a company's logistics function". The Council of Supply Chain Management Professionals suggests a more general definition: "Any business which provides logistics services" (Vitasek, 2013, p. 117). Even though LSPs provide a great variety of logistics services, they can still be classified into one of the following categories in terms of the basic service, on which they are focused, without excluding the provision of

other services (Coyle et al., 2013, p. 120): Transportation based, warehouse/distribution based, forwarder based (non-asset based LSPs - the logistics services they provide are based on partnerships with other LSPs), financial based (provide freight payment and auditing, cost accounting and control, etc.), information based (provide web-based platforms for logistics services like transport, warehousing or "door-to-door" services). As it can be seen, all of these LSPs provide services based on assets or skills. Some LSPs cannot be classified in just one of these categories because they may provide transportation, warehousing, forwarding and financial services all together, for example. The number of these LSPs is constantly growing.

Berglund et al. (1999) divide LSP into the following three groups: Asset-based logistics providers – the services they provide primarily include the usage of their own fleet, warehouses and equipment; Network logistics providers – express parcel companies, started in the 90s, that have built global networks in order meet new customer requirements as a result of globalization; Skill-based logistics providers – typically, they don't possess assets and provide financial, consulting, IT, supply chain management services, among others.

Any attempt to classify LSPs would be incomplete without regarding the work of Langley, Allen, and Colombo (2003). Many studies have been conducted with the usage of their classification as a basis. It includes four groups of LSPs depending on the number of logistics services they provide: Second Party Logistics Providers (2PL) provide one or more single services which are not bundled together. Third-Party Logistics Providers (3PL) provide several or all logistics services a customer needs bundled in a package. Lead Logistics Providers (LLP) organize, manage and control outsourced logistics activities, that are performed by subcontractors (2PL or 3PL), and represent single points of contact for the customers. Fourth Party Logistics Providers (4PL) are defined in 1996 by Arthur Andersen (now Accenture) as integrators that assemble resources, capabilities, and technology of its own organization with other organizations to design, build and run comprehensive supply chain solution (Bade and Mueller, 1999). The Council of Supply Chain Management Professionals considers 4PL as being a separate entity established as a joined venture or long-term contract between a primary client and one or more partners (Vitasek, 2013). In the ideal case, all aspects of the client's supply chain are handled by the 4LP.

The development of the LSPs can be assessed not only by the number of the services they provide, but also based on their customization capability. Using this criterion, Hertz and Alfredsson (2003) classify LSPs into four groups: The Standard logistics service provider provides basic standardized services like transportation, warehousing, brokerage, etc.; The Service developer offers several sets of standardized services combined in packages, which can be adjusted to specific customer requirements. The idea behind these sets is to create economies of scale and scope for the LSP. The Customer adapter typically has very few but close customers. LSPs of this kind provide dedicated solutions such as taking over the customer's transportation and they are often seen as parts of the customer's organization. The Customer developer is the most advanced type of LSPs that can fully integrate with the customers and even take over their whole logistics operations.

We can notice an analogy between this classification and the one of Langley, Allen, and Colombo (2003) presented earlier. For example, the Service developer from Hertz and

Alfredsson' classification corresponds to the 3PL, and the Customer developer to the 4PL. Both classifications are well structured, with clear grouping criteria. However, the classification and terminology of Langley, Allen, and Colombo (2003) are well-known both in theory and practice. This classification is a basis for research on the structure of the logistics sector in terms of the extent of the LSPs' development, measured with the types of services they provide.

1.3. Phases of LSPs' development

We have mentioned in the previous section that Berglund et al. (1999) classify LSPs in three categories. The authors state that these three categories correspond to three periods of the LSPs' development. Every period is characterized by the type of LSPs that is prevailing in the sector in that period. The typical LSP in the first phase, which continued until 1980, provides a single basic service (transportation or warehousing) in accordance with the logistics activities outsourced by manufacturing and trading companies. The second period began in the 90s when companies like UPS and DHL started offering additional administrative services. In the third period, companies providing IT, consulting and financial services became part of the sector and contributed to the service package.

Papadopoulou and Macbeth (1998) describe the evolution of LSPs in the following five phases according to the type of services provided, the level of control that customers exercise on the services and the role of logistics in customers' strategies:

- *Introductory period (until late 1950s)*: LSPs are specialized in one service, transportation or warehousing, i.e. these are single service providers. Customers do not consider using a LSP except for the cases of a lack of capacity or a significant cost advantage.
- *Awareness period (late 1950s until mid-1960s)*: LSPs provide transportation and warehousing services, but not as a combination. Basically, these are logistics providers of separated services. Companies start to consider LSP as an alternative, because they need to stay competitive and profitable. However, losing the control over logistics activities is a big concern.
- *Necessity period (mid-1960s until the end of the 1970s)*: LSPs offer integrated transportation and warehousing services. Market changes as well as legal changes make distribution more complex. This drives companies to search for the assistance of LSPs.
- *Integration period (from the end of 1970s until the end of 1980s)*: LSPs provide not only the traditional transportation and warehousing services, but some administrative and planning services as well. The use of LSPs gets more and more attractive because of the augmented complexity of the distribution channels as a result of the internationalization.
- *Differentiation period (from the end of the 1980s until the end of the 1990s)*: LSPs provide complex combined services, including yard management, information management and many more. The role of globalization and the importance of building partnerships increase in this phase. The use of external logistics provider helps companies to differentiate themselves and stay competitive.

These five evolutionary phases have the same logic as those of Berglund et al. (1999) The additional criteria, which Papadopoulou and Macbeth (1998) use, enrich the understanding of LSP's evolution. Considering the time of conducting the research, the contemporary period, beginning in the 2000s with the advent of the supply chain management concept, has not been included as a phase. This period is characterized by extensive complex services that LSPs provide on the basis of IT and supply chain management systems.

The above mentioned studies are focused mainly on the historical side of the LSPs' evolution. It is also interesting to understand the LSPs' development from the organizational point of view. The growth of the sector and the related increasing competition are the drivers for the internal organizational changes of the LSPs. Another important factor is the growing customer requirements. Research works outline several key development directions rooted in the LSPs' strategies that allow the satisfaction of customer requirements and the increase of competitiveness. Lieb (2005) defines the following strategies that American LSPs use: Development through partnership – LSP broaden their service portfolio through the use of other LSPs' services and building partnerships; Strategy "everything for everyone" – a focus on the supply of integrated services to the clients; Customer-selective – a focus on services for satisfying a segment of attractive customers.

Carbone and Stone (2005) reveal the strategies used by the European LSPs: Growth in terms of service provision and geographical coverage through mergers and acquisitions or joint-ventures; widening market segmentation on a global scale; specialization in several complementary services; and building alliances to provide broader service coverage.

Comparing the LSPs' strategies for growth and development on the two continents, we can conclude that the basis of the strategies is the desire to meet customer requirements concerning a wide range of integrated services or a narrow range of specialized services, global or regional coverage. This is achieved by mergers and acquisitions, alliances, or specialization.

The literature review brought up the following research questions:

1. Do the LSPs in Bulgaria follow the development of the LSPs on a global scale and what are the phases of their development?
2. What resources and customer service aspects characterise the different phases?

In addressing these important issues it is possible to provide a contribution to knowledge about the dynamics of the development of LSPs.

2. Context of functioning of Bulgarian LSPs

Bulgaria has a strategic central position on the Balkan Peninsula being a crossroad between Europe and Asia. The country is crossed by 5 TEN corridors: corridors IV, VII, VII, IX and X. Although that brings a lot of obligations for the government, it creates opportunities for the logistics sector.

The volume of industrial and logistics space has doubled between 2008 and 2014 and reached 803 thousand sq. m. Specialists expect even more investments and as a result more available logistics space. In addition, the costs for logistics space are competitive in comparison with the costs in the region. Only in Romania, Hungary and Slovakia the price per sq. m is lower than the one in Bulgaria with less than 0.5 euro.

On the basis of statistical data and expert opinion, the registered companies in Bulgaria, which can be identified as LSPs, are between 10000 and 12000. One third of the most profitable companies in the top 30 of the transport companies in Bulgaria are government-own companies (Capital Daily, 2015).

3. Methodology

3.1. Data collection

A survey questionnaire was developed to collect information from LSPs in Bulgaria. This method is widely used to research the logistics sector (Selviaridis and Spring, 2007). The use of a survey questionnaire requires reliability and validity assessment to assure that the instrument measures what is supposed to be measured and produces the best results (Dunn, Seaker, and Waller, 1994). A thorough literature review and a pilot test were conducted to ensure content validity of the questionnaire. Most of the questions use 5-point Likert scales to get an understanding of the level of agreement, usage, demand, etc. Managers in five Bulgarian LSPs evaluated the questionnaire for statements clarity. As a result some of the scale items were reformulated or dismissed.

Data were collected through personal interviews or by e-mail from February 2015 to July 2015. The contacted companies were 200 and a total of 136 responses were received. Most of the researched companies are Bulgarian privately owned companies (85%). More than 1/3 (39%) of the companies have been in business for over fifteen years, 42% were registered between 2001 and 2010 and 15% - in the last 5 years. The last shows that the logistics sector is still attractive for starting companies.

A large part of the companies (63%) are micro and small ones with less than 49 employees. Approximately one of every five companies has over 250 employees. Typically, these companies operate in several cities such as the courier companies, for example, but also haulage companies with truck drivers as main employees as well.

Concerning the LSPs' clients, most of them are local private companies, followed by foreign companies - 33%, and those with foreign ownership - 16%. The government owned companies are barely 5% of the clients. Almost 70% of the clients are located in Bulgaria and Western Europe, followed by those from Eastern Europe, Russia, the Commonwealth of Independent States countries and the Middle East. Clients from Asia, Africa, America, Australia and New Zealand are very few.

3.2. Data analysis

The phases of development of the LSPs were derived through clustering the companies based on their service capabilities. The literature review revealed that service capabilities are widely used for the assessment of the logistics sector. The cluster analysis, applied in this research, classifies the respondents in groups with similar characteristics within a group, but with different characteristics between groups (Lai, 2004). Thus, it is easy to predict the characteristics of an organization, based on its affiliation to a group.

Hair et al. (1998) suggest using both hierarchical and non-hierarchical cluster methods. The first one is used to determine the number of the clusters, and the second one – to produce the clusters. The Ward method of agglomerative hierarchical cluster analysis, which is considered as a very effective method, was used to determine the number of clusters through squared Euclidean distances. Then, a K-mean cluster analysis of the LSPs' service capabilities was performed to form the clusters. Using 7-point Likert scales, Liu and Lyons (2011) interpret the relative magnitude of the service capabilities across the clusters as high (mean $\geq$ 5), medium (mean $\geq$ 3 and <5) and low (mean < 3). The division points on a 5-point scale can be estimated as 3.7 and 2.3. Thus, LSPs with scores above 3.7 are supposed to possess high-level corresponding capabilities, between 2.31 and 3.69 – medium-level capabilities, and bellow 2.3 – low-level capabilities. SPSS, version 17, was used to conduct the statistical analyses.

Each cluster is characterized in terms of the LSPs' resources and different customer service aspects. Wong and Karia (2010) assert that LSPs aquire physical, human, information, knowledge and relational resources and bundle them together in various manners to create inimitable and firm-specific capabilities. Physical resources are tangible assets, related to the movement and storage of goods, and include logistics hubs, transport vehicles, warehouse facilities, and material handling equipment. Information technologies, like the physical resources, require an access to capital, but both resources allow LSPs to provide a wide range of logistics services in an effective manner. Human resources represent the employees that form the organization with their skills and qualification. The knowledge and skills help the organization bundle its resources to provide effective logistics services. Another important resource is the capability to build and maintain relationships. This capability is considered as a core capability as it is difficult to imitate and at the same time it helps LSPs to grow faster. In the logistics sector relationships can be considered in two directions. On one hand, relationships can be built between the LSP and the customer, and on the other, relationships between the organizations in the sector are important too. For example, freight forwarders' operations are based mostly on the relationships they have established with other LSPs. Such cooperation suggests knowledge transfer and information sharing and coordination, which help reduce costs and improve the quality of logistics services. The result of bundling the resources is the services that LSPs provide, i.e. the level of the service capabilities is related to the resources that LSPs possess.

Different aspects of customer service were assessed within the clusters too such as methods used by LSPs for customer service assessment, factors that influence the determination of customer service levels, causes for low-level customer service and the customer service level itself.

4. Findings

The hierarchical cluster analysis showed that the most appropriate number of clusters was 3. Subsequently, the K-means cluster analysis was used to assign the LSPs into the clusters. Cluster 1 has the least number of respondents, which represent 27% of the total number (Table 2). Cluster 3 is the biggest one with 56 respondents (41%).

Table 2

Distribution of the LSPs in the clusters

Clusters	Number of respondents	Relative share
Cluster 1	36	27%
Cluster 2	44	32%
Cluster 3	56	41%
Total:	136	

Source: Authors.

The three-cluster solution is shown in *Figure 1*. On the basis of the division points, described in Section 4.2., it can be asserted that Cluster 3 is characterised with low-level capabilities concerning almost all services, except for road transportation (mean 4.05). Thus, we can conclude that LSPs in this cluster are traditional transportation-based providers.

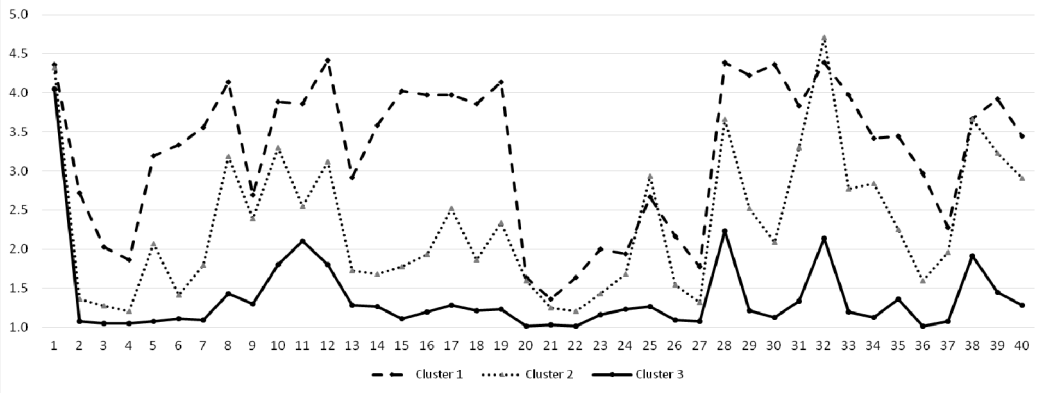
The second cluster consists of companies with a high level of road transportation and tracking and tracing capabilities (the last ones are part of the administration services). They assess as medium-level their capabilities concerning some other transportation related services ("Door-to-door", courier services, express delivery, transportation of products with special requirements), warehousing and almost all administrative services (except for customs clearance), delivery planning and management, development and implementation of individual logistics solutions and supply chain management solutions. Hence, it appears that this cluster consists of LSPs that try to extend the range of their services, providing additional administrative and some management services.

LSPs in Cluster 1 possess medium or high-level capabilities in ¾th of the services in the list. This suggests that LSPs in this cluster provide a wide range of services, which can be bundled in a package depending on the customer needs.

presents the firm age per cluster. The results clearly show that the number of the younger firms rises steadily from Cluster 1 to Cluster 3, i.e. LSPs in Cluster 1 with a broader range of logistics services have been in business for a longer time than those in Cluster 3 with prevailingly single service providers. Based on this, it can be concluded that these clusters have characteristics corresponding to different phases of the development of the Bulgarian LSPs.

Figure 1

Level of logistics service capabilities in the three clusters



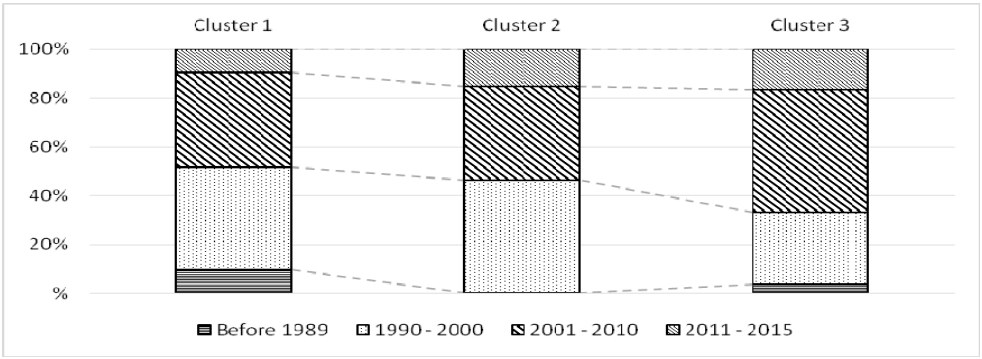
Notes: 5 – Very high, 1 – No such a capability

Legend: 1-Road transportation, 2-Maritime transportation, 3-Rail transportation, 4-Inland waterways transportation, 5-Air transportation, 6-Intermodal transportation, 7-Multimodal/Combined transportation, 8-"Door-to-door", 9-Courier services, 10-Express delivery, 11-Transportation of goods with special requirements, 12-Warehousing, 13-Storage of goods with special requirements, 14-Bonded warehouse, 15-Cross-docking, 16-Consolidation/deconsolidation, 17-Packing, repacking, 18-Labelling/relabeling, 19-Assembling, 20-Installation/deinstallation, 21-Production customization, 22-Recycling, 23-Product testing/quality control, 24- Product repair, 25-Call-centre operation, 26-After sales service, 27-Exhibition of products, 28-Freight forwarding, 29- Cargo insurance, 30-Customs clearance, 31-Financial services, 32-Tracking and tracing, 33-Administration of the orders of the customers' customer, 34-IT services, 35-Consultancy, 36-Inventory management, 37-Procurement management, 38-Delivery planning and management, 39-Development and implementation of individual logistics solutions, 40-Development and implementation of supply chain management solutions.

Source: Authors

Figure 2

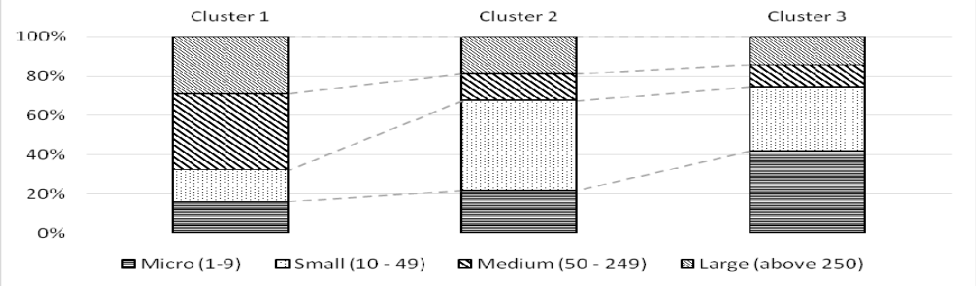
Distribution of companies in the clusters according to company age



Source: Authors.

Another specific feature is related to the size of the LSPs in the clusters. Most of the smaller LSPs are part of Cluster 2. As it was stated earlier, this cluster is constituted of LSPs that broaden their logistics service package. These LSPs are in development and would hire more employees with the provision of new services. The share of the small firms in Cluster 2 is almost equal to the share of the micro LSPs (with less than 9 employees) in Cluster 3, confirming that most of the transportation firms are small in size.

Figure 3
Distribution of companies in the clusters according to company size (number of employees)



Source: Authors.

Source: Authors.

presents the type of the organizations in the three clusters. Two-thirds of the companies in Cluster 3 are transportation companies. Cluster 2 consists mostly of transportation/freight forwarding companies and couriers. These companies are under a great pressure to enrich their service offerings in order to stay competitive. Every second company that considers itself a third-party logistics provider and/or a warehousing company is part of Cluster 1. More than 2/3rds of the companies, which consider themselves consulting companies or customs brokers, fall in this cluster too.

Figure 5 presents the number of the services provided by LSPs across the three clusters. The differences can be clearly seen. LSPs from Cluster 3 provide a relatively small number of services and 1/3rd of them provide between 1 and 3 services. Cluster 2 is characterised by a larger scope of offered services and providers with less than 8-10 services are rare. Almost all of the providers assigned to Cluster 1 provide at least half of the listed logistics services.

Thus, the following can be summarized regarding the clusters:

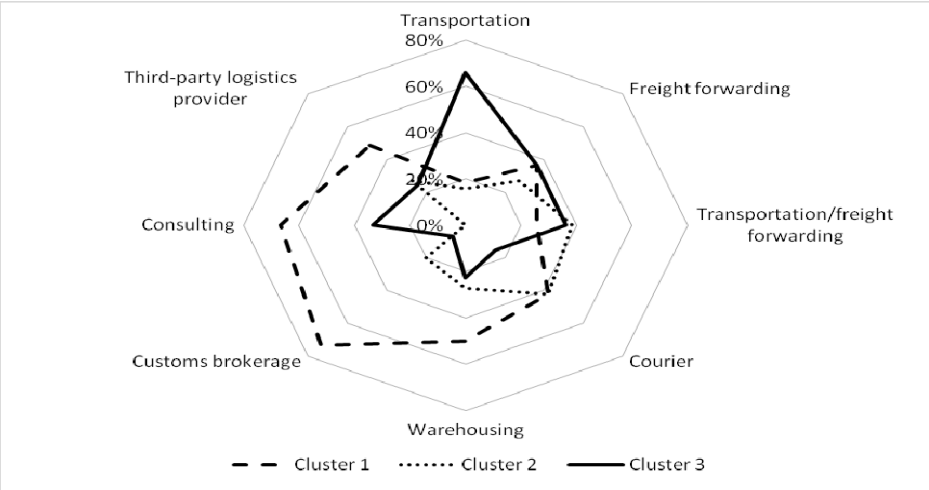
Cluster 3 accounts for 41% of the companies, which are basically small ones with less than 15 years of business operations and road transportation as a main provided service. This leads to the conclusion that LSPs in this cluster can be labelled as "*Typical transport providers (TTP)*".

Cluster 2 accounts for 32% of the companies. One of every two LSPs in this cluster has between 10 and 49 employees and considers itself a transport/freight forwarding or a courier company. The analysis revealed that such LSPs try to broaden their service package

through the provision of additional administrative services and some management services. These are "*Transport providers in development (TPD*)".

