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BULGARIAN ACADEMY OF SCIENCES

ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ НА БЪЛГАРСКАТА АКАДЕМИЯ НА НАУКИТЕ

ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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ECONOMIC GROWTH AND DEVELOPMENT OF THE CONCEPT OF CONVERGENCE – THEORETICAL BASIS

The aim of the study is to outline the theoretical foundations of the concept of convergence related to economic growth, as well as to systematise the different types of convergence. The development of the concept of convergence, which is a result of many applied researches worldwide on the connection between growth and convergence, has been theoretically traced. The specifics of neoclassical and endogenous theories of economic growth are briefly presented as the basis of the concept of convergence, including its types – alpha (absolute), beta (relative), "club" and sigma convergence. The types of convergence that appeared in these studies are critically analysed – structural, based on labour productivity, regional, price, monetary, business cycle, and others. For EU countries, the interaction between nominal and real convergence has been studied.
JEL: E13; F63; N10; O11

Introduction

The interest in the issues of convergence of economies stems from the neoclassical theory of economic growth. According to the neoclassical model, the growth of per capita income tends to grow inversely with the initial level of this income. In practice, however, there is no convergence in the standard of living between developed and underdeveloped countries, which does not meet this theoretical assumption. The later endogenous theory of growth offers possible explanations for the observed lack of convergence. It also provides a better explanation of long-term growth factors and opportunities for real convergence.

The theoretical foundations were laid mainly in the second half of the 80s and in the 90s of the twentieth century, and then, especially in the last twenty years, there is the emergence of numerous and diverse empirical studies, including in Bulgaria, which contribute to the development of the concept of convergence. Therefore, an attempt was made in the study to analyse and systematise the applied ideas and topics for convergence (called in this case approaches or types of convergence – structural, regional, price etc.). The aim is to make a critical review of what has been done so far in the international scientific literature and to summarise in which direction it is going and to what extent the development of the concept of convergence has been scientifically explained. These issues are addressed on a universal

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(global) scale, but the aim is to focus on practice within the EU and, above all, the specificities of nominal and real convergence.[2]

1. Convergence in the Neoclassical Model of Economic Growth

According to Solow's neoclassical model of growth, countries with lower GDP per capita (laggers) are expected to grow faster than developed countries (advanced) and thus to move closer to them. This follows from the difference in the capital-labour ratio and the difference it is created in the productivity of capital. In the context of an open economy and with sufficiently high mobility in international capital markets, a capital flow would be created from 'rich' countries (with low marginal productivity), directed to 'poor' countries (with high marginal productivity). Thus, the initial difference in capital intensity will tend to decrease and even disappear. At the same time, existing differences in technology (and therefore in the type of production function) would tend to disappear as well through the (assumed) intensity of consciously and unconsciously knowledge transfers.[3]

According to the neoclassical model, if the level of the physical capital K is low, i.e. under the steady-state condition K*, the growth rate will be high.[4] The explanation of the differences in the growth rates among the considered countries could be found in their initial level of development and potential to develop in a long-term perspective. If a given country has a scarce capital K, and its ratio with the labour L, i.e. K/L is low, it is expected that this country could realise a higher rate of profit in comparison with another country with a higher rate of capital accumulation and respectively a higher growth rate. As far as capital is mobile on a world scale, it will try to move to countries where the perspectives for returns are the best and the described tendency will get higher and higher. Thus it is expected that the gap between the income level of the rich and the poor countries will decrease and gradually will disappear.[5]

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[2] The study is part of the research project at the Economics Research Institute at the Bulgarian Academy of Sciences titled "Economic Growth and Convergence in the EU", adopted by the Scientific Council. Project participants: Prof. D.Ec.Sc. Rossitsa Rangelova (Project leader), Prof. Dr. Daniela Bobeva and Associate Professor Dr. Dimitar Zlatinov.

[3]These questions are considered by the author Rositsa Rangelova in the dissertation for defending of the scientific degree "Doctor of Economic Sciences". The dissertation is titled "Contemporary Dimensions of Economic Growth", Higher Attestation Commission, 2008. Here these questions are presented very briefly and further developed according to the theme of the study. For detailes, see Rangelova, 2008, pp. 48-63.

[4] Interestingly, Solow had not realize that he was creating a model that explained the differences in economic growth rates by country, but that this was just a way to study the dynamics of growth in a country.

[5] It is assumed that the change in population number and the share of savings in GDP, or in other words the factors influencing savings, are identical for all countries. If these factors do not affect equally, each country will form a different steady state, but GDP growth per capita in individual countries will continue to converge because new technologies are embodied in new capital goods and the importance of capital accumulation is growing.

If a number of conditions are met, the neo-classical model of economic growth implies *economic convergence*[6] between a number of countries or groups of countries, at least in terms of rates of growth.

The main assumptions and conclusions from Solow's model in the context of the considered issue of economic convergence are as follows (Solow, 1956, pp. 65-94):

- labour supply grows at a constant rate n*:* $L^S(t) = L_0 e^{nt}$;
- labour market continuously clears: $L^S(t) = L^D(t) = L(t)$;
- technological progress is 'labour augmenting'; this means that the effective input of labour E (Employed) can be written as $E(t) = L(t) e^{\varphi t}$; φ is the rate of labour-augmenting, so-called Harrod-neutral, technological progress;
- savings are a constant fraction of income: $S(t) = sy(t)$;
- the production function is neo-classical and is characterised by constant returns to scale: $y(t) = F(K(t), E(t))$, with $F(\mu K, \mu E) = \mu F(K, E)$ $(\mu > 0)$.

The hypothesis of constant returns to scale means that the production function can be written as follows, without loss of generality:

$$q \equiv y / E = f(K/E) = f(k), \tag{1}$$

where q is income as a result of a unit of productive capital; k = K/E is the capital/labour ratio. After analysing and transforming (1),[7] it is concluded that the immediate consequence of this is that the growth rate of the capital/labour ratio (and therefore per capita income) is higher in countries with a lower initial value of k. *This means that with the same production technology, the capital/labour ratio in less developed countries will grow faster than in developed countries.* This property of the neoclassical model of growth is known as the hypothesis of ***absolute (unconditional)*** convergence and leads to the conclusion that all countries will follow the same model (trajectory) of growth.

Measurement issues: β- and σ-convergence

In order to test the hypotheses mentioned above empirically, it is necessary to use a specific form for the production function. It is usual in this context to opt for a simple Cobb-Douglas specification:

$$q = f(k) = Bk^{\alpha}, \text{ with } 0 < \alpha < 1 \tag{2}$$

After a series of transformations, it takes the form:

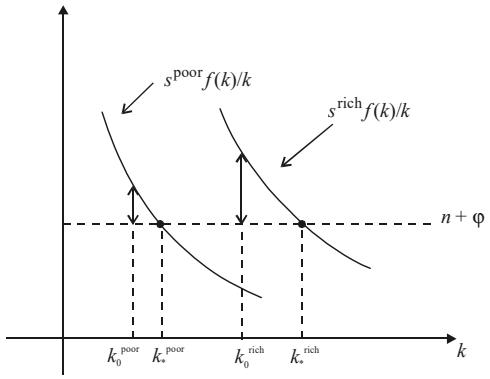
[6] In the modern economic literature and analyses, two concepts are used – catching-up and convergence, to which we adhere in the theoretical consideration of these processes.
[7] For details, see Rangelova, 2008, pp. 48-66.

$$\frac{\mathrm{d}\log q}{\mathrm{d}t} = \frac{\mathrm{d}\log(q/q^*)}{\mathrm{d}t} \cong -(1-\alpha)(n+\varphi)\log(q/q^*) \tag{3}$$

The parameter $\beta \equiv (1-\alpha)(n+\varphi)$ shows how fast a person's income (measured in units of efficiency) will approach its equilibrium value (Figure 1). Equation (3) is the basis of the concept of β-convergence, as an alternative choice for convergence of economic growth rates. If β is equal to 0.03 (suppose, for example, that n = 0.01, φ = 0.03 and α = 0.25), then each year 3% of the relative difference between q (income as a unit of efficiency capital) and its equilibrium value will decreases.

Figure 1

β-convergence in the neo-classical model of economic growth



It is proved, however, that β-convergence is not valid for all the countries. It can only be confirmed for countries from a more or less homogeneous groups (EU or OECD member-states), but not for more heterogeneous groups, and even more so on a global scale. This circumstance denies the theoretical concept of absolute convergence, according to which convergence should be valid in all cases and even more so in the typical case of income disparities between rich and poor countries. Therefore, without changing the neoclassical model of growth, it was necessary to redefine convergence in a conditional form. Most likely, the countries are characterised by different coefficients in front of the variables for them in the model and therefore have different long-term equilibrium values k* and different growth trajectories. In this situation, growth in a rich country will be higher than in a poor country if the capital/labour ratio for it is relatively far from its equilibrium value. In such a case, we are talking about conditional β-convergence, according to which the lower initial value of a person's income corresponds to a higher growth rate, if the variables that determine the value of long-term equilibrium are controlled as well as possible.[8]

[8] The theory defines three hypotheses for convergence: a) *absolute (unconditional)*, when the income per capita in different countries approaches each other in the long run, regardless of their initial state; b) *conditional*, when per capita incomes in countries with similar structural characteristics (e.g.

Convergence, as defined so far, relates to β-convergence in growth rates of per capita income. In other words, there is β-convergence if poor economies tend to grow faster than rich ones. Whether such (absolute or conditional) convergence exists in specific cases is always an open question, but one that most of the time can be empirically answered. An altogether different question, however, is whether this type of convergence also implies that income inequality between countries diminishes as time goes by. The answer is 'not automatically', even in the case of absolute β-convergence. In other words, the convergence of growth paths does not necessarily lead to a lower variance in the group, to so-called ***σ-convergence***. This could be shown as a measure for inequality of per capita income and we take the sample variance of the logarithm of q_{it}:

$$D_t = \frac{1}{N} \sum_{i=1}^{N} \left(\log(q_{it}) - \mu_t\right)^2 \quad (4)$$

where μ_t is the sample mean over the units considered (countries, regions, etc.). If N is sufficiently large, then we can consider D_t to be a good estimate for the variance of the population. Under the assumption that the disturbances u_{it} are independently distributed in time and between 'countries' with a constant variance σ_u^2, we get the following first-order difference equation for D_t describing the dynamics of income inequality in the group under study:

$$D_t = b^2 D_{t-1} + \sigma_u^2 \quad (5)$$

The two concepts express different phenomena: β-convergence studies *the dynamics of income in a sample of studied countries*, and σ convergence studies how *the distribution of income between the individual countries* in the sample changes over time (Figure 2).

Although the two concepts are different, they have a connection to each other. It can be proved that β-convergence is a necessary but not sufficient condition for σ-convergence (Sala-i-Martin, 1996, pp. 1325-1352). From Figure 2 it follows that even with absolute β-convergence, the deviations in the income levels remain positive values. The deviations may even increase at the time when the initial dispersing is lower than the equilibrium value D*. The existence of β-convergence (i.e. b <1) does not necessarily lead to a reduction in inequality between countries (σ-convergence).

For the purpose of empirical studies, the speed of convergence could be estimated using the following non-linear equation.

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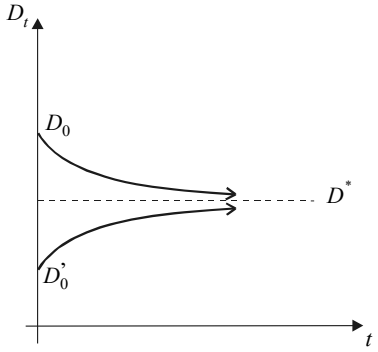
technology development, population growth rate, government policy, etc.) approach each other in the long run, as countries with lower initial income levels achieve higher economic growth and are closer to those of richer countries; c) *club convergence*, when countries in a group that have a similar initial level of income and similar structural characteristics approach each other in the long run.

convergence, the deviations in the income levels remain positive values. The deviations may even increase at the time when the initial dispersing is lower than the equilibrium value D*. The existence of β-convergence (i.e. b <1) does not necessarily lead to a reduction in inequality between countries (σ convergence).

Figure 2

Sigma (σ) convergence starting from two different initial positions



For the purpose of empirical studies, *the speed of convergence* could be estimated using the following non-linear equation (Barro, Sala-i-Martin, 1992, pp. 230):

$$1/T \ln (y_{i, t0 +T}/y_{i, t0}) = \alpha - (1 - e^{-\beta T})/T. \ln (y_{i, t0}) + u_{it0, t0 + T}, \quad (6)$$

where $\ln y_{i, t0 +T}$ and $\ln y_{i, t0}$ mean log of the growth rates of the income per capita in the initial and respectively final year; i is the country index; T – duration of the observed period in years; α – constant; $u_{it0, t0 + T}$ – average error u_{it} in the time interval between t_0 и t_0+ T. After estimation by the Least Squares method and transformations, it is obtained that the speed of β-convergence rate can be calculated using the equation:

$$(1 - b_T) = (1 - e^{-\beta T})/T \quad (7)$$

It is proved that *conditional β-convergence* could observe if the partial correlation between the income per capita growth and its initial level is negative. In case the regression coefficient of the variable of the initial level is negative, we can speak about absolute *β-convergence.* Absolute *β*-convergence is limited to relatively homogeneous groups of countries, conditional *β*-convergence is an empirically well-established fact, and *σ*-convergence is not warranted, even in the case of absolute *β*-convergence.

2. The Role of Endogenous Models for the Development of the Concept of Convergence

The emergence of endogenous economic growth models is associated with the research interest in the theory of convergence (or catching up), embedded but undeveloped in the neoclassical model. The neoclassical model of economic growth includes the technological progress as an exogenous factor. Because of this weakness, the model cannot actually offer

insight into why some countries are growing faster than others are. This prompted scientists to work further, and since the mid-1980s, models of endogenous growth have emerged to seek a solution. The mechanism of their creation is to reject the assumption of a declining return on capital accumulation and to replace it with the assumption of a constant return. These models aim to explain why convergence did not take place, and the answer is because there are positive externalities of capital accumulation that outweigh the effects of increasing the capital/labour ratio (K/L). Therefore, the marginal productivity of capital does not decrease with increasing GDP per capita. As a result, the rich remain rich and the poor remain poor.

The assumption of increasing returns on capital opens up opportunities for policy changes or preferences that affect the rate of economic growth in the long term. It allows the inclusion in the growth models of indicators from a number of other aspects of the financial, demographic and social systems, including reducing income inequalities between the population and between countries and improving the quality of life, environment, role of institutions, non-economic factors, etc.

Over the last three or four decades, there has been a debate on what are the determinants of economic growth and the reasons for the growing income gap between people in different countries. One of the main questions is whether economic growth and the difference in per capita income should be included in the processes of accumulation of physical and human capital or in total factor productivity (TFP). However, looking at the impact of these two factors alone (accumulation and productivity) is an oversimplification of reality. The process of economic growth is the result of a complex and interconnected combination of factors. Therefore, it is crucial to study the system of relationships that connects the factors of production, including the quality of institutions, investment in new technologies and others. For example, the CEE countries were on relatively comparable levels of development at the beginning of the transition to a market economy after 1989. However, 30 years later, some of them are in the group of developed countries, while others such as Bulgaria have reached only a little over half of the average level of development (GDP per capita) in the EU.[9] These effects on long-term growth rates are accounted for by the endogenous theory of growth, which is a further development of neoclassical theory.

The beginning of endogenous ideas could be found in the publications of Paul Romer (1986) and Robert Lucas (1988), who defend the view that in the model of economic growth, the ratio of capital and labour should be a key endogenous variable and the technological change cannot be treated as an exogenous factor. However, if technological change is included as an endogenous factor, perfect competition cannot be the main theoretical basis for modelling growth. In his defence against the exogenous nature of technological progress embedded in his model, Solow acknowledges, “no one can deny that technological progress is at least partially endogenous to the economy”. To overcome this limitation is “the most promising

[9] E. Spasova (2016) gives her reading of the possibilities for real convergence through the prism of modern economic theories.

aspect of the third wave of growth theory and the inclusion of monopoly competition in growth theory is undoubtedly a good thing" (Solow, 2000).[10]

The first works of P. Romer (Romer, 1986, pp. 1002-1037), R. Lucas (Lucas, 1988, pp. 3-42) and others, laying the foundations of the theory of endogenous growth, do not treat the issue of technological progress. They emphasise a reassessment of the theory of declining returns on factors of production. Most new models take Solow's model as a starting point and try to endogenise it using one or another mechanism.

The transition from exogenous to endogenous theory takes place via three channels: 1) Reflection of the spill-over effects of knowledge as a consequence of the accumulation of physical capital; 2) A way is sought for increasing the labour productivity through the accumulation of human capital, relying on the fact that there is a strong dynamic connection from education to the produced product; 3) An expression of achieving more productive projects through R&D is sought.

In summary:

- There is a rising level trend of GDP worldwide, but this cannot be reconciled with the idea of the declining return of the factors of production in the neoclassical theory of growth. The lack of explanatory power of neoclassical theory was particularly evident in the constant and even widening gap in the level of economic development (GDP per capita) between the developed and poor countries of the world for many years. The statistics for increasing the differences between developed and developing countries confirm the unsuitability of the model, which cannot explain the sustainable existence of these differences, nor does it give recommendations for their elimination (Spasova, 2015).
- Although Adam Smith was the first to proclaim the role of free trade, after him up to the neoclassical model of Solow, the economy is seen as a closed system in perfect markets, which is a strong violation of today's conditions of international economic and trade cooperation. Endogenous models look at economic growth in open economies, including under the influence of ongoing globalisation in the world, which suggests the inclusion of another wide range of variables.
- A strong shortcoming of Solow's neoclassical model is the assumption that changes in the growth rate of per capita output in a long-term sustainable equilibrium come from changes in the growth rate of exogenously set technological progress. The endogenous theory is the first to attempt to explicitly decipher technological progress. The idea of the poorer countries catching up with the richer ones is to reduce the gap in technological

[10] From the end of the first half of the twentieth century until today, there have been three successive waves of growth patterns. *The first wave* relates to the emergence of the theory of economic dynamics with the main representatives R. Harod (and his works from 1939 and 1948) from Great Britain and E. Domar (1947) from the USA and the development of the neo-Keynesian models of economic growth. *The second wave* concerns the emergence of the so-called neoclassical models, the beginning of which is considered to be the work of R. Solow (1956). *The third wave* has been observed since the mid-1980s. It has become an expression of efforts to overcome the limitations and contradictions in neoclassical models and is associated with the emergence of endogenous growth patterns.

development between them. It can be accelerated through the import of capital goods and through foreign direct investment (FDI), but the effectiveness of this process depends on the absorption capacity, i.e. "social capacity" and "technological similarity". It includes a wide range of variables reflecting the state of human capital, political stability and institutional development.

- As noted by N. Nenovski, the idea of convergence (as a process of general motion of certain variables) is borrowed in economics from classical physics and mathematics and generally remains within the neoclassical equilibrium model. According to the latter, without the presence of state intervention, there are internal forces that lead to convergence between different economic units (be it individuals, groups, classes, enterprises, nations, etc.). Convergence is the result of price movements and the profitability of factors of production, following the principles of marginal utility. It is believed that balancing takes place in an ideal world without restrictions, transaction costs are zero, information is free and freely available, knowledge is complete (Nenovski, 2007).
- A question would be curious hypothetically about what would happen if full convergence was achieved.[11] For example, if GDP per capita get equal in all countries, what will follow? Will the countries and regions develop equally? Will there be an opposite phase of divergence, who will cause it, etc.?
- In the process of accumulating theoretical knowledge in science, some assumptions and statements remain more persistent over time and convincing in the minds of those who defend or criticise them, others less, and others who are simply rejected. Very often, certain assumptions and mantras take such deep roots in thinking that almost no one realises that they are created only under certain theoretical assumptions. One of the many examples is that most often, the justifications for certain economic decisions are based on the postulates of perfect markets and perfect competition. Other important conditions are missed, which change the meaning, even make the acceptance of the used ideas meaningless, and thus affect the correctness of the proposed solutions and policies. An example of such discrepancies is the attitude towards neoclassical theory. It has been widely criticised for the last 5-6 decades. However, it continues to be prevalent among the models taught in most faculties of economics in the world, and the vast majority of research is based on it. On this occasion, Thurlwall notes that after so much criticism, it is "a mystery how the neoclassical model based on Solow's continues to dominate the training of economists in growth theory, and social psychologists probably need to explain this" (Thirlwall, 2013, p. 34).

3. Empirical Studies of the Relationship between Economic Growth and Convergence

Empirical research on convergence includes historical analyses. They consider GDP per capita as a dependent variable (and proxy) for the degree of catching up. Most empirical

[11] Likely the author N. Nenovski (2007) was the first to ask this question. In addition, he finds similarities with the Marxist model, where there is a tendency to equalize the rate of profit within and between industries.

research relates to growth in industrialised OECD countries. This is mainly because of the available reliable estimates and data for long periods, mainly due to the assessments of A. Madison, A. Heston and R. Summers, the World Bank and others. Research in this area is primarily on the nature of β-convergence and σ-convergence, as well as the relationship between the two, proving that β-convergence is a necessary but not a sufficient condition for σ-convergence. According to the authors Barro and Sala-y-Martin (1992), the rate at which regions in different countries approach in terms of the level of development in different periods is surprisingly close – about 2% per year. These estimates are stable and always statistically significant. The authors reject the possibility that this unified assessment for all countries is the result of measurement errors or due to a small sample (Sala-i-Martin, 1996, pp. 1325-1352).