Figure 4

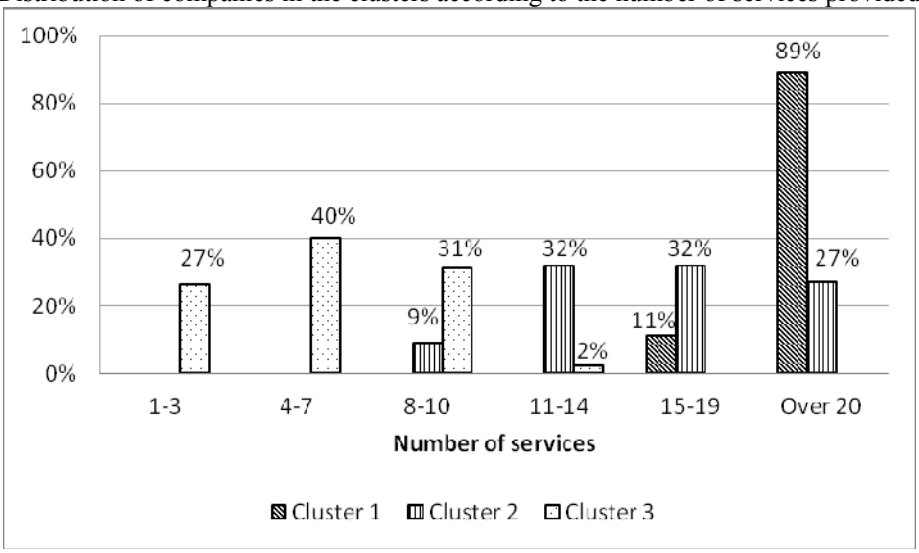
Distribution of companies in the clusters according to company type



Source: Authors.

Figure 5

Distribution of companies in the clusters according to the number of services provided



Source: Authors.

Cluster 1 has the least number of companies but they have medium or high-level capabilities for most of the listed services. These are "*True third-party logistics providers*

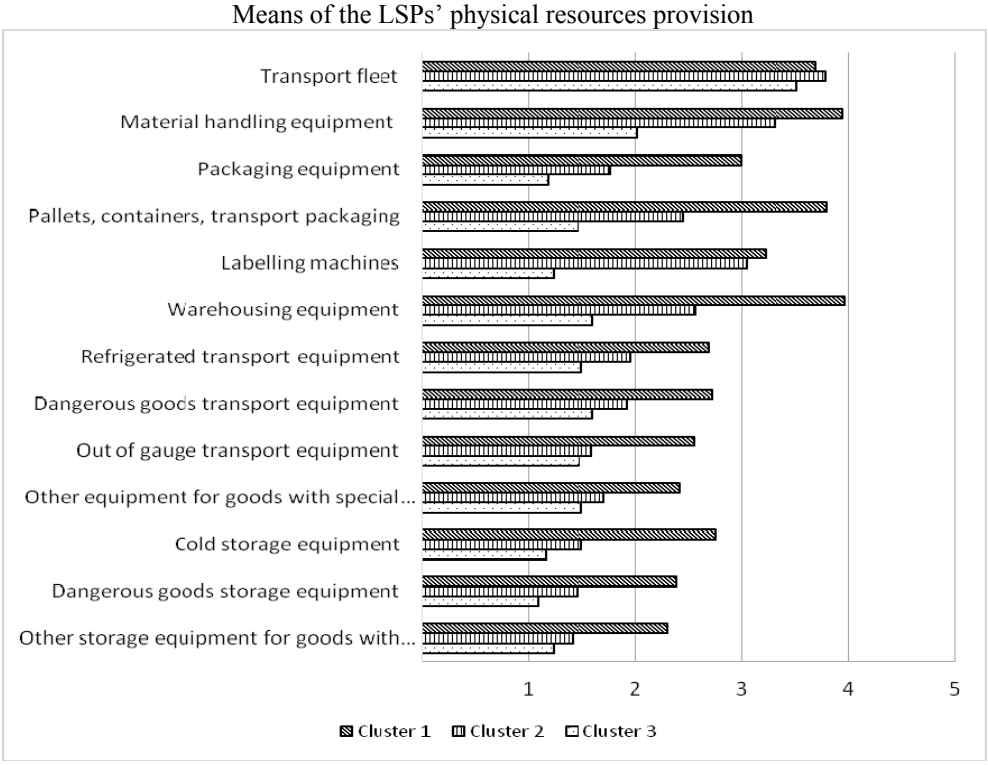
(TTPL)". Most LSPs in this cluster are medium and large ones (39% and 29% of all the LSPs in the cluster, respectively). It is the cluster with the biggest number of LSPs, which consider themselves 3PLs.

The above analysis leads to the conclusion that the Bulgarian LSPs follow the development model of the LSPs in the world. This model is expressed in the gradual expansion of the scope and complexity of the provided logistics services as the company develops.

It's interesting to examine the resource provision across the three clusters. The results concerning the physical resources are shown in Figure 6. The TTPL providers have a higher level of provision of all the resources in comparison with the companies in the other clusters. The exception is the transport fleet, which has relatively equal means for all the clusters. We can observe that the scores of the TTPL for material handling equipment, pallets, containers and transport packaging, and warehousing equipment are relatively high (around 4) and well above the scores of the other two clusters.

Figure 6

Means of the LSPs' physical resources provision



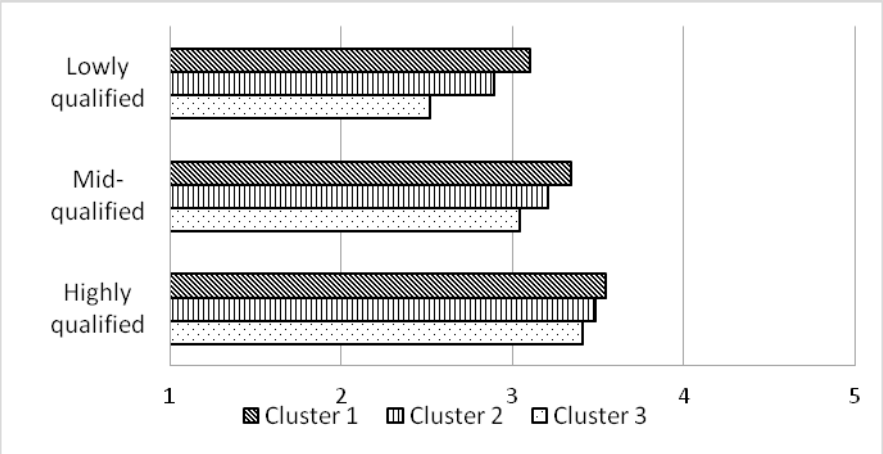
Notes: 5-Excellent, 1-Missing or not corresponding to the requirements.
Source: Authors

Employees' education/qualification is another criterion that can be used for the comparison of clusters. The results presented in

show a certain gap between clusters regarding the lowly qualified employees. In particular, the education and qualification of the lowly qualified employees in the TTPs (Cluster 3) are lower than the requirements for the position, while in the TTPL providers the education and qualification of these employees meet the requirements. That leads to the conclusion that LSPs in their first phase of development (Cluster 3) entrust the lowly qualified employees with functions that are unusual for their education/qualification. A possible reason for this is that they neglect the importance of the human resources education and qualification for the organisational growth. Another reason may be the lack of financial resources to hire and pay highly qualified employees. From the figure bellow we may notice also that, with the increase of the qualification, the difference between the clusters decreases.

Figure 7

Mean values of the compliance between employees' education/qualification and their positions' requirements



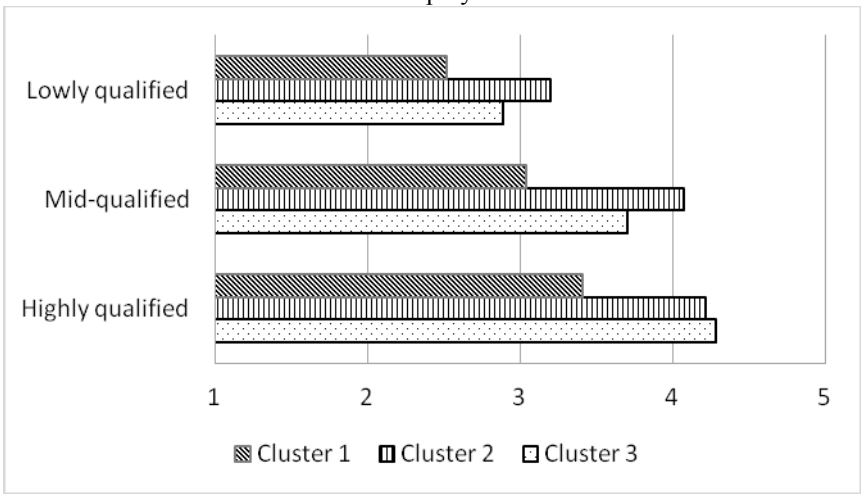
Notes: 5-Education and qualification are much higher that the requirements for the position, 1-Education and qualification are much lower that the requirements for the position.

Source: Authors

As for the human resources motivation, the survey results clearly show that with the increase of qualification, the employees' motivation also increases (Figure 8). However, there is a difference between the clusters. In Cluster 1 employees are generally less motivated. Bearing in mind that 1/3rd of the companies in this cluster are large companies, we can infer that the motivation in the bigger companies is lower. On the other hand, the mean values of Cluster 2 for lowly qualified and mid-qualified employees show the highest level of motivation among the three clusters. Thus, the companies in development, as we have defined them earlier, seem to provide growth opportunities for their employees and that leads to their higher motivation.

Figure 8

Mean values of employees' motivation



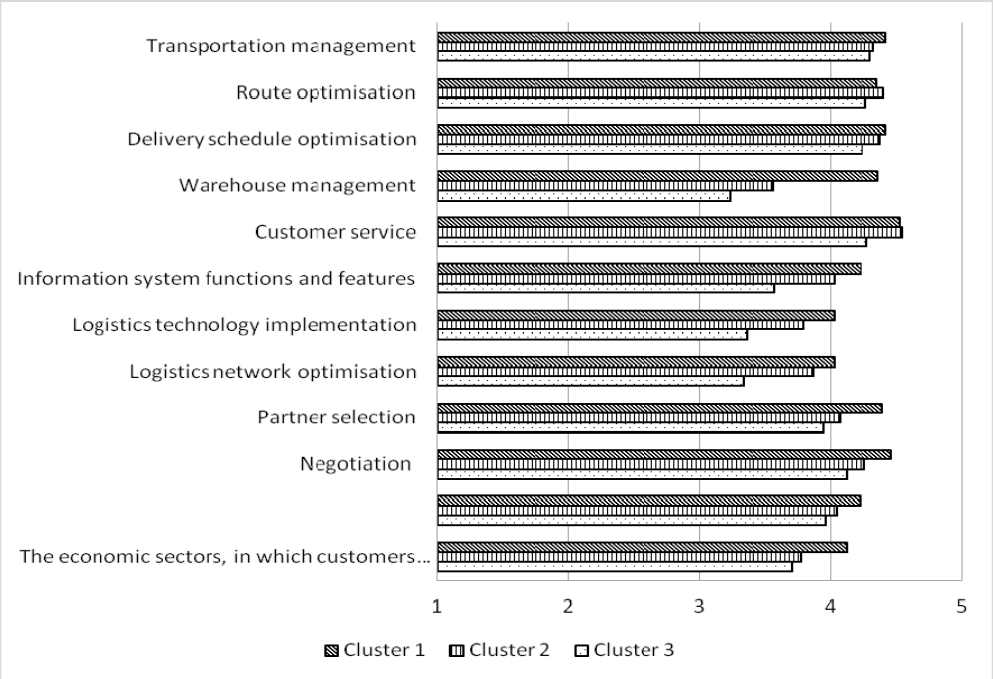
Notes: 5-Very high, 1- No motivation.
Source: Authors

The declared expert knowledge does not differ much between clusters in relation to transportation activities (transportation management, route and delivery schedule optimisation) and customer service *The* mean values of the software that companies use in different areas clearly show a pattern among the three clusters (*Figure 10*). The values of the TTPL providers are the highest, followed by the values of the TPDs. The TTPs have the lowest mean values. Some of the areas, such as radio-frequency identification that is mostly neglected, and invoicing, transport management, tracking and tracing and EDI, which are more broadly encountered, do not differ much between clusters (Figure 9). However, the clusters have different levels of warehouse management knowledge. The assessment of Cluster 1 (which includes most of the 3PLs) is much higher than the one of the other two clusters. Cluster 1 also exceeds them in the knowledge of information systems, logistics technologies, logistics network optimization, partner selection and negotiation. This cluster's higher knowledge of the economic sectors, in which its customers operate, is a prerequisite for providing higher customer service levels.

The mean values of the software that companies use in different areas clearly show a pattern among the three clusters (Figure 10). The values of the TTPL providers are the highest, followed by the values of the TPDs. The TTPs have the lowest mean values. Some of the areas, such as radio-frequency identification that is mostly neglected, and invoicing, transport management, tracking and tracing and EDI, which are more broadly encountered, do not differ much between clusters.

Figure 9

Mean values of the knowledge quality



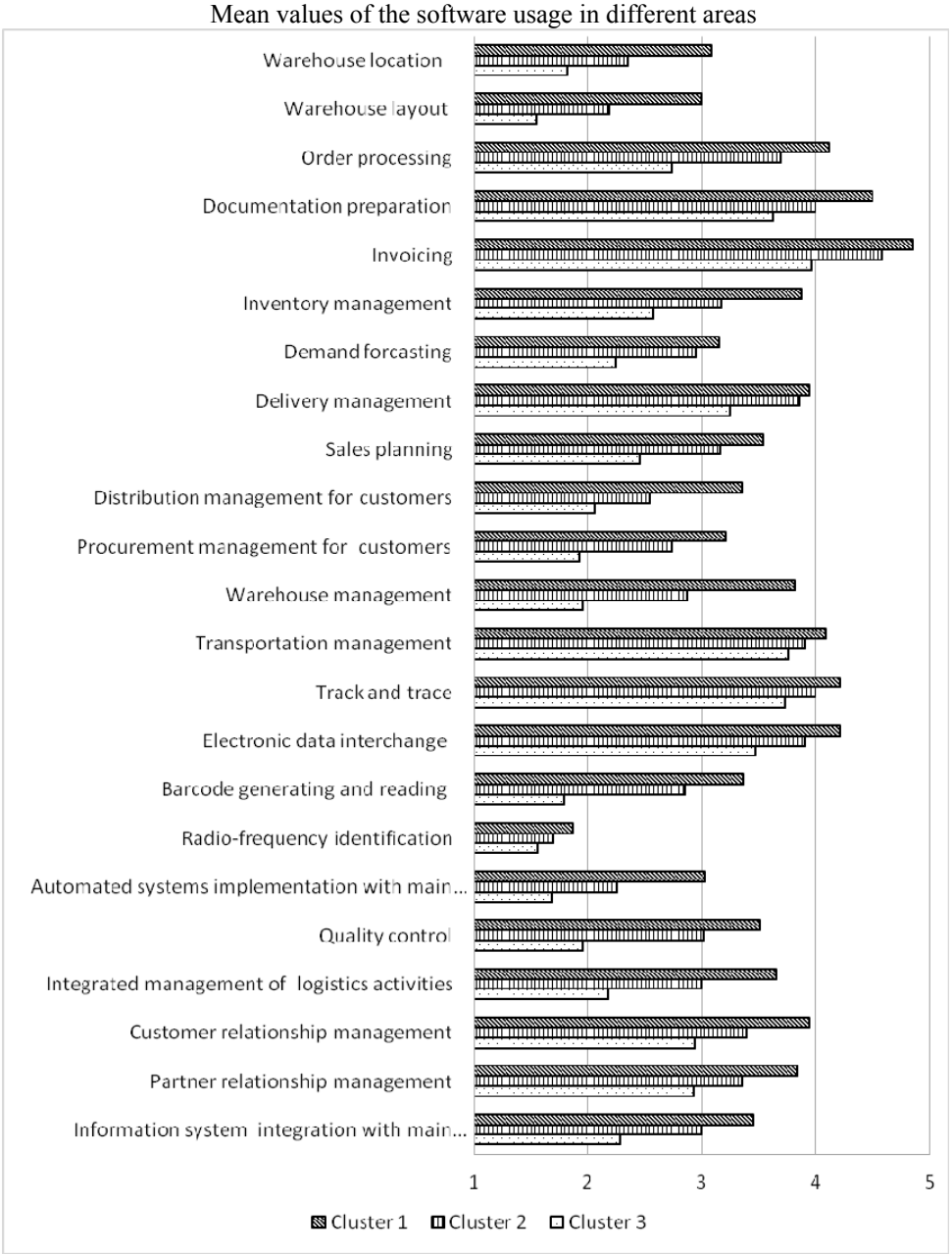
Notes: 5-Very high; 1-Very low.

Source: Authors

Relationships can be considered in two directions: 1) relationships between the LSP and other logistics providers, and 2) relationships between the LSP and its customers. Figure 11 reveals that generally the means of the first cluster (TTPLs) are higher than those of the second cluster (TPDs) except for the following items: "Providing confidential information to reduce costs", "Sharing performance indicators" and "Each party considers the financial interests of the other one". Most of the organisations in the second cluster are micro or small, relatively young and with future prospects for development. Thus, the higher means of the above mentioned items show the willingness of these firms to be more flexible. They need more financial resources to grow and sharing information to reduce costs seems quite reasonable. This conclusion is confirmed by their readiness to consider the other party's financial interests. Sharing performance indicators is also important to show the direction of LSPs' development.

Figure 10

Mean values of the software usage in different areas

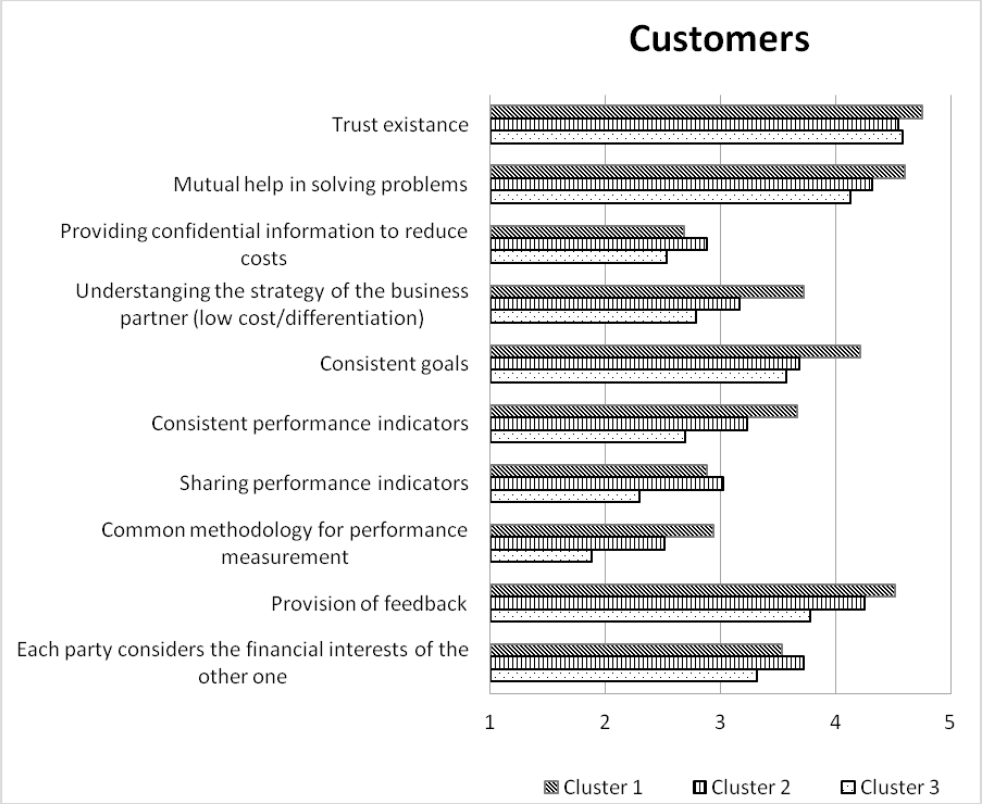


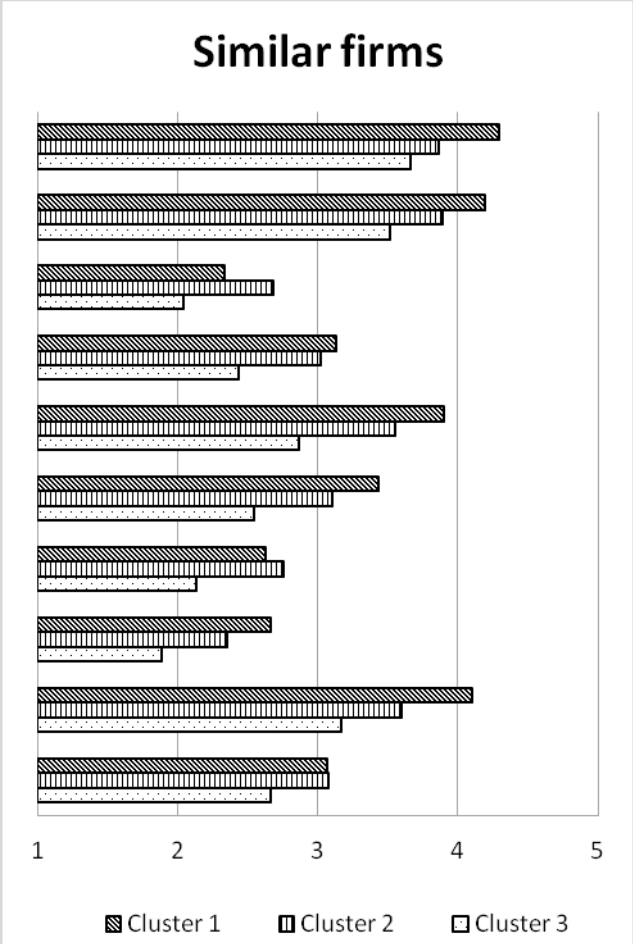
Notes: 5-Intensive usage, 1-Not at all used.
Source: Authors

We observe the same results for the relationships with similar firm, although to a lesser extent. This means that firms in Cluster 2 have recognised the importance of building partnerships within the logistics sector and rely on such a type of resources to achieve their goals.