The following comments could be made on these empirical assessments. *Firstly*, the rate of 2% per year is very slow. This means that it takes about 35 years to shorten 50% of the distance between an economy with a certain initial level and its sustainable state and that 75% of this difference disappears after a full 70 years. In other words, after a long period of 70 years, a quarter of this distance will remain. *Secondly*, this constancy of a coefficient of 2%, obtained in numerous inspections and cases, is doubtful. It could reflect some mechanical, mathematical dependencies, or the economic structure of growth is independent of the variables in question. Another author, examining the results of a previous article by Sala-i-Martin (in the same journal and the same issue in 1996), argued that a convergence rate of about 2% could be due to measurement errors or the presence of endogenous relationships between the variables (Quah, 1996, pp. 1353-1375). Reasons could also be some statistical artefacts – measurement errors, small sample and so on. It should also be noted that the studied dependencies are much more complex and the results are not always statistically significant and reliable. Even Romer, in a study of increasing returns, argues that, in fact, the rate of economic growth does not show a correlation with the initial level of income per capita (Romer, 1986, pp. 1002-1037). Many studies and by statistics confirm the lack of convergence. The only optimist about convergence is Lucas. Based on data for a very long historical period (1800-2000), the author shows that the indicator of income inequality between countries tends to increase since 1800 onwards, reaching its peak in 1970. This convergence is intensifying and according to him, it will be one of the main economic events in the 21st century (Lucas, 2000, pp. 159-168).[12]

Because of the criticism regarding the unrealistic nature of the neoclassical model, a number of authors (Mankiw, Romer, Wail, 1992, p. 407-437) modify the model by adding human capital (using the variable for the number of high school graduates) to the determinants of growth. They prove that the expanded indicator of physical capital with the variable measuring human capital is more effective in quantifying growth. According to Baumol, the inclusion of education as a variable in regression analysis changes the results – countries with a close level of education approach each other very consistently (Baumol, 1986, pp. 1072-1085). Other authors rely on the role of institutions (Knack, 1996, pp. 207-228), etc. It has

[12] There are a large number of studies that deserve attention. Here are presented only ones of the most known publication on the subject concerend. For further information in Bulgarian literature, see Rangelova, 2008, p. 48-66; Spasova, 2016; and others.

been shown, however, that *extended versions of Solow's model do not change the basic presumptions of the neoclassical theory of growth*.

A number of authors examine the issues of convergence through the prism of the development of technological progress. For example, James proves that technological change mainly affects developed economies, but not the developing world, which leads to a widening gap between them. This fact is not explained in neoclassical theory, as it states that technological changes occur at comparable, exogenously determined rates throughout the world. It is important to note that the low degree of technological diffusion in these countries is due to their inability to absorb capital-intensive, large-scale technologies due to their outdated technological systems (James, 2003, pp. 312-323). Others do not deny the presumption that only technology can change long-term growth rates, while all other factors (savings, investment, employment, and increase in human capital) can only change the levels of aggregate per capita output (Mankiw, Romer and Weil, 1992, pp. 407-437). This fact is confirmed by the study of three authors of β-convergence between 12 countries in Western Europe over a 55-year period (1937-1992). According to them, the β-ciefficient is 0.029 at a significance level of 5%, which means that during this period, the countries have been approaching each other at an average rate of nearly 3% (Fischer, Sahay, Vegh, 1998).

A summary assessment of Solow's model is given by Temple (Temple, 1999), which model is an ideal tool to show divergence, and in particular that anything unrelated to the rate of investment in rich and poor countries leads to an increase in income dispersion. The main reason for the different growth rates between the countries is the different macroeconomic stability in them. This is partly due to capital investment, with equipment investment perhaps playing a special role. Solow himself examines the issues theoretically and notes that the use of convergence criteria makes sense only if the countries in question have a significant number of common features: level of savings, demographic parameters, available technological knowledge, and so on (Solow, 2000).

A more recent study uses the availability of data for many countries, in the long run, to make it possible to trace the convergence of today's EU Member States in the 20th century on the basis of β- and σ-convergence (Rangelova, 2008, pp. 48-66).[13] A. Madison's estimates of GDP per capita based on PPPs, in particular from 1913 to 2006, were used. The convergence calculations for the period under review for all 42 countries gave a β-coefficient of 0.021 with a significance level of 5%, which means that during this period the income gap between richer and poorer countries decreased by almost 2%. The results for the two subperiods 1913-1939 and 1939-2006 confirm the observed phenomenon of more intensive convergence in the second than in the first subperiod.

[13] The sample consists of a total of 42 countries. The thirty countries include 15 countries of the "old" EU, 7 newcomers to the EU (Cyprus, Malta, Bulgaria, Czechoslovakia, Hungary, Poland and Romania), 4 other European countries – Iceland, Switzerland, Norway and Turkey as well as 4 countries outside Europe – USA, Canada, Australia, and New Zealand. Poorly developed are 12 countries from Africa, selected by us to obtain a more diverse sample, which is closer to the world average – Algeria, Congo, Ivory Coast, Egypt, Ethiopia, Ghana, Kenya, Morocco, Nigeria, South Africa, Sudan, Tanzania.

4. Integration, Cohesion, Nominal and Real Economic Convergence in the EU

EU terminology uses several terms related to the convergence processes of the Member States in economic and social policy. The most frequently used terms in EU policy, as well as in separate publications, are integration, cohesion and convergence (Hristova-Balkanska, 2017, pp. 84-102). Most of the available publications mix the use of these concepts and often create ambiguity in the results and messages. This happens because the authors do not feel a desire or need to differentiate the concepts, or because of the logical one-way connection between them – as a rule, greater convergence implies greater cohesion and then – greater integration between the countries considered. Before considering the issues of nominal and real convergence in the EU, an attempt is made to basically define and distinguish the three concepts – integration, cohesion and convergence.

4.1. Economic Integration

The concept of integration has the broadest meaning compared to the other concepts considered. Generally speaking, it expresses growing economic interaction between countries. Economic integration is based on accepted economic agreements between different countries, including common monetary, fiscal, social and economic policies managed by supranational institutions. The main goals of economic integration are to achieve higher efficiency in the use of the factors of production and a fairer distribution of income between people and countries given the existing inequalities between them (Marinov, 2017). The same author distinguishes the following types of integration: a) according to the object of integration – market integration (removal of obstacles to the free movement of factors of production) and policy integration (creation of a common framework for the functioning of individual sectors or economies); b) according to the means (direction) for implementation – positive (creation of means, measures and institutions) and negative (removal of barriers and obstacles); c) according to the form of implementation – informal (practical actions, interaction between the markets) and formal (institutionalisation, political decisions). Institutional integration within the EU is organised in accordance with certain bilateral or multilateral treaties, which express the interests and expectations of individual Member States. These documents must comply not only with specific internationally established economic norms, but also with the relevant rules in the field of international cooperation, defined by international organisations such as the UN, WTO, IMF, and others in a wide range of human relations such as democracy, world security, environment, protection of human rights, etc. The EU Treaty sets out the conditions (Article 49) and principles (Article 6) that every country wishing to join and integrate into the EU must meet. The Copenhagen European Council in 1993 (known with the Copenhagen Criteria) has set out further criteria at the Madrid meeting in 1995. They could be divided into three groups – political, economic and administrative capacity – and are as follows:

- Stability of institutions guaranteeing democracy, the rule of law, human rights and the protection of minorities;
- Existence of a functioning market economy and the ability to withstand competitive pressure and market forces within the EU;

- Ability to fulfill the obligations of membership, including a willingness to adhere to the goal of Economic and Monetary Union, known as the Euro area.

In addition, the membership criteria require candidate countries to establish conditions for integration into the EU by adapting its administrative structures. This requirement was introduced by the Madrid European Council in December 1995. It concerns the ability of candidate countries not only to adopt but also to effectively implement harmonised European legislation through the relevant administrative and judicial structures. All these criteria got mandatory by the 1997 Amsterdam Treaty.[14]

In order to start EU accession negotiations, the candidate countries had to meet the political (first group above) criteria, assuming that they would continue their efforts to meet the other criteria until full integration.

The wording of the criteria shows that they are interpretive in nature and not set by parameters, as in the case of the nominal convergence policy (which will be discussed below). The evaluation of their implementation is carried out on the basis of many indicators for each country, but there is a possibility also for subjective consideration and evaluation.[15]

Even today, 15 years for ones countries and 12 for others after accession, the EU Member States of CEE do not fully meet the Copenhagen criteria and conditions listed above. The newly acceded countries were accepted into the EU benevolently and encouragingly, but also for strategic and geopolitical reasons (Table 1).

Table 1

Indices of GDP per capita in SPP, 2008 and 2019, EU=100%

Regions, countries	Index		Regions, countries	Index		Regions, countries	Index	
	2008	2019		2008	2019		2008	2019
EU-28*	102*	101*	Malta	80	99	Romania	52	69
Euroezone-19	110	106	Italy	108	95	Greece	95	68
Ireland	136	191	Czech Republic	85	92	Chroatia	64	65
Luxemburg	266	261	Spain	102	91	Latvia	60	69
Danmark	127	129	Cyprus	107	89	Bulgaria	43	53
The Netherlands	143	128	Slovenia	91	88			
Austria	127	127	Estonia	70	84	Turkey	49	61
Germany	118	121	Lituinia	64	82	Montenegro	42	50
Sweden	129	120	Portugal	82	79	Northern Macedonia	32	38
Belgium	116	117	Slovakia	73	74	Surbia	39	41
Finland	123	111	Poland	56	73	Bosnia and Herzegovina	29	32
France	108	106	Hungary	64	73	Albania	25	31
United Kingdom	113	105						

* Based on EU-27 for 2020.

Source: National Statistical Institute, available at: https://www.nsi.bg/bg/content/11470/.

[14] See: Accession criteria (Copenhagen criteria), available at: https://eur-lex.europa.eu/summary/glossary/accession_criteria_copenhague.html?locale=bg, Portal Europe http://old.europe.bg/htmls/page.php?category=198.

[15] The EC assesses the progress of reforms in the candidate countries through annual reports to the Council. Negotiations take the form of an intergovernmental conference of the Member States with the candidate countries.

The accession to the EU of candidate countries from the so-called Western Balkans and probably Turkey is forthcoming. However, the level of economic development of these countries is lower than the starting point of the already accepted CEE Member States (Table 1). With the accession of these countries, the EU will become even more heterogeneous, more unstable and full of internal contradictions, which would undoubtedly affect the integration into this community.

4.2. Cohesion – economic and social

The concept of cohesion[16] in the EU is considered in the scientific literature as economic and mostly as social cohesion. Some authors consider the concept of economic cohesion as an element of economic integration. According to D. Hadjinikolov, economic cohesion means achieving a homogeneous structure of the economy of individual member states and regions, which allows the EU economy to act as a single organism. Defined in this way, the level of economic cohesion can be determined by the structures of: the economy (GDP and/or GVA); services sector, manufacturing, exports, etc. (Hadjinikolov, 2014). The cohesion is based on the fact that the greater the similarity of these indicators between the different national economies, the greater the cohesion between them in the European Economic Area. Economic cohesion defined in this way, however, is very similar and mixed with economic convergence. The same author distinguishes between cohesion and convergence, as the former reflects the similarity in structures (economic, social, ethnic, etc.), but the latter, convergence reflects the similarity of processes (the cycle of GDP development, etc.).

Social cohesion is defined as "an approach and process of cohesion and inclusion in society based on overcoming inequality, injustice, marginalisation and social exclusion of certain individuals and groups... Social cohesion cannot solve and eliminate social problems, but could mitigate social contrasts and reduce the economic burden on the socially disadvantaged".[17]

The EU, via Eurostat, monitors the situation and changes in the social sphere and on this basis, certain policies are adopted.[18] The main financial instrument for cohesion between the individual EU Member States is the Cohesion Fund. It is established in 1993 and provides financial assistance for projects in the field of trans-European networks, transport infrastructure and the environment for the EU Member States with a GDP of less than 90% of the EU average. The aim is for these countries to reduce their economic and social backwardness, as well as to stabilise their economies. This fund is subject to the same

[16] The word cohesion (from Latin language "stick together") literally means the force of attraction, the adhesion between the molecules of a substance. That is why it appearances firstly in physics and chemistry.

[17] See Dictionary, available at: http://rechnik.info/%D1%81%D0%BE%D1%86%D0%B8%D0%B0%D0%BB%D0%BD%D0%B0+%D0%BA%D0%BE%D1%85%D0%B5%D0%B7%D0%B8%D1%8F

[18] The main indicators related to measuring social cohesion could be found on the Eurostat website under the heading "Income and Living Conditions". These are as follows: relative share of the poor by sex and age groups, relative share of the poor by economic activity and by sex (for persons aged 18 and over), percentage of the population living with material deprivation by age and sex, etc. Available at: https://ec.europa.eu/eurostat/data/database.

programming, management and control rules as the European Social Fund (ESF) and the European Regional Development Fund (ERDF).

Social cohesion can be seen as a function of economic cohesion. It is logical to assume that the greater the economic cohesion and the more similar the structure of the economies of the countries concerned, the more similar the structure of incomes. In our opinion, however, this is a crude assumption, insofar as it is necessary to specify what structures are in question and insofar as in this case, different and divergent factors play a role.

The concept of cohesion is most closely linked to the concept of policies and catch-up. The bulk of cohesion policy funding goes to less developed countries and regions in the EU (including co-financing from the national budget) in order to help them catch up and reduce the economic, social and territorial disparities that exist. The cohesion policy of the EU's targets all regions and cities to support job creation, business competitiveness, economic growth, sustainable development and improve the quality of life of citizens. That is why cohesion policy is at the heart of European solidarity. Investment helps to achieve many other EU policy objectives, such as education, employment, energy, the environment, the single market, research and innovation. In particular, cohesion policy provides the necessary investment framework and strategy to achieve the agreed growth targets.[19]

4.3. Nominal and real convergence in the EU

This section examines the most typical and most frequently considered for the EU types of convergence – nominal and real, as well as the relationship between them.

In addition to having the political will, an acceding country needs to meet certain formal criteria for its accession and integration, in particular with regard to its macroeconomic and financial stability. Nominal convergence is expressed in the implementation of the so-called Maastricht criteria. Initially introduced as a mechanism for imposing budgetary discipline in the EU, they later became the main criteria for joining the single currency.

The criteria include five basic requirements:

1. *Inflation,* according to the harmonised index of consumer prices, should not be higher than 1.5 percentage points above the average value between the three Member States with the lowest inflation.
2. *Budget deficit*, measured as a percentage of GDP, shall not exceed 3%. The rule allows a deficit that exceeds the threshold only under exceptional conditions.

[19] By 2020, the EU targets to five specific objectives: employment, innovation, education, social policy and social inclusion, and climate/energy. Each Member State has adopted its own national targets in these areas. To achieve these goals and to meet the development needs of all EU regions, 351.8 billion EUR has been set aside for cohesion policy for the period 2014-2020 – almost a third of the total EU budget. See: Europe Strategy 2020 – ec.europa.eu/eu2020; EU Cohesion Policy 2014-2020, date accessed 20 July 2015, available at: http://ec.europa.eu/regional_policy/sources/docgener/informat/basic/basic_2014_en.pdf.

3. *Government debt* as a percentage of GDP should not exceed 60%. In the event of a downtrend, the rule allows debt above 60%, as long as it is expected to fall below the limit in the near future.
4. *Long-term interest rates* (average yield on ten-year government bonds) shall not exceed by more than 2 percentage points the average value between the three Member States with the lowest inflation.
5. *Stability of the exchange rate against the euro.* Stability of the exchange rate against the euro. The currency of the candidate country should not devalue significantly in the last two years against the European currency. The deviation may vary by +/- 15% from the threshold set by which the currency of the Member State concerned has entered Economic and Monetary Union (EMU) II.

EMU is set as a tool to achieve the Member States integration into the EU and the objectives "economic and social progress, high employment, balanced and sustainable development" (as referred to in Article 2 of EU Treaty). Such goals implicitly include "real" convergence, which enables the achievement of results in which the lagging countries and regions catch up with the more developed ones.

Nearly 20 years have passed since the adoption of the euro in the EU. During the first years (2002-2008), EMU was characterised by general macroeconomic stability, low inflation and calm in the financial markets. The global financial and economic crisis of 2008 and the ensuing debt crisis, caused stagnation, which raised doubts about the validity of the EMU content. The EU has proved vulnerable to financial and economic shocks, but there has been a lack of research and a vision for long-term economic convergence according to EMU principles (Marelli, Parisi, Signorelli, 2017, pp. 2-7). [20]

Nominal stability and convergence were satisfactory in the run-up to the 2008 crisis. In most countries, inflation was very close to the ECB's 2% target. Slightly higher inflation was registered in the then faster-developing countries such as Ireland, Spain, Greece and others. A reflection of the different inflation dynamics was that the short-term interest rate set by the ECB caused lower real interest rates in the inflation-prone countries. This stimulated investment in non-tradable activities and the creation of asset and bubbles in the housing sector. The result was *structural divergence* as the "periphery" specialised still from the time before the crises of 2008 in non-tradable activities and construction, while the centre, relied on exports and tradable activities – manufacturing and services (Buti, Turrini, 2015).

At that time, there was calm in the financial markets and interest rates were almost the same everywhere. This environment encouraged huge capital flows from the "centre" to the "periphery", fostered by the disappearance of currency risk and private capital flows in the euro area, which replaced the missing centralised public budget and contributed to rapid economic growth. However, this environment masks the growing (trade and debt) imbalances, while the increase in peripheral debt was mainly related to private debt, not public debt.

[20] See: Institutional, Nominal and Real Convergence, available at: https://ebrary.net/39903/political_science/institutional_nominal_real_convergence.

In the reports, which monitor compliance with the criteria in individual economies, the European Central Bank (ECB) said that in the years after the crisis, only Bulgaria and Estonia managed to comply with all Maastricht conditions. However, according to the ECB, in none of the countries, including Bulgaria, the legal framework is yet in full compliance with all the requirements for adopting the euro. Therefore, the criteria for stability, accession, cohesion, convergence, integration, etc., intertwine and most often are one-way in their action, which hampers in many cases clearly distinguish. This raises the question of whether convergence is a natural consequence of the "catching up" effect of less developed countries to more developed ones. Is there and what is the relationship between nominal and real convergence given the policy and the observed trends within the EU?

The logic assumes that the Maastricht Treaty sets out the criteria for nominal convergence as a necessary condition for candidate countries to join EMU. Meeting these criteria leads to the stability of economies and preparation for the inclusion of some of them in the euro area. Convergence issues were not yet on the agenda at the time (Andreff, 1998, pp. 111-138). In this sense, *nominal convergence could be seen as a necessary condition for real economic convergence*, which, however, is not enough to lead to real economic convergence. Real convergence requires higher economic growth to ensure that catching-up countries grow faster in terms of GDP per capita.

The concept of "economic convergence" has different meanings. In the literature on economic growth, convergence refers to the expected trend of countries to grow faster the lower the GDP per capita of the population. The *real economic convergence* is considered as the decreasing differences in GDP per capita, which the neoclassical theory of growth predicts. The concept of real convergence includes the possibility of sustainable GDP growth over a relatively long period at a sufficiently high rate to bring the level of development of an economy closer to that of the developed world.

Since 1992, the EU's economic policy has focused on achieving a higher degree of nominal and real convergence between its members. It could be said that nominal convergence has been achieved, but this is not happening with the real one.

To compensate for the underestimation of the problems of economic growth in the 1990s, the EU adopted the Lisbon Strategy (2000-2010) and its subsequent revisions, where one of the main objectives of economic and social development is to build a knowledge society. In the Europe 2020 economic strategy adopted on 13th July 2010, the European Commission (EC) outlines its vision for the development of the EU over the next 10 years. The immediate objectives of the new strategy are to identify the causes of the crisis in the EU and to find ways to prevent its recurrence. Part of the cause of the global crisis is believed to be the lack of a long-term vision and development agenda, including economic growth, which is why creating a new strategy is essential. It is recognised that no country can tackle global challenges on its own through isolated action.

Through the Europe 2020 economic strategy, the EU sets itself the task of preparing the conditions and achieving smart, sustainable and inclusive growth in a dynamically changing world. These three mutually reinforcing priorities had to help individual countries and the community as a whole to achieve a high level of employment, productivity and social cohesion (homogeneity).

The aim of the strategy Europe 2020 was to avoid the mistakes in the implementation of the Lisbon Strategy by making it more concrete, stricter and better integrated with other EU strategies – that of sustainable development, cohesion and social policy, policies in the field of energy and climate, etc. In both basic strategies, the main priority is to build a new economic model based on knowledge, a low-carbon (green) economy and high employment (Rangelova, 2011, pp. 3-29).

The concept of *convergence* between countries and/or regions is opposed in a dichotomy to the concept of *divergence*. The latter means an increase in the gap between economic developments in the countries concerned (Nell, Signorelli, 2015). One of the reasons for the discrepancy is the lack of infrastructure and the simultaneous effects of the network, which is why lagging countries cannot take advantage of new technologies. The divergence between countries could also be the result of badly functioned institutions (such as corrupt or dictatory); discrepancies in the demographic, social and economic processes between rich and poor nations, etc. Globally, social disparities can be caused by social barriers to knowledge sharing due to language and cultural constraints, as well as differences in income, ethnicity or other social dimensions.