Figure 11

Mean values of the characteristics of the relationships with customers/similar firm



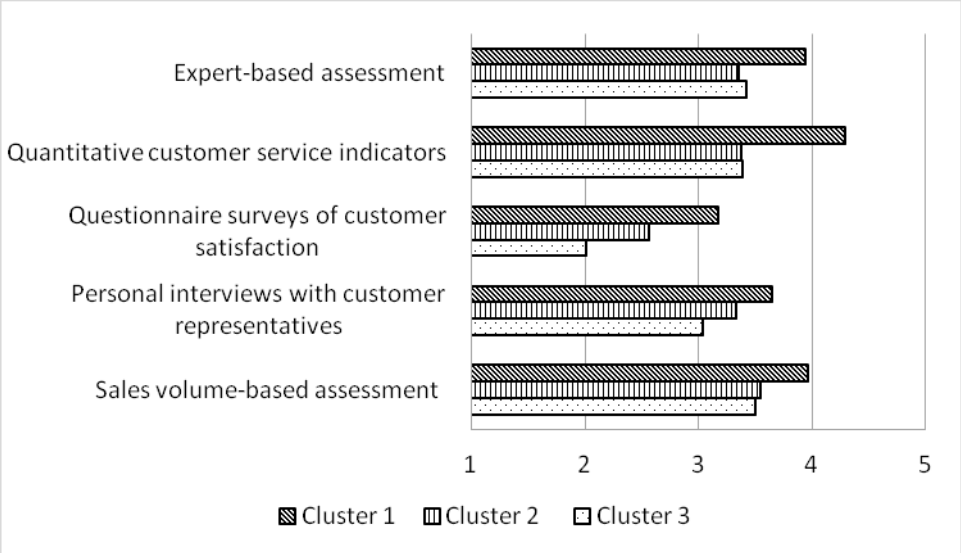


Notes: 5-Relevant to a very great extent, 1-Not at all relevant.
Source: Authors

Concerning the methods used for customer service assessment, the TTPL providers outperform the LSPs in the other two clusters in all methods (Figure 12). Cluster 2 and Cluster 3 show identical results (around 3.5) for three of the five methods, but firms in Cluster 2 exceed in the usage of surveys with questionnaires and interviews. This speaks about their striving to gain an understanding of the customer satisfaction.

Figure 12

Mean values of the usage of methods for customer service assessment

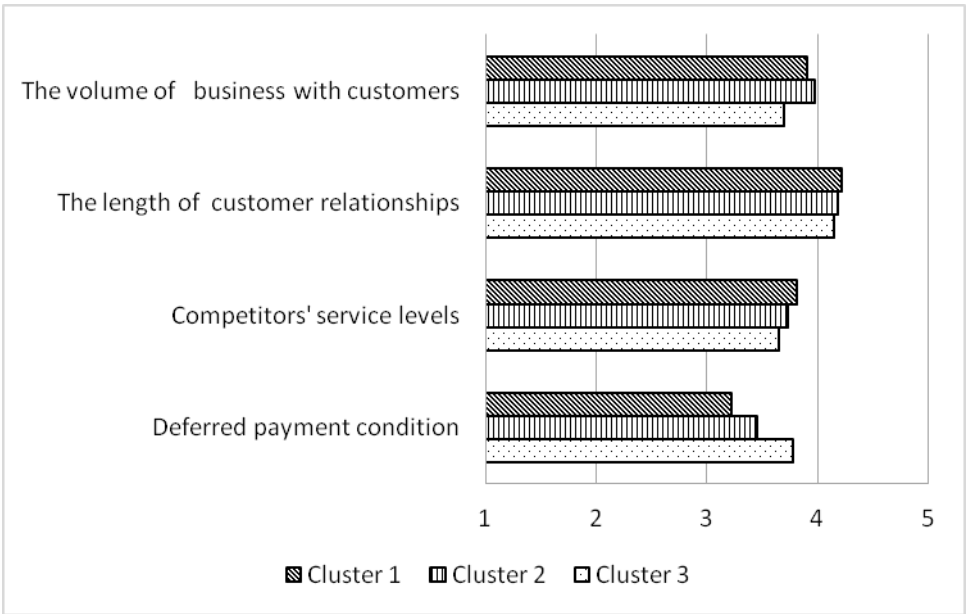


Notes: 5-Intensive usage, 1-Not at all used.
Source: Authors

Figure 13 presents the mean values of the factors that are considered by LSPs when determining customer service level. We can notice that the means for the three clusters are almost the same. Only the deferred payment condition is an exception with an interesting pattern among the three clusters. This pattern seems to be related to the type of the LSPs that constitute the clusters. For Cluster 1 the factor "deferred payment condition" has the lowest mean. This is the cluster with larger companies, which are supposed to have enough financial resources to perform their operations even with longer deferred payment terms, if such behaviour will bring them positives. However, most of the companies in Cluster 2 and Cluster 3 are smaller in size and the longer is the deferred payment term, the bigger is the threat of worsening their financial state. Thus, this factor is considered to a greater extent when customer service levels are determined.

Figure 13

Mean values of the factors that are considered to determine customer service levels



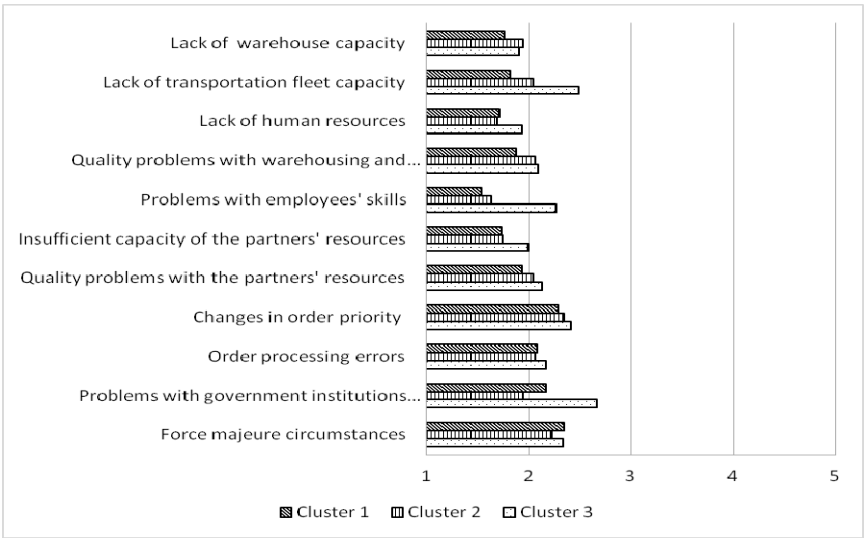
Notes: 5-Very often considered, 1-Never considered.
Source: Authors

The mean values of the reasons for customer dissatisfaction, presented in *Figure 14*, reveal that the cluster with the true third-party logistics providers has the lowest values of all measures, except for two, which are considered external to the "firm-partner-client" chain - problems with government institutions and force majeure circumstances. Thus, firms in this cluster can manage most of the reasons for customer dissatisfaction, but should concentrate on reducing the influence of government institutions and force majeure circumstances on customer service.

Figure 15 presents the mean values of the reported customer service levels. All the clusters have close values for all the measures except for three of them, which have higher scores for Cluster 1 - new services developed in the last 3 years, time to develop a new service and implementation of contemporary logistics technologies. These three measures are related to the company ability to be flexible and innovative and thus determine the LSPs' competitiveness. An important aspect to understand the results better is the service portfolio of the firms in Cluster 1. As it was stated earlier, these LSPs provide a large number of logistics services in order to respond to the growing needs of their customers in a timely manner. That explains the higher values of this cluster for the above mentioned three measures.

Figure 14

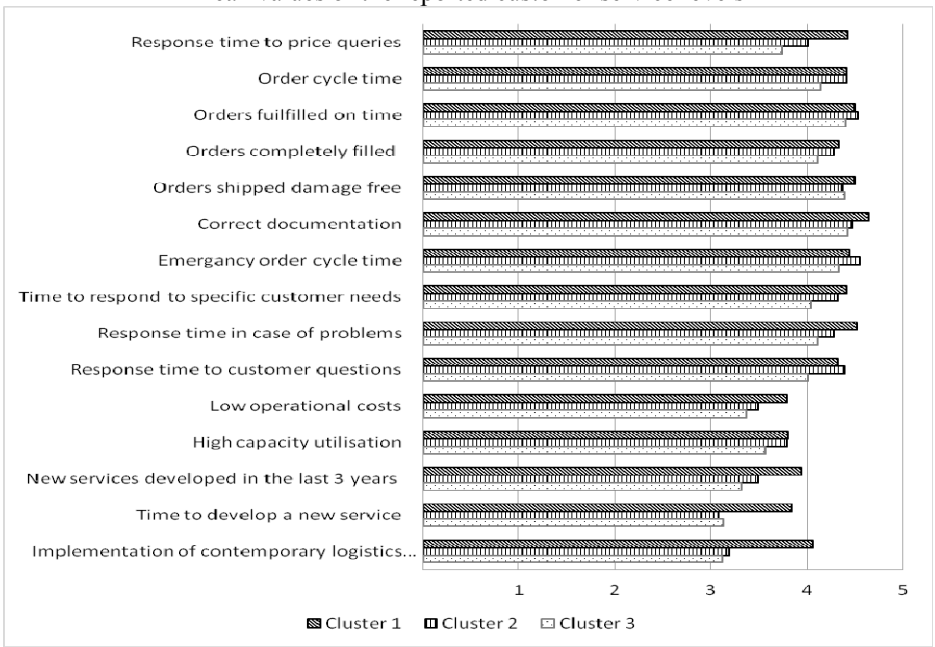
Mean values of the reasons for customer dissatisfaction



Notes: 5-Very frequent reason, 1- Not a reason.
Source: Authors

Figure 15

Mean values of the reported customer service levels



Notes: 5-Much higher than the industry average; 1-Much lower than the industry average.
Source: Authors

Conclusion

The logistics market is growing constantly over the last five years, increasing the interest in the logistics sector. In support of this fact is the doubled volume of the industrial and logistics space in Bulgaria since 2008. Meanwhile, the sector is growing although at a slower pace. For the 10 years between 2003 and 2013 the number of the firms in the logistics sector has increased by 16%, but the structure of the sector, with regard to firm size, has remained the same. LSPs play an important role in the economy because they contribute to the efficiency of supply chain processes through the development of service capabilities corresponding to the needs and requirements of customers.

This research work contributes to the knowledge of LSPs. Based on empirical data the article reveals the development phases of the LSPs in relation to their service capabilities and outlines the characteristics of these phases concerning company resources and different aspects of customer service. It is useful for LSPs' managers because it reveals the needed resources in the evolution of a LSP and the customer service aspects that should be emphasised on in order to increase competitiveness in the changing environment.

In relation to the raised research questions the study revealed three phases of the development of LSPs: *Typical transport providers,* offering one basic service, which is most commonly transportation. LSPs in the first phase are mostly small, considerably young firms with resources, related to the basic service they provide; *Transport Providers in development* that add some other administrative or management services. LSPs in the second phase are also mostly small, but they seek for opportunities to broaden the range of their services. Although the levels of physical resources are relatively higher for this phase, firms rely more on well-developed human resources and partner relationships to meet their goals; *True third-party logistics providers,* offering a broad range of logistics services that can be bundled in a package depending on the customer needs. The share of LSPs in the third phase of development is smallest but it is represented by many of the medium and large firms. Also, many LSPs that consider themselves third-party logistics providers have the characteristics of this development phase. They possess the highest level of resources in comparison with the companies in the other phases.

The groups formed as result of the cluster analysis and the characteristic resources and customer service aspects in each group provided a clear understanding of the typical features of these phases – what are the resources and customer service aspects in relation to which some LSPs lag behind and what are the resources and customer service aspects that are applied by the leaders. The outstanding aspect of this development is the addition of services to the main package and the development of the necessary resources for providing customers with an integrated solution.

The transition from one phase to another is accompanied by difficulties and constraints such as time and financial constraints, among others. Not all firms possess the needed capital to afford all the required physical resources, for example. The relatively small Bulgarian market does not allow the LSPs to achieve economies of scale. Thus using bank credits to support investments may not be attractive. An important constraint is also the variety of LSPs concerning the services, size, market orientation, strategic goals, etc.

Hence, LSPs should carefully select to offer those services that would contribute mostly to customer satisfaction. The organizational resistance to change can also be considered as a constraint. The implementation of new information technologies, for example, enables process automation, which leads to technological unemployment (loss of jobs caused by a technological change).

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 5

Hrabrin Bachev[1]

A STUDY ON SUSTAINABILITY OF AGRICULTURAL FARMS IN BULGARIA

The issue of assessment of sustainability of agricultural farms is among the most topical for researchers, farmers, investors, administrators, politicians, interests groups and public at large. Despite that practically there are no assessments on sustainability level of Bulgarian farms in conditions of European Union Common Agricultural Policy implementation. This article applies a holistic framework and assesses sustainability of Bulgarian farm as a whole and of different juridical type, size, production specialization, and ecological and geographical location. Initially the method of the study is outlined, and overall characteristics of surveyed agricultural holdings presented. After that an assessment is made of integral, governance, economic, social, environmental sustainability of farms in general and of different type and location. Finally, factors for improving sustainability of Bulgarian farms are identified, and directions for further research and amelioration of farm management and public intervention in the sector suggested.
JEL: Q12, Q18, Q56, Q57

Introduction

The issue of assessment of sustainability of farms is among the most topical for researcher, farmers, investors, administrators, policy-makers, interests groups and public at large around the globe (Andreoli and Tellarini, 2000; Bachev, 2005, 2006, 2016; Bachev and Petters, 2005; Bastianoni et al., 2001; EC, 2001; FAO, 2013; Fuentes, 2004; Häni et al., 2006; OECD, 2001; Rigby et al., 2001; Sauvenier et al., 2005; UN, 2015). In the last years that problem has been also studied in Bulgaria (Башев, 2016a, 2016b; Иванов и др., 2009; Йовчевска, 2016; Котева, 2016; Кънева, 2015; Хаджиева и др, 2005.; Bachev, 2005, 2010, 2013, 2016; Bachev et al., 2016, 2017). Nevertheless, practically there are no comprehensive assessments on sustainability level of Bulgarian farms in the conditions of European Union (EU) Common Agricultural Policy (CAP) implementation.

This article applies a holistic framework and assesses sustainability of Bulgarian farms as a whole and of different juridical type, size, production specialization, and ecological and geographical location. The framework for assessing farms sustainability includes 12 Principles, 21 Criteria, 45 Indicators and Reference values, which content, justification,

[1] *Hrabrin Bachev is Professor in Institute of Agricultural Economics – Sofia, e-mail: hbachev@yahoo.com.*

modes of calculation and integration are presented in details in our previous publication in this journal (Башев, 2016a).

Assessment of sustainability of farms in the country is based on a 2016 survey with the managers of "representative" market-oriented farms of different type. The survey was carried out with the assistance of the National Agricultural Advisory Service (NAAS) and the major associations of agricultural producers in the country, which identified the "typical" agricultural holdings of different type and location. The managers of selected agricultural holding were instructed and consulted by the regional stuff of NAAS, filled in a structured questenair, and send it the the regional office of NAAS.

Assessment of sustainability level of individual farm is based on estimates of the managers for each Indicator in four qualitative levels: "High/Higher or Better that the Average in the Sector/Region", "Similar/Good", "Low/Lower or Worse than the Average in the Sector/Region", "Negative/Unsatisfactory/Unacceptable". That approach is the only feasible to get necessary data for assessing sustainability of Bulgarian farms for a number of reasons: (1) level of most governance and social indicators is practically "known" only by farm managers - e.g. satisfaction of activity, acceptable income, available alternative for supply of inputs, etc.; (2) precise data for most ecological indicators on farm levels are not available and they can only be gathered through costly laboratory tests; and (3) our pilot study has proven that the majority of farm manager are well familiar with comparative production, economic and financial indicators of their farms in relation to the industry average, as well as with most available environmental indicators.

After that the qualitative estimates of farm managers have been quantified, and for integration equal weights are used for each Indicator in a particular Criterion, and for each Criterion in a particular Principle, and for each Principle in a particular Aspect, and for each Aspect in the Integral Index. Integral assessments for farms as a whole or of a particular group are arithmetic average of individual assessments of each participating holding.

For classification of farms according to juridical type (Physical Person, Sole Trader, Cooperative, Company), production specialization (Field Crops, Vegetables, Flowers, and Mushrooms, Permanent Crops, Grazing Livestock, Pigs, Poultry, and Rabbits, Mix Crop-Livestock, Mix Crops, Mix Livestock), geographical and administrative regions (North-West Region, North-Central Region, North-East Region, South-West Region, South-Central Region, South-East Region), and ecological locations (Mountainous or Non-mountainous regions with Natural Handicaps, with Lands in Protected Zones and Territories) the official typology for farming holdings in the country is used. In addition, every manager self-determined his/her farm as Predominately for Subsistence, rather Small, Middle size or Large for the sector, and located mainly in Plain, Plain-mountainous or Mountainous region. The latter approach guarantees an adequate assessment since the farms managers are well aware of the specificity and comparative characteristics of their holdings in relations to others in the region and the (sub)sector.

Initially, an overall characteristics of the surveyed farms is made. After that, integral, governance, economic, social, and environmental sustainability of the farms in general and of different type and location is assessed. Finally, factors for improving sustainability of

farms are identified, and directions for further research and amelioration of farm management and public intervention in the sector suggested.

1. Overall Characteristics of Surveyed Farms

The survey with the farm managers took part in summer of 2016 and included 190 registered agricultural producers, which comprise around 0,2% of all registered under 1999 Regulation No 3 for Creation and Maintaining a Registry of Agricultural Producers in Bulgaria[2]. Managers of "representative" farms of all juridical type, size, specialization and location have were surveyed. (Table 1). The structure and importance of surveyed farms approximately corresponds to the real structure of registered agricultural producers and market-oriented holdings in the country.

Table 1

Type and Number of Surveyed Agricultural Farms (percent, number*)

Type and location of farms	Physical persons	Sole Traders	Cooperatives	Companies	Total
Total	80,00	4,21	6,84	8,95	190*
Mainly subsistence	11,18	0,00	0,00	0,00	8,95
Small size	57,89	37,50	0,00	5,88	48,42
Middle size	28,95	37,50	92,31	70,59	37,37
Big size	1,32	25,00	7,69	23,53	4,74
Field crops	10,53	25,00	69,23	29,41	16,84
Vegetables, flowers, and mushrooms	13,82	12,50	0,00	0,00	11,58
Permanent crops	24,34	25,00	0,00	11,76	21,58
Grazing livestock	17,76	25,00	0,00	5,88	15,79
Pigs, poultry, and rabbits	0,66	0,00	7,69	0,00	1,05
Mix crop-livestock	14,47	0,00	23,08	23,53	15,26
Mix crops	13,82	12,50	0,00	29,41	14,21
Mix livestock	4,61	0,00	0,00	0,00	3,68
Mainly plain region	51,97	50,00	53,85	64,71	53,68
Plain-mountainous	19,74	50,00	38,46	17,65	22,11
Mainly mountainous	14,47	0,00	7,69	17,65	13,68
Lands in protected zones and territories	6,58	0,00	0,00	17,65	6,84
Mountainous regions with natural handicaps	15,13	0,00	7,69	11,76	13,68
Non-mountainous regions with natural handicaps	1,97	0,00	7,69	0,00	2,11
North-West region	15,79	37,50	7,69	11,76	15,79
North-Central region	21,05	0,00	23,08	23,53	20,53
North-East region	15,13	12,50	38,46	11,76	16,32
South-West region	14,47	0,00	7,69	11,76	13,16
South-Central region	19,74	12,50	15,38	29,41	20,00
South-East region	13,82	37,50	7,69	11,76	14,21

** mainly Corporations and 5,88% Partnerships.

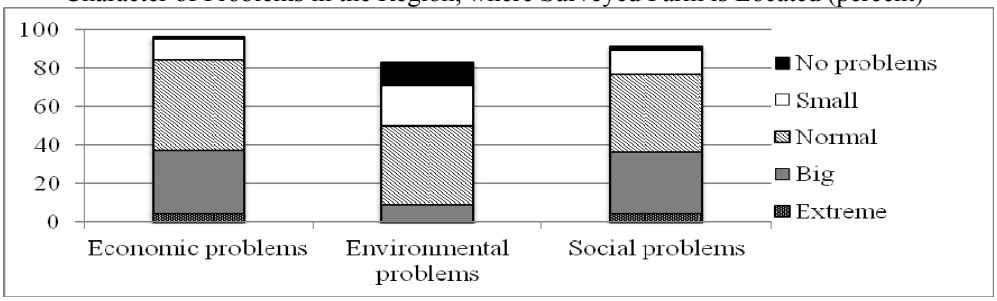
Source: survey with managers of farms, July 2016

[2] According to the Ministry of Agriculture and Food during 2014/15 business year there is a significant agmentation of the number of registered agricultural producers, whcih in the end of Jule 2015 reached 94815 (Agrarian Report, 2015).

The survey has found out that the majority of farms are located in regions with "Normal" economic, social and environmental problems (Figure 1). However, a significant part of holdings are in regions with "Big" or "Extreme" economic, social and environmental challenges. A third of the managers indicate that their farm is located in a region with "Small" or "Without" environmental problems, while share of enterprises with similar economic and social problems is smaller. A good portion of the managers are not aware of he character or are not able to assess the level of socio-economic and environmental problems in the region, where their farm is located. The latter concerns to the greatest extent competency of farmers in regard to environmental problems in the region, followed by the social and economic challenges.

Figure 1

Character of Problems in the Region, where Surveyed Farm is Located (percent)



Source: survey with managers of farms, July 2016

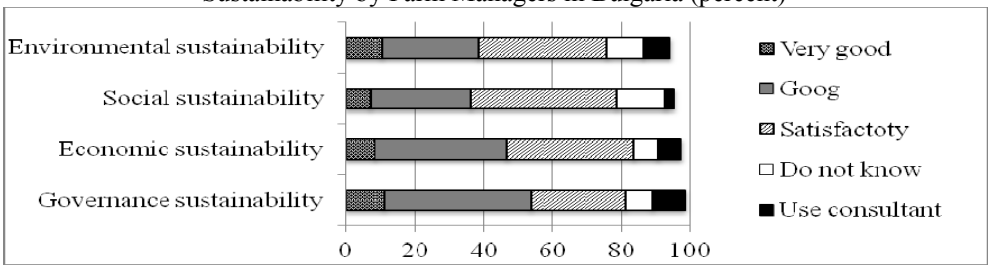
The owners and/or managers of three-quarter of surveyed farms are male, and around 60% are of up to 55 old. Such gender and age structure of managers (owners) will manage the majority of Bulgarian farms in coming 10-15 and more years and contribute to one or another sustainability level of holdings.

A good number of surveyed farms are with a relatively short period of existence up to 5 year, including almost 30% of them "less than two years". The majority of holdings however, are with a longer period of operation, including around 29% with 11 and more year effectively experience in management of farming sustainability. A little more than a half of surveyed farms indicate, that the period they put efforts for improving sustainability of farms look is up to 5 year. Another significant part of them is with a long-term experience in improving farm sustainability, including 19% with 11 and more year.

Awareness and respecting of major principles of sustainable agriculture is a base for effective management of farm sustainability. Majority of farms know Well or Very good the principles of governance and economic sustainability (Figure 2). At the same time, most holding acknowledge that their knowledge of principles of social and environmental sustainability is Satisfactory or entirely Absent.

Figure 2

Extent of Knowledge of Principles of Governance, Economic, Social and Environmental Sustainability by Farm Managers in Bulgaria (percent)



Source: survey with managers of farms, July 2016

A good portion of surveyed farms increase their capability for management of sustainability through hiring a consultant, as the biggest share of this mode is as far governance, environmental and economic sustainability is concerned.

With relatively the greatest own (internal) capability for management of diverse aspects of sustainability are Cooperatives, out of which a considerable fraction know Very well or Well the principles of governance, economic, social and environmental sustainability. Internal knowledge regarding sustainability principles is also high for Sole Traders and Companies, while for Physical Persons it is relatively lower. To the greatest extent consultants are used for enhancing knowledge of economic and environmental sustainability by Sole Traders (by 12%) and Physical Persons (accordingly 12% and 9%).

Competency of sustainability principles increase along with the size of farms and larger holdings tend to know better governance, economic, social and environmental sustainability. There is also a differentiation of competency according to specialization of holdings as those in Field Crops, Grazing Livestock, Pigs, Poultry and Rabbits, and Mix Crop-Livestock are with a bigger competency of governance sustainability, specialized in Pigs, Poultry and Rabbits, and Mix Crop-Livestock with the best awareness of economic sustainability, and those with Mix Livestock with the highest competency in respect to environmental sustainability. Similarly, the share of holdings with a high competency on sustainability principles is the greatest for those with Lands in Protected Zones and Territories, and farms located in South-West Region of the country.

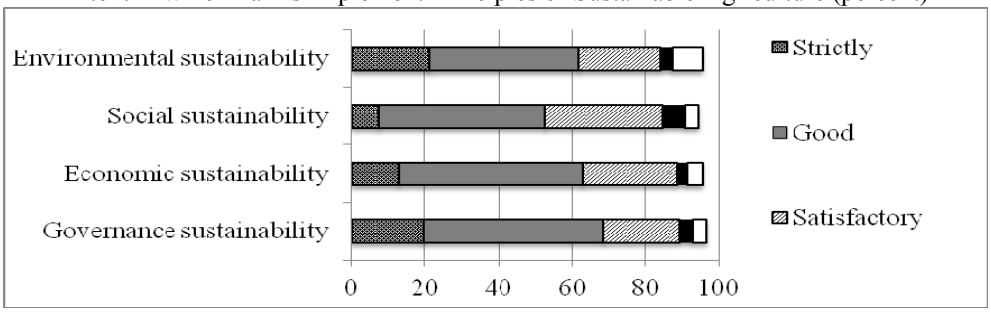
In the future more efforts are to be directed t improving competency of farms with low culture in regard to principles of agrarian sustainability through education, training, consultation, advices, exchange of positive experiences, etc.

Due to incomplete knowledge and other economic, technological, agronomical, behavioral, etc. reasons, and in different period of time, farmers not always apply strictly principles of sustainable agriculture. According to the best part of the managers in farms are applied Strictly or Well principles of governance, economic, social and environmental sustainability (Figure 3). Nevertheless, a significant fraction of holdings respect principles of social, economic, environmental and governance sustainability only Satisfactorily. What

is more, a part of holding indicates that they Do not Respect such Principles, or respect there merely If Sanctions are Applied. (reaching up to 8% for environmental sustainability).

Figure 3

Extent in which Farms Implement Principles of Sustainable Agriculture (percent)



Source: survey with managers of farms, July 2016

To the greatest extent principles of agrarian sustainability are integrated (applied) in the overall management by Cooperatives and Companies. Around 8% of Cooperatives apply principles of environmental sustainability only if there are sanctions. Relatively smaller scale of Sole Traders and Physical Persons apply principles of social sustainability to a great extent. A good segment of Physical Persons respect principles of sustainable agriculture only if there are sanctions - 9% of them for environmental sustainability, 5% for economic sustainability and by 5% for governance and social sustainability. All these data demonstrate, that sanctions of state, local authority, owners, members, etc. induce business behavior for amelioration of environmental sustainability for certain type of farms like Cooperatives and Physical Persons.

Application of sustainability principles increases along with the size of holdings and as a rule larger farms respect better governance, economic, social and environmental sustainability. Regarding principles of sustainability is most common for farms specialized in Field Crops, Grazing Livestock, Mix Crop-Livestock and Mix Crops, and holdings with Lands in Protected Zones and Territories, and located in Non-mountainous Regions with Natural Handicaps, and South-West Region of the country. For all groups of farms the share of those which respect well or strictly the principles of agrarian sustainability overpass the portion of these which know well or very well these principles. Therefore, there is questionable how some holdings apply effectively principles, which they do not know well.

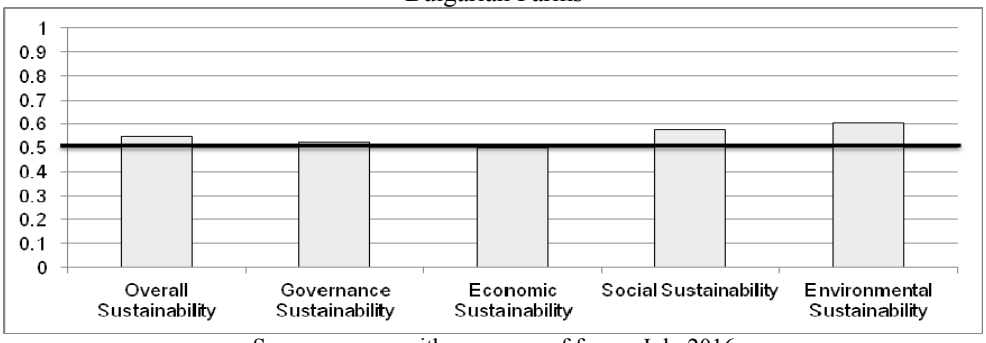
2. Overall and Multi-aspect Sustainability Level of Agricultural Farms

Multi-indicators assessment of sustainability level of surveyed farms indicates, that the Index of Integral Sustainability of holdings is 0,55, which represents a *good* level of sustainability of Bulgarian farms (Figure 4). With the highest levels are Indexes of Environmental (0,61) and Social (0,57) Sustainability of holdings, while Indexes of

Governance (0,52) and Economic (0,5) Sustainability are at the border with a low level. Therefore, improvement of the latter two is critical for maintaining a good sustainability of farming enterprises in the country.

Figure 4

Indexes of Integral, Governance, Economics, Social and Environmental Sustainability of Bulgarian Farms

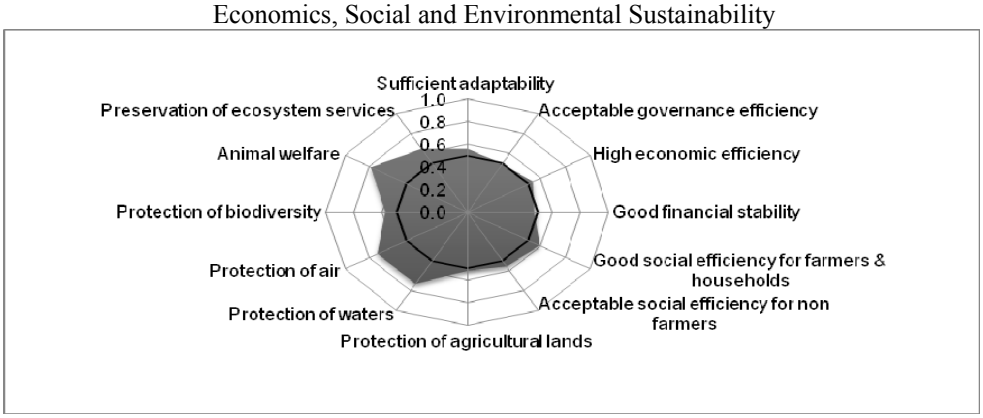


Source: survey with managers of farms, July 2016

Analysis of individual Indexes for major sustainability Principles, Criteria and Indicators let identify components contributing to diverse aspects of farms' sustainability in the country. For instance, governance and economic sustainability of Bulgarian farms are relatively low because of the fact that the Index of Governance Efficiency (0,49) and the Index of Financial Stability (0,47) of holdings are low (Figure 5). Similarly, it is clear that despite that the overall environmental sustainability is relatively high, the Index of Preservation of Agricultural Lands (0,52) and the Index of Preservation of Biodiversity (0,56) are relatively low and critical for maintaining the achieved level.

Figure 5

Index of Sustainability of Bulgarian Farms for Major Principles for Governance, Economics, Social and Environmental Sustainability

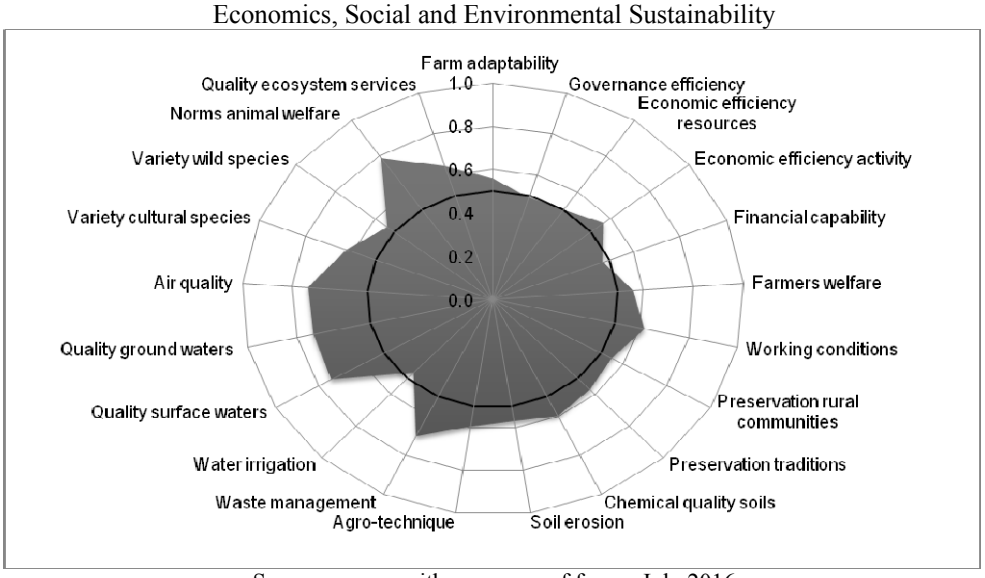


Source: survey with managers of farms, July 2016

In depth analysis for individual Criteria and Indicators further specifies the elements, which enhance or reduce farms' sustainability level. For instance, insufficient Comparative Governance Efficiency and Financial Capability (Figure 6) are determined accordingly by: a low Comparative Efficiency of Supply of Short-term Inputs in relations to alternative organizations (0,28), and unsatisfactory Profitability of Own Capital (0,41) and Overall Liquidity (0,48) of farms (Figure 7). Similarly, low levels of Indexes of Preservation of Agricultural Lands and Preservation of Biodiversity are determined accordingly by insufficient Application of Recommended Irrigation Norms (0,46), high level of Soils Water Erosion (0,55), and lowered Number of Wild Animals on Farm Territory (0,53).

Figure 6

Level of Sustainability of Bulgarian Farms for Individual Criteria for Governance, Economics, Social and Environmental Sustainability



Source: survey with managers of farms, July 2016

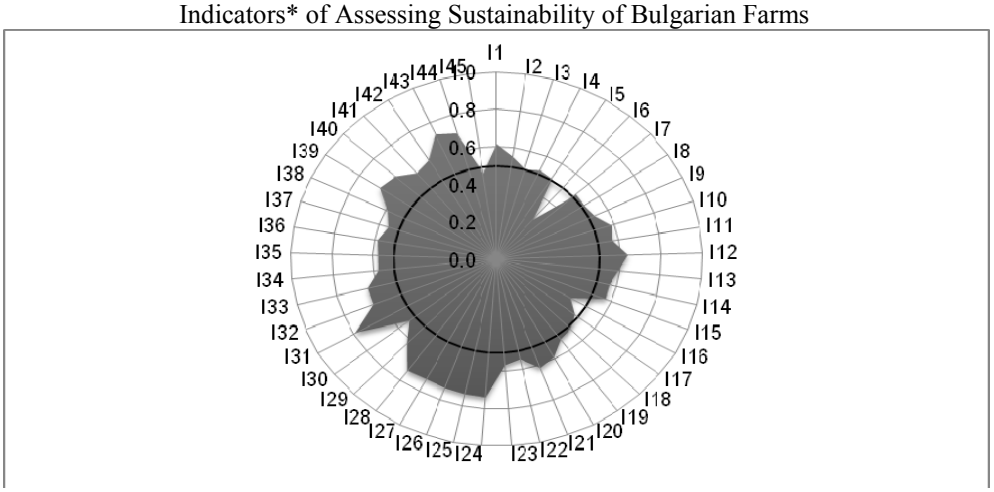
Low levels of indicators identify the specific areas for improvement of sustainability of farms through adequate changes in management strategy and/or public policies. For instance, despite that the overall Adaptability of Farms is relatively high (0,56), the Adaptability of Farms to Changes in Natural Environment (climate, extreme events, etc.) is relatively low (0,5). Therefore, effective measures are to be undertaken to improve the latter type of adaptability through education, training, information, amelioration of agro-techniques, structure of production and varieties, technological and organizational innovations, etc.

On the other hand, superior levels of certain indicators show the absolute and comparative advantages of Bulgarian farms related to sustainable development. At the current stage of development the latter are associated with respecting Animal Welfare standards, Preservation of Quality of Surface and Ground Waters from contamination with nitrates and pesticides, Preservation of Air Quality, implementation of Good Agricultural Practices,

reduced Number of Livestock per unit of Farmland, acceptable Labor Conditions and comparative Satisfaction from Farming Activity, optimal Productivity of Livestock, good Adaptability to Market (prices, competition, demands), and Comparative Governance Efficiency of Marketing of Products and Services.

Figure 7

Indicators* of Assessing Sustainability of Bulgarian Farms



**I1-Level of Adaptability to Market Environment; I2-Level of Adaptability to Institutional Environment; I3-Level of Adaptability to Natural Environment; I4-Comparative Efficiency of Supply and Governance of Labor Resources; I5-Comparative Efficiency of Supply and Governance of Natural Recourses; I6-Comparative Efficiency of Supply and Governance of Short-term inputs; I7-Comparative Efficiency of Supply and Governance of Long-term Inputs; I8-Comparative Efficiency of Supply and Governance of Innovation; I9-Comparative Efficiency of Supply and Governance of Finance; I10-Comparative Efficiency of Governance of Marketing of Products and Services; I11-Land productivity; I12-Livestock Productivity; I13-Level of Labor productivity; I14-Rate of Profitability of Production; I15-Income of Enterprise; I16-Rate of Profitability of Own Capital; I-17-Overall Liquidity; I18-Financial Autonomy; I19-Income per Farm-household Member; I-20-Satisfaction of Activity; I21-Compliance with Working Conditions Standards; I22-Contribution to Preservation of Rural Communities; I23-Contribution to Preservation of Traditions; I24-Nitrate Content in Surface Waters; I25-Pesticide Content in Surface Waters; I26-Nitrate Content in Ground Waters; I27-Pesticide Content in Ground Waters; I28-Extent of Air Pollution; I-29-Number of Cultural Species; I30-Number of Wild Species; I31-Extent of Respecting Animal Welfare; I32-Extent of Preservation of Quality of Ecosystem Services; I33-Soil Organic Content; I34-Soil Acidity; I35-Soil Soltification; I36-Extent of Wind Erosion; I37-Extent of Water Erosion; I38-Crop Rotation; I39-Number of Livestock per ha of Farmland; I40-Norm of Nitrogen Fertilization; I41-Norm of Phosphorus Fertilization; I42-Norm of Potassium Fertilization; I43-Extent of Application of Good Agricultural Practices; I44-Type of Manure Storage; I45-Irrigation Rate

Source: survey with managers of farms, July 2016

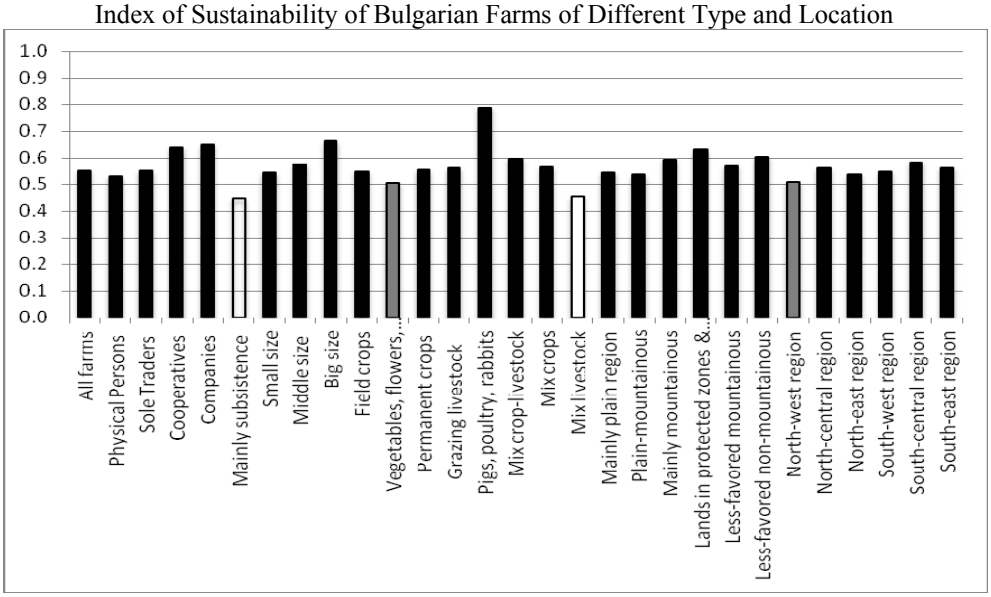
All results of assessment of overall and multi-aspect sustainability level of Bulgarian farms are in lines with another study focusing on assessing sustainability of Bulgarian agriculture, based on more "objective" information and available aggregate data from EUROSTAT, DG Agriculture and rural development, National Statistical Institute, Department

"Agrostatistics" at the MAF, Ministry of environment and waters (Bachev et all., 2017). The later proves that similar assessments based of opinions and estimates of farm managers are reliable and should be used in research and managerial practice.

There is a great variation in sustainability levels of farms of different type and location (Figure 8). Only holdings Predominately for Subsistence and Mix Livestock are with low sustainability. Economic, governance, and social sustainability of first ones are particularly low (Figure 9). The second group is with low economic, environmental and governance sustainability, and a marginal social sustainability.

Figure 8

Index of Sustainability of Bulgarian Farms of Different Type and Location

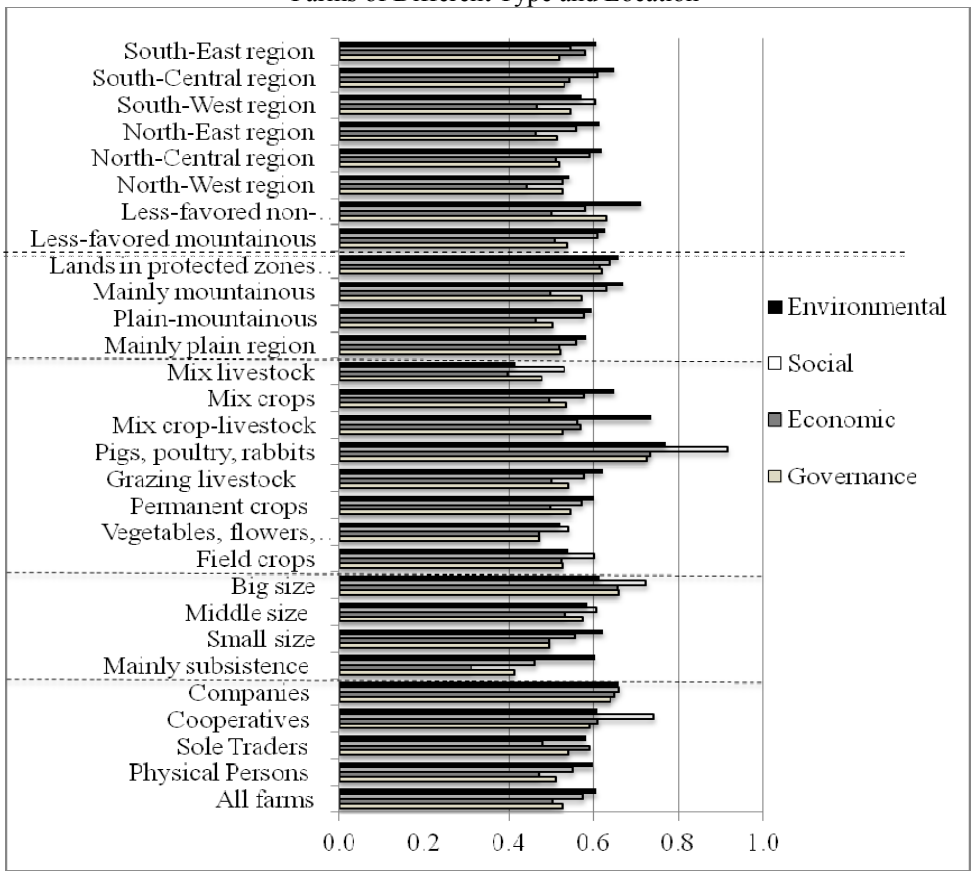


Source: survey with managers of farms, July 2016

Another category of farms is with a good sustainability, but with levels on or close to the border with inferior one. In the latter group are holdings specialized in Vegetables, Flowers and Mushrooms having a low governance and economic sustainability, and not a particularly good social and environmental sustainability. In that group are also Physical Persons and farms located in North-West Region of the country. Former are with a low economic sustainability and a marginal social and governance sustainability. The latter are with a low economic sustainability and not particularly good social, governance and environmental sustainability. For all these enterprises effective measures have to be undertaken for improving all aspects of sustainability.