Another used concept, related to the considered topic, are the *macroeconomic imbalances*, setting the differences in the growth rates, the dynamics of productivity and competitiveness, the current account positions, the public budgets, etc. They show constant asymmetries in the EU, especially in the euro area. However, there are no studies on whether and to what extent these differences mean an economic divergence, lack of convergence or simply weak convergence.

5. Approaches to Convergence Research

In recent decades, ideas have been developed and implemented about what additional conditions can lead to real convergence between the EU Member States. This section analyses different approaches to convergence research proposed and used in various scientific publications. Different authors call them kinds, types, etc., but we prefer the term aproach, because in fact, the reaserch approaches to the convergence, considering individual economic sector or economic parameters. Various indicators and methods are used in the studies to test or prove an accepted hypothesis. Along with the presentation of selected approaches by different authors, a critique of characteristic moments is made.[21]

[21] On the topic of convergence between the EU member states, the serious work of a circle of experts from Italy is impressive. Itt is presented here as an illustration of the issues under consideration, as well as research by Bulgarian scientists is presented.

Structural convergence

The concept of structural convergence was introduced by M. Buti and A. Torini.[22] They argue, "Real cohesion was implicitly intended to work towards greater similarity of the economies involved in a monetary union in terms of economic structures, thus approaching EMU with the requirements of the OCA and easing the Maastricht nominal criteria". According to the two authors, what has already changed, is the type of convergence, as today's convergence is neither nominal nor real, it is structural. They see structural convergence as a basis for renewing real convergence. For this to happen, however, the right institutions and policies need to be put in place at both the European and national level (Buti, Turrini, 2015). However, the concept of structural convergence or divergence is theoretically still unclear.

Convergence by major economic sectors

The topic of structural convergence is first and foremost associated with the convergence of the productive structures of the countries' economies, which in turn is often seen as an important contribution to the synchronisation of business cycles and the effectiveness of the ECB's monetary policy. The global crisis of 2008 further raised the question of the similarity in the production structures of individual economies and their influence in the single monetary union. These considerations show the intertwined relationship between individual indicators and areas in the economy. For example, Bulgarian authors S. Raleva and D. Damyanov show the progress made by several of the new EU member states from CEE in terms of the convergence of the three main economic sectors – agriculture and forestry, industry and services – to the euro area level (Raleva, Damyanov, 2019, pp. 29-41).

In my view, the structural convergence based on economic sectors, industries and activities put logically the question to what extent of disaggregation it is assumed that there could be convergence, taking into account the comparative advantages and respectively the industry specialisation? The question of efficiency and competitiveness is an integral part of this. Does it mean that if the relative shares (structure) of the individual economic sectors and productions equalise, full convergence will be achieved? And if at the highest level of aggregation (by economic sectors) it may sound acceptable, then at a lower level, it is not logical. Research should be directed to these issues.

Monetary convergence

Among the Maastricht criteria, the monetary sphere includes the following indicators: inflation, partly interest rates and exchange rates. They can be seen as part of monetary convergence. N. Nenovski (2007) suggests to expand the set of variables related to monetary

[22] Marco Buti serves as Chief of Staff to EU Commissioner Paolo Gentiloni and Alessandro Turini as Head of Unit at the EC's Directorate-General for Economy and Finance. Available at: https://voxeu.org/article/types-ez-convergence-nominal-real-and-structural. This explains the style of these authors – they offer expert and affirmative work, but are a little away from academic research and critical analysis.

convergence by including different types of monetary and credit aggregates, interest rates, price indices and others. Institutional and organisational requirements regarding the independence of central banks and their administrative capacity may also be considered necessary for monetary convergence. The author pays attention to the fact that convergence is analysed and measured primarily through quantitative and aggregated indicators. But this type of convergence disregards the institutional characteristics and differences of Eastern European countries, including Bulgaria. Under this condition, it is even possible to see an increase in divergence in an enlarged Europe.

Institutional convergence

In order to achieve structural convergence, Buti and Turrini suggest that the right institutions and policies need to be put in place at both the European and national level (Buti, Turrini, 2015). The topic of the role of institutional convergence (cohesion, integration) is especially popular (Marelli, Signorelli, 2005, pp. 140-155).

There is a growing idea that institutions are important factors that can determine the development of nations, economic growth or decline, as the institutional factor stimulates or blocks economic and social mechanisms. Therefore, institutional cohesion must become not only an object of in-depth study, but also a starting point and a basis for compliance with the structure and requirements of the EU institutions. The main reason for not solving the problems of institutional cohesion comes from the difficulty of measuring processes and quantifying them, and hence the reduced ability to summarise indicators as reliable, significant, rigorous and synthetic.

So far, some experience has been gained in collecting data on the quality of institutions, but these data and results should be treated with caution. It is well known, for example, that institutions are context-specific because they evolve into a longer-term historical and cultural context. It is also questionable whether the legal characteristics and systems are sufficient to describe the actual impact of institutions. Moreover, most of the empirical data on the quality of institutions and the measures taken from there are usually based on public opinion polls and expert data surveys, which introduces a great deal of subjectivity and conditionality (Voigt, 2013, pp. 1-26).

Convergence of business cycles

The classical theory of OCA assumes preliminary synchronisation of economic cycles and the main macroeconomic indicators. When the common monetary policy is considered as a basic precondition, the existence of a sufficiently strong convergence between the individual economic cycles and the existence of similarity in the transmission mechanisms is assumed. It is also assumed that this similarity allows the impulses of ECB policy to have a symmetrical effect on the euro area. Otherwise, when there are differences in cycles and transmission mechanisms, it is expected the probability of asymmetric shocks to increase, as well as their harmfulness. This is because a common monetary policy could not dampen the various individual shocks.

The EU countries participation in EMU means enhanced trade integration and a greater degree of joint movement of economic cycles. It is assumed that homogeneity in structures makes economic shocks more symmetrical, so that real indicators can respond more adequately. In addition, the post-shock adjustment would be easier to deal with, provided there is an adequate degree of flexibility in prices and wages, high labour mobility and a sufficiently centralised public budget.

The degree of symmetry of shocks is also assessed in terms of per capita income, labour productivity, labour market indicators, trade relations and others. The impact of the business cycle is also measured by the openness of the economy, the ratio between tradable and non-tradable industries, income elasticity and market-weighted differences in the production of the economies of the EU member states.

Price convergence

Accession to the EU and the subsequent free movement of goods and capital, together with the EU's common customs policy, lead to price convergence in the participating countries.

Price convergence in the EU and euro area countries is the subject of research in the works of many authors, who regard either a group of countries or a single country. It is understandable that the first type of research for a group of countries has a higher degree of aggregation and often, the analysis is limited to the general convergence and price dynamics, but is not considered product groups or individual products. Also, the former lack an in-depth analysis of the factors behind the observed price processes (Bilyanski, Bozev, 2021, pp. 75-95).[23]

Individual authors consider price convergence to be one of the EU's main objectives (Cavallo, Neiman, Rigobon, 2013). According to them, during the recent turmoil in the Eurozone around the 2008 global crisis, little attention was paid to this issue. But this is important because the price structure has implications for the theory of optimal currency areas (OCA) and for correction as a result of external factors. The results of such studies suggest a greater role for consumer psychology or corporate organisational structure in macro-models for pricing.

Regional convergence

It is rightly believed that the crisis in the euro area is at the root of the crisis of failed regional cohesion and a lack of structural reforms. These reforms can be essential to promote the

[23] The theoretical basis of the study of the two cited authors is the Balasa-Samuelson model. The empirical study of the relationship between economic growth and price levels is carried out through regression analysis and panel regressions, the latter analyzing the change in the strength of the relationship over time and the peculiarities of its manifestation in EU member states. The results clearly show the significantly greater importance of economic growth rates for price levels of non-tradable products compared to tradable goods. The role of governments in the CEE countries and in particular in Bulgaria in keeping the prices of products, where these governments can directly set prices or influence indirectly, but to a large extent through indirect taxes, also stands out.

development of lagging regions in a country, and thus accelerate the degree of convergence between countries within the EU. Usually, poorer countries have higher regional disparities in per capita output. In addition, the going on technological change through a revolution in product and labour markets slows down the current model of convergence. Digital technologies, artificial intelligence and 3D printing, offer more and more opportunities for highly skilled workers, while low-skilled workers and less productive companies risk falling behind. Convergence can be observed both in countries that use different currencies and in countries and regions in a country where the use of the same currency is expected to speed up the process, as capital and technology can move more easily within the area. It seems, however, that the rate of convergence in Europe has not increased (does not correlate) with the introduction of a single currency. Two authors examine whether slow (or slower than expected) convergence is due to the lack of structural reforms that should accompany monetary union and which are the structural reforms that promote regional cohesion (Che, Spilimbergo, 2012). Using a large set of data, including regional panel data for 32 (advanced and emerging) countries over a period of 3-4 decades, they find out that structural reforms in terms of financial development, trade development, good institutional infrastructure (rule of law, bureaucracy, low corruption) contribute to the faster convergence of poorer areas and in particular border areas.

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What does show the diversity of researched topics on convergence among countries, called by us approaches? It is logical to assume the EU as a single economic system that includes a wide variety of elements, sectors and subsystems. Some of them were presented above, others – omitted due to the impossibility to cover all. Such approaches are directed to as follows: structure of GDP by elements of end-use, labour productivity, TFP, technological progress, foreign trade, labour market, including unemployment, demographic processes, including geographical mobility of the population, wages and incomes, poverty and inequality, fiscal policy, distribution and control of European funds, ecology, etc. However, the question is whether, in such cases, we can always talk about convergence, or is it a matter of tracking and analysing trends in individual economic areas, which still do not give a total picture of real macroeconomic convergence.

Conclusion

The interest in the question of the convergence of economies stems from the neoclassical theory of economic growth. However, the observed economic growth could not be reconciled with the theory of the declining return on the factors of production. The basic shortcomings of Solow's neoclassical model are the consideration of the economy as a closed system in the conditions of perfect competition (markets) and the assumption that changes in the rate of growth do not come from exogenously set technological progress. The endogenous theory tries to overcome the lack of explanatory power of neoclassical theory by trying to explicitly decipher technological progress. The idea of the poorer countries catching up with the richer ones is to reduce the gap in technological development between them. In connection with this, a large number of publications and studies have emerged on the empirical link between

long-term growth and their role as determinants of growth includes various economic, social, political and institutional indicators that may influence it.

In a large number of studies on the processes of convergence and/or the other similar concepts defined above – cohesion and integration, are observed imprecision and even mixing of concepts, not taking into account the specifics of the concept of convergence. The three processes are generally one-way and research cannot be openly contradictory, but their differentiation would enrich the analysis. In addition to the mentioned, other concepts are similar in meaning, expressing the ongoing and desired processes in the EU – accession, stability, (im)balances, competitiveness, cohesion, nominal and real convergence and, more broadly, integration. The criteria for their implementation are intertwined and mutually conditioned.

The process of aligning growth rates with convergence and hence on living standards in the individual countries is complex and highly vulnerable. Perhaps nowadays, it is more useful and more important to consider the processes of divergence and how they could be overcome. And when it comes to converging institutions and policy responses to vulnerabilities, things get even more complicated. In addition, the emergence of major economic shocks – such as those caused by the economic crises and the lack of adequate adjustment mechanisms dramatically increase socio-economic disparities within EMU.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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THE EUROPEAN UNION FACING THE CHALLENGES OF GLOBALISATION

The article presents a study of the phenomenon of globalisation, which connects the whole world favoured by the development of free trade, the specialisation in international trade and the prodigious advances of technical progress, and results in challenges unfolding in a triple modality: intensification of commercial exchanges and the interconnection of economies, massification of capital exchanges, and increase in international migration. These developments run many risks globally and also on the European Union level. The objective of the article is to analyse the challenges arising from the triple modality attached to the globalisation with a focus on the European Union and the instruments and mechanisms of governance and control in an attempt to systemise an integrated approach for reduction of the risks and optimisation of the potential gains. The methodological framework makes use of existing statistical and factual data and the institutional analysis of the means of control applied to the material (goods), immaterial (capital), and people (migration) flows.
JEL: F10; F21; F22; F60

Introduction

In 2013, the European Commission estimated that tax evasion and tax avoidance represents a cost of around EUR 2000 annually for each European citizen, greater than the total amount spent by the member states of the European Union (EU) on healthcare, and amounting to more than four times the spending on education, being thus a threat to the European social model (EC, 2020a). Three years later, the EU published strong arguments on the fight against tax evasion (CE, 2016a, 2016b, 2016c, 2016d, 2016e); this fight became a European priority requiring intensification of efforts and coordination between European states. Twelve countries were listed as non-cooperative tax jurisdictions in early 2020 (EC, 2020b). Still, these concerted European measures have not been sufficient to establish transparency regarding the tax havens. Yet, the fight against tax evasion is also a priority on a global level (OCDE, 2020).

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Tax evasion and tax havens are as a matter of fact one of the most important problems consubstantial with the phenomenon of development of market economy on a global scale which is globalisation and networks it in all dimensions (transports, IT systems, others). This phenomenon has been and still is favoured by the combination of three factors: (i) *specialisation* in parallel to the growth of international trade, carried alternately by the theories of absolute, comparative and competitive advantages; (ii) development of *free trade* imposing reduction or disappearance of diverse tariff and non-tariff barriers; (iii) prodigious advances of *technical progress*, particularly in mechanical engineering, transports, information and communication technologies. This globalisation, which highlights issues that can only be captured on a global scale (global public goods such as the ozone layer, biodiversity, forests, etc.) is spreading essentially through a process of increasing trade and boosting interdependence between economies (Tsafack Nanfosso, 2017). This process of growth involves a threefold modality: (i) intensification of *trade* and increase in the degree of openness of the economies; (ii) massification of *capital* exchanges, and (iii) increase in international *migration.* The paper presents a study of this phenomenon, as well as of the challenges arising from its threefold modality, and which incur many risks at a global level, but also for the EU and its member states (Tsafack Nanfosso, Hadjitchoneva, 2020). Besides the cross-cutting risk linked to growing insecurity, the intensification of trade exposes the countries to illicit and prohibited products; the massive capital exchanges feed tax havens and integrate harmful and parallel flows, and the increase in international migration opens up worrying transfers of misery and necessity.

The objective of this article is, therefore, to analyse these challenges attached to the globalisation and impacting the EU level, including the instruments and mechanisms of governance and control, in an attempt to propose an integrated approach to minimise these risks and optimise the potential savings and gains. The paper is structured in three main sections, focusing on the triple modality challenges with respective subsections on the risks undertaken and the means of control. Finally, some concluding remarks, recommendations and potential for future research are summarised in the conclusion. The methodological framework makes use of existing statistical and factual data and institutional analysis of the approaches of control applied to all three dimensions of globalisation.

Globalisation and Challenges to Material Flows

Globalisation is characterised by large material flows in terms of goods and commodities. The industrial revolutions, the transport revolution (particularly containerisation) and the trade liberalisation have allowed an unprecedented increase in material flows. WTO (OMC, 2013) indicates that since 1850, international trade has grown at a much faster rate than world production. Between 1950 and 1973, the world trade increased by 8.2% per year on average, while world GDP has grown by only 5.1% per year on average. From the 1990s until the 2005s, the gap between the world's trade and GDP growth widened. Since 2008, world trade (in volume) and world GDP have evolved in parallel by 26% (OMC, 2019). The average share of exports and imports of goods and services in world GDP has increased significantly; thus, GDP is strongly influenced by international trade (13.65% in 1970, 19.35% in 1990, 26.03% in 2000, 30.75% in 2008, 30.11% in 2018 (World Bank, 2020a). The share of

merchandise trade in world GDP has had a similar trend arising from 16.71% in 1960 to 46.14% in 2018 (Figure 1).

Figure 1

Merchandise trade (% of GDP)

Source: World Bank, 2020b.

Between 1948 (effective start of the GATT) and 2014, trade has grown dramatically, with world exports increasing from USD 59 to 18 494 billion (increase of 31 246%), and the imports from USD 62 to 18 641 billion (an increase of 29 966%) (Table 1). This growth highlights the fact that world trade is no longer largely dominated by developed countries. European countries and North America carried out two-thirds of world trade in 1948, but only half in 2014. The Middle East has doubled its market share, but the Asians have benefited the most from this openness to world trade since their share of the world market has risen to a third.

Table 1

World trade in goods (%)

	Exports		Imports	
	1948	2014	1948	2014
In value (billions USD)	59	18 494	62	18 641
North America	28.1	13.5	18.5	17.7
South and Central America	11.3	3.8	10.4	4
Europe	35.1	36.8	45.3	36.4
Commonwealth of Independent States	-	4	-	2.7
Africa	7.3	3	8.1	3.4
Middle East	2	7	1.8	4.2
Asia	14	32	13.9	31.5

Source: OMC, 2015, pp. 42-43.

In 2018, the value of the world merchandise trade reached USD 19.670 trillion (OMC, 2019). Globally, the EU is the first of the three largest players for international trade along with China (since 2004) and the United States; in 2018, the European share of world merchandise imports and exports amounted 37%; the EU's international trade represented 17.6% of its GDP; the EU's trade in goods reached EUR 4 071 billion in 2019 (OMC, 2019; Eurostat, 2020a).

Risks and means of control

The exponential increase in trade in goods, unfortunately, includes unexpected, illicit and harmful products. At least five plagues are attached to this increase. The first scourge is the one of narcotics, which constitutes a major illustration. Raufer (2010, p. 112) indicates that world drug trafficking is estimated at EUR 300 billion per year; thus, about 1% of the world trade. The fight against drugs costs EUR 28 to 40 billion each year in the EU, with between 7000 and 8000 people dying annually due to narcotics. From 1990 to 2005, the EU recorded no less than 130 000 drug-related deaths.

Table 2 shows that between 2000 and 2002, for example, the world supply of cannabis increased by 4% and that of amphetamines and ecstasy by 38%. The "clientele" of this market is estimated at 216 million people worldwide (the table illustrates only the case of the USA), with in a very worrying manner the explosion of "nightclub" drugs, increasingly consumed by young people.

Table 2

The global drug markets, million USD

Type of narcotic	2000	2002	US consumers in 2003
Cannabis	± 144	± 150	± 20 million
Amphetamines and ecstasy	± 29	± 40	± 4 million
Cocaine, Crack, etc.	± 13	± 13	± 5 million
Opiates (Heroin, etc.)	± 13,5	± 13	± 1 million

Source: Raufer, 2004.

In the EU, 29% of people aged 15 to 64 have used illicit drugs (96 million) in their lifetime (EMCDDA, 2020a). The European illicit drug market is estimated at more than EUR 24 billion (EMCDDA & Europol, 2020). The share of young adults aged 15 to 34 who used drugs in 2017 has risen to more than 71% of all European consumers aged 15 to 64 (Table 3).

Table 3

Estimates of drug use in EU in 2017 (millions) and markets in 2016 (EUR billion)

Type of narcotic	Adults (15-64)	Young adults (15-34)	Lifetime use	Market per year (minimum)
Cannabis	24.7	17.5	91.2	9.3
Amphetamines	1.7	1.2	12.4	1.8
MDMA	2.6	2.1	13.7	0.67
Cocaine	3.9	2.6	18	5.7
Heroin				6.8

Source: Based on EMCDDA, 2020b; EMCDDA, Europol, 2020.

The daily consumption of cocaine, the most widely consumed illicit stimulant in Europe, has reached 1000 mg per 1000 inhabitants in major European cities (Bristol and Amsterdam, Barcelona), a significant increase is observed in Paris, Lisbon, Brussels, Milan, Berlin, Zagreb. At the same time, public expenditure of European states varies on average between 0.05% and 0.2% of GDP per country (EMCDDA, 2020a). Yet it seems almost impossible to estimate the multiple ramifications of drug markets on societies, such as the impact on the legal economy (money laundering and cash smuggling, among others), the pressures on government institutions (including government spending), the impact on society (drug-related crime and violence, etc.) and other forms of crime (EMCDDA & Europol, 2020). So, these trends in European consumption impact different aspects of European social and economic well-being, while European anti-drug policies are deployed to reduce the demand and supply, and strengthen international coordination, cooperation and information, research and evaluation (Drug Strategy 2013-2020 (EC, 2013) and Drug Action Plan 2017-2020).

The second scourge of these unwanted products is linked to the international criminal trafficking of so-called "light" weapons. This illegal trafficking, estimated at USD 1 billion annually, is closely related to human beings trafficking and narcotics. The United Nations (UN) estimated that small arms of criminal origin cause around 500 000 deaths each year or nearly 57 homicides every hour (Raufer, 2004). The EU pledged to "*combat the destabilising accumulation and spread of small arms, as well as help stop it; help reduce existing stocks of these weapons and their ammunition to levels consistent with countries' legitimate security needs; help solve the problems posed by the excessive accumulation of these stocks*" (EU, 2006, p. 7); a commitment renewed in 2018 in a context of a ten-year triple increase in the number of civil wars, also fuelled by the proliferation of illicit small arms and light weapons, and preventing nearly 800 million people from having access to food (EU, 2018).