Figure 9

Levels of Governance, Economic, Social and Environmental Sustainability of Bulgarian Farms of Different Type and Location



Source: survey with managers of farms, July 2016

With a low economic sustainability are also farming enterprises with Small size, those specialized in Mix Crops and Permanent Crops, and holdings situated in Mountainous Regions, and in North-East and South-West Regions of the country. Consequently, overall sustainability of these farms is close to the border with inferior level. For all these enterprises effective measures are to be undertaken for increasing their economic sustainability in order to improve overall long-term sustainability.

With a low social sustainability are merely farming enterprises of Sole Traders for which adequate measures are to be introduced for improvement of that aspect such as training, stimulation, regulation, support, etc.

With the best overall sustainability are Companies, Cooperatives, and farms with Big size, all having high levels of governance, economic, social and environmental sustainability.

Holdings specialized in Pigs, Poultries and Rabbits are with highest sustainability, having very good levels for governance, economic and environmental aspects. The latter are the only type of enterprises, having a high level of sustainability of a certain aspect.

Farming enterprises with Lands in Protected Zones and Territories, and those located in Non-mountainous Regions with Natural Handicaps and in South-Central Region are with superior levels of sustainability. Former group are with high governance, economic, social and environmental sustainability.

On the other hand, Holdings in Non-mountainous Regions with Natural Handicaps and in South-Central Region are with relatively good levels of certain aspects of sustainability – governance and environmental for the first ones, and environmental and social for the latter. The rest aspects of sustainability of all these farming enterprise are with relatively low levels – accordingly for the former ones economic and social sustainability, and for the latter ones governance and economic sustainability. The other aspects of sustainability of these categories of holdings are with relatedly low levels – accordingly for former ones in regard to economic and social sustainability, and for the latter ones for governance and economic sustainability. Similarly, Mix Crop-Livestock farms are with a relatively high environmental sustainability, but with a lower level of governance sustainability. The latter necessitates undertaking adequate measures to improve sustainability in aspects with critical inferior levels for these types of farms.

3. Structure of Farms with Different Sustainability Levels

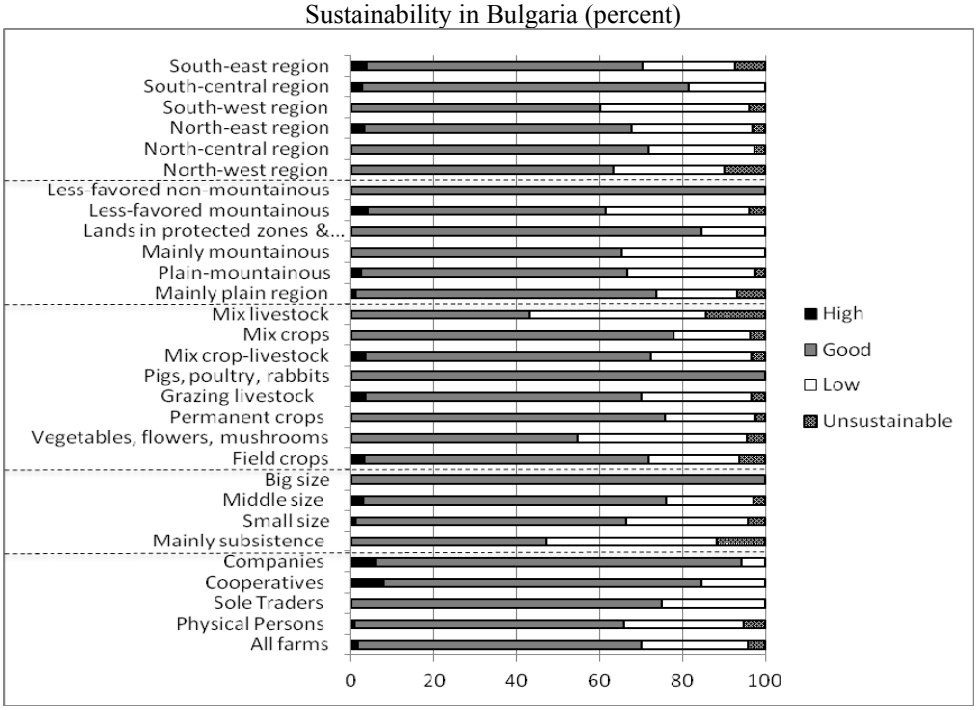
The overall and partial levels of farms' enterprises do not give a full picture about the state of all holdings since there is a great variation in the share of farms with different sustainability levels. The biggest portion of Bulgarian farms is with a good sustainability and only under 2% with a high sustainability (Figure 10). At the same time, 30% of agricultural holdings in the country are with a low sustainability or unsustainable at all.

The greatest share of farming enterprises with a good and high sustainability is among Companies, following by Cooperatives, and Sole Traders, The smallest is the fraction of holdings with a good sustainability among Physical Persons, where merely less than 1% is highly sustainable. Furthermore, more than a third of latter holdings are with a low sustainability or unsustainable at all. Every forth of Sole Traders is with a low sustainability, like 15% of Cooperatives, while only 6% of Companies are in the group of low sustainable enterprises.

There are also considerable differences in the portion of farms with unlike sustainability depending on the size of holdings. While all farms with Big size for the sectors are with a good sustainability, more than a half of holdings Predominately for Subsistence are with a low sustainability or unsustainable. Around a third of farms with Small size and almost a quarter of those with Middle size are with a low sustainability or unsustainable.

Figure 10

Structure of Farms of Various Type and Location with Different Levels of Overall Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

Among farms with diverse specialization, the share of holdings with a good and high sustainability is the greatest for Pigs, Poultry and Rabbits, Mix-crops, Permanent Crops, Mix Crop-livestock, Field Crops and Grazing Livestock. On the other hand, majority of holdings in Mix-livestock are with a low sustainability (43%) or unsustainable (14%). A good portion of the farms specialized in Vegetables, Flowers and Mushrooms is also low sustainable (41%) or unsustainable (4%).

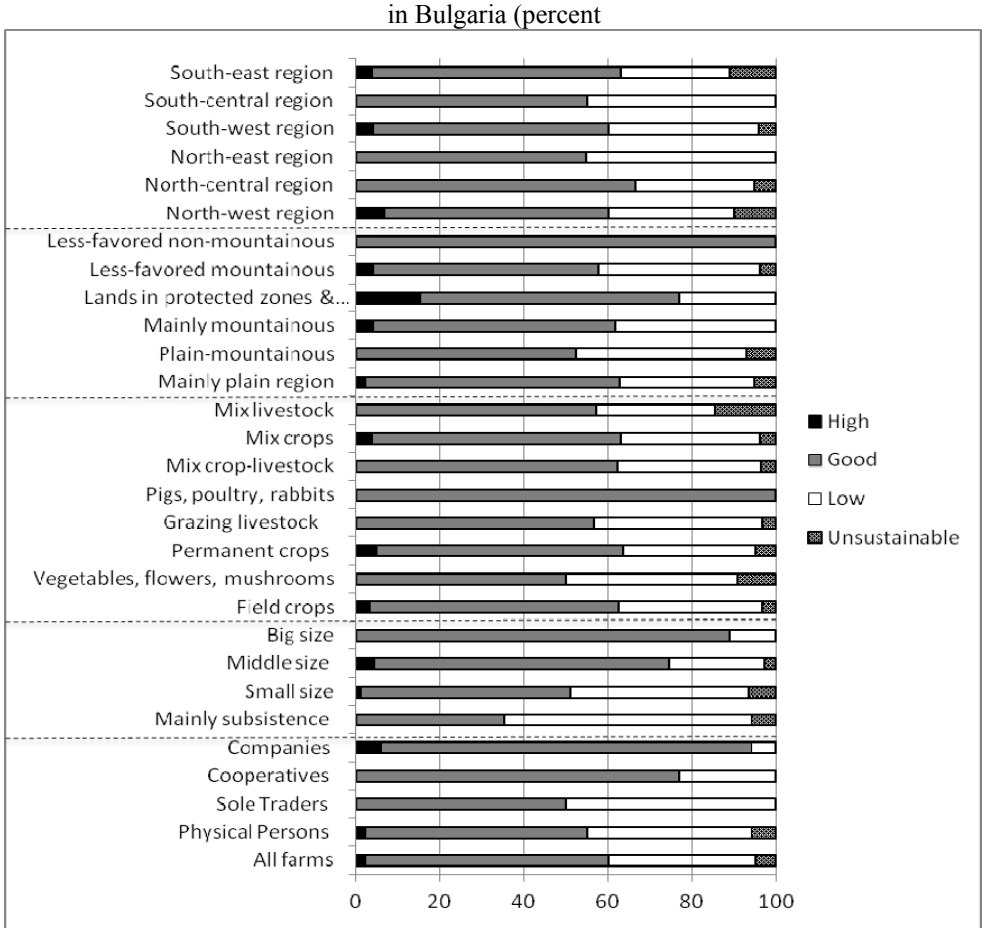
The share of farms with a good and high sustainability is significant among those located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, in Plain Regions, in South-Central, North-Central, and South-East Regions of the country. Simultaneously, 40% of holdings in South-West Region with low sustainability or unsustainable, similar to 37% of those in North-West and 32% in North-East Region. North-West Region is the leader in segment of unsustainable farms, where every tenth is unsustainable. Many holdings in Mountainous Regions with Natural Handicaps (38%), and Mountainous Regions (35%), and a third in Plain-mountainous Regions are low sustainable or unsustainable.

Data for dispersion of farms of different type in groups with diverse level of sustainability has to be taken into account when forecast the number and importance of holdings of each

kind, and modernize public (structural, sectorial, regional, environmental, etc.) policies for supporting agricultural producers of certain type, sub-sectors, eco-systems, and regions of the country.

Analysis of structure of farms with different level of sustainability for each aspect gives important information about the long-term sustainability of farms and factors for its improvement. Our assessment shows that 40% of holdings in the country are with a low governance sustainability or managerially unsustainable (Figure 11). That means that the comparative governance efficiency for supply of labor, land, finance, etc. and/or marketing of produce in these farms is lower than another feasible organization, and that the adaptability to evolving socio-economic, institutional and natural environment is insufficient.

Figure 11
Structure of Farms of Various Type and Location with Different Governance Sustainability in Bulgaria (percent

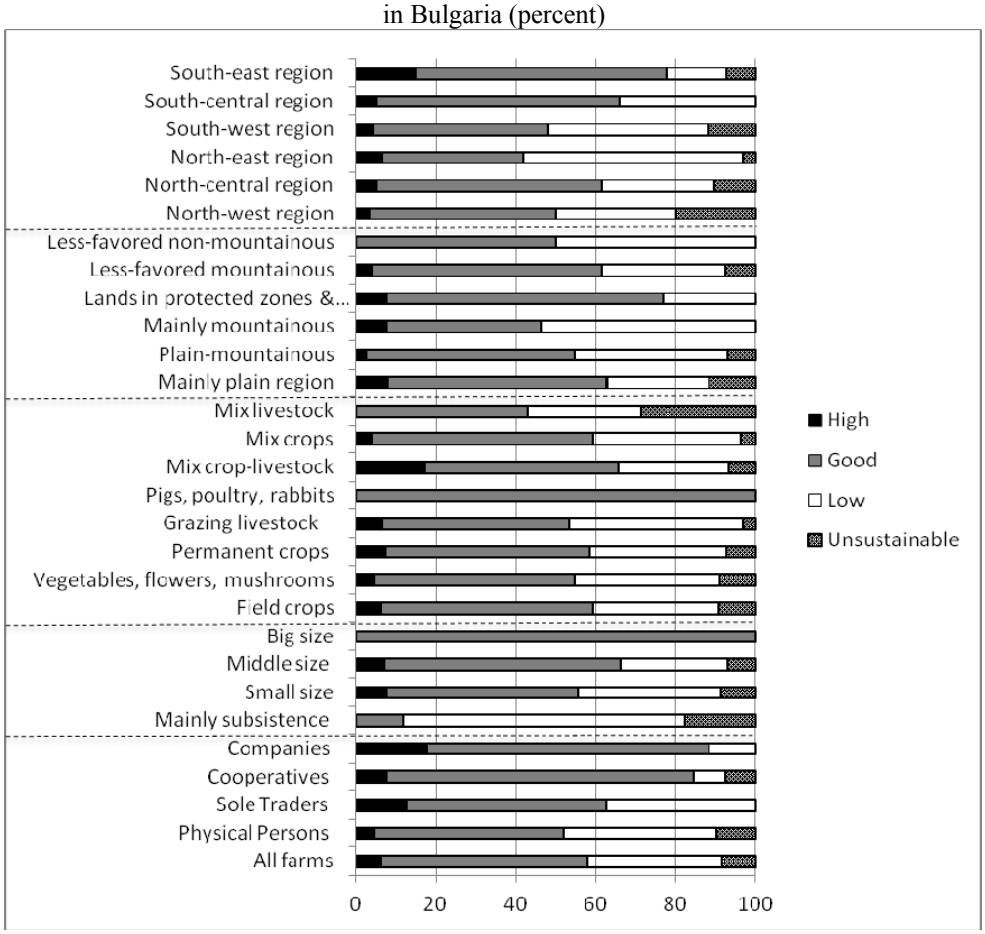


Source: survey with managers of farms, July 2016

Furthermore, 42% of all farms are with a low economic sustainability or unsustainable at all (Figure 12). That means that economic and financial efficiency of activity and resource utilization in a good portion of Bulgarian farms is low and do not correspond to the modern management and competition requirements.

Figure 12

Structure of Farms of Various Type and Location with Different Economics Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

The biggest is the share of farms with a good and high governance sustainability among Companies and Cooperatives, holding with Big and Middle size for the sector, these specialized in Pigs, Poultry and Rabbits, Permanent Crops, Mix Crops, Field Crops, and Mix Crop-Livestock as well as located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, Plain Regions, Mountainous Regions with Natural Handicaps, and in North-Central, South-East, North-West and South-

West Regions of the country. With the greatest portion of farms with a low or lack of governance sustainability are Sole Traders (50%) and Physical Persons (45%), holdings Predominately for Subsistence (65%) and Small size for the sector (49%), specialized in Vegetables, Flowers and Mushrooms (50%), and situated in Plain-Mountainous Regions (48%), and those in North-East and South-Central Regions of the country (by 45%).

All that means that a considerable fraction of Bulgarian farms are with insufficient governance sustainability for meeting contemporary socio-economic, institutional and natural challenges, and they have to modernize or they will cease to exists in a middle term.

The biggest share of farms with a good or superior economic sustainability is among Companies, Cooperatives, and Sole Traders. Moreover, a significant portion of firms is with a high economic sustainability. Besides, all enterprises with Big size for the sector are with a good economics sustainability. All these prove the comparative economic advantages of registered holdings and those with large scale.

The relative share of farms with a good and high economic sustainability is also considerable for farms with Middle size for the sector, specialized in Pigs, Poultry and Rabbits, Mix Crop-Livestock, Field Crops, Mix Crops, and Permanent Crops, and these with Lands in Protected Zones and Territories, located in Plain Regions, and Mountainous Regions with Natural Handicaps, and in South-East, South-Central, and North-Central Regions of the country.

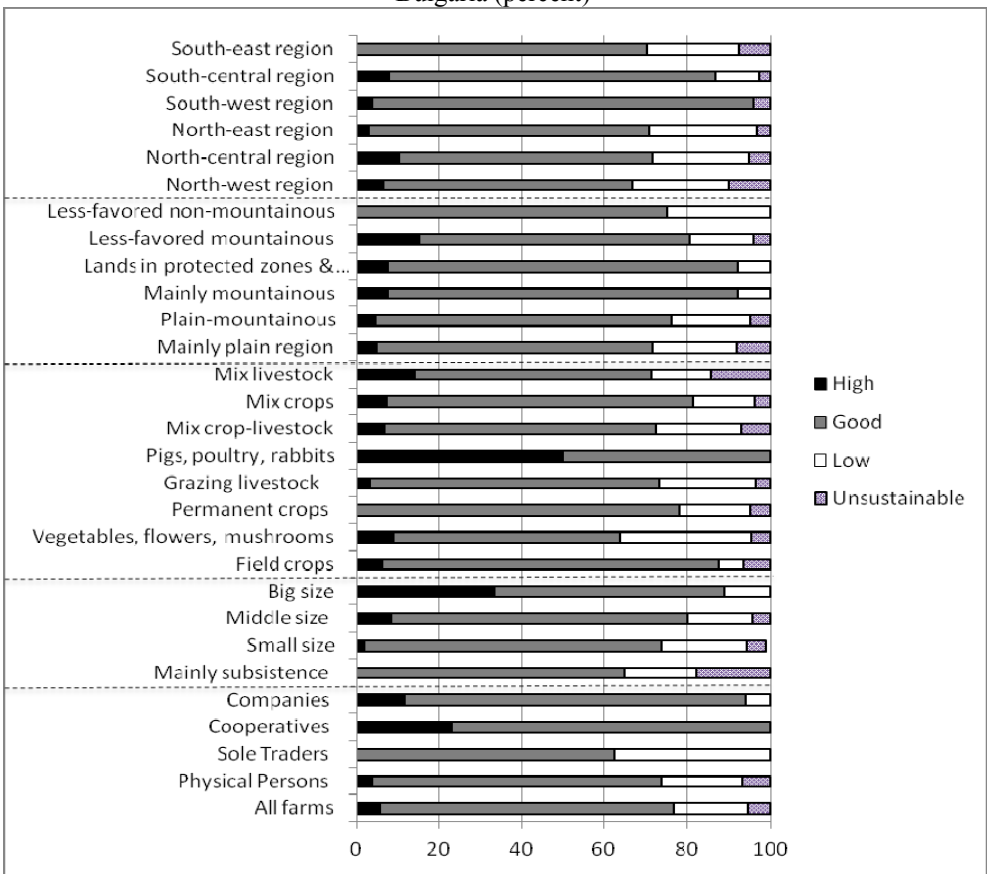
The greatest fraction of farms with a low or lack of economic sustainability are among Physical Persons (48%), most part of holdings Predominately for Subsistence (88%), and among specialized in Mix-Livestock (57%), Grazing Livestock (47%), and Vegetables, Flowers and Mushrooms (45%) as well as located in Mountainous (54%) and Plain-Mountainous (45%) Regions, and those in North-East (58%) and South-West (52%) Regions of the country. Moreover, a significant portion of latter category of holdings are currently economically unsustainable, which concerns almost every tenth of Physical Persons, 29% of farms with Mix-Livestock, each fifth farm located in North-West Region and 12% of those in South-West Region of the country, 18% of holdings Predominately for Subsistence, 9% of specialized in Vegetables, Flowers and Mushrooms, almost 9% of holdings with Small size, and 7% of those located in Plain-Mountainous regions of the country.

All these indicates that, a great part of Bulgarian farms currently are with low economic sustainability or economically unsustainable, and most likely they will cease to exists in near future or in coming years, unless effective measures are taken (public support regulations, etc.) for improving their economic sustainability.

As far as social aspect of sustainability is concerned the majority of surveyed farms in the country are with a good or high sustainability (Figure 13). Despite that holdings with a low social sustainability are numerous (almost 18%), and each tenth one is socially unsustainable. That demonstrates that social efficiency of enterprises for farmers, communities and society and a whole do not correspond to contemporary requirements and standards.

Figure 13

Structure of Farms of Various Type and Location with Different Social Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

A considerable part of Cooperatives is with a good social sustainability, and the rest 23% are with a high social sustainability. The share of Companies with a good and high social sustainability also is impressive, as merely 6% of them are low sustainable in social sense. A significant portion of Physical Persons is also with a good or high social sustainability. Despite that, each fifth of the latter holdings are socially low sustainable, while 7% are unsustainable in social plan. With the greatest fraction of low sustainable in social aspect enterprises are Sole Traders – around 38% of the total number.

The level of social sustainability increases along with the size of farms. Every third of enterprises with Big size for the sector are with a high social sustainability, and another major segment is with a good social sustainability. For enterprises with Middle size dominates those with a good and high social sustainability as almost each fifth is socially

low sustainable or unsustainable. Contrary to the traditional perception with the largest portion of low sustainable or unsustainable in social aspect farms are semi-market ones (Predominately for Subsistence), including 18% unsustainable, as well as every forth of Small size farms.

In groups with diverse specialization the largest is the share of farms with a good and high social sustainability in Pigs, Poultry and Rabbits, Filed Crops, and Mix Crops. On the other hand, 37% of specialized in Vegetables, Flowers, and Mushrooms are with low social sustainability or socially unsustainable, followed by holdings with Mix Livestock, out of which 29% are with inferiors social sustainability (including around 14% unsustainable).

With a good or high social sustainability are farms located in Mountainous Regions and in Protected Zones and Territories, and in South-West, South-Central, and North-Central Regions of the country. At the same time, most numerous socially low sustainable or unsustainable enterprises are located in Plain and Plain-Mountainous Regions as well as in North-West, South-East, and North-East Regions of the country.

All these data show, that a good portion of Bulgarian farms currently are with a low social sustainability or socially unsustainable, which compromises their overall middle and long-term sustainability. Therefore, effective measures have to be undertaken to improve income, labor and living conditions of farmers and farm households as well as their importance for preservation of rural communities and traditions.

Environmental sustainability of the majority of surveyed farms is good or superior, while a considerable portion is with a low sustainability (18%) or environmentally unsustainable (4%) (Figure 14). The latter two figures clarify that eco-efficiency in a large number of Bulgarian farms do not meet contemporary norms and standards for preservation of lands, waters, air, biodiversity, ecosystem services, and animal welfare.

A big share of Companies and a good number of Physical Persons and Cooperatives are with a high environmental sustainability, while majority of enterprises in these categories are with a good eco-sustainability. Despite that, main portion of these holdings are with low sustainability (accordingly 24%, 18% and 23%), as every twentieth of Physical Persons is even environmentally unsustainable. All of Sole are with a good level of eco-efficiency.

The largest is the portion of farms with good and high eco-sustainability among holdings Predominately for Subsistence, with Small size for the industry, and Big farms. The greatest part of holdings with a low or unacceptable eco-sustainability is in groups of Middle and Big sizes.

The fraction of strongly environmentally sustainable farms is significant among those specialized in Crop-Livestock, Grazing Livestock, Mix Crops, and Permanent Crops. All holdings specialized in Pigs, Poultry and Rabbits, most of those in Mix Crops and by three-quarters in Crop-Livestock and Permanent Crops are with a good environmental sustainability.