A third scourge is the trafficking in natural resources and the illegal trade in wildlife. The first includes the smuggling of raw materials such as diamonds and rare metals (often from conflict zones). The timber trafficking in Southeast Asia alone generates USD 3.5 billion. The illegal wildlife trade involves animal skins and body parts for export to foreign markets. The trafficking of elephant ivory, rhinoceros' horn and tiger parts from Africa and Southeast Asia to Asia generates USD 75 million annually. According to WWF, traffickers smuggle more than 100 million tonnes of fish, 1.5 million live birds and 440 000 tonnes of medicinal plants every year (UNODC, 2010a). As one of the destination markets for wildlife and a hub for transit to other regions, the European states are stakeholders in the global fight, estimated between EUR 8 and 20 billion per year. These countries have implemented series of measures to be taken by EU institutions and/or member states by 2020 in three areas: (i) *preventing* wildlife trafficking and tackling the root causes of this phenomenon, (ii) implement and enforce existing *rules* and fight more effectively against organised crime, and (iii) strengthen the global *partnership* between countries of origin, destination and transit (CE, 2016f). Regarding the trafficking of natural resources, concrete actions were planned in 2003 by the EU within the framework of forest law enforcement, governance and trade (CCE, 2003), assessed in 2016 as having contributed with success in raising awareness among the general public and market operators of the problem of illegal logging, and reducing imports of illegal timber into the EU.

Counterfeiting and piracy is a fourth scourge attached to the globalisation of trade. This scourge represents a gigantic market, that weighs nearly EUR 300 billion, rising steadily for ten years (Darche, 2015). DGE's evaluation (2016) indicates that counterfeiting would have as a direct consequence the loss of 200 000 jobs worldwide, including 100 000 in Europe. Most counterfeit products are luxury goods (clothing, body care, personal accessories, shoes, etc.), medicines, high-tech products (sound, video, mobile phone, etc.), school's equipment, food, children's products (toys, gadgets, etc.), tobacco, auto parts, cosmetics, music, movies, etc. INTERPOL (2016a) indicates that the global market for counterfeit medicines is very worrying as almost 15% of medicines, sold around the world, are fake. In developing countries in Africa, Asia or Latin America, this figure rises to 30%, in some regions to 50%. However, Internet sales are not left aside as 50% of the medicines, sold through this channel, are fake. A recent study on the enforcement of intellectual property rights on the basis of detentions at the EU borders or member states, trying to build a more complete picture of trends, showed that 438 million counterfeits had been held in 2013-2017 (around 30-40% at EU borders and the rest on national markets); this almost equates to one counterfeit per EU citizen; the estimated value of these counterfeits, EUR 12 billion, was equivalent to the GDP of member state such as Malta in 2018; still, these detentions represent only some percentage of total counterfeits in circulation (EUIPO, 2019). The trade in counterfeit and pirated products represented up to 3.3% of world trade in 2016 but more than doubled the EU's imports from third countries, which represented a gradual increase (Table 4).

Table 4

Shares of counterfeit and pirated products in world trade and EU imports from third countries (2007, 2013, 2016)

Counterfeit and pirated products	2007	2013	2016
In Global trade	1.95%	2.5% (461 billion USD)	3.3% (509 billion USD)
In EU imports from third countries		5%	6.8%

Source: Based on EUIPO, 2019; OECD-EUIPO, 2019.

The main country of origin of counterfeit goods held at EU borders, both in terms of a number of items (67.7%) and estimated value (63.7%) is China (mainly with toys and cigarettes), followed by Hong Kong-China. In 2017, in terms of estimated value, luxury products such as watches (33.1%); bags, wallets, and handbags (9.1%); clothing (10.9%), perfumes and cosmetics, and sunglasses dominated, while in terms of number there were the cigarettes (7.1%), small toys (13.7%), and foodstuffs (27%). The Italian market was the most targeted with over 77% of counterfeit goods held.

The fifth scourge of trade globalisation is electronic commerce (e-commerce), the result of novel technologies, improved Internet access, and electronic payment and delivery systems, which significantly reduce trade costs. In 2013, business-to-business totalled USD 15 trillion and business-to-consumer e-commerce to over USD 1 trillion. However, as it is difficult to identify all international electronic transactions, it is not possible to precisely measure the size of this market and the nature of goods traded (OMC, 2015). The last ten years have seen a strong growth in online commerce, and more particularly cross-border commerce, observed on the global and European level. The share of companies with electronic sales and the turnover generated by them increased, respectively, to 20% and 18% in 2018 (Eurostat,

2020b); at the same time, losses of uncollected VAT revenue from the e-commerce sector are also on the rise in the EU member states. In 2017, they were already estimated at EUR 5 billion per year, with a projection of reaching EUR 7 billion in 2020 (CE, 2017). Only 11% of European households were not connected in 2018; 76% of Europeans were daily users and 83% regular users (Eurostat, 2020c). An increase to 60% in online orders or purchases of goods and services for private use was also noted. Thus, the prospects could be only towards larger e-commerce activities; potential in counterfeit goods trade and losses of uncollected VAT revenues raises.

To control this type of trade, countries and/or national and international organisations have implemented numerous measures. In the first place, it is situated within the overall framework of the World Customs Organisation (WCO) to sensitise and train special customs services to curb the flow of these illicit products. For example, in 2002, the French customs seized 2.58 tonnes of cocaine and 19 million ecstasy pills (+47.2% compared to 2001), in 2009, 5.2 tonnes of cocaine, while globally, seizures of ecstasy jumped from 5 (1991) to 40 tonnes (2000). In 2008, 30 tons of cocaine were seized by the Maritime Analysis and Operation Centre/Narcotics (MAOC/N) created one year before. For the USA alone, the total cost of the "war on drugs" was USD 15 billion in 2010 (Raufer, 2004; 2010). The Motion Picture Association of America (MPAA), which represents the American film industry, calculated that globally the losses from piracy were USD 18.2 billion (Clift, 2011).

Table 5

Number of counterfeit seizures in 2010

Number of seizures	WCO	EU
USA	11.552	-
Germany	1.319	22.146
France	1.220	748
Italy	859	5.137
Spain	813	3.169

Source: Based on Clift, 2011, p. 16.

Table 5 provides WCO and EU statistics on the number of seizures of counterfeit or pirated trademarks for selected countries, with each seizure potentially affecting thousands of items. In 2013, French customs seized 7.6 million counterfeit items (DGE, 2016); in 2014, 198.4 tonnes of narcotics, 828 firearms, 2.6 million counterfeit drugs were confiscated. According to the Union des Fabricants (UNIFAB), in 2010, the cost of counterfeiting for the French economy is EUR 6 billion, and 27% of French companies spent more than EUR 1 million per year to protect against counterfeiting (Darche, 2015). As part of the EU's customs union, the customs authorities of the member states work together to ensure customs control at the external borders and protect consumers against dangerous and harmful products for the health. In order to fight crime, tax evasion, illegal trafficking and terrorism, they cooperate with other specialised services, such as immigration and police. In 2018, 26 721 million items infringing intellectual property rights were apprehended with a market value of EUR 738 126 million; seizures climbed to 69 354 for a year (EC, 2019). Most apprehended items are cigarettes (15.6% of total volume), toys (14.2%), packaging materials (9.4%), labels and

stickers (8.9%) and clothing (8.6%). In 2017, 409 tonnes of drugs, 3 600 firearms, over 2.7 million ammunition and 188 800 explosives were seized by European customs (EC, 2020c).

Second, in addition to the vigilance of customs services, countries are putting in place increasingly strong repressive legislation to deter and therefore control the flow of prohibited goods. In France, for example, a new law was adopted in 2014 to strengthen the fight (3 years in prison and a fine of up to EUR 300 000 imposed on establishments involved in the counterfeiting market).

Thirdly, countries create programs and/or organisations dedicated to the fight and control of trafficking of this nature. In the USA, in addition to MAOC/N, the Office of National Drug Control Policy (ONDC) or the Crime and Narcotics Centre (CNC) are functioning; in the EU, the European Observatory on Counterfeiting and Piracy (ECPO). Globally, it could be mentioned the UN Office on Drugs and Crime (UNODC); likewise, the "Colombia Plan" by the USA with the approval and support of the European Parliament and UNODC. The EU is committed to the protection of intellectual property as part of its strategies for the single market. In 2017, it implemented a set of measures aimed at improving the respect and enforcement of intellectual property rights and stepping up the fight against counterfeiting and piracy. Efforts have been made to harmonise relevant laws in EU countries in order to create effective Union-wide systems for protection of these rights. The role of public authorities and the way to fight against intellectual property infringements have been revised. The body which assists national authorities, the private sector and EU institutions in the fight against infringements of intellectual property rights is the Observatory, which is a service within the structure of the European Union for Intellectual Property Office (EUIPO).

Fourth, alongside states and public institutions, companies are also mobilised to protect their sectors of activity by pooling their efforts within the framework of private associations. Thus, in addition to MPAA, there is the International Alliance for the Protection of Intellectual Property (IIPA) for copyright, the Business Software Alliance (BSA) for the software industry, the Entertainment Software Association (ESA) for video games, video game consoles, personal computers and the Internet, the Business Action to Stop Counterfeiting and Piracy (BASCAP) for the cross-border fight against counterfeiting and piracy, and others. (Clift, 2011). The EU has facilitated the cooperation between stakeholders to prevent the sale of counterfeit products via the Internet. In 2020, the list of companies, associations and online platforms that signed the memorandum included 26 organisations (EC, 2020c). This initiative has already brought positive results and has been further strengthened.

Globalisation and Challenges to Financial Flows

In addition to trade in goods, globalisation also involves massive exchanges of capital. The first of these exchanges concerns Foreign Direct Investments (FDI). The stock of capital invested abroad represents more than a quarter of global GDP, compared to 5.2% during the post-war boom. The global increase in trade integration and trade in goods and services has been accompanied by an increase in financial flows since the 1990s, and in particular cross-border capital flows, which quintupled between 1990 and 2010 under the effect of financial deregulation and multinationals. They are polarised by the major stock exchanges of the Triad

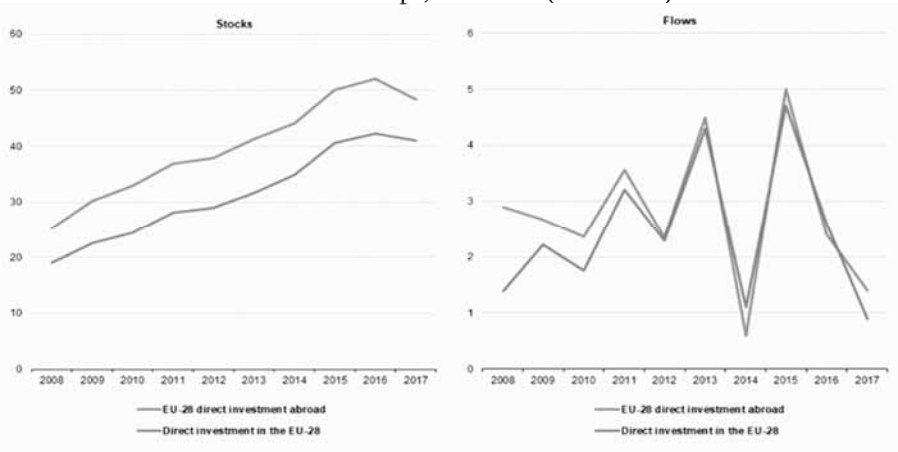
(London, New York, Tokyo) and have as major players the Transnational Firms (TNF), which move their FDI and contribute to the development of certain territories, since they distribute productive tasks across the planet according to comparative advantages of countries (OMC, 2015; Butzen, et al., 2014).

The evolution of capital flows is characterised by the much sharper increase in gross flows than in net flows; this reflects a financial widening of balance sheets and, at the same time, a decline in national preference in financial matters, which has led to an increase in the share of foreign assets and liabilities in these balance sheets. This cross-border capital flows recorded a spectacular increase, which accelerated especially from the mid-1990s, fuelled in particular by cross-border interbank exchanges (included in "other investments") and, to a lesser extent, the constitution of reserves. In 2007, cumulative inflows and outflows reached 20% of world GDP, compared to barely 1% on average for the period 1980-1995. After the collapse of these flows with the 2008 crisis and their surge in 2009, these flows are again at their 1990 level (Butzen et al., 2014; Suchanek, Vasishtha, 2010).

Considering the period, following the onset of the global financial and economic crisis, there was an increasing trend in FDI stocks, with stocks entering to EU being lower than those coming out from the EU (Figure 2).

Figure 2

FDI outside Europe, % of GDP (2008-2017)



Source: Eurostat, 2020d.

Throughout the period, the value of the EU outward FDI stocks exceeded the value of inward stocks; the ratio of FDI stock intensity to GDP almost doubled; in 2017, the one off-EU FDI stood at 48.3% and the one of foreign investment stocks in the EU at 41%. This progressive trend demonstrates an increasing exposure to globalisation of the European economy. Regarding the destinations of FDI flows, they are mainly towards the United States in 2017 (EUR 92.1 billion) and tax havens, such as Bermuda (EUR 53.9 billion) and Barbados (EUR 39.4 billion) (as of 2019, the latter are no longer listed among the non-cooperative tax jurisdictions from the EU). EU direct investment flows went to the Isle of Man, Hong Kong,

Switzerland, Iceland and Mexico, but of much lower value (EUR 12-20 billion). The two largest destinations for outward FDI flows, at the same time offshore financial centres, were also among the main destinations for inward FDI. The largest inward FDI inflows in 2017 came from the Cayman Islands (EUR 83.9 billion) and Hong Kong (EUR 51.8 billion). Preliminary results for 2018 indicate a general disengagement of direct investment capital flowing between the EU and the rest of the world. US companies withdrew net FDI capital from the EU market, as did direct EU investors withdrew from the US market (Eurostat, 2020d); Canada and Switzerland were top investors in the EU and European investment destinations in 2018.

The second step in capital exchange is financial services. Thus, the massification of capital flows has not spared international trade in financial services, which has also increased sharply over the past 20 years as financial markets have become more open and globalised. After growing rapidly from 2002 to 2007, world exports of financial services stagnated in 2008 and fell by 12% in 2009, when the value of assets under management fell sharply and commissions and fees charged by banks and other financial institutions have declined worldwide, then followed recovery in 2014 (OMC, 2015). In 2018, the EU was the world's largest exporter and importer of services; extra-EU trade in services accounted for almost 30% of the total value of European trade (Eurostat, 2020e); the financial services represent around 10% in the exports structure (EUR 82.5 billion) and around 6% in the imports structure (EUR 50.4 billion).

Third, capital flows concern official development assistance (ODA). In 2014, the total amount of this aid at the global level stood at USD 135.2 billion, regularly increasing till then. However, private aid flows (in particular from foundations), although poorly evaluated, should also be considered; they may be greater than public aid. Taking into account both aids, the USA ranked 6th; only with its public aid 21st position in 2006 (OECD, 2015). Currently, more than 150 countries or territories are in the list of countries, that can receive ODA in order to promote their economic development and well-being (without military purposes). The world's largest provider in 2018 was the EU and its member states; collective aid amounted to more than EUR 74.4 billion and represented almost 57% of total development aid globally. Developed European countries have spent between 0.148 and 1.405% of their GDP annually in the last ten years; around 0.18% for the USA (OECD, 2020).

In this globalisation of capital flows, it is necessary to underline the fourth channel constituted by the transfers of funds. Indeed, migrants' remittances represent colossal sums. These transfers to developing countries reached USD 372 billion in 2011, three times the ODA. They are actually much higher because many of the funds sent by emigrants use informal means that are not captured by the statistics. Total transfers, including towards high-income countries, reached USD 583 billion in 2014. These transactions were expected to reach USD 479 billion in 2017, driven by the more favourable international economic situation (Faujas, 2012; Banque Mondiale, 2015). It is estimated that 150 million people worldwide benefit from remittances from the 20% migrant workers (50 million) in Europe. Of all migrant workers in the world, a total inflow of USD 109.4 billion was secured in 2014 (FIDA, 2015). The EU member states are home to more than half of them (28 million), with remittances totalled USD 63.7 billion. The European countries from which the main flows came were the United Kingdom (USD 17.1 billion), Germany (USD 14 billion), France (USD

10.5 billion), Italy (USD 10.4 billion) and Spain (USD 9.6 billion); two-thirds of all funds leaving Europe, go to the developing countries outside of Europe. In 2018, only registered personal transfers sent by EU residents to third countries, mainly remittances from migrants to their country of origin, amounted to EUR 35.6 billion, an increase of 9% compared to 2017 and still with a negative balance of more than EUR 20 billion for the EU. Observing the surplus of personal transfers, it could be noted that more than EUR 8 billion were received by Portugal, Romania and Poland, while France was the European country which recorded the largest deficit, i.e. EUR 10.5 billion. 21% of total non-EU outflows were directed to Asia, 18% to North Africa, 16% to non-EU European countries, 14% to Central and South Africa and 13% to South America (Eurostat, 2019).

The exponential development of capital flows has been favoured, in the fifth place, by the extent of trade in information services. In 2014, they were estimated at USD 302 billion, driven by the growth of the Internet and telephony. The EU's international trade in information services has grown significantly since 2010. Exports almost tripled to EUR 9 400.8 million in 2018 (Figure 3). It could be easily noted that if the export of the European information services raised significantly for eight years, the imports only doubled. The gap between both flows was smallest in 2011 and biggest in 2018 without precedent.

Figure 3

Information services in EU, million EUR (2010-2018)

Source: Eurostat, 2020f.

Risks and means of control

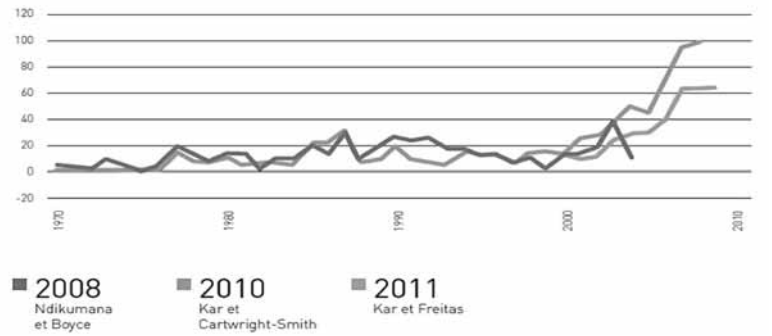
The larger the capital flows, the more they can have a significant impact on a first risk which is the fragility of the economy, in particular, if this leads over the years to accumulate large amounts of gross positions. While offering benefits to economies, capital inflows are not without a number of risks. First, a growing presence of foreign investors can help amplify volatility in local financial markets. Foreign cash flows are indeed characterised by their very pro-cyclical tendency, which means that they are cheap and available in abundance, but they dry up quickly in times of gloom. Besides, the increased presence of foreign investors in local financial markets does not guarantee more liquid markets. Second, the shift from bank financing to market financing in the private sector did not reduce the risk of an imbalance in the composition of the balance sheet by currency, on the contrary; more than 90% of international debt securities of companies established in emerging economies were denominated in foreign currencies (BRI, 2014). Finally, the significant influx of cheap liquidity to emerging economies helped to ease financial conditions, which pushed up asset valuations and rekindled indebtedness and hence macroeconomic and financial imbalances;

debt ratios have risen on average by 58% and 14%, respectively for private and public organisations since 2007. All of these increase the vulnerability of economies to a normalisation of the level of interest rates and a reversal of capital flows, two factors that could increase the costs of financing (Butzen, et al., 2014, p. 48).

Another major risk of globalisation is constituted by illicit financial flows (IFF). Indeed, over the past 50 years, it is estimated that Africa has lost more than USD 1 000 billion due to IFFs, that is, capital acquired, transferred or used illegally. But these estimates may be far below reality as there are no precise data for all African countries, as they often exclude certain forms of financial flows which are by nature secret and therefore cannot be correctly estimated, for example, amounts resulting from corruption and drug trafficking, trafficking of people and trafficking in firearms (FFI, 2014, p. 15).

Figure 4

Evolution of IFFs from Africa, 1970-2009 (USD billion)



Source: FFI, 2014, p. 94.