At the same time a considerable portion of enterprises specialized in Vegetables, Flowers, and Mushrooms are with a low eco-sustainability (32%) or eco-unsustainable (14%), similarly to those in Mix Livestock (accordingly 29% and 14%) and Field Crops

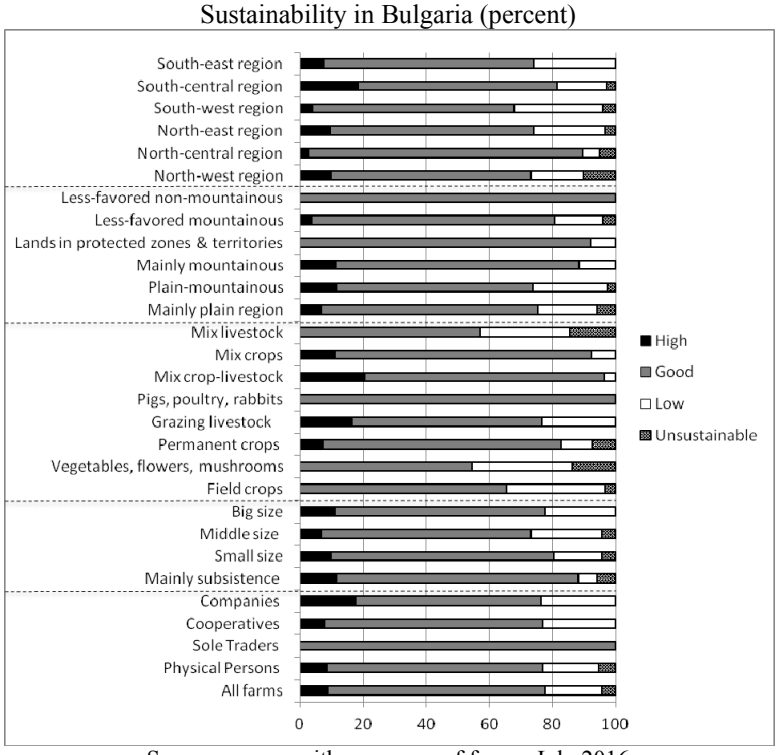
(accordingly 31% and 3%). The share of environmentally unsustainable farms is also considerable among those specialized in Permanent Crops (a little more than 7%) as well as a low sustainable in environmental regard holdings among those in Grazing Livestock.

All farms located in Non-mountainous Regions with Natural Handicaps are with a good environmental sustainability as well as most with Lands in Protected Zones and Territories. The biggest share of holdings with a high eco-sustainability is in Plain Mountainous and Mountainous Regions as well as in Mountainous Regions with Natural Handicaps. At the same time, the greatest fraction of enterprises with a low eco-sustainability or eco-unsustainable are in Plain-Mountainous (26%) and Plain (25%) Regions as well as in Mountainous Regions with Natural Handicaps (19%). The biggest part of enterprise with a high and good eco-sustainability is in North-Central and South-Central Regions of the country while of these with a low eco-sustainability or eco-unsustainable in South-West, North-West, South-East and North-East Regions.

All these data indicates, that a good number of Bulgarian farms are with a low eco-sustainability or environmentally unsustainable, which also compromises their overall long-term sustainability. Therefore, effective measures have to be undertaken to improve eco-efficiency in these groups through training, informing, stimulation, sanctions, etc.

Figure 14

Structure of Farms of Various Type and Location with Different Environmental Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

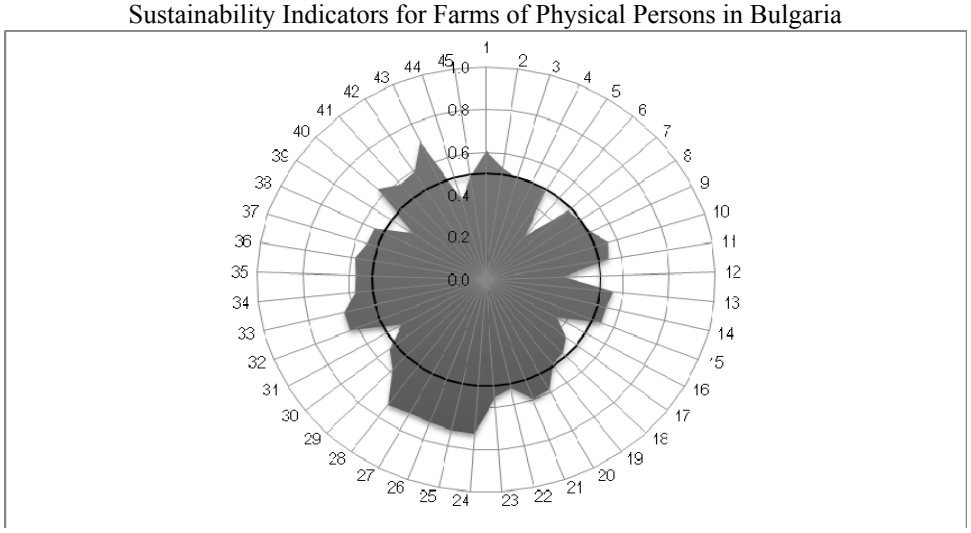
4. Sustainability of Farms of Different Juridical Type

There is a great variation in levels of individual sustainability indicators for farms of different juridical type.

Most sustainability indicators of Physical Persons are low and lead to a decrease in sustainability for individual aspects and the overall level (Figure 15). In governance aspect of sustainability of these holdings are inferior the Level of Adaptability to Natural Environment, and Comparative Efficiency of Supply and Governance of Labor Resources, Natural Resources, Long-term Inputs, and Innovations, and extremely low the Comparative Efficiency of Supply and Governance of Short-term Inputs.

Figure 15

Sustainability Indicators for Farms of Physical Persons in Bulgaria



Source: survey with managers of farms, July 2016

In the economics aspect sustainability of Physical Persons is particularly low in respect to Livestock Productivity, Rate of Profitability of Own Capital, Overall Liquidity, and Financial Autonomy. In social aspect sustainability of these farms is only low in relation to Income per Farm-household Member, while in environmental plan in respect to complying with norms for Number of Livestock per ha, Type of Manure Storage, Extent of Respecting Animal Welfare, and Irrigation Rate. In all these directions adequate measures have to be taken by farm managers and state authority in order to improve aspect and overall sustainability of that type of holdings.

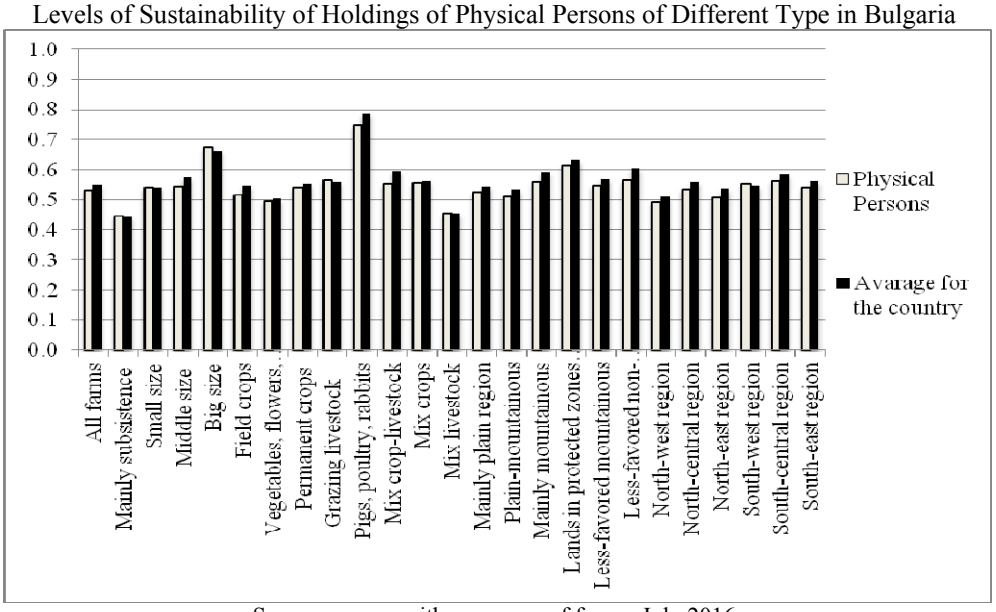
At the same time, a number of indicators for environmental sustainability of Physical Persons are with relatively high positive positions within a good level: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, and Extent of Application of Good Agricultural Practices. All these advantages of Physical Persons are to

be maintained and enhanced, while other indicators for eco-efficiency increased in order to preserve and increase aspect and overall sustainability of these types of holdings.

Holding of Physical Persons are the most numerous and to a great extent they (pre)determine the "average" sustainability level of all farms in the country. Consequently, the level of integral sustainability of Physical Persons of different type deviates insignificantly from the average sustainability levels of respective categories in the country (Figure 16).

Figure 16

Levels of Sustainability of Holdings of Physical Persons of Different Type in Bulgaria



Source: survey with managers of farms, July 2016

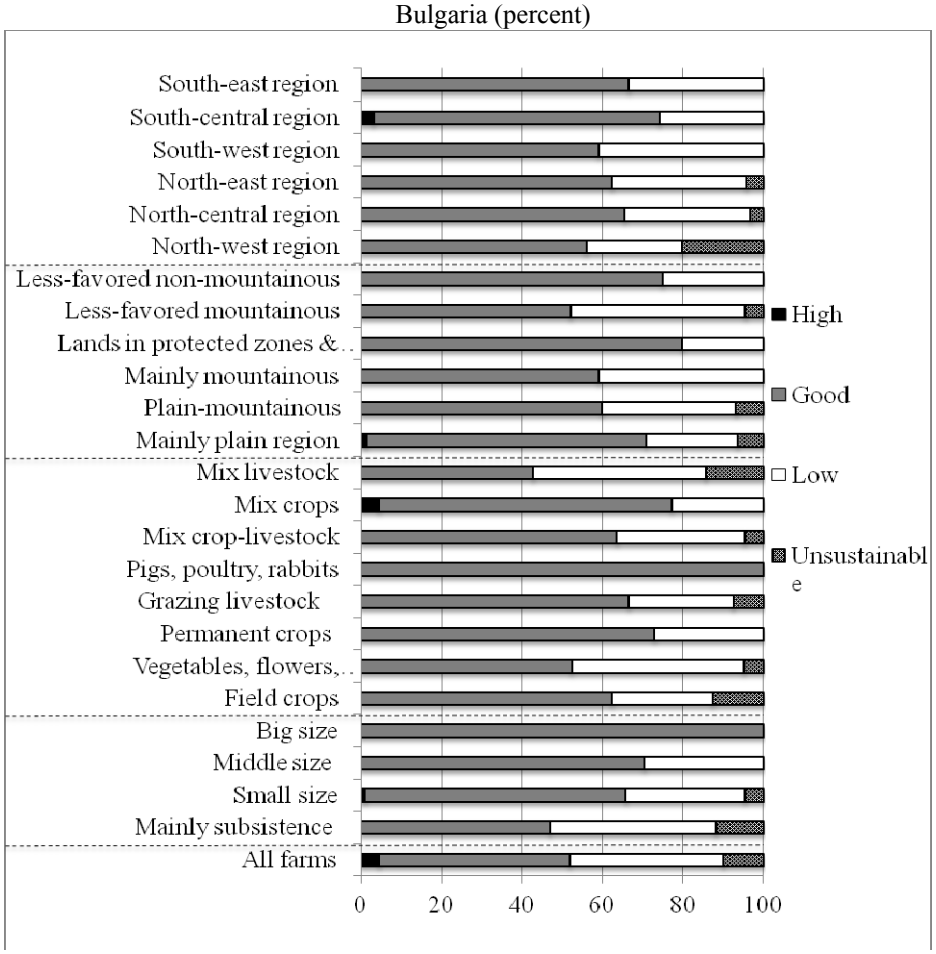
There are significant variations in sustainability of Physical Persons depending on their size, specialization, ecological and geographical location. That indicates that the size, product specialization and location of Physical Persons are more important factors for their sustainability than their juridical status.

With the best sustainability, within a good level, are holdings of Physical Persons with Big size, specialized in Pigs, poultry and Rabbits, these with Lands in Protected Zones and Territories, and located in the South-Central region of the country. At the same time, with low sustainability are Physical Persons which are Predominately for Subsistency, those specialized in Mix-Livestock and in Vegetables, Flowers and Mushrooms, and located in the North-West region of the country. According to the ecological location, the lowest (within a good level) is sustainability of Physical Persons situated in Plain-mountainous regions of the country.

There is also a significant differentiation in the share of farms with different level of sustainability for the major type of Physical Persons (Figure 17). All Physical Persons with Big size for the sector and specialized in Pigs, poultry and Rabbits, and most of these in Mix Cops and Permanent Crops, and located in Non-mountainous Regions with Natural Handicaps and with Lands in Protected Zones and Territories are with a good and a part with a high sustainability. On the other hand, majority of Physical Persons, which are Predominately for Subsistence and these with Mix Livestock are with low sustainability or unsustainable. The portion is also considerable of low sustainable or unsustainable Physical Persons in groups with Vegetables, Flowers and Mushrooms, Grazing Livestock, and Crop-Livestock specialization, those located in Mountainous Regions with Natural Handicaps, in Plain-Mountainous Regions, and in NorthWest and South-Wets Regions of the country.

Figure 17

Structure of Physical Persons of Various Type with Different Sustainability Level in Bulgaria (percent)

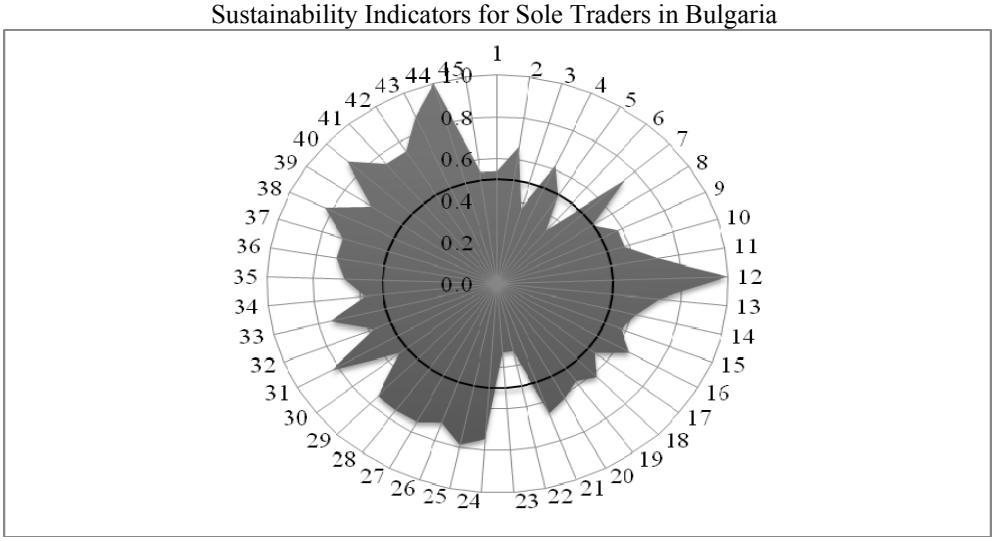


Source: survey with managers of farms, July 2016

Sole Traders are with low values for governance sustainability in respect to Level of Adaptability to Natural Environment, and Comparative Efficiency of Supply and Governance of Short-term inputs, and for social sustainability in respect to their Contribution to Preservation of Rural Communities and Preservation of Traditions (Figure 18).

Figure 18

Sustainability Indicators for Sole Traders in Bulgaria



Source: survey with managers of farms, July 2016

Simultaneously, Sole Traders have high sustainability for eco-aspects of activity in regards to Type of Manure Storage, Norm of Nitrogen Fertilization, and Extent of Application of Good Agricultural Practices, and marginal to the highest level for implementation of effective Crop Rotation. What is more, enterprises with livestock are with a high sustainability for Livestock Productivity as well as a marginal to the highest level for Extent of Respecting Animal Welfare Standards. Furthermore, many indicators for environmental sustainability of Sole Traders are with high positive values within the borders of a good level: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, Number of Cultural Species, Soil Organic Content, Extent of Wind and Water Erosion, and application of recommended Norms of Potassium and Phosphorus Fertilization.

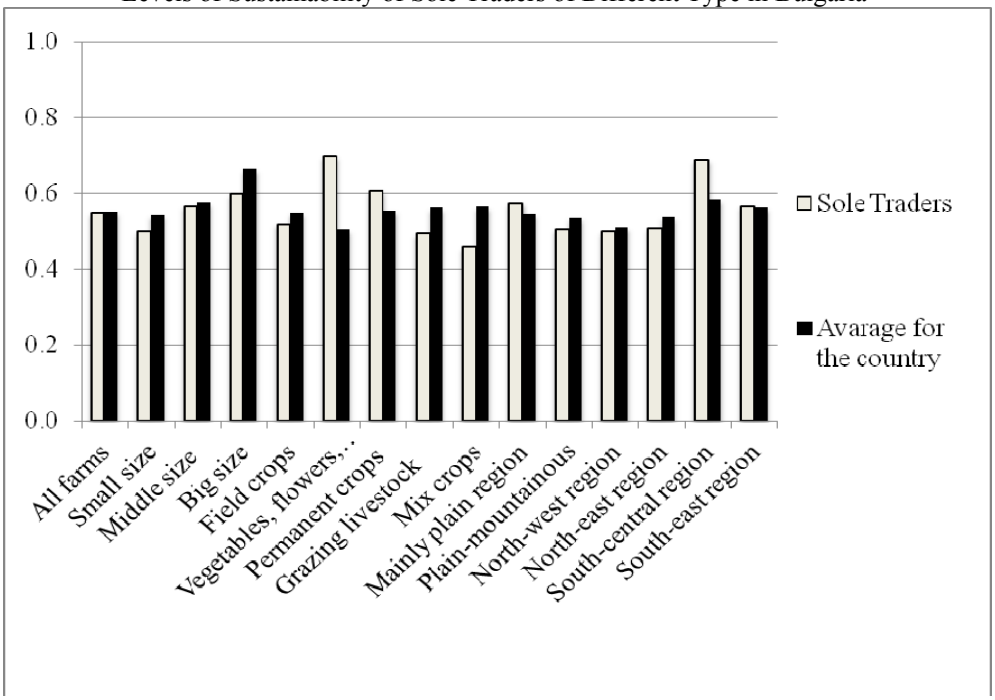
Sole Traders are also with a high position, within the borders of a good level, for Comparative Efficiency of Supply and Governance of Long-term Inputs, Level of Labor Productivity, and Land Productivity. All that also contributes to a growth in their governance and economic sustainability.

For Sole Traders there is also variation in sustainability level dependent on size, specialization, ecological and geographical location. With the highest sustainability are Sole Traders with Big size for the sector, specialized in Vegetables, Flowers and

Mushrooms, and located in Plain regions, and in South-Central region of the country (Figure 19). Simultaneously, with a low sustainability are Sole Traders specialized in Mix Crops and in Grazing Livestock, and in the border with the inferior level those with Small size, and located in Plain-mountainous and North-West region of the country.

Figure 19

Levels of Sustainability of Sole Traders of Different Type in Bulgaria



Source: survey with managers of farms, July 2016

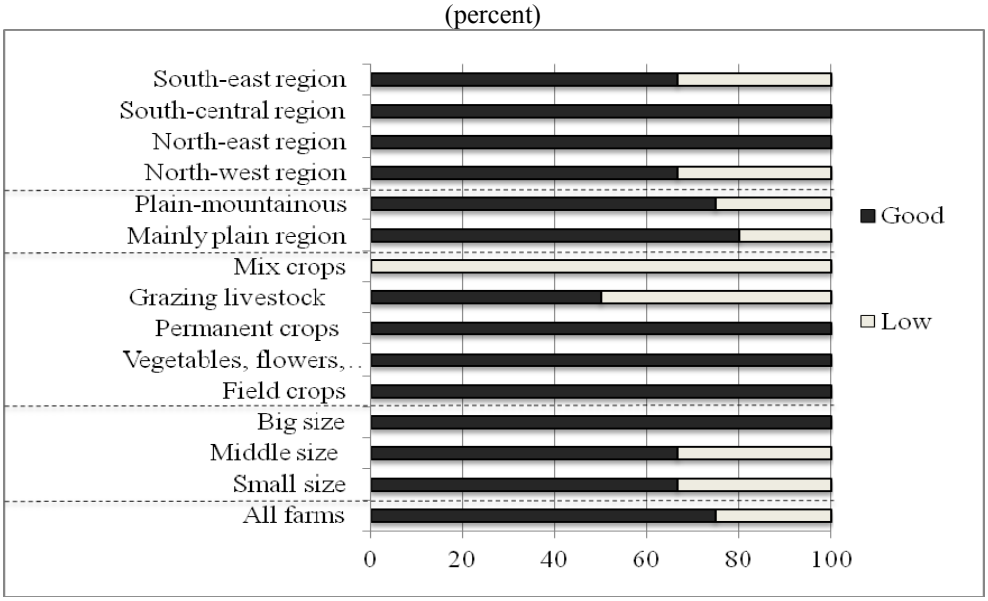
In Sole Traders' groups with the lowest and the highest sustainability levels there are significant deviations from the average levels of sustainability in respective categories of farms in the country. That demonstrates that the specific juridical status of Sole Trader is a critical (and more important) factor determining the level of sustainability in this group, rather than belonging of holdings to a certain type. On the other hand, in other groups of Sole Traders the levels of sustainability are close to the average in the country, which shows that for these Sole Trades the size, specialization and location are dominating for formation of one of another sustainability level.

There are significant variations in the share of Sole Traders of different type with unlike sustainability levels (Figure 20). All farms with Big size, specialized in Field Crops, Vegetables, Flowers and Mushrooms, Permanent Crops, and those located in North-East and South-Central Regions of the country are with a doo sustainability. On the other hand, all holdings with Mix Crops, every other specialized in Grazing Livestock, and one third of

these with Small and Middle size as well as situated in North-West and South-East Regions of the country are low sustainable.

Figure 20

Structure of Sole Traders of Various Type with Different Sustainability Level in Bulgaria (percent)

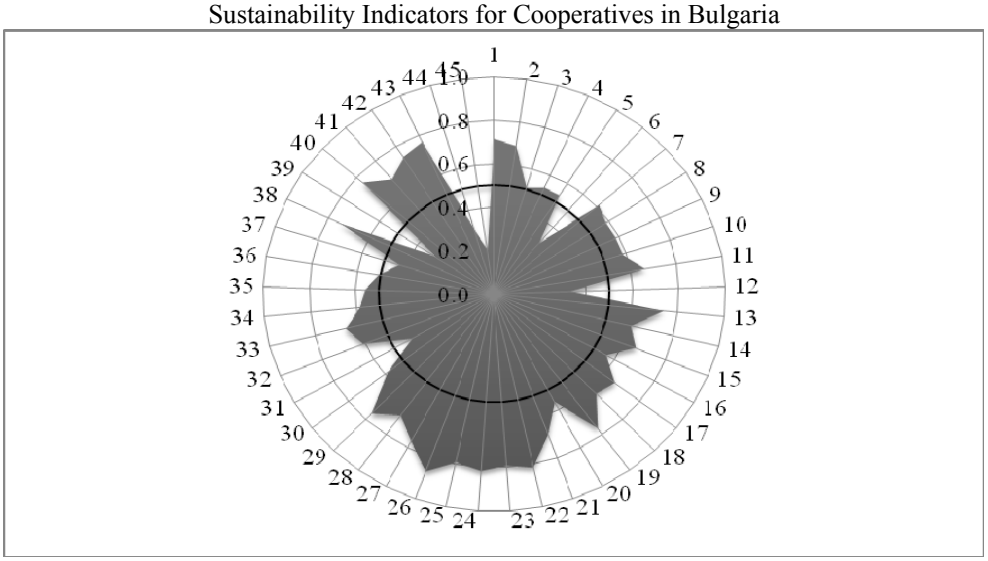


Source: survey with managers of farms, July 2016

For Cooperatives, in the borders of a good sustainability level, the highest indicators values are for governance, social and economic sustainability: Level of Adaptability to Market Environment, Level of Labor Productivity, Income per Farm-household Member, Contribution to Preservation of Rural Communities and Preservation of Traditions (Figure 21). Numerous environmental indicators of Cooperatives are also with superior levels – a high eco-sustainability for Nitrate Content in Ground Waters, and a good eco-sustainability for Nitrate and Pesticide Content in Surface Waters, Pesticide Content in Ground Waters, Number of Cultural Species, Extent of Application of Good Agricultural Practices, efficient Crop Rotation, and application of Norms of Nitrogen and Phosphorus Fertilization. All these positive aspects of the activity of Cooperative are to be maintained and expended.

Figure 21

Sustainability Indicators for Cooperatives in Bulgaria



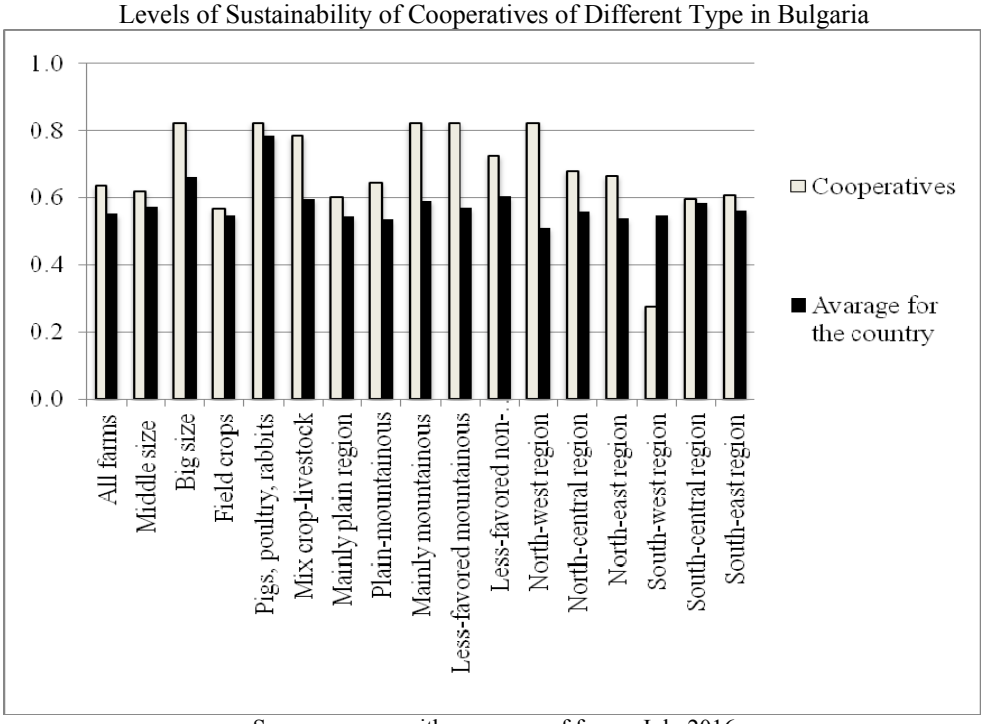
Source: survey with managers of farms, July 2016

On the other hand, Cooperatives are environmentally unsustainable in respect to Irrigation Rate, and with low levels for Comparative Efficiency of Supply and Governance of Short-term Inputs, Livestock Productivity, required Number of Livestock per ha, Type of Manure Storage, Extent of Respecting Animal Welfare, and Extent of Water Erosion. These parts of Cooperatives' activity have to be considerably improved in order to increase governance, economic, environmental and integral sustainability of these organizations.

For Cooperatives there exists considerable differentiation in sustainability level depending on the size, specialization and location of the farms. With the best sustainability (close to the border with a high level) are cooperatives with Big size for the sector, those specialized in Pigs, Poultries and Rabbits, located in Mountainous regions, Mountainous Regions with Handicaps, and in North-Central region of the country (Figure 22). With the lowest sustainability are cooperatives located in South-West region of the country.

Figure 22

Levels of Sustainability of Cooperatives of Different Type in Bulgaria

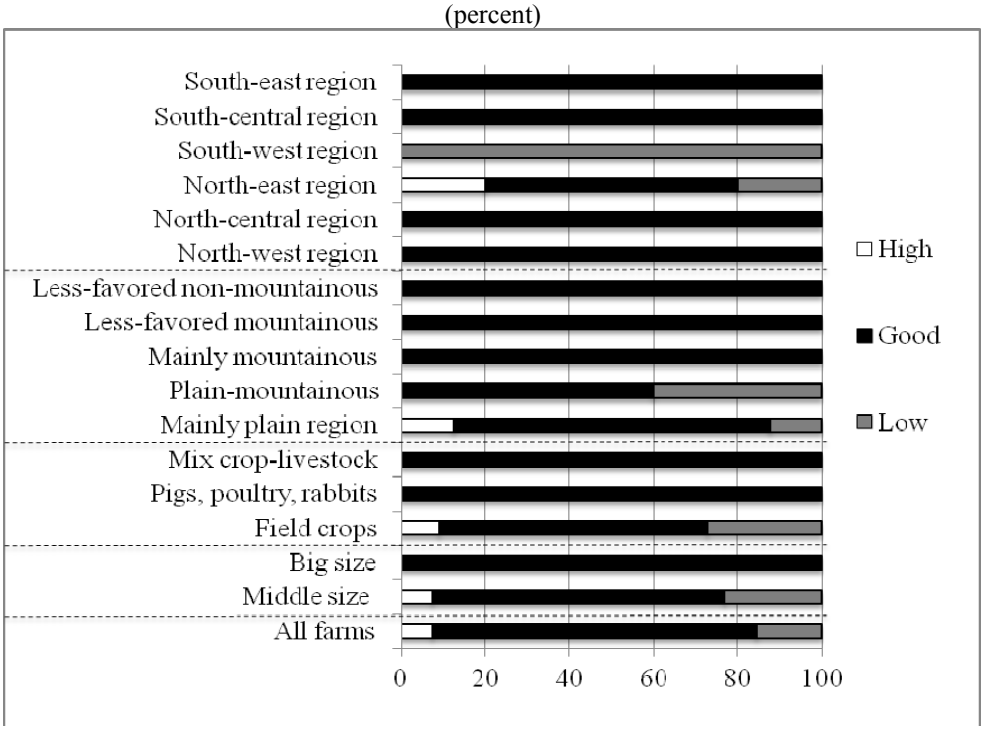


Source: survey with managers of farms, July 2016

The levels of sustainability of most Cooperatives of different type deviate considerably from the average levels for sustainability in these groups of holdings in the country. That proves that specific "Cooperative forms" (the juridical status of Cooperative) is critical factor determining sustainability levels of cooperative farms of a particular type, rather than their belonging to certain category of holdings in the country.

There are significant variations in the share of Cooperatives with different sustainability level for individual type of farms (Figure 23). All Cooperatives with Big size, specialized in Pigs, Poultry and Rabbits, Crop-Livestock, and those located in Mountainous Regions, Mountainous and Non-mountainous Regions with Natural Handicaps, and in North-West, North-Central, South-Central and South-East Regions of the country are with a good sustainability. The greatest portion of highly sustainable Cooperatives are among located in North-East Region, and Plain Regions of the country as well as specialized in Field Crops. At the same time, each of Cooperatives in South-West Region and 40% of located in Plain-Mountainous Regions of the country are low sustainable.

Figure 23
Structure of Cooperatives of Various Type with Different Sustainability Level in Bulgaria (percent)

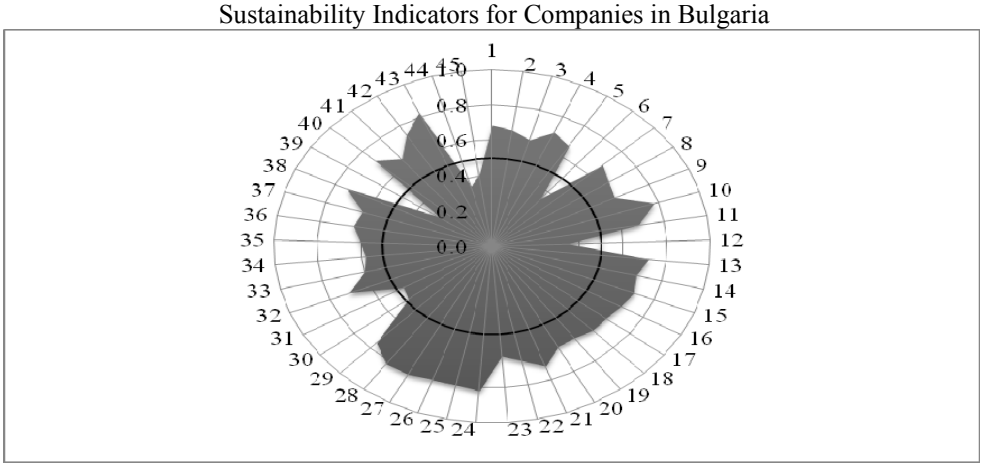


Source: survey with managers of farms, July 2016

For Companies the highest levels, within the borders of a good sustainability, are for indicators of governance sustainability: Comparative Efficiency of Supply and Governance of Labor Resources, and Comparative Efficiency of Governance of Marketing of Products and Services (Figure 24). In respect to economic sustainability the best levels are for Labor Productivity and Income of Enterprise, while for social sustainability for Compliance with Working Conditions Standards. For environmental suitability superior are indicators for Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, Extent of Application of Good Agricultural Practices, efficient Crop Rotation, Number of Cultural Species, application of Norms of Nitrogen and Phosphorus Fertilization, and Extent of Preservation of Quality of Ecosystem Service.

Figure 24

Sustainability Indicators for Companies in Bulgaria



Source: survey with managers of farms, July 2016

With the lowest values for Companies are indicators for governance and economic sustainability: Comparative Efficiency of Supply and Governance of Short-term Inputs, and Livestock Productivity as well as indicators for eco-sustainability: permissible Number of Livestock per ha, Type of Manure Storage, Extent of Respecting Animal Welfare, Irrigation Rate, and Number of Wild Species on the Territory of Farm. These sides of activity of corporative enterprises have to be improved in order to increase their governance, economic, environmental and integral sustainability.

There are a significant specificity and variation in sustainability levels of Companies with different size, specialization and location (Figure 25). With the highest sustainability are Companies with Small size for the sector, specialized in Permanent crops, located in Mountainous regions, and in South-East region of the country. Simultaneously, farms of that juridical type specialized in Grazing Livestock, and located in North-West region of the country are with the lower levels of sustainability.

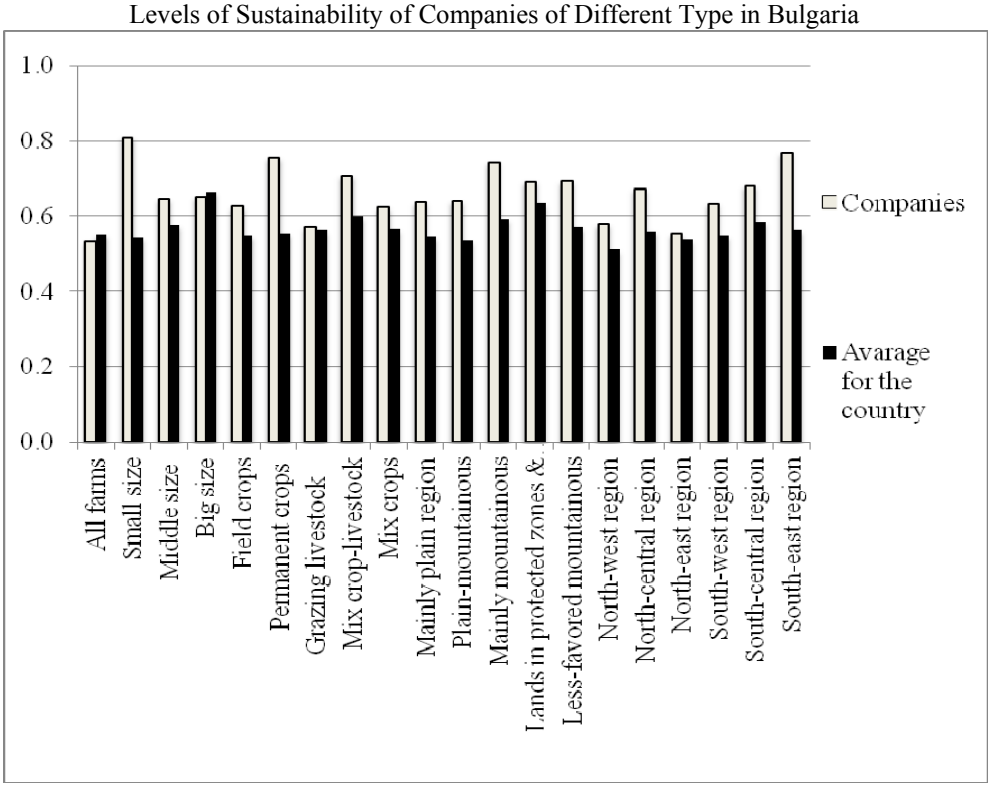
There are great elevations in sustainability levels of Companies of all type with an exception of firms with Big size for the sector, specialized in Grazing Livestock, and located in North-East Region of the country. That means that for most categories of Companies the specific juridical status is critical for one or another level of sustainability. Sole exceptions are mentioned above three groups of firms, where belonging to farms with a particular (Big) size, specialization (Grazing Livestock) and location (North-East Bulgaria) is an important factor for sustainability formation.

In Companies also there is a great differentiation in fractions of holdings with one or another level of sustainability in each particular group (Figure 26). All farms with Crop-Livestock specialization, and those located in Mountainous Regions in Natural Handicaps as well as the vast majority of those with Big size for the sector and Mix Crops are highly

sustainable. At the same time, a half of the Companies in North-West Region of the country and every third of those in South-West Region are low sustainable.

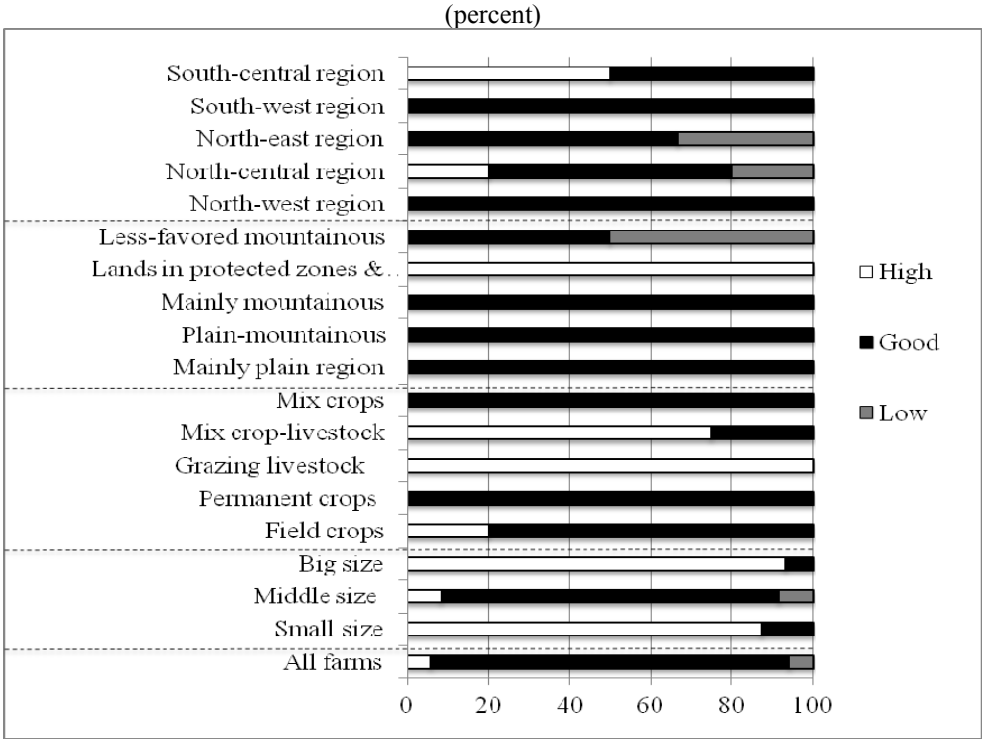
Figure 25

Levels of Sustainability of Companies of Different Type in Bulgaria



Source: survey with managers of farms, July 2016

Figure 26
Structure of Companies of Various Type with Different Sustainability Level in Bulgaria (percent)



Source: survey with managers of farms, July 2016

5. Factors for Farms Sustainability in Bulgaria

Diverse social, economic, market, ideological personal, etc. factors in various extent stimulate or restrict activities of agricultural farms for sustainable operations and development.

According to managers of surveyed farms, factors which to the greatest extent stimulate their actions for increasing governance sustainability of holdings are: Access to Advisory Services, Professional Training of Manager and Hired Labor, Personal Conviction and Satisfaction, Positive Experience of Other Farms, Available Innovations, Financial Capability, Private Contracts and Agreements, and Registration and Certification of Products, Services, etc. (Figure 27).

Factors which to the greatest extend stimulate actions of most farms for improving economic sustainability are: Market Demand and Prices, Received Direct State Subsidies, Market Competition, Financial Capability, Participation in Public Support Programs,

Possibilities for Benefits in Present Moment, Possibilities for Benefits in Near Future, Tax Preferences, Possibilities for Benefits in Long-term, and Integration with Buyer of Product.

For the biggest part of farms the factors which to the greatest extent stimulate their actions for enhancing social aspect of sustainability are: Personal Conviction and Satisfaction, Social Recognition of Contribution, Immediate Benefits for Other Persons and Groups, Community Initiatives and Pressure in Region, Access to Advisory Services, Policies of European Union, and Existing Problems and Risks in the Region.

Factors which to the greatest extent stimulate farming enterprises for increasing environmental sustainability are: Existing Problems and Risks in Global Scale, Official Regulations, Standards, Norms, etc., Existing Problems and Risks in the Region, and Policies of European Union.

All these specific incentives for Bulgarian farms as a whole and of different type has to be taken into account in the process of modernization od public policies and programs for sustainable development.

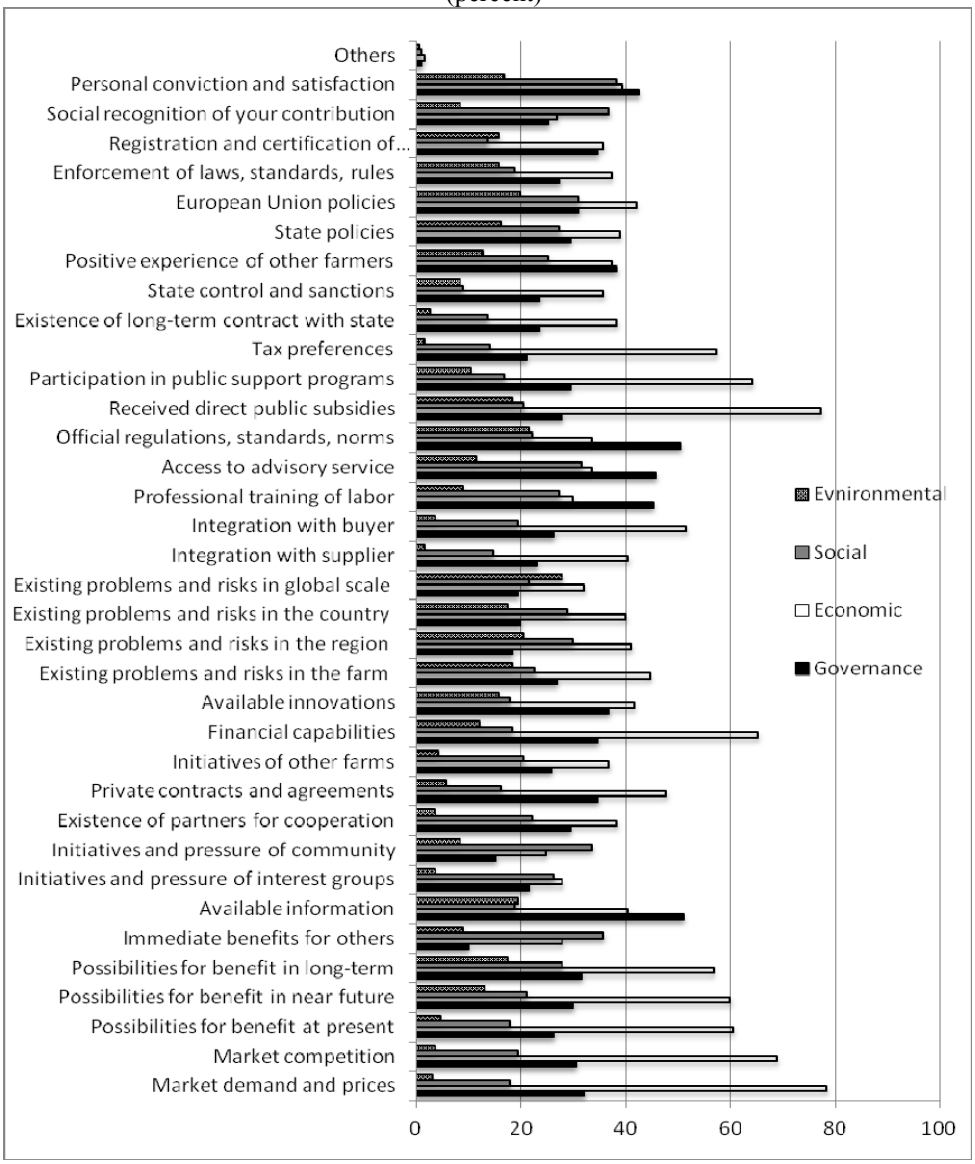
Our survey has found out that public policies relatively weakly affect governance sustainability of Bulgarian farms (Figure 28). National and European Union mechanisms of regulation and support, which to the greatest extent increase governance sustainability of surveyed holdings are: Professional Training and Advices, Obligatory Standards, Norms, Rules and Restrictions, Modernization of Agricultural Holdings, and Setting up Produces Organizations. On the other hand, the impact on governance aspect of sustainability of smallest number of farms is from measures such as: Afforestation and Restoration of Forests, Natural Handicap Payments to Farmers in Non-mountain Areas, Payments for Natura 2000, and Restoration and Development of Residential Areas.