Figure 4 shows the evolution of IFFs, in constant progression, whether the assessment is made for all illicit flows or by falsifying trade prices only. According to Kar and Cartwright-Smith (2010), Africa would have lost USD 854 billion to IFFs between 1970 and 2008, or an annual average of USD 22 billion. This cumulative amount is considerable if we compare it both to the continent's external debt and to the total ODA inflow during the same period: on the one hand, this figure is equivalent to almost all of the ODA received by Africa during this period; and on the other hand, an amount equal to only one-third of the losses due to the IFFs would have been sufficient to fully cover the external debt of the African continent which, in 2008, reached USD 279 billion. The trend has been increasing over time and especially over the past decade, with annual IFFs averaging USD 50 billion between 2000 and 2008 (USD 9 billion between 1970 and 1999). From 2000, it could be noted that in reality, Africa is a net creditor to the rest of world, and not a net debtor as often assumed. It should be noted that the upward trend of IFFs coincides with a period of relatively strong economic growth observed in Africa and the IFFs, therefore, cancelled out the expected impact of the acceleration on the continent's growth (Kar, Freitas, 2011). Globally, IFFs from developing countries and emerging economies remained consistently high in the period 2005-2014 (nearly USD 1 000 billion in 2014); illicit financial outflows represented 4.2-6.6% of the total trade of developing countries in 2014; in total, outflows and entries were expected to account

for between 14.1% and 24% of developing country trade on average (GFI, 2017). The total FFIs increased at an average rate of between 8.5% and 10.1% per year over the ten-year period; illicit capital outflows from sub-Saharan Africa ranged from 5.3% to 9.9% of total trade in 2014, a higher ratio than any other geographic region studied. Considering that false commercial invoices are one of the largest components of measurable IFFs and that on average, 87% of illicit capital outflows in the period 2005-2014 were due to fraudulent invoicing of trade, in 2020, a new study estimated their magnitude among developing countries and developed economies, considering value gaps of USD 8.7 trillion in 2008-2017 (GFI, 2020). Only in 2017, identified trade value gaps totalled USD 817.6 billion. The most significant annual average value differentials in their bilateral trade with advanced economies were observed in China (USD 323.8 billion), followed by Mexico, Russia, Poland. The developing countries with the highest value gap as a percentage of their total bilateral trade with advanced economies were Gambia (37.3%), Togo (30.2%), Maldives (27.4%), Malawi (26.8%), Bahamas (26.6%).

In 2018, the European Parliament recalled the priority of a more effective, coherent and universal fight against IFFs, stressing that the impact of IFFs is felt most heavily in the poorest countries, helping to maintain or worsen the levels of poverty and inequality, and hampering investments by these countries to achieve the Sustainable Development Goals by 2030 (PE, 2018; WB, 2017). Depending on the database, in the top quintile (30) of countries, ranked by the value of illicit outflows in USD in 2015, the EU member countries are Hungary and Poland (respectively, USD 6.5 and 3.1 billion) (IMF DOTS) or Hungary, Romania and Bulgaria (respectively, USD 7.6 billion, USD 5.1 billion and USD 1.8 billion) (UN Comtrade). According to the latter, the top quintile (30) of countries, classified according to the value of illicit inflows in USD, also includes European countries, Poland and Romania (respectively, USD 32.3 and 6.8 billion) (GFI, 2020). The IFFs also concern, certainly, narco-currencies. In 2004, IMF and the World Bank estimated that at the global level, the cumulative amount of narco-currencies manipulated by Transnational Organised Crime (TOC) was of the order of EUR 1 450 billion, i.e. the value of the stock of gold held by all central banks in 1997. In 2014, the cumulative value of these narco-currencies exceeded the level of the USA's GNP reached in 1997. In the sole area of drug trafficking, experts from the UNODC estimated that the turnover of global narco-business in 2001 was between EUR 300 and 550 billion (Raufer, 2004). UNODC estimates that the global drug market generates profits totalling USD 400 billion. The problem is that the profits from most illegal activities are generated in cash, which is risky for criminals; hence, the imperative of their laundering (transfer of cash abroad, purchase of other assets, collusion with companies that brew a lot of cash, etc.). But in the case of TOC, about 70% of the profits are laundered through the mainstream financial system. Despite this, however, only less than 1% of these laundered products are intercepted and confiscated (UNODC, 2011).

In order to try to control these massive capital flows, the first step is to control the statistics. To do this, they should be compiled, their quality and adequacy of their dissemination should also be ensured. It was the way to understand the risks of imbalances in the composition of an economy's balance sheet according to currencies and maturities, although there was still great uncertainty. Increased transparency regarding these imbalances can help the competent authorities to define and implement targeted measures to address vulnerabilities. Besides, it could help investors to better assess the risks associated with certain markets, which would

allow the valuations of financial assets to be better aligned with the underlying fundamentals (Butzen, et al., 2014). As for the EU, a mechanism for the automatic exchange of information on income received in the form of interest by non-residents has existed since 2003. Later in 2014, a new automatic and mandatory exchange of tax information was introduced covering various types of income.

The control can involve, secondly, a form of a search for resilience. As a result, several emerging countries have accumulated an unprecedented level of foreign exchange reserves and are therefore less vulnerable to a sudden capital drain. Likewise, FDI flows are now higher than portfolio investment flows, making a sharp reversal of capital flows less likely. Besides, in recent years, capital inflows (resulting from the establishment of a solid institutional framework) have gone hand in hand with current account surpluses. These facts indicate that although there are notable exceptions, most countries that were fragile are now much more resilient (Suchanek, Vasishtha, 2010). This search for resilience can also result, on the one hand, in limiting exposure to certain categories of investors who tend to amplify cycles and international shocks such as mutual funds, institutional investors; and on the other hand, to implementation of macro-prudential measures to maintain the stability of financial systems (Caupin, 2014, p. 69).

The control can be clearly concretised, thirdly, by the implementation of specific measures of capital controls. Long considered a taboo, these measures are now an integral part of the toolbox instruments used by countries. Thus, in 2009, to cope with large capital inflows, Brazil introduced a tax (up to 6%) on the inflow of portfolio flows, abolished in 2013. Peru, Indonesia, South Korea and Thailand have had also introduced some form of capital controls. Conversely, countries have also sometimes adopted transitional measures to encourage capital inflows and to discourage or even temporarily restrict capital outflows. The use of this type of intervention is growing, but the overly systematic and indiscriminate use of capital controls can, unfortunately, deter foreign investors for a long time. Capital controls put in place by one country indirectly could lead to a transfer of the tensions to other countries (Caupin, 2014, p. 71).

Fourth, oversight is also carried out through (respect for) existing international standards. This is the case of the Basel Committees, although they have no supranational authority; in order to be implemented, the standards must be endorsed and integrated into national legislation. The best known is the Basel Committee on Banking Supervision (BCBS), which was at the origin of Basel I (1988) agreements on bank capitalisation ratios, and Basel II (2004). A set of initiatives following the 2008-2009 financial crisis is known as Basel III. Then, there is the Committee on Payment and Settlement Systems (CPSS), which developed standards for the efficiency and security of payment and clearing systems. Finally, there is Committee on the Global Financial System (CGFS), which monitors developments in financial markets and analyses their implications for financial stability. In addition to these Basel Committees, there is the International Organisation of Stock Exchanges (IOSCO) which brings together the bodies that regulate securities and derivatives markets. Finally, there has been an International Association of Insurance Supervisors (IAIS) (Destais, 2011).

In an attempt to control IFFs, there are, fifth, initiatives and forums to fight against these flows, namely the World Customs Organisation, the UN Committee of Experts for

International Cooperation in Tax Matters, the UN Office on Drugs and Crime, the Financial Action Task Force (FATF), the Global Forum for Transparency and Exchange of Information for Tax Purposes and the Convention on Mutual Administrative Assistance in Tax Matters OECD, Extractive Industry Transparency Initiative (EITI), Base Erosion and Profit Shifting Project (OECD and G20), Dodd-Frank Act (USA), Foreign Account Tax Compliance Act and Foreign Corrupt Practices Act (USA), Automatic Exchange of Information (OECD, G20, G8), Anti-Corruption Convention (OECD), UN Convention against Corruption, etc. In Africa, governments have established numerous regulatory bodies and fiscal, customs, police and financial intelligence agencies whose remit includes preventing such flows. Among others, we can cite the Action Group against Money Laundering in Central Africa (GABAC), the Intergovernmental Action Group against Money Laundering in West Africa (GIABA), the Economic and Financial Affairs Crime Commission, Anti-corruption Commissions, Anti-money laundering Units, National financial investigation agencies, etc. This often involves controlling certain large companies, certain international banks, and some small and medium-sized enterprises. In addition to these state resources, civil society organisations (CSOs) (Action Aid International, Christian Aid, Chr. Michelsen Institute, Global Financial Integrity, Oxfam, Pan African Lawyers Union, Global Network for Tax Justice and Transparency International, etc.) constitute another set of actors who have distinguished themselves in the fight against these flows (FFI, 2014).

Sixth, the control of money laundering has become a priority, particularly in developed countries, as most of the profits generated by the sale of drugs are laundered and invested in these countries. A multitude of specialised international and national services to track down the dirty money of drug trafficking has been set up: Financial Action Task Force (FATF/GAFI), but also Intelligence processing and action against clandestine financial flows (Tracfin), Financial Crimes Enforcement Network (FinCEN), Financial Intelligence Processing Unit (CTIF-CFI), Funds from Criminal Activities (FOPAC), etc. FATF report indicates that if around 10% of drugs in circulation are seized, only 1% of profits generated by all criminal activity are confiscated. Besides, all seizures made since the anti-money laundering exists are estimated to be around USD 2 billion, while the profits from drug money are estimated annually between USD 300 and 500 billion (INTERPOL, 2016a). In the case of the EU in particular, recent operations and transactions subject to control are well presented by Girard-Oppici (2016): reporting obligations, thresholds for triggering control, monitoring of fund movements, etc. For example, the limitation for cash payments; declaration for transfers; obligation to publish references of accounts opened, used or closed abroad; supervision of financial investment advisers; obligation of certain professionals (banks, investment companies, insurers, accountants, lawyers, etc.) to be vigilant with regard to their customer. The EU anti-money laundering directive, revised in 2018, is based on due diligence towards customers from high-risk third countries from the list established by the European Commission, reporting obligations, obligation of conservation and measures of execution, taking into account the risks associated with virtual currencies. The capacity of the Financial intelligence units is strengthened. National centralised registers of accounts or of central data retrieval systems in all member states, and registers of beneficial owners of companies and trusts are in place.

In some countries, control is deemed to be of better quality if, seventh, repression is substituted with taxation and, therefore, with authorisation. Since the legalisation of

"recreational" cannabis in the United States, the government has benefited from new revenues. In the United States, the sale of legal cannabis totals USD 2.7 billion (the New Republic, 2015). Some countries in Europe are more or less following the same path: Germany, Austria, Belgium, Croatia, Denmark, Spain, Estonia, Finland, Italy, Luxembourg, Netherlands, Portugal, Czech Republic, Switzerland, etc.

Globalisation and Challenges to Migratory Flows

Globalisation is characterised by an increase in international migration. The number has surpassed a record 250 million people, as affected populations seek better economic opportunities and rapidly growing developing countries continue to attract populations from other regions of the developing world. Contrary to popular belief, South-South migrations are more numerous than South-North migrations (Banque Mondiale, 2016).

Table 6 provides migrant statistics by regions in the world. Apart from Latin America (at 85%) and, to a lesser extent, East Asia (at 50%), migrants do not prefer the OECD countries as their preferred destination, but primarily countries not far from their regions of departure. There are many reasons for their movement.

Table 6

Migration and remittances

	Number of migrants (millions)		Remittances (billions of dollars)	
	Emigration	Immigration	Entrances (2015)	Exits (2014)
East Asia and the Pacific	31.4 of which 50% to OECD	9	129	24
Europe and Central Asia	31.9 of which 46% to OECD	17.2	36	11
Latin America and the Caribbean	32.5 of which 85% to OECD	4.2	67	6
Middle East and North Africa	23.9 of which 38% to OECD	11.7	52	98
South Asia	37.1 of which 21% to OECD	12.4	123	16
Sub-Saharan Africa	23.2 of which 26% to OECD	18	35	4

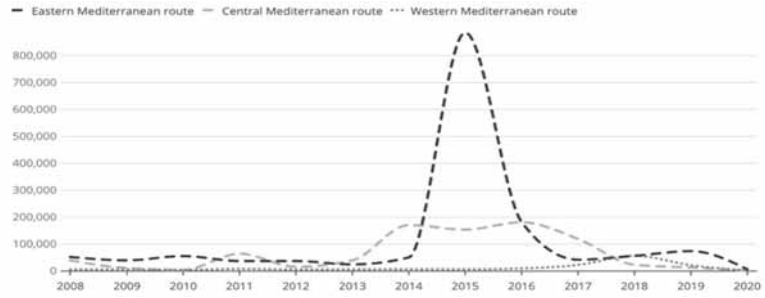
Source: Based on Banque Mondiale, 2016.

First, there is a migration for reasons of prosperity which concerns those who leave of their own free will in order to find better use of their skills. Women in this group usually head to countries where they will be equal to men. Then there is a migration for political reasons, which concerns people driven from their homes by war, political opinions, poverty, famine, drought. There is also migration for climatic reasons, a category of refugees highlighted with climate change. Finally, there is a migration for tourist reasons. These tourist flows are in full development; they have experienced a real explosion thanks in particular to the fall in transport costs and the increase in quality of life. But when they are irregular, these movements suffer a sharp decline now, especially the arrivals in the EU.

As shown in Figure 5, the total irregular arrivals in the EU passed from 1.04 million in 2015 to 137 080 in 2018. In 2019 (until June), only 35 000 people arrived irregularly in the EU.

Figure 5

Total irregular arrivals in the EU



Source: CE, 2020.

Risks and means of control

The major risk of the displacement of populations is inscribed in two distinct criminal phenomena, that are often confused: trafficking and human trafficking (treatment of human beings). Trafficking of human beings is a matter of violation of rights or state security as it involves crossing the state's borders illegally. This trafficking relates to helping people enter or stay in a given territory with the aim of abnormal profit. Trafficking in persons is a matter of violation of the rights of the individuals and therefore of their exploitation, either through work or in the sex industry, forced begging, organ trading or having to commit crimes against one's will. The two phenomena are different but have a lot in common often trafficked persons become victims of exploitation. Indeed, people who have been subject of human trafficking find themselves in an irregular situation and the perpetrators of human trafficking take advantage of this, for example, by putting pressure on these people (SCP, 2015, p. 2).

The first of the risks of globalisation, related to human flows, is, therefore, human trafficking, an international criminal activity in which men, women and children are subjected to labour, sexual or other exploitation. Although the figures vary, INTERPOL cited a turnover of USD 17 billion and 25 million victims, including a million women and children sexually exploited each year. Globally, 25 to 27 million human beings live in slavery; among which between 700 000 and 4 million individuals, 95% of whom are women, adolescents and children, transformed each year into a "human commodity", generally doomed to prostitution, theft, begging, and in the case of children, to illicit adoptions. In the direction of Europe, this traffic involves 200 to 500 000 people per year (Raufer, 2004). The International Labour Organisation (ILO) estimated in 2005 that the number of victims of trafficking at any given time was around 2.4 million people with profits of around USD 32 billion. However, the magnitude of the problem is much greater. In Europe, trafficking, mainly of women and children, carried out for the sole purpose of sexual exploitation generates USD 3 billion a year, affecting 140 000 people at any given time, with an annual flow of 70 000 victims (UNODC, 2010a).

The second risk of global population movement is that of migrant smuggling, a well-organised activity in which people are displaced around the world using criminal networks,

groups and routes. Migrants may be offered a "country smuggling package" by organised criminal groups, with the treatment they receive on the way at a price they pay their smugglers. Each year this trade is valued at USD billions. In 2009, some USD 6.6 billion was generated from the smuggling of 3 million migrants from Latin America to North America, while the previous year, 55 000 migrants were smuggled from Africa to Europe for an amount of USD 150 million (UNODC, 2010b). There are around 3 million illegal migrants in the EU, in addition to the 2 million prostitutes, the majority of whom are illegal migrants. These migrants are subjected to forced prostitution, sometimes accompanied by abuse, blackmail of the family, etc. (Raufer, 2004).

The first element of control is international and related to INTERPOL. Indeed, human trafficking is a crime under international law and many national and regional legal systems. Given the complexity of this problem, several strategies must be put in place at different levels in order to limit this phenomenon. INTERPOL has thus set up operations and projects, which are concrete actions on the ground aimed at dismantling human trafficking networks (AKOMA, NAWA, TUY, BANA, others), technical tools and IT systems allowing information to be exchanged on a global scale (Human Smuggling and Trafficking (HST) to expand the global database); MIND/FIND technical solutions which allow all police and border police services to access the data of lost documents; partnerships with various agencies, many resources and other general and international law information, guides and manuals for law enforcement agencies. In terms of international law, it could be cited the UN Convention against Transnational Organised Crime and the Protocols relating thereto, the Council of Europe's Convention on Action against Trafficking in Human Beings; the International Centre for Migration Policy Development (ICMPD); the Global Initiative to Fight Human Trafficking (UN.GIFT), and others (INTERPOL, 2016b).

The second element of control is the EUROPOL and the European Border and Coast Guard Agency (FRONTEX) of the EU member states. This Agency was created first in October 2004 in response to the need to improve the integrated management of external borders in the Union, then evolved in 2016. The member states remain responsible for the control and surveillance of the external borders, but FRONTEX must make it possible to facilitate the application of existing and future Community measures relating to the management of these borders, but also to coordinate cooperation between member states of the EU.

In spite of strong criticisms, Table 7 presents some FRONTEX operations supposed to favour the control of the external borders of the EU and therefore prevent trafficking and smuggling of human beings. Also, in May 2019, FRONTEX deployed for the first time outside the borders of Europe to come to the aid of Albania (Gros-Verheyde, 2020).

The European Committee on Migration (CDMG) of the Council of Europe adopted in 2000 a text on international migration directed towards the European continent, aptly named "Towards a Migration Management Strategy", to propose a comprehensive strategy for concerted migration management identifying nine areas of major interest to improve quality of cooperation between stakeholders countries in labour migration, migration of skilled people (brain drain), female migration, link between regular and irregular migration, border control and internal security, fight against labour and human trafficking, better social and economic integration, return of migrants, and socioeconomic development in countries of

origin, sometimes through the existence of diasporas (Tapia, 2006). European migration policy is actually integrated into the broader framework of the European Council's new strategic agenda for 2024 (CE, 2019).

Table 7

FRONTEX operations

Nom	Requesting country	Objective	Intervention area
Hera	Spain	Control of illegal immigration in Canaries	Canary Islands, Mauritanian and Senegalese coasts, Cape Verde archipelago
RABIT	Greece	Control of illegal immigration in Aegean Sea	Eastern Aegean Sea – Detention centres in Greece, Bulgaria and Turkey
Triton	Italy	Control of illegal immigration from Libya	Sicilian Sea, Sicily Channel
Poseidon	Greece	Border surveillance, saving lives at sea, registration and identification capacities, coast guard functions, combatting cross-border crime	Greek coast, borders and waters
Themis	Italy	Border control, surveillance, search and rescue, coast guard functions, combatting cross-border crime	Central Mediterranean coast, Italian borders and waters

Source: Based on Wikipedia-Frontex, 2020; Frontex web, 2020.

Finally, for control and risk analysis, the new FRONTEX integrates cross-border crime and terrorism, tracks the personal data of individuals suspected of terrorism and cooperates with any other EU agency and other international body dedicated to the fight against terrorism. To do this, it will be necessary to draw up a grid of vulnerabilities of the member states in order to control their ability to cope with various migratory risks and to call on the European Space Agency for reasons of satellite surveillance of borders.

Conclusions

In order to minimise the risks resulting from the networking of the world, how to respond to the challenges generated by the economic, financial and human flows fuelled by the irresistible globalisation of trade, and particularly its effects on the EU? That was the question this article set out to answer. Since globalisation essentially impacts three dimensions (goods, capital, migration), it seemed logical each time to present the magnitude of the challenges and identifying the risks incurred before differentiating the multiple approaches and methods accordingly.

Thus, in the first place, to control trade in goods and commodities, in particular in order to curb the flow of illicit products, it is first necessary to sensitise and train special customs services. It is then necessary to put in place increasingly stronger repressive legislation to deter the flow of prohibited goods. It is also necessary to create programs and/or organisations dedicated to the fight and control of trafficking of this nature, but also to exploit the fact that alongside States and public institutions, companies are also mobilised to protect

their sectors of activities by federating their efforts within the framework of private associations.

Second, in order to control the massive exchange of capital and financial flows, it is recommended first to master the statistics. It is then necessary to seek a form of resilience of the exposed economies and to put in place specific measures of capital controls, in particular through (respect) the existing international standards in this field. In order to try to control illicit financial flows, initiatives and forums to fight against these flows must be encouraged, and money laundering control mechanisms implemented, in particular in developed countries, as the majority of profits generated by the sale of drugs are laundered and invested in these countries. Depending on the circumstances, it may also be relevant to substitute repression for taxation and therefore to authorise, in a very controlled manner, the circulation of some products.

Third, to control the illegal international migration market, the role of INTERPOL has to be challenged as human trafficking is a crime under international law and many national and regional legal systems. The responsible European bodies, including EUROPOL and the FRONTEX Agency, must then be made more efficient and the major priorities of the new EU strategic programme must be implemented without delay around common European values and objectives and the challenges of globalisation which are largely European.