Diverse mechanisms of public support to the greatest extent improve economic sustainability of farms in the country. Instruments, which impact the economic sustainability of the most part of surveyed enterprises are: Direct Area Based Payments, National Tops Ups for Products, Livestock, etc., Modernization of Agricultural Holdings, Green Payments, Support to Semi-market Farms. At the same time, measures such as Afforestation and Restoration of Forests, Restoration and Development of Residential Areas, Stimulation of Rural Tourism, and Services to Residents of Rural Areas affect considerable economic sustainability of small amount of holdings.

The impact of national and European policies on social and environmental sustainability of Bulgarian farms is relatively smallest. Instruments, which augment social sustainability of most farms are: Strategies for Local Development, Services to Residents of Rural Areas, Restoration and Development of Residential Areas, and Stimulation of Rural Tourism. Simultaneously, social sustainability of least number of holdings is improved by “eco-measures” like: Payments for Natura 2000, Agro-environmental Payments, and Support to Organic Farming.

Figure 27

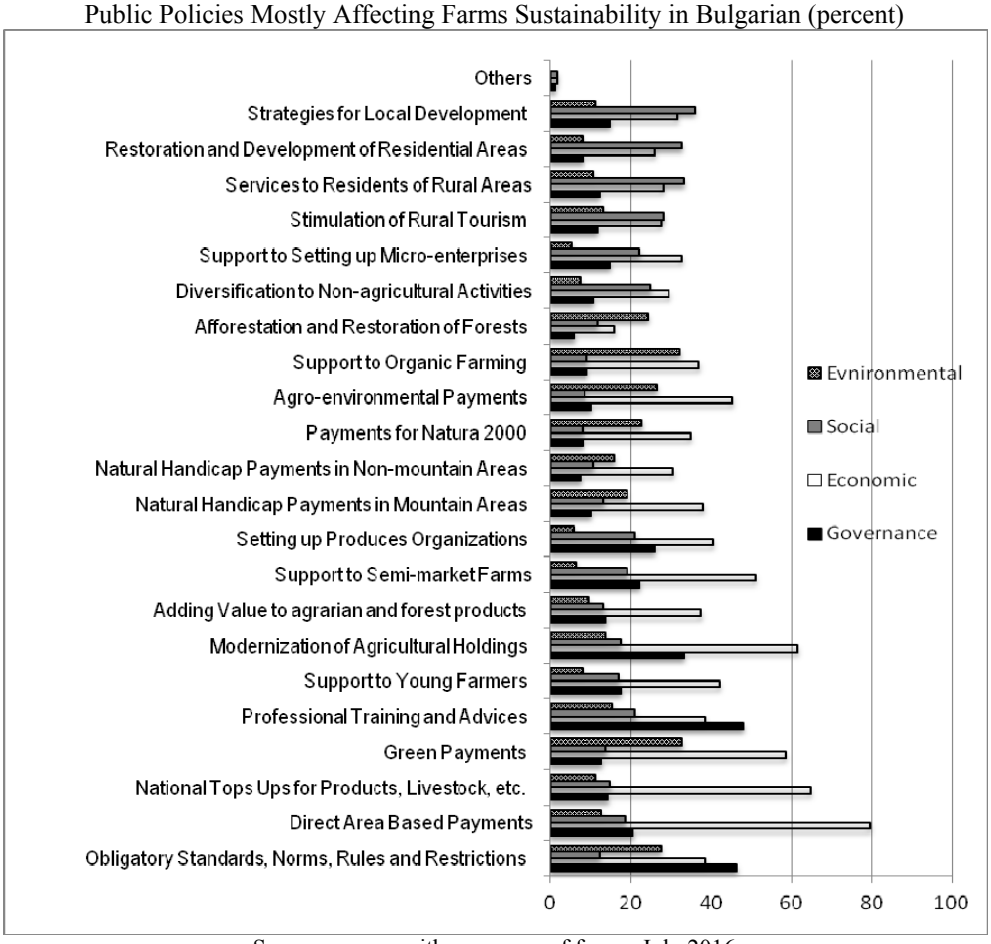
Factors Mostly Stimulating Farms Actions for Improving Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

Figure 28

Public Policies Mostly Affecting Farms Sustainability in Bulgarian (percent)



Source: survey with managers of farms, July 2016

For improving environmental sustainability of farms most important are: Green Payments, Support to Organic Farming, Obligatory Standards, Norms, Rules and Restrictions, and Agro-environmental Payments. On the other hand, public instruments with the least impact on eco-sustainability of Bulgarian farms at the current stage of development are: Support to Setting up Micro-enterprises, Setting up Produces Organizations, Support to Semi-market Farms, Diversification to Non-agricultural Activities, Support to Young Farmers, and Restoration and Development of Residential Areas.

There is differentiation of impacts of individual instruments of public policies on sustainability of farms of different type and location. Mechanisms and instruments of national and European policies, which to the greatest extent affect improvement of sustainability of Bulgarian farms are: Obligatory Standards, Norms, Rules and Restrictions

in respect to governance sustainability of Big size enterprises (66,7%) and environmental sustainability of enterprises specialized in Pigs, Poultry and Rabbits (100%); Direct Area Based Payments for economic sustainability of Sole Traders (87.5%), Cooperatives (84.62%), Companies (82.4%), holdings with Small size for the sector (81.5%), enterprise specialized in Pigs, Poultry and Rabbits (100%), Mix Crops (88,9%) and Permanent Crops (87,8%), and those located in Non-mountainous Regions with Natural Handicaps (100%), with Lands in Protected Zones and Territories (100%), in mainly on Mountainous Regions of the country (92,3%), in Mountainous Regions with Natural Handicaps (88,5%), South-West (88%) and South-Central (84,2%) regions of the country; National Tops Ups for Products, Livestock, etc. in regard to economic sustainability of Companies (82.4%), holdings Predominately for Subsistence (76.5%), and those specialized in Grazing Livestock (80%), mainly in Mountainous Regions (88,5%) and with Lands in Protected Zones and Territories (76,9%), and located in North-Central (74,4%) and South-West (72%) regions of the country; Green Payments for economic sustainability of enterprises located in Mountainous Regions, and with Lands in Protected Zones and Territories (by 69,23%), and those in South-West Region of the country (68%); Professional Training and Advices for Big size enterprises (66,7%); Modernization of Agricultural Holdings in relations to economic sustainability of Sole Traders (87,5%), Companies (76,5%), and specialized in Mix Livestock (71,4%) and Mix Crops (70,4%), and located in Mountainous Regions (76,9%), and North-Central (76,9%) and South-Central (71,1%) regions of the country; Support to Semi-market Farms and Setting up Produces Organizations for economic sustainability of holdings Predominately for Subsistence (accordingly 76,5% and 70,6%); Natural Handicap Payments to Farmers in Mountain Areas for economic sustainability of farming enterprises located in such areas (73,1%).

All these data for real impact of individual mechanisms and instruments of public support on different aspect of sustainability of Bulgarian farms are to be taken into account when improve support policies and programs in the sectors and enterprises of diverse type and location.

We have also studied out relations between the personal characteristics of farm managers (such as age, gender, competency on sustainability issues, etc.), the type of problems in the region, and the level of holdings sustainability. For surveyed farms share of male managers whose holdings are with a "good or high" sustainability is significant (70,5%) and bigger than of the female managers (57,9%). Nevertheless, the high levels for both genders indicate that there are not significant differences in regards to sustainable management of farms in the country.

There exists a strong correlation between the age of the manager and the sustainability of farm, as the highest is the portion of holdings with a superior sustainability of managers above 65 (83,3%) and younger than 40 (82,4%). Relatively smaller share of managers between 56 and 65 with a good and high sustainability of holdings shows, that the latter category either focus of pure economic vitality of enterprises (a strategy for profiting or survival) or they are not interested in a long-term sustainability (due to a plan for exit farming activity, lack of heir ready to undertake the farm, etc.).

Estimates on links between sustainability of farms and the character of problems in the region, where the holding is located, demonstrate that they are not important. For surveyed

farms there exist no significant differences in the share of holdings with a good and high sustainability in regions with various social, economic and environmental problems. Therefore, levels of sustainability of farms depend primarily on managerial capability and strategy of managers as well as other important external factors (public policies, etc.) rather than on the specific socio-economic and environmental challenges in the region of farms.

There is a strong correlation between the levels of competency of farm managers and respecting the principles of governance, economic, social and environmental sustainability, and the levels of sustainability of farms. For all aspects of sustainability is extremely great the portion of farms with a good and high sustainability, which know and implement well or very good principle of sustainable agriculture. Therefore, increasing competency, culture and practices of sustainable farming is a crucial factor for improving sustainability of agricultural holdings.

Analysis of surveyed farms found out that, the biggest share of holdings with a good and high sustainability is among farms with a longer period of existence and implementing actions for improving sustainability – with maximum values for holdings with a period between 11 and 15 years (accordingly 75% and 87,5%). The latter proves that sustainable farming requires a long-term strategy and targeted actions for amelioration of individual aspects of sustainability. Relatively smaller fraction of holdings with a good and high sustainability among those, taking actions more than 15 years (55%) is probably a consequences of a lack of effective modernization in strategies corresponding to constantly changing socio-economic, institutional and natural environment in the past years.

Our analysis also found out a big share of farms with a good and high sustainability for all instruments of policies, which according to the managers to the greatest extent increase governance, economic, social, and environmental sustainability of their holdings. Political mechanisms and instruments, which to the greatest extent have actually affected sustainability of Bulgarian farms are: Support to Organic Farming in respect to social (100%) and governance (94,1%) sustainability, Adding Value to Agricultural and Forests Products for governance sustainability (92,3%), Diversification to Non-agricultural Activities for governance (90%) and environmental (85,7%) sustainability, in regard to social sustainability Natural Handicap Payments to Farmers in Mountain Areas (88%), Agro-environmental Payments (87,5%), and Natural Handicap Payments to Farmers in Non-mountain Areas (85%), and National Tops Ups for Products, Livestock, etc. in respect to governance sustainability (85,2%).

Conclusion

Our survey includes “typical” and to a certain extent “sustainable” (perspective) agricultural farms, which means that sample sustainability level is higher than the real (average) for the country. Despite that undertaken first large-scale study on sustainability of Bulgarian farms let us make some important conclusions about the level of holdings sustainability in the country, and recommendations for managerial and assessment practices.

Suggested holistic framework gives a possibility to improve assessment, analysis and management of sustainability of individual farms and holdings of different type in general and for major aspects, principles, criteria and indicators of governance, economic, social and environmental sustainability. That approach has to be further discussed, experimented, improved and adapted to the specific conditions of operation and development of farms of different type, subsector of production, geographical region and ecosystem as well as the special needs of decision-makers at various levels.

Overall sustainability of Bulgarian farms is at a good level, with superior levels for environmental and social sustainability, and inferior level for governance and economic sustainability. Thus improvement of the latter two is critical for maintaining sustainability of Bulgarian holdings. Governance and economic sustainability of Bulgarian farms are low because of the fact that Governance Efficiency and Financial Stability of holdings are low. Furthermore, low Comparative Efficiency of Supply of Short-term Inputs in relations to alternative organizations, and unsatisfactory Profitability of Own Capital and Overall Liquidity of farms, determine the latter. Simultaneously despite that the overall environmental sustainability is relatively high, Preservation of Agricultural Lands and Biodiversity are relatively low and critical for maintaining the achieved level. Insufficient Application of Recommended Irrigation Norms, a high level of Soils Water Erosion, and lowered Number of Wild Animals on farm territory, determines the latter inferior levels.

There are great variations in sustainability levels of farms of different type and location as well as in shares of holdings with unlike level of sustainability. Distribution of farms of different type in groups with diverse levels of sustainability has to be taken into account when forecast the number and importance of holdings of each kind, and modernize public (structural, sectorial, regional, environmental, etc.) policies for supporting agricultural producers of certain type, sub-sectors, eco-systems and regions of the country.

Factors which stimulate to the greatest extent the actions of Bulgarian farms for improving individual aspects of sustainability are quite distinct, but the most important are: Access to Advisory Services, Professional Training of Manager and Hired Labor, Personal Conviction and Satisfaction, Positive Experience of Other Farms, Available Innovations, Financial Capability, Private Contracts and Agreements, and Registration and Certification of Products, Services, etc., Market Demand and Prices, Received Direct State Subsidies, Market Competition, Participation in Public Support Programs, Possibilities for Benefits in Present Moment, Possibilities for Benefits in Near Future, Tax Preferences, Possibilities for Benefits in Long-term, Integration with Buyer of Product, Social Recognition of Contribution, Immediate Benefits for Other Persons and Groups, Community Initiatives and Pressure in Region, Policies of European Union, Existing Problems and Risks in Region, Existing Problems and Risks in Global Scale, Official Regulations, Standards, Norms, etc. All these specific incentives for Bulgarian farms as a whole and of different type have to be taken into account in improving public policies and programs of sustainable development.

National and European mechanisms of regulation and support, which affect to the greatest extent economic sustainability of the most Bulgarian farms are: Direct Area Based Payments, National Tops Ups for Products, Livestock, etc., Modernization of Agricultural Holdings, Green Payments, Support to Semi-market Farms. Impacts of national and

European policies on governance, social and environmental sustainability of Bulgarian farms is relatively weak. There are strong differentiations in impacts of individual policy instruments on sustainability of holdings of different type and location.

Having in mind the importance of holistic assessments of sustainability of farms and the enormous benefits for farm management and agrarian policies, such studies are to be expended and their precision and representation increased. The latter require a close cooperation between all interests parties and participation of farmers, agrarian organizations, local and state authorities, interest groups, research institutes and experts, etc. Moreover, the precision of estimates has to be improved and besides on assessments of managers to incorporate relevant information from field tests and surveys, statistical and other data, and expertise of professionals in the area.

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SUMMARIES

Stefan Petranov

NEGOTIATION OF SOCIAL SECURITY FLOORS: PROBLEMS AND POSSIBLE SOLUTIONS

This paper examines the process of negotiating social security floors (SSF) in Bulgaria and analyzes its problems. The focus is placed on finding the adequate balance between the role of SSF to accumulate sufficient means in the social funds and the impact of these floors on employment. Five different systems of SSF are presented aimed at offering specific rules for their change over time. These rules ensure the lack of motivation for informal practices and for reduction of employment, and at the same time meet the need for adequate revenues for the social funds. All five systems are based on sound economic arguments, they are practically oriented and are easy to use. They may be used separately or together – in combination.
JEL: J32; J38; J46; J50

Ivan Todorov

BULGARIA'S CYCLICAL POSITION AND MARKET (DIS)EQUILIBRIA

Bulgaria's potential output and cyclical position for the period 2010-2015 are estimated by a methodology based on a two-factor Cobb-Douglas production function. An IS-LM model of the Bulgarian economy is developed to study the condition of the different types of markets (labor market, goods market and money market). During the entire period 2010-2015 Bulgaria's output remained below its potential, while unemployment was above its natural level. The goods market and the money market were not balanced but fluctuated around their equilibrium levels. The conclusions of the study are in agreement with the Keynesian views about the disequilibrium character of the economic system and about the necessity of an expansionistic macroeconomic policy to stabilize the economy at its potential level in case of a deflationary gap (as in Bulgaria during 2010-2015).
JEL: E32

Julijana Angelovska

INTEGRATION OF MACEDONIAN, BULGARIAN AND CROATIAN STOCK MARKETS – VECM APROACH

At the end of March 2016, regional platform CEE link was established by three Balkan bourses from Macedonia, Bulgaria and Croatia. This platform provides investors from these countries possibility to buy and sell securities listed on the three bourses. The purpose of this paper is to investigate the linkages between Macedonian, Bulgarian and Croatian stock market indices. If they move together or there is common trend, then investors cannot gain portfolio diversification on this regional platform. Using Johansen Vector Error Correction Model (VECM) on data sample from January 3rd, 2005 to December 30th, 2015 the existence of long and short term relationships between the Macedonian and the Bulgarian and Croatian stock markets are detected. These findings can be limit to the benefits of equity portfolio diversification for Macedonian investors. Bilateral Co-integration test between Croatian and Bulgarian stock markets did not detect common trend that links these two stock markets. So investors from Macedonia cannot make diversification buying stocks on the Croatian and Bulgarian stock markets and vice versa, while Croatian and Bulgarian investors can diversify their

portfolios by trading stocks listed on the Bulgarian and Croatian Stock Exchanges. The results are of particular interest for investors, portfolio managers and policymakers.
JEL: G15, F36, C32

Plamen Tchipev

MODERN FIRM THEORY AND ITS PRINT ON CORPORATE GOVERNANCE

A number of previous projects on corporate governance, accomplished with the participation of the author (Dimitrov et al. 2014; Mintchev et al. 2007; Tchipev, 2009 and others), pointed out the fact that the set of instruments, regulations and good practices of corporate governance are a product of a more or less **predetermined** choice; of the firm specific creation and functioning in a certain economic system. Even more, the very firm, (called in general **corporation** or, sometimes, **company** with the same meaning) - being itself a subject of analysis and influence by the corporate governance is also a "datum". There are many hypotheses on the reasons and nature of these specificity, starting from the different legal system applied in the different countries, through the varieties of corporate finances systems, to the nature of the firm in general. The answers are not quite satisfactory. The current paper studies in a broader methodological frame the characteristics of the modern firm, which define the features, interact and determine the choice of a model or system of corporate governance.
The analysis starts with the relation of the corporate governance to the institutional nature of the firm. The second section outlines the problems of defining the firm (the "paradox of the firm") in the standard neoclassical economics. The third section draws special attention to the criticism of the transaction costs approach as defining the firm. The fourth section shows its contradiction with the other axioms of the classical and neoclassical economic paradigms and holds the thesis that the firm cannot be understood that way but only through its institutional nature. In the fifth section, with the help of the General Systems Theory, the firm is set in a wider frame of its relations with the market in general and the exchange of value (or utility, depending on the chosen explanatory model). The last section outlines the final conclusion that the firm (corporation) functions (through the value/utility mechanisms) as a base unit of distribution, which determines its contribution to the whole set of goods. Thus, the categories **firm and corporate governance** are in certain mutual order, and it creates the mentioned predetermination. The latter requires and suggests certain solutions for corporate governance adequacy. More concrete answers are also offered, for example to the question why the "stakeholders" cannot (and should not) be an object of the corporate governance.
JEL: D21; D23; G30

Maryna Tatar
Olena Sergienko
Sergii Kavun
Lidiya Guryanova

COMPLEX OF MANAGEMENT MODELS OF THE ENTERPRISE COMPETITIVENESS FOR STEEL INDUSTRY IN THE CURRENCY INSTABLE ENVIRONMENT

The complex of models of metallurgical enterprises competitiveness management in unstable currency environment is built based on the metallurgical enterprises competitiveness level evaluation and industry trends of their development. The degree of the exchange rates impact on the metallurgical enterprises competitiveness by the methods of reduction, integrated assessment models, and econometric panel data is estimated. The exchange rates dynamics is investigated based on fractal

models and forecasts are made by using a wide range of forecasting models. The system of exchange rate factors is improved and their impact on the metallurgical enterprises competitiveness is assessed on the bases of an integrated evaluation, econometric dynamic models and fuzzy sets.
JEL: C13; C15; C51; C63; L61

Miroslava Rakovska
Petya Fileva

PHASES OF THE DEVELOPMENT OF LOGISTICS SERVICE PROVIDERS: THE CASE OF BULGARIA

This paper describes the phases of the development of a sample of logistics service providers (LSPs) based upon their service capabilities. Data was collected from 136 Bulgarian LSPs. Scores of 40 service capabilities were subjected to hierarchical cluster analysis using Ward's method, and as a result, three distinct clusters of service capabilities were derived. On the basis of the differences in service capabilities the resulting groupings were labelled as: Typical transport providers, Transport providers in development, True third-party logistics providers. The clusters were characterised in terms of the LSPs' resources and some aspects of the customer service provided by the LSPs. The use of cluster analysis for understanding the phases of the development of LSPs will be useful for researchers who want to test the existence of these phases in their countries and for managers who could formulate a strategy based on their companies' level of development.
JEL: L89; M19

Hrabrin Bachev

A STUDY ON SUSTAINABILITY OF AGRICULTURAL FARMS IN BULGARIA

The issue of assessment of sustainability of agricultural farms is among the most topical for researchers, farmers, investors, administrators, politicians, interests groups and public at large. Despite that practically there are no assessments on sustainability level of Bulgarian farms in conditions of European Union Common Agricultural Policy implementation. This article applies a holistic framework and assesses sustainability of Bulgarian farm as a whole and of different juridical type, size, production specialization, and ecological and geographical location. Initially the method of the study is outlined, and overall characteristics of surveyed agricultural holdings presented. After that an assessment is made of integral, governance, economic, social, environmental sustainability of farms in general and of different type and location. Finally, factors for improving sustainability of Bulgarian farms are identified, and directions for further research and amelioration of farm management and public intervention in the sector suggested.
JEL: Q12, Q18, Q56, Q57