Finally, the close cooperation at the European and global level and intensive coordination of the efforts of EU member states should not follow but be at the forefront of the new societal and economic realities and developments resulting from the dynamic globalisation. The current study and findings integrate a holistic approach. As such, it opens perspectives for further research on diverse aspects of the trade and globalisation. A further interest of potential research in this field could be found in relation to the pandemic crisis impacting strongly and unprecedently the globalisation and consequent material, financial and human flows.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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UNRAVELLING THE EU DEBT KNOT OVER 2000-2019: AN INJECTION-LEAKAGE APPROACH[2]

Against the backdrop of a negative relation between the public debt and the economic growth in the EU over 2000-2019, the government budget constraint could clearly outline the transmission channels at work. Firstly, the debt stock weakens the fiscal policy of the government. It is emphasized that a debt stock surpassing 100% of GDP is critical for any government as it renders the budget impulses incapable to generate at least a proportional change in GDP. This conclusion is further strengthened by the proposed decomposition of the expenditure multiplier into several terms. They unambiguously reveal that its value is negatively affected by the budget surplus, the debt ratio's growth rate and the output gap. Secondly, the effects of the public indebtedness are tracked down to the overall economy. Initially, the private sector's cyclical behaviour is found to weaken the higher the average debt position of a country which accounts for the lower economic growth in a high debt environment. Eventually, the nonlinear relationship between the debt ratio and the net private savings is explored by estimating a TAR model for each EU country over 2002-2019. It is inferred that while in the first regimes, the injections and leakages take turns, in the second regimes, the leakages exceed the injections. Furthermore, it is concluded that the higher the debt ratio, the greater the number of regimes a country might fall into and the greater the number of the autoregressive terms suggesting a persistent change in the private agents' behaviour.
JEL: E60; E62

1. Introduction

The conduct of a fiscal policy that systemically does not respect the dynamic government budget constraint is related to the accumulation of debt stock. The Global Financial and Economic Crisis in 2009 outlined the risks of such fiscal policy. Specifically, many EU countries were forced to consider the limited fiscal leeway, which had not been binding up to that moment. Following the crisis, the attempts for debt reduction still remain on the EU agenda. That is why, the objective of the present study is to contribute to a better understanding of the relationship between the government debt stock and the economic activity as well as the implied transmission channels, which are likely to involve

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nonlinearities. The object of the study is the relation between public debt and economic activity in the EU over 2000-2019. The subject of the study is the transmission channels triggered by this relation.

The rest of the paper is organized as follows. Section 2 provides a brief review of the related literature. Section 3 examines the EU governments' budget balances through the lens of the private and external sector. Section 4 explores the general impact of the debt stock on the current GDP, derives a scaling factor for the budget influence, which gives rise to a theoretical indicative debt threshold and to a decomposition of the expenditure multiplier. Section 5 presents the nonlinear econometric methodology following the outlined transmission channels of the debt impact to the private sector. Section 6 presents the results. Finally, section 7 concludes.

2. Literature Review

The debate about the sustainability of a debt burden revolves around the issue of the existence of a debt threshold beyond which the debt stock weighs on the growth rate. This discussion virtually hinges on the issue of reverse causality.

On the one hand, under the assumption of unilateral causality from the debt to the growth rate, the debt threshold is more probable, though its level is still much debatable. Cecchetti et al. (2010) conclude that a potential risk of a higher level of debt is associated with potentially lower growth, which is due to the need of higher distortionary taxation for maintaining a given level of public services and the crowding-out effect caused by higher real interest rates. In a further study using a dataset for 18 OECD countries over 1980-2010, Cecchetti et al. (2011) reach a debt threshold amounting to 96% of GDP above which the economic growth is negatively affected by debt accumulation. While Kumar and Woo (2014) infer that a 10 p.p. of GDP increase in initial public debt is associated with a slowdown in subsequent growth in real GDP per capita of around 0.25 p.p. per year, they also find evidence that the negative effect of debt on growth gains additional statistical significance with higher debt ratio. Similarly, Checherita-Westphal and Rother (2010) use data for a sample of 12 Eurozone countries for 1970-2011. They point to the existence of a concave, inverted U-shaped relationship between public debt and economic growth rate, with the debt turning point at about 90-100% of GDP. Through a threshold model, Égert (2012) finds arguments in favour of a negative nonlinear relationship between indebtedness and economic growth. Although the results are quite sensitive to various assumptions, the negative nonlinear effect begins at very low levels of public debt (between 20% and 60% of GDP).

On the other hand, if the weak growth is attributable for the rising debt dynamics, then a threshold would be less likely to be observed. In this case, the policy should be focused on stimulating growth. Using data of the debt ratios covering the entire IMF membership back to 1875, Pescatori et al. (2014) examine the real GDP growth per capita over the following 1, 4, 10 and 15 years when the gross public debt rose above 90% of GDP. In so doing, they attempt to overcome the reverse causality issue. Specifically, they conclude that the growth drops sharply in the first year after the debt ratio exceeds 90% of GDP, but over longer horizons, the growth performance improves dramatically. Therefore, no clear debt threshold

is found. Interestingly, they add that the initial debt trajectory is important as they do not find any sharp reduction in the growth of countries whose high debt falls below 90% of GDP. Similar conclusions are reached by Lof and Malinen (2014), who estimate panel vector autoregressions (PVAR) that describe the dynamic relation between sovereign debt and economic growth, using annual data on debt and GDP for a panel of 20 developed countries, over the period 1954-2008. They conclude that the negative correlation between debt and GDP results from the negative impact of GDP growth on debt, rather than the negative impact of debt on GDP growth. Analogously, Kempa and Khan (2016) have found causality from growth to debt to be much more prevalent, especially during the global financial crisis.

Considering the government budget constraint, the causal association between economic growth and public indebtedness is bidirectional. On the one hand, it is the low economic growth that deprives a government from budget revenues, thereby spurring debt accumulation, but on the other hand, the high public indebtedness stifles the economic growth by means of higher economic uncertainty, higher interest rates and a crowing-out effect on the private investments. Reinhart and Rogoff (2010a, 2010b) rely on descriptive statistics in order to show that the public debt level above 90% of GDP affects the median economic growth negatively by 1%, while the average rate of economic growth falls even more. Using a dataset of all 28 EU countries, Ferreira (2014) obtains through panel estimations statistically relevant bidirectional causality relations between public debt and economic growth.

A different view is shared by Fatás et al. (2019), who infer that despite the negative correlation between debt and subsequent growth, there is no convincing evidence of causality. According to them, the difficulty to pinpoint a causal effect stems from the fact that not all debts are equal, that is, the assumption whereby any given level of debt has the same consequence on economic growth, regardless of its structure, is too simplistic. Similarly, in a sample of 15 OECD countries over 2001-2017, Atanasov (2019) states that evidence for causality between the long-term debt and the economic growth emerges in less than half of the examined countries.

Due to the endogenous reaction of market interest rates to higher default risk, Ostry et al. (2010) raise the issue of keeping the debt stock at a level well below the debt limit so as to keep the fiscal space in check, which they define as the difference between the current level of public debt and the debt limit implied by the country's historical record of fiscal adjustment. The concept has since been adopted by Moody's in their assessment of fiscal risks in advanced economies.

The path to the safeguarding or the restoration of debt sustainability through the business cycle is not straightforward as various circumstances have to be taken into consideration.

In cases of limited fiscal space, the choice to preserve sustainability, during a crisis, might not be invariably an optimal policy. According to Fatás (2018), the failure to discern between permanent and transitory shocks might lead to a negative loop of fiscal contractions, that can turn out to be self-defeating. The dynamics are amplified by the hysteresis effects and the size of the multiplier. The result is a rising debt ratio despite the initial intentions to adhere to sustainability.

Even in the aftermath of the crisis, the reduction of debt itself should not be at the expense of the growth prospects of the countries. Ostry et al. (2015) argue that for countries that have ample fiscal space, the benefit of reducing debt (by deliberately running overall surpluses) is unlikely to exceed the cost of the necessary distortionary taxation. In such cases, debt-to-GDP ratios should be reduced organically, through output growth. Likewise, Houbenova (2019) claims that in times of economic recovery, the front-loading fiscal tightening through taxes is an inappropriate policy. Taking into account the euro area post-crisis economic recovery, Bobeva and Zlatinov (2019), however, claim that the underestimated various structural factors and reforms cannot continuously be compensated by expansionary fiscal and monetary policies. According to them, the implementation of fiscal incentives without structural reforms can only further deepen the macroeconomic imbalances of the EU countries, thereby increasing their vulnerability to crises.

3. Government's Role in the Debt Accumulation through the Injection-Leakage Approach

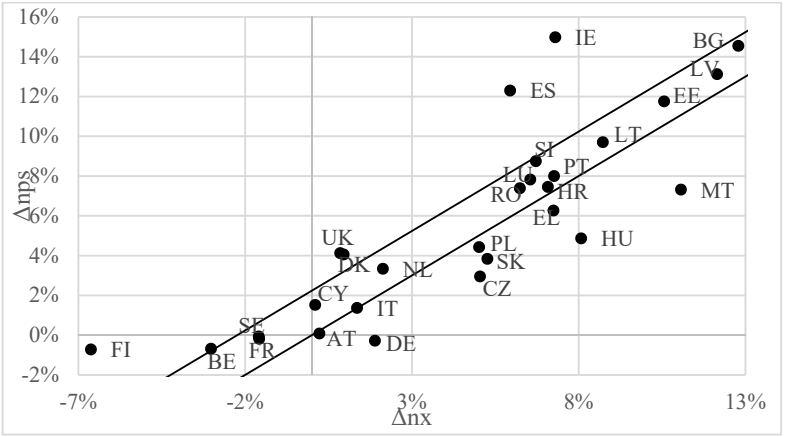
The budget balance is one of the main factors to determine the debt dynamics of a given country. Theoretically, its value could be derived from a framework which allows for the private and external sector. Using the injection-leakage identity, it could be shown that the budget deficit, bd_t, may be presented as follows:

$$bd_t = nps_t - nx_t \quad (1)$$

where bd_t is the budget deficit as % of GDP in period *t;* nps_t is the net private savings as % of GDP in period *t;* nx_t is the net exports as % of GDP in period *t*. It is of a particular interest to trace the determinants that have shaped the budget deficits' dynamics within the EU over 2000-2019. That is why, the equation is explored in its growth form. In particular, the change in the average overall budget deficit is examined between two subperiods. The crisis of 2009 is considered to best separate the two subperiods from one another, because it represents a turning point in the business cycle. For each EU country, there have been constructed the changes in the average net private savings (nps) and net exports as components of the respective change in the budget deficit. Thus, eq. (1) could be presented graphically on a scatter diagram. The area above the line $y = x$ outlines the countries with a budget deficit and vice versa.

What it could be observed in Figure 1 is that 20 countries are positioned above the $y = x$ line, that is, they have worsened their average budget balance between the two subperiods. The budget performance has dropped by 2.2 p.p. on average. This fact shows in a clear way that the EU governments have been fueling the debt dynamics after the outbreak of the crisis. Their fiscal behaviour could only be partially justified. On the one hand, the need to prop up the economy during the slump and the subsequent fear of a potential relapse into the financial and economic crisis due to insufficient fiscal stimuli explains the governments' actions. On the other hand, the usage of excessive debt exerts a largely negative influence on the economy due to rising uncertainty and interest rates.

Figure 1
Decomposed change in the average budget deficit between 2000-2008 and 2009-2019



Source: Eurostat.

The additional upper parallel line depicts clearly the countries whose budget deficits have grown more than the average level. These are Belgium, Denmark, Ireland, Spain, Finland and the United Kingdom. Except for Belgium and Finland, the rest of the countries experience lower investment and/or higher savings. As a matter of fact, the rise in the net private savings after the crisis is a strongly prevailing reason for the soaring deficits in the EU. Such development is observed in 16 member states with deteriorating budget balances. Interestingly, the falling private investments and the surging private savings have an equal contribution to this trend.

The budget surpluses of the remaining 8 EU countries have increased by 1.8 p.p. among the two subperiods. Noteworthy, all of these countries owe their soaring surpluses to the expanding exports that have generated a greater flow of taxable incomes.

Understandably, the underlying dynamics of the budget deficits in the EU has altered among the subperiods because they encompass different cyclical conditions. It seems that the booming economic dynamics before the crisis have translated into buoyant international trade and short-term capital flows impacting the governments' budget balances sizably. Particularly, in the Baltics and Bulgaria, absorption booms financed by capital inflows not only resulted in large output gaps but also spilled over into large external imbalances. Subsequently, these countries have seen their net exports adjust severely upwards since the beginning of the crisis. Atoyan et al. (2012) argue that push factors (low returns in originating countries) rather than pull factors (high returns in destination countries) drove most of the private capital flows to emerging Europe. Nevertheless, they admit that local pull factors also played an important role in some countries.

During the downturn and thereafter, the debt problems afflicting the EU have attracted much more attention and spread worries about the sustainability of the sovereign public finances.

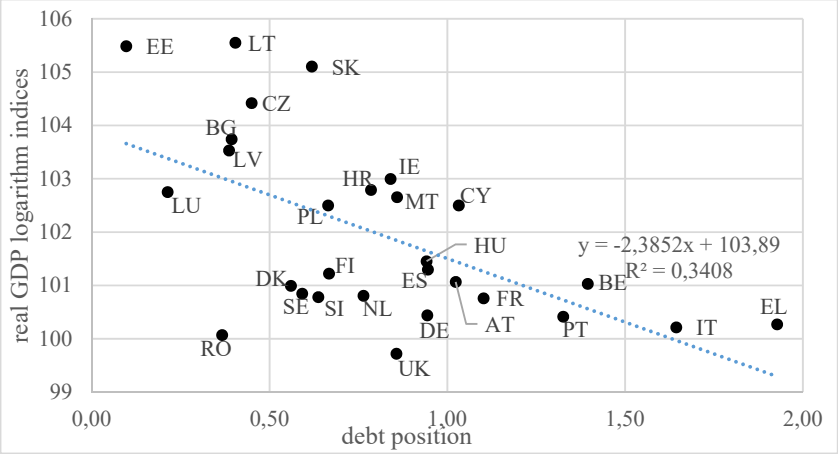
Hence, Yotzov (2016) argues that in the post-crisis period the uncertainty remains a distinctive feature of the global economies. In fact, the negative sentiments of the private agents have by all means dragged the consumption and investments down, which explains the dominant role of the net private savings in the second period. As a whole, the EU countries have systematically been fiscally incontinent throughout the whole period, regardless of the underlying reasons.

4. The Effects of the General Government's Debt on the Economy

Accumulating yet more debt, the EU countries face the prospects of lower economic growth in the future. Figure 2 depicts the negative correlation between the debt position of the EU countries and their average economic growth over 2000-2019, captured by fixed-base indices of the real GDP logarithms. The debt position of a country in a given period reflects the average debt ratio of the respective country as a share of the average EU debt ratio. In practice, countries, which are indebted more than the EU average level, tend to grow at a lower rate and vice versa, all else the same.

Figure 2

Average of real GDP logarithm indices (2000=100) and debt position in 2000-2019



Source: Eurostat, own estimations.

The government budget constraint depicts how the debt evolves through time:

$$\Delta d_t = \lambda d_{t-1} + pd_t + sf_t \quad (2)$$

where λ is the interest rate-growth differential, d_{t-1} is the first lag of the debt ratio; pd_t is the current primary deficit; sf_t is the stock-flow adjustment which relates to all other factors affecting the outstanding stock of debt but are not recorded as part of the primary balance. All variables are denoted by small letters because they are divided by the GDP. After algebraic transformation of eq. 2 the current GDP could be presented as the outcome variable:

$$Y_t = \frac{1}{d_{t-1}} BD_t - \frac{\Delta d_t}{d_{t-1}} Y_t + Y_{t-1} + \frac{SF_t}{d_{t-1}} \quad (3)$$

where BD_t is the current overall budget deficit in absolute terms; Y_t is the current nominal GDP in absolute terms, $\Delta d_t / d_{t-1}$ is the growth rate of the debt ratio in a period t; SF_t is the current stock-flow adjustment in absolute terms. The left-hand side of the equation includes only the current GDP. In contrast, the right-hand side conveys the complex interrelations determining the GDP in the current period. The first term on the right-hand side is effectively this part of the current GDP the government has contributed to. What is really important here is that the overall deficit doesn't exercise a direct influence on the production, but rather it is multiplied by a scaling factor, $1/d_{t-1}$. This quotient reflects the obligation of the government to service its debt by regularly paying interest. In practice, the ratio plays the role of a debt's grip as it may magnify or subdue the impact of the government on the actual GDP depending on whether it falls or rises. The higher the lagged debt, the higher the paid interests, the less available budget funds for public investments or any other productive expenses. The factor actually imposes a penalty for the build-up of debt burden in time, that is, the debt's grip tightens when debt increases. This inference is in line with the conclusion of Bacchiocchi et al. (2011), who find a negative correlation between debt and public investment in countries with a high debt ratio, and a positive correlation between debt and public investment in countries with low debt ratios. As it is readily seen, there is no upper bound for the rising debt, so it systematically reduces the capability of the government sector to stimulate production. Besides, if the lagged debt ratio exceeds the value of 1, the impulses to the aggregate production are less than proportional.

The second term on the right-hand side reflects the production loss due to the rise in the debt ratio expressed as a share of the current GDP. Such a loss might stem from the rise in the interest rates in the economy because of the possibly riskier profile of the country. Alternatively, the debt ratio's negative growth rate might stimulate the level of the economic activity due to the lower cost of borrowed funds.

The third term is the lagged nominal GDP. As a whole, this recursive equation captures the role of the government in the dynamics of GDP.

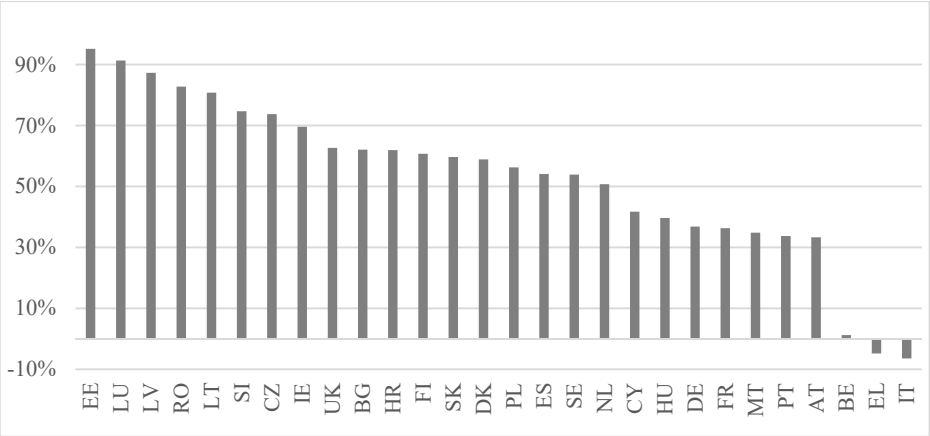
The last term is the stock-flow adjustment which reflects the accumulation of financial liabilities due to banking sector support and differences between cash and accrual accounting. Since these residuals add to the budget deficit, they also increase the GDP.

The unity of the scaling factor leads to a reasonable debt threshold beyond which the country plunges into a spiral of inefficient efforts. As a matter of fact, the implied critical debt value is consistent with the results of a growing empirical literature which shows that the negative correlation between public debt and economic growth becomes particularly strong when public debt approaches 100 percent of GDP (Reinhart, Rogoff, 2010a, 2010b; Kumar, Woo, 2014; Checherita-Westphal, Rother, 2010; Cecchetti et al., 2011). This threshold debt value provides for the opportunity to construct the leeway of each country before the impact of the government on the GDP is downgraded on account of the debt's grip. The government's leeway is virtually the difference between the introduced debt threshold amounting to 100% of GDP and the debt ratio of a country. To some extent, the constricted room before the debt's tighter grip mirrors the "fiscal space" introduced by Ostry et al. (2010). The rising debt

burden is the common cause for the emergence of the two concepts. Figure 3 presents the estimates of the government sector's leeway for each EU country before 2009. In the initial period 2000-2008, the government leeway is positive among 26 EU countries. The average leeway is 57 p.p. Notably, 25 of these countries exhibit a fiscal leeway greater than 30 p.p. The highest leeway is observed in Estonia with 95 p.p, followed by Luxembourg with 91 p.p. The only two countries that have exhausted their leeway due to substantial debt burden are Italy and Greece, which have surpassed the debt threshold by 6 p.p and 5 p.p., respectively. This inference, however, conceals the fact that there is another country on the brink of a tighter debt's grip. This is Belgium with a leeway of 1 p.p.

Figure 3

Difference between the debt threshold and the average debt for 2000-2008

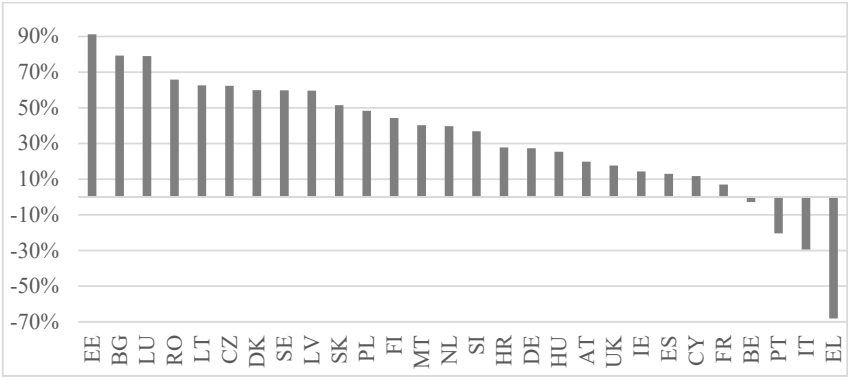


Source: Eurostat, own estimations.

Figure 4 presents the estimates of the government sector's leeway for each EU country after 2009. Over the second period, the inclination of the EU countries towards debt becomes clearer. The average fiscal leeway contracts by 14 p.p. to 43 p.p. This trend might be attributed to the crisis in 2009, which called for substantial fiscal stimulus packages. Therefore, the period is probably too short to expect full recovery of the pre-crisis public finances of the EU countries. Besides, the unusual circumstances in the post-crisis period, like subdued investments against the background of very low-interest rates, don't provide incentives for the countries to reduce the accumulated debt swiftly. Nevertheless, the distinct tendency of more debt usage warns against risks for the public finances ahead. In the second period, Estonia keeps the capacity of the government sector to stimulate the aggregate production at the highest level with 91 p.p, which is by 12 p.p. higher than the next country. The member states with a depleted leeway are Greece with -68 p.p., Italy with -29 p.p., Portugal with -20 p.p. and Belgium with -3 p.p.

Figure 4

Difference between the debt threshold and the average debt for 2009-2019



Source: Eurostat, own estimations.

The tendency for growing indebtedness is ubiquitous within the EU. This development is quite evident because only 4 EU countries have managed to loosen the debt's grip on the economy throughout the whole period. These are Bulgaria with 17 p.p., Sweden with 6 p.p., Malta with 5 p.p. and Denmark with 1 p.p. In contrast to them, the rest of the economies experience a negative change in their fiscal leeway that varies from -4 p.p. to -63 p.p. The lower boundary is mainly expanded by three economies whose fiscal leeway's changes go beyond -50 p.p. These are Greece with -63 p.p., Ireland with -55 p.p. and Portugal with -54 p.p. Noteworthy, along a group of countries which makes attempts to hold back its indebtedness there exists another group of countries which seems not to be able to crack down on its growing debt burden. This inference is supported by the observed variability of the estimates as their standard deviation rises from 27 p.p. to 36 p.p. Overall, the EU countries have not put enough efforts into the reduction of the debt burden, so the debt problems still remain pressing.

The unusual resemblance between the scaling factor from eq. 3 and the fiscal multiplier warrants further scrutiny. Indeed, there could be found an algebraic relationship between these two concepts after further transformation of the budget constraint captured by eq. 3:

$$Y_t = \frac{BD_t}{D_{t-1}(1+g_t)}Y_t - \frac{\Delta d_t}{d_{t-1}}Y_t + \frac{1}{1+g_t}Y_t + \frac{SF_t}{D_{t-1}(1+g_t)}Y_t \quad (4)$$

where g_t is the economic growth in period t and D_{t-1} is the lagged debt stock in absolute terms. The expenditure multiplier (α_t^G) is:

$$\alpha_t^G = \frac{Y_t}{S_t + Im_t} \quad (5)$$

where S_t is the total savings in the economy in period t and Im_t is the imports of the economy in period t. After the division of eq. 4 by $(S_t + Im_t)$, a direct relation between the expenditure multiplier and the debt emerges:

$$\alpha_t^G = \frac{BD_t}{D_{t-1}(1+g_t)}\alpha_t^G - \frac{\Delta d_t}{d_{t-1}}\alpha_t^G{}_t + \frac{1}{1+g_t}\alpha_t^G + \frac{SF_t}{D_{t-1}(1+g_t)}\alpha_t^G \quad (6)$$

The first term could be positive if a deficit is present and growing and vice versa. Specifically, the explanation for a positive sign of the term comes from the fact that the budget deficit stimulates the aggregate production, so the level of the GDP rises, which boosts the expenditure multiplier, all else the same. Nevertheless, the final magnitude of this term is dependent on the level of the lagged debt stock. The accumulated debt stock previously reduces the impact of the government on the economy at present as it decreases the expenditure multiplier, all else being the same. But most importantly, this effect of the debt stock persists regardless of the budget stance. The negative effect of the debt on the fiscal multiplier is supported by previous studies (Kirchner, et al., 2010; Ilzetzki, et al., 2011; among others).

The second term drags the multiplier down whenever the debt ratio soars and vice versa, all else the same. This effect is stronger, the greater the absolute growth in the debt ratio. Theoretically, the crowding-out effect on the private investments underlies this term, that is, the higher interest rates induced by the expansionary fiscal stance suppress the private sector's investment activity.

The third term conveys the nonlinear fiscal effects, that is, the expenditure multiplier rises if the economic growth declines and vice versa, all else the same. This term mirrors the countercyclical nature of the multiplier, which has been of particular interest to many researchers (Auerbach, Gorodnichenko, 2012a, 2012b; Baum, Koester, 2011; Jorda, Taylor, 2013; Canzoneri, et al., 2016; among others).

The decomposed values of the expenditure multipliers within the EU are explored at the beginning of the crisis in Figure 5 and the end of the observed period in Figure 6. In so doing, the behaviour of the expenditure multiplier could be examined in different cyclical conditions.

According to Figure 5 at the outbreak of the crisis, all countries exhibit a budget deficit which contributes positively to the value of the multiplier, though this influence is reduced by the accumulated lagged debt stock. The average influence is 0.32. Romania is the only country whose actions uplift the multiplier by more than 1.

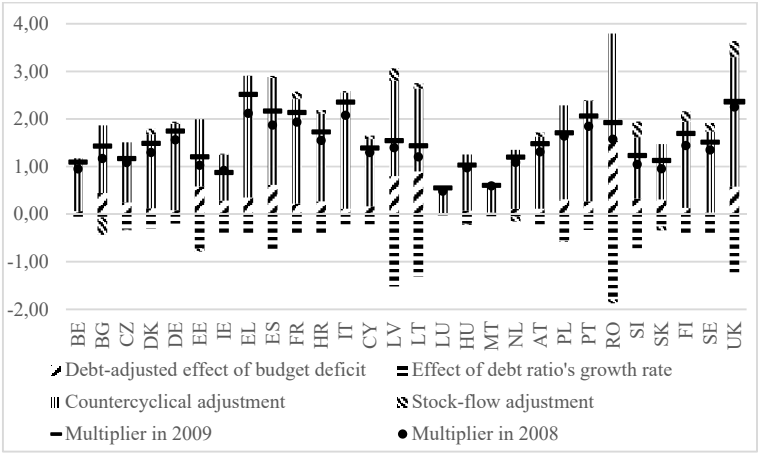
Although the negative influence of the debt ratio's growth rate on the expenditure multiplier is on average -0.49 in 2009, this impact exceeds -1 in several EU countries. These are Romania, Latvia, Lithuania and the United Kingdom. The negative effect is smallest in size in Luxembourg, Netherlands and Malta whose multipliers are reduced by 0.05 the most.

The unfavourable cyclical conditions in 2009 contribute positively to the EU expenditure multipliers' values. The average contribution is 1.65. The multipliers of the UK and Greece are cyclically augmented by more than 2.5.

The stock-flow adjustment pushed the multiplier upwards in 20 EU countries in 2009. Specifically, its positive influence is 0.11 on average and it is the highest in the United Kingdom, amounting to 0.34. The average negative impact is virtually -0.1, though it is perceptibly large in size in Bulgaria, whose multiplier is reduced by -0.37.

Figure 5

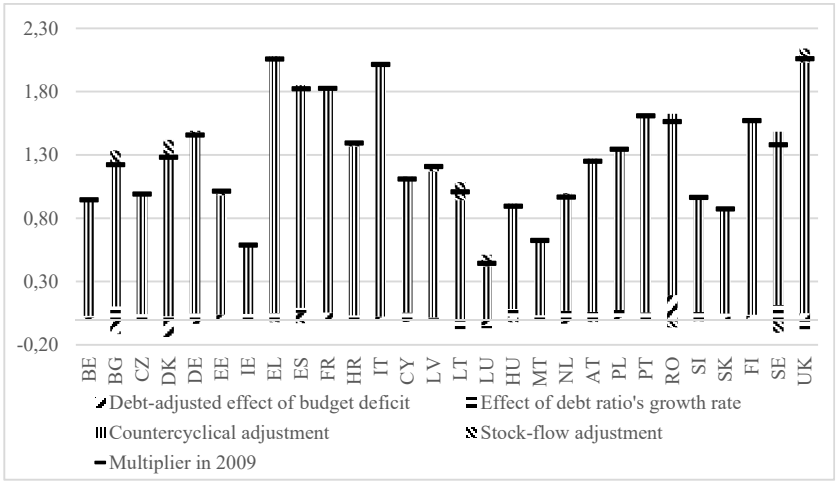
Decomposition of the expenditure multiplier in 2009 against its value in 2008



Source: Eurostat, own estimations.

Figure 6

Decomposition of the expenditure multiplier in 2019



Source: Eurostat, own estimations.

Figure 5 allows for the comparison between the pre-crisis and crisis multipliers' values. As of 2009, in all but one EU countries, the expenditure multipliers have risen. The average increase is by 0.18. Greece's expenditure multiplier soars the most by 0.4. Only the multiplier of Ireland drops, though slightly. In percentage terms, Bulgaria and Romania see their multipliers rise the most by 22%, while the average percentage growth is 13%.

In Figure 6 the contributions of the budget deficit and the debt ratio's growth rate to the magnitude of the EU expenditure multipliers in 2019 have weakened tangibly.

12 out of 28 countries exhibit a budget deficit, so they contribute to the rise in the multiplier. In Romania, the debt-adjusted effect of the budget deficit raises the expenditure multiplier the most by 0.19. This effect is smaller in France and Spain, amounting to 0.06 and 0.05, respectively. In the remaining 16 EU countries, the negative debt-adjusted effect is highest in Denmark, Bulgaria and Luxembourg but is no stronger than -0.14.

The debt ratio's growth effect is positive in 22 EU countries. In this regard, Sweden, Bulgaria and the Netherlands boost the expenditure multiplier the most, as they reduce their debt accumulation. In contrast, the United Kingdom, Lithuania and Luxembourg weigh on the expenditure multiplier by -0.08 the most.

The cyclical adjustment of the expenditure multiplier is highest in Greece, Italy and the United Kingdom and amounts to 2 in all three countries. The effect of the business cycle on the multiplier is smallest in Luxembourg, Ireland and Malta and varies between 0.42 and 0.58.

The exerted average influence of the stock-flow adjustment in 2019 has dropped by half as it is less than 0.05 in absolute value.

As a whole, the expenditure multipliers within the EU exhibit a dramatically altered magnitude and structure in 2019 compared to 2009. Specifically, 27 countries have lower multipliers a decade later. Expectedly, the improvement of the output gap has caused a drop in the multipliers. Malta is the only country whose multiplier has increased subtly.

From the decomposition of the expenditure multiplier, several inferences could be derived:

- The expenditure multipliers of the EU countries could rise by up to one-fifth in a crisis. This is a direct consequence of the multiplier's countercyclical properties within the business cycle.
- The greater the rise in the debt ratio, the lower the value of the expenditure multiplier, all else being the same.
- At any given time, the accumulated debt stock decreases the influence of the budget impulses on the real economy by reducing the expenditure multiplier.
- The implementation of a countercyclical fiscal policy throughout the economic cycle is highly desirable. Such a policy would allow the government to keep in check the accumulated debt stock prior to a crisis, to accumulate enough fiscal buffers and to stimulate the economy by running a cyclically-adjusted deficit in a crisis. These circumstances would ensure that the value of the expenditure multiplier is not reduced by the first two terms in eq. 6.
- Regardless of the prevailing output gap, the cyclical adjustment is a dominant factor for the value of the expenditure multiplier. The lower the economic growth, the higher the expenditure multiplier, all else being the same.

- the stock-flow adjustment (SF) could increase in importance as a determinant for the expenditure multiplier during crises.

In reality, because of its various characteristics, the EU economies have different tolerable levels of debt ratio. The level of indebtedness that is totally bearable for some countries might make some other countries struggle with severe hardships. In fact, these difficulties may not solely pertain to sudden events like a default or a loss of access to capital markets. Rather, such countries begin to experience the deceleration of the economic growth due to high debt stock more tangibly. It is even possible that many countries experience difficulties long before. The prerequisites for such development are various. For instance, the private sector could be debt-averse, because sovereign defaults have already occurred in the past. It could also be the case that the government's fiscal policy lacks credibility, so the economic agents manifest depressed animal spirits. It is even likely that a specific event on an international scale might contribute to lower debt tolerance. This reasoning implies that the transmission mechanisms through which the debt burden stifles the economic growth could be subtle and might involve nonlinearities. To this end, eq. 3 could be viewed from yet another perspective by feeding the injection-leakage identity into it:

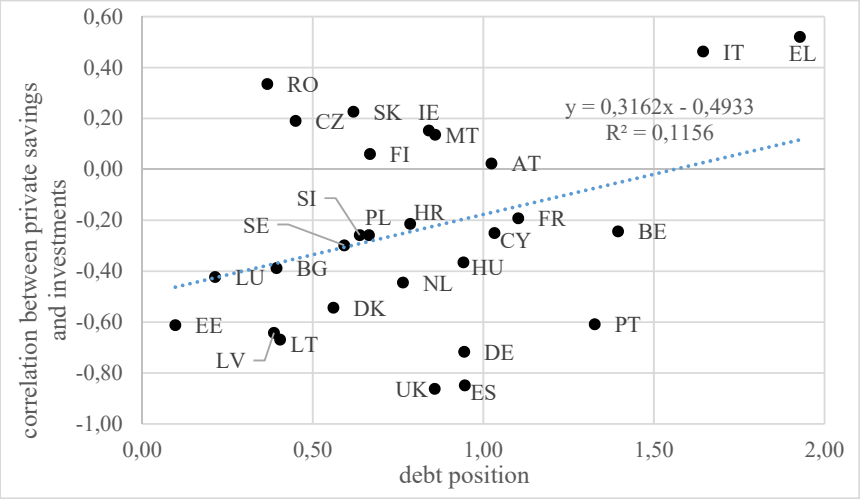
$$Y_t = \frac{1}{d_{t-1}} NPS_t - \frac{1}{d_{t-1}} NX_t - \frac{\Delta d_t}{d_{t-1}} Y_t + Y_{t-1} + \frac{SF_t}{d_{t-1}} \quad (7)$$

From a macroeconomic point of view, the net private savings should be positively, though imperfectly, correlated with the net exports. This is the case because the private sector lends the excessive savings either to the government or to the non-residents. This positive correlation provides for the opportunity to examine whether the private sector's behaviour alters when the general government accumulates debt by focusing solely on the net private savings.

Figure 7 provides evidence that the correlation between private savings and investments is negative and changes in correspondence with the debt position of the country. In countries that are indebted less than the EU average level, the negative correlation is usually stronger, that is, the rise in the savings is associated with a fall in the investments. In fact, when the indebtedness is lower than the EU average level, the private sector behaves more cyclically. Nonetheless, provided that the debt burden rises, this cyclical behaviour weakens, that is, the debt renders the private sector distant from the business cycle. This finding is important as it has serious implications for the future prospects of the given economy. Seemingly, against the backdrop of higher than the average EU indebtedness, the private sector's dynamics steadily loses its capacity to stimulate the economic growth. Specifically, during booms and busts, the distance between the private savings and investments is usually expected to rise as one of these aggregates rises and the other falls and vice versa. Such dynamics propel the economic growth in good times, thereby allowing for the government to accumulate fiscal buffers for bad times. In a situation of high indebtedness, however, the distance between the private savings and investments may not enlarge as it would be in the case of low debt stock. Thus, the economic growth would be relatively lower and the government unable to pile up substantial buffers for possible unfavourable economic conditions. Understandably, the budget stimuli during the crisis would be at the cost of higher debt accumulation.

Figure 7

Private savings-investment correlation and debt position in 2000-2019

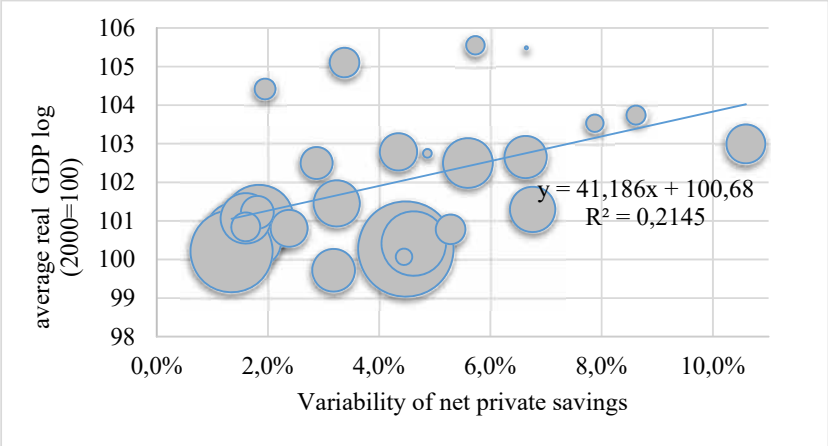


Source: Eurostat, own estimations.

Figure 8 serves to corroborate several important points in the discussion. Firstly, countries whose net private savings tend to be more variable in time exhibit higher economic growth. Secondly, if the indebtedness is measured by the width of the balloons, there could be noticed a general tendency for the indebted above the EU average level countries to position themselves in the lower left area of Figure 8, that is, the variability of the net private savings is lower if the debt stock is larger. This confirms the proposition that the private sector tends to act somehow inconsistently with the business cycle in a high-debt environment. The reason why the private agents slowly become estranged from the business cycle when the debt ratio is higher than the EU average is their expectations about the future. They virtually have to plan their consumption and investment behaviour over a longer horizon, so that they could take into account the probable higher future tax burden and the unfavourable interest dynamics.

Although the debt burden is negatively associated with the correlation between the private savings and investments, up to this point, it remains unclear whether the relationship is linear in nature. If this is the case, then the increase in debt would always exert a constant negative influence on the distance between private savings and investments. Analogously, the negative impact of debt on the economic growth is present at any given time. Therefore, there are direct consequences the moment a country makes use of debt financing. If the debt weakens the negative correlation between private savings and investments in a nonlinear way, that is, there is a certain threshold beyond which the negative correlation weakens exponentially, then the usage of debt becomes yet costlier in terms of output. The next section presents the econometric methodology, which is used later on to address the issue of a possible nonlinearity between the net private savings and the debt stock.

Figure 8
Standard deviation of net private savings and indices of average real GDP logarithm by a degree of indebtedness in 2000-2019



Source: Eurostat.

5. Empirical Methodology and Data

The TAR models are introduced by Tong (1983). They are actually piecewise linear. The threshold process divides one-dimensional Euclidean space into k regimes, with a linear autoregressive model in each regime. Such a process makes the model nonlinear for at least two regimes, but remains locally linear (Tsay, 1989).

$$nps_t = \sum_{j=1}^{J} I_t^{(j)} \left(\varphi_0^{(j)} + \sum_{i=1}^{p_j} \varphi_i^{(j)} nps_{t-i} + u_t^{(j)} \right), r_{j-1} \leq z_{t-d} \leq r_j \qquad (8)$$

where $I_t^{(j)}$ is a Heaviside indicator for j-th regime, npv_t is the net private savings, z_{t-d} is an observed variable determining the switching point and $u_t^{(j)}$ is a zero-mean independently and identically distributed error process. The delay parameter, d, is set to one, as it is presumed that the net private savings in the current period are plausibly determined by the first lag of the debt threshold. Since not all debts are equal, the relation between the net private savings and the debt remains highly country-specific. Hence, a TAR model is estimated for each EU country.

Before 2001, there is incomplete data availability of the total government revenues and expenditures of the EU countries, which are needed to derive the private sector aggregates. Due to this reason, the forthcoming analysis relies on the data from that moment on. Since the data are on a quarterly basis, all the time series are seasonally adjusted. In order to be easily interpretable afterwards, the time series are then transformed into a logarithmic form.

Subsequently, the properties of the net private savings for each country are examined. The data are checked for stationarity using the ADF test and the KPSS test. A specification with an intercept is adopted. The null hypothesis of the ADF test implies a unit root, while the KPSS test cannot reject the stationarity under the null hypothesis. The results from the ADF test are present in Appendix 1.

Although the ADF test cannot reject the null hypothesis for most of the net private savings (nps) at levels, there exist several countries whose time series are under question. These are Belgium, Czech Republic, Denmark Cyprus, Luxembourg and Hungary. After the KPSS test for these time series alone, the results for Czech Republic, Cyprus, Luxembourg and Hungary still remain debatable. Nonetheless, due to the short length of the observed period and the fact that the majority of the examined nps time series already contain a unit root at least at 5% level of significance, the net private savings of the aforementioned countries may also plausibly be viewed as rather nonstationary at levels despite the counterintuitive result from the ADF test.

Under the ADF test, the debt time series of all countries have a unit root at levels of 5%. Most of the time series are rendered stationary after first differencing except these of Ireland, Spain, Latvia, Malta, Portugal, Romania and the United Kingdom. The applied KPSS test for these time series alone confirms that they are rather I(1), though the results for Malta remain not clear-cut. Eventually, the debatable debt time series of the aforementioned EU countries would be assumed to be stationary at first differences.

The specific order *p* of the TAR models is determined by means of the Schwarz information criterion (SIC). The SIC values of the TAR models with various orders are presented in Appendix 2. The chosen order of the autoregressive processes is summarized in Table 1.

Table 1

Order *p* of the AR suggested by the SIC

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
p=2	p=1	p=1	p=1	p=1	p=1	p=2	p=3	p=2	p=1	p=1	p=3	p=2	p=1
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
p=1	p=1	p=2	p=2	p=2	p=2	p=1	p=2	p=1	p=2	p=1	p=1	p=2	p=1

Source: Own estimations

6. Empirical Results

The TAR models of the net private savings for each EU country are displayed in Appendix 3. The first lag of the respective debt ratio is used as a threshold variable in all models except the ones for Spain, France, Italy and Romania.

The analysis of the estimated models leads to the inference that in the one-regime models as well as in the first regime of two-regime models, the parameters of the autoregressive terms are always negative, that is, a 1% increase in the lagged net private savings translates into a drop in the current net private savings. A plausible explanation is that the leakages and the injections in the economy take turns which contributes to sustaining a given level of private sector's activity. In the second regime of the two-regime models, however, there could be

observed that some signs of the autoregressive terms are positive. In other words, in countries that are indebted higher than the EU average level, the leakages prevail over the injections, which could account for their lower economic growth.

In Appendix 4 the adequacy of the models is examined through several diagnostic tests for autocorrelation, heteroskedasticity and normal distribution of the residuals.

Overall, at 5% level, the Breusch-Godfrey test using 4 lags cannot reject the null hypothesis of no serial correlation in all models except in these of Czech Republic and Lithuania. In 5 models, the White test rejects the null hypothesis of a constant variance at 5% level of significance. According to the Jarque-Bera test, the null hypothesis of normally distributed error terms cannot be rejected in 9 models. Due to the small number of observations, the results from the Jarque-Bera test are rather expected. Against the backdrop of a decent performance under the diagnostic tests, the TAR models have in command rather low explanatory power. This means that the debt stock is vital but hardly the only determinant for the net private savings.

The negative influence of the debt stock on the economic growth works through the suppression of the net private savings' cyclical behaviour. This inference raises the question of whether the rising debt burden generates a one-off or lasting effect on the net private savings. This supposition could be tested if the lag length of the autoregressive processes is regressed on the indebtedness of the EU countries. The sign of the parameter shows the persistence of the debt's impact on the net private savings.

$$\underset{}{p_i} = \underset{(0{,}174)}{0{,}6} + \underset{(0{,}192)}{1{,}15} \times dps_i \tag{9}$$

where p_i is the pth order of the TAR model of the given country i; dps_i is the debt position of the given country i. The respective standard errors are in brackets. The constant and the parameter of dps_i are statistically significant at 1% level. Specifically, the higher than the EU average debt burden corresponds directly with the higher persistence present in the models of indebted countries. In other words, the greater debt ratios correlate with higher orders of the TAR models. This observation supports the inference that the private sector becomes yet more aware of the potential hardships following the rising debt stock.

Earlier it was found that the lagged debt ratio above 100% of GDP could serve as an indicative threshold above which a budget impulse of a given size is already unable to generate at least an equiproportional change in output, all else being equal. Also, it was pointed out that from an intuitive standpoint, the threshold might emerge earlier. The mentioned reasons for the occurrence of this event all pertain to the behaviour of the economic agents. A sudden change in their behaviour might trigger an unexpected fall in the budget revenues, thereby leading to a budget deficit. Hence, it is important to examine whether such nonlinearity might emerge as a result of debt stock greater than the EU average level. This hypothesis could be explored as the number of regimes in the TAR models is regressed on the debt positions of the EU countries.

$$\underset{}{nj_i} = \underset{(0{,}169)}{0{,}89} + \underset{(0{,}186)}{0{,}44} \times dps_i \tag{10}$$

where nj_i is the number of regimes in the TAR model of the given country i; dps_i is the debt position of the given country i. The respective standard errors are in brackets. The constant is statistically significant at 1% level, while the parameter of dps_i is significant at 5% level. It seems that the higher than the EU average the debt ratio is, the greater the number of regimes a country might fall into. Such a conclusion comes as no surprise, because the greater debt burden is certainly more likely to stir worries about the sustainability of the government. In such a situation, the economic agents might be stimulated to adjust their spending behaviour.

7. Conclusion

The general economic outlook after the crisis in 2009 reveals the dominant role of the net private savings in the negative change in the budget balances. Some EU governments fail to adjust their budgets in view of the relatively lower revenues, which leads to debt accumulation. Such dynamics is unfavourable for the economic prospects of the country because the higher debt stock is graphically found to correspond to lower economic growth. This is also evidenced by the transformed budget equation, whose outcome variable is the current GDP. There have been discerned two transmission channels through which the debt exerts its negative impact on the aggregate production.

Firstly, the debt stock suppresses the government's capacity to affect the economy as the interest expenses on the growing debt absorb yet greater budget funds. Beyond a certain debt threshold, the budget impulses become unable to generate equipropornial influence on the GDP anymore, because the worsened budget structure is inconsistent with a robust economic growth. It bears emphasizing that the concept of the fiscal multiplier strongly relates to the budget exhaustion induced by the debt accumulation. In fact, the government budget constraint is demonstrated to explicitly outline the negative relation between the expenditure multiplier and the debt.

Secondly, the debt affects the overall economy. In particular, the debt stock modifies the behaviour of the private agents. In usual circumstances, they act consistently with the business cycle. In a high debt environment, however, their spending behaviour alters and might even adjust downwards in a sudden way. Such unexpected change in the private expenditures due to pessimistic expectations effectively triggers a nonlinearity between the debt stock and the economic growth. Actually, in heavily indebted EU countries, such nonlinear private behaviour is confirmed by the estimated threshold autoregressive models. Moreover, the high level of the accumulated debt stock alters the private sector's spending in a persistent way signalling for a self-exciting process. The governments have to be wary about the consequences of the accumulating debt burden. The credibility of the fiscal policy can certainly reduce the likelihood of an upward change in the net private savings. Nonetheless, against the backdrop of consistent fiscal imprudence, the debt tolerance is easily exhaustible.

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Appendix 1

Table 2

Tests for unit roots

Test / Variable	Emp. statistics – ADF – BIC		Test / Variable	Emp. statistics – ADF – BIC	
	at levels	first difference		at levels	first difference
lgnps_01_be_sa	-5,270300***	-8,876650***	lgdebt_01_be_sa	-1,513857	-5,654556***
lgnps_02_bg_sa	-1,515571	-11,85474***	lgdebt_02_bg_sa	-2,200151	-3,003727**
lgnps_03_cz_sa	-5,245569***	-12,75190***	lgdebt_03_cz_sa	-1,283678	-4,001856***
lgnps_04_dk_sa	-2,253678	-11,02319***	lgdebt_04_dk_sa	-1,320096	-7,905678***
lgnps_05_de_sa	-3,012134**	-11,28288***	lgdebt_05_de_sa	-1,144183	-5,787596***
lgnps_06_ee_sa	-2,516552	-11,23889***	lgdebt_06_ee_sa	-1,022607	-6,010656***
lgnps_07_ie_sa	-1,521528	-10,68070***	lgdebt_07_ie_sa	-2,031255	-1,744872
lgnps_08_el_sa	-2,171669	-13,25915***	lgdebt_08_el_sa	-0,656830	-9,638515***
lgnps_09_es_sa	-1,071214	-7,694168***	lgdebt_09_es_sa	-1,153828	-2,371271
lgnps_10_fr_sa	-2,035681	-9,268849***	lgdebt_10_fr_sa	-1,429117	-3,705744***
lgnps_11_hr_sa	-2,222457	-10,78968***	lgdebt_11_hr_sa	-1,413138	-2,997417**
lgnps_12_it_sa	-2,040142	-9,301729***	lgdebt_12_it_sa	-0,520419	-5,595026***
lgnps_13_cy_sa	-3,155950**	-9,074083***	lgdebt_13_cy_sa	-0,889043	-6,305044***
lgnps_14_lv_sa	-1,707657	-4,730750***	lgdebt_14_lv_sa	-2,335774	-2,331706
lgnps_15_lt_sa	-1,949469	-11,88491***	lgdebt_15_lt_sa	-1,436770	-3,009978***
lgnps_16_lu_sa	-4,797065***	-8,517455***	lgdebt_16_lu_sa	-1,084257	-9,180357***
lgnps_17_hu_sa	-7,012065***	-10,15148***	lgdebt_17_hu_sa	-2,443473	-7,873460***
lgnps_18_mt_sa	-2,770939*	-9,499615***	lgdebt_18_mt_sa	2,165241	-2,630590*
lgnps_19_nl_sa	-2,087831	-9,401982***	lgdebt_19_nl_sa	-0,873224	-6,473616***
lgnps_20_at_sa	-1,313894	-10,88160***	lgdebt_20_at_sa	-1,318651	-8,798112***
lgnps_21_pl_sa	-2,741557*	-11,31614***	lgdebt_21_pl_sa	-2,454614	-6,297050***
lgnps_22_pt_sa	-2,148386	-14,88429***	lgdebt_22_pt_sa	-1,559008	-1,849427
lgnps_23_ro_sa	-2,162961	-12,10671***	lgdebt_23_ro_sa	-1,461454	-2,625147*
lgnps_24_si_sa	-1,764282	-10,01324***	lgdebt_24_si_sa	-0,637837	-5,740912***
lgnps_25_sk_sa	-2,826486*	-12,38423***	lgdebt_25_sk_sa	-1,292183	-4,805102***
lgnps_26_fi_sa	-2,685532*	-13,39630***	lgdebt_26_fi_sa	-0,549960	-3,296188**
lgnps_27_se_sa	-1,996230	-13,93945***	lgdebt_27_se_sa	-0,722105	-6,897426***
lgnps_28_uk_sa	-2,056096	-9,510568***	lgdebt_28_uk_sa	-1,760302	-2,244437
KPSS			KPSS		
lgnps_01_be_sa	0,476641**	0,045484	lgdebt_07_ie_sa	0,727285**	0,226926
lgnps_03_cz_sa	0,224040	0,101673	lgdebt_09_es_sa	0,920876***	0,235914
lgnps_05_de_sa	0,833221***	0,051832	lgdebt_14_lv_sa	0,797446***	0,104502
lgnps_13_cy_sa	0,122291	0,050899	lgdebt_18_mt_sa	0,610769**	0,496293**
lgnps_16_lu_sa	0,179983	0,069463	lgdebt_22_pt_sa	1,031320***	0,389192*
lgnps_17_hu_sa	0,144142	0,205007	lgdebt_23_ro_sa	0,675736**	0,160850
			lgdebt_28_uk_sa	1,024439***	0,254589

Source: Own estimations.

*The levels of significance at 1%, 5% and 10% are denoted respectively as ***, ** and *. The empirical statistic of the ADF test is compared with the critical values by MacKinnon (1996).*

Appendix 2

Table 3

BIC values of possible TAR models from 1 to 5 autoregressive terms

	BIC				
	ar(1)	ar(2)	ar(3)	ar(4)	ar(5)
BE	-5,127017	[-5,112497]	-5,034603	-5,035810	-4,964242
BG	-3,460739*	-3,404714	-3,440907	-3,313869	-3,221722
CZ	[-4,839275]	-4,813138	-4,794708	-4,844561	-4,810284
DK	-5,317637*	-5,248268	-5,179181	-5,100910	-5,066392
DE	-5,656193*	-5,610494	-5,539852	-5,490506	-5,433136
EE	-4,022535*	-3,975081	-3,905994	-3,962105	-3,782361
IE	-2,596398	[-2,691072]	-2,671589	-2,708968	-2,730005
EL	-3,662398	-3,644731	-3,683313*	-3,644003	-3,521707
ES	-4,904756	-4,915725*	-4,904780	-4,832284	-4,808469
FR	-6,619383*	-6,492870	-6,440892	-6,426843	-6,411535
HR	-4,570905*	-4,536596	-4,494729	-4,432945	-4,482414
IT	-6,002550	-5,947946	[-5,888948]	-5,843888	-5,544678
CY	-2,583062	[-2,569813]	-2,497433	-2,502066	-2,425102
LV	-4,394320*	-4,350134	-4,255438	-4,199698	-4,137354
LT	-3,897013*	-3,846670	-3,770026	-3,751949	-3,656654
LU	-5,148845*	-5,137640	-5,110225	-5,036605	-5,012891
HU	-4,592597	-4,648981*	-4,629974	-4,577714	-4,557958
MT	-4,087331	-4,158983*	-4,147718	-3,801163	-3,830952
NL	-5,053204	-5,053601*	-4,995237	-5,049499	-5,023647
AT	-5,558998	-5,637346*	-5,616940	-5,574190	-5,543583
PL	-5,268687*	-5,212684	-5,267456	-5,200563	-5,155157
PT	-4,034752	[-4,023107]	-3,960157	-3,929844	-3,911196
RO	[-3,801188]	-3,815582	-3,741321	-3,662677	-3,731443
SI	-3,911453	-3,944516*	-3,878016	-3,799390	-3,790671
SK	-5,474259*	-5,410709	-5,335376	-5,283381	-5,212234
FI	-5,290327*	-5,217871	-5,143292	-5,110680	-5,041754
SE	-6,146518	-6,156846*	-6,108041	-6,041627	-6,119828
UK	-5,879215*	-5,759567	-5,689766	-5,734288	-5,656719

The selected model is either in parentheses as the one chosen by the BIC or in square brackets as the one preferred due to better performance under the diagnostic tests.

Appendix 3

Table 4

TAR models of the EU countries

Country	regime	threshold (Δ in debt ratio)	c	$ar(1)$	$ar(2)$	$ar(3)$
BE	1		-0,00	-0,56***	-0,25**	
BG	1		-0,00	-0,33***		
CZ	1		-0,00	-0,4***		
DK	1		-0,00	-0,28**		
DE	1		-0,00	-0,3**		
EE	1		0,00	-0,3**		
IE	1		-0,00	-0,71***	-0,4***	
EL	1	d_{t-1}<0,015	0,00	-0,28**	-0,01	0,03
	2	d_{t-1} ≥0,015		-0,87***	-0,68*	1,27***
ES	1	d_{t-3}<0,019	0,00	0,28**	0,46***	
	2	d_{t-3} ≥0,019		-0,4**	-0,12	
FR	1	d_{t-5}<0,004	-0,002	0,29		
	2	d_{t-5} ≥0,004		-0,43***		
HR	1		0,00	-0,24**		
IT	1	d_{t-1}<0,002	0,00	-0,13	-0,28*	-0,29*
	2	d_{t-1} ≥0,002		-0,32	0,33**	0,4**
CY	1		-0,00	-0,66***	-0,25**	
LV	1	d_{t-1}<0,008	-0,00	-0,47***		
	2	d_{t-1} ≥0,008		0,29*		
LT	1		0,00	-0,35***		
LU	1		0,00	-0,43***		
HU	1		-0,00	-0,67***	-0,35***	
MT	1	d_{t-1}<0,006	0,00	-0,81***	-0,42***	
	2	d_{t-1} ≥0,006		0,28	0,24*	
NL	1		-0,00	-0,7***	-0,26**	
AT	1		-0,00	-0,84***	-0,38***	
PL	1		0,00	-0,31***		
PT	1		0,00	-0,68***	-0,27**	
RO	1		0,00	-0,37**		
SI	1		0,00	-0,73***	-0,32*	
SK	1		-0,00	-0,38***		
FI	1		-0,00	-0,45***		
SE	1		-0,00	-0,4***	0,01	
UK	1	d_{t-1}<0,005	0,00	-0,42***		
	2	d_{t-1} ≥0,005		0,42*		

Source: Own estimaions.

Appendix 4

Table 5

Diagnostic tests of the TAR models

Country	R-squared	BGT(4)	HWT	JBT
BE	0,25	0,19	0,16	0,00
BG	0,11	0,66	0,25	0,00
CZ	0,17	0,04	0,00	0,00
DK	0,08	0,95	0,75	0,00
DE	0,09	0,68	0,00	0,17
EE	0,09	0,75	0,08	0,00
IE	0,37	0,33	0,76	0,00
EL	0,51	0,48	0,00	0,95
ES	0,24	0,2	0,26	0,76
FR	0,13	0,65	0,26	0,01
HR	0,06	0,64	0,07	0,00
IT	0,2	0,1	0,81	0,96
CY	0,32	0,17	0,13	0,00
LV	0,15	0,11	0,89	0,00
LT	0,12	0,4	0,01	0,00
LU	0,19	0,08	0,99	0,05
HU	0,34	0,27	0,88	0,29
MT	0,43	0,17	0,64	0,00
NL	0,35	0,87	0,03	0,00
AT	0,46	0,14	0,98	0,05
PL	0,1	0,12	0,57	0,00
PT	0,35	0,36	0,54	0,23
RO	0,13	0,64	0,45	0,02
SI	0,38	0,86	0,47	0,00
SK	0,15	0,64	0,51	0,00
FI	0,2	0,97	0,94	0,49
SE	0,18	0,65	0,07	0,64
UK	0,16	0,52	0,5	0,65

Source: Own estimations.

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CONTRIBUTION OF SMEs TO THE BULGARIAN EXPORT[4]

The paper presents the findings of a study on the contribution of small and medium-sized enterprises (SMEs) to the Bulgarian export. The study compares the structures of the exporting companies from Bulgaria with the companies in other EU member states. The preferences of the companies for trade in the EU and with third countries are also taken into account. The picture of the internationalization of the Bulgarian enterprises is supplemented by an analysis of the structure of the exporting companies by economic sectors. The study contains also estimates of the amount of the value added in the export realized by different categories of companies.
JEL: P45; D22; F23; L25

The paper presents the findings of a study on the contribution of small and medium-sized enterprises (SMEs) to the Bulgarian export. It uses public data of the National Statistical Institute of Bulgaria (NSI), Bulgarian National Bank (BNB) and Eurostat on the Bulgarian foreign trade activity. The analysis covers the period 2009-2019. The foreign trade processes in 2020 are not typical (due to the COVID-19 pandemic situation in 2020), so they are not included in the analysis.

1. General Characteristics of Bulgarian Export

In the years after the global economic crisis of 2008-2009, "export of goods and services recover quickly and become a main factor for post-crisis growth in the country" (Zlatinov, 2018). Figure 1 shows the impact of export on the realization of GDP growth.

During the studied period, goods constitute for an average of about 76% of all Bulgarian export, while services – an average of 24%.

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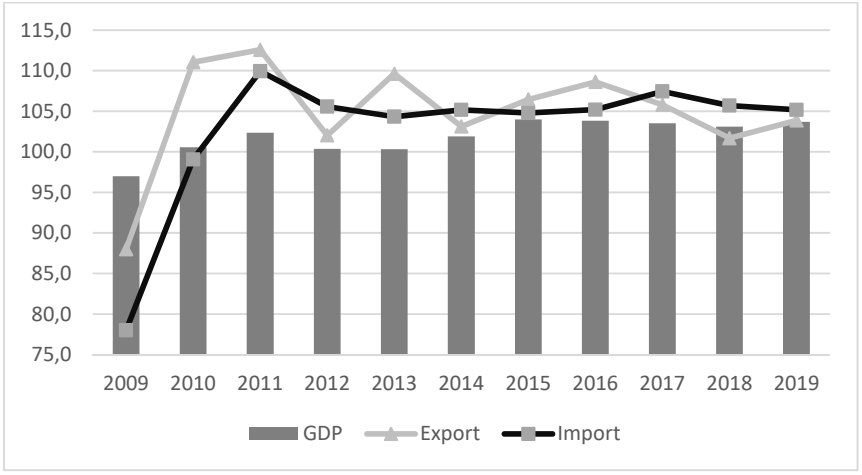
[4] This research was supported by the National Science Fund of the Ministry of Education and Science, Republic of Bulgaria, by contract № DN 05/15 15.12.2016: *"Determinants and Models of Competitive Performance of Small and Medium-Sized Enterprises in an International Business Environment"*.

Figure 1

Index of physical volume of GDP, export and import of Bulgaria (%)



Source: NSI data.

During this period, Bulgarian companies have export[5] higher than the levels before the global economic crisis (2008-2009). Export has a new structure (Figure 2).

Figure 2

Share of goods and services in Bulgarian export, 2009-2019 (%)

Source: NSI data.

[5] "Export" refers to both intra-EU transactions and transactions with third countries.

The structure of the exported goods by type of usage shows that the economy maintains the permanently established predominant export of raw materials (Figure 3).

Figure 3

Structure of export of goods by type of usage, 2009-2019 (%)

Source: BNB data.

Figure 3 shows that "Raw materials" have the highest share in the export of goods from Bulgaria (about 40%). In this group, the largest contribution is by "Non-Ferrous Metals" and "Raw Materials for Food" (both about 8% of all export of goods). The second group of goods in terms of their share in export is "Consumer Goods" (about 25%). The representatives with the highest values here are "Food" (6%) and "Clothing and Footwear" (5% of all export). The third group is "Investment Goods" (about 24%). The largest turnover of the group is for "Spare Parts and Equipment" (6%) and "Machinery, Appliances and Apparatus" (6% of the export of goods in the country). Fourth is the group "Energy Resources" (11%). Dominant in it are "Petroleum Products" (8%).

The outlined export structure by type of usage shows that Bulgaria remains an exporter mainly of goods with low added value. The established trend for export of goods with a low degree of processing, including raw materials and goods with relatively low added value, "shows the structural problems of the Bulgarian foreign trade and economy" (Bobeva, 2020). In the period after 2013, there is a decrease in the share of "Raw Materials" and "Consumer Goods" by 1-2% at the expense of an increase in the share of "Investment Goods" by 3%. This seems to be a favourable trend for bigger export of higher value-added goods.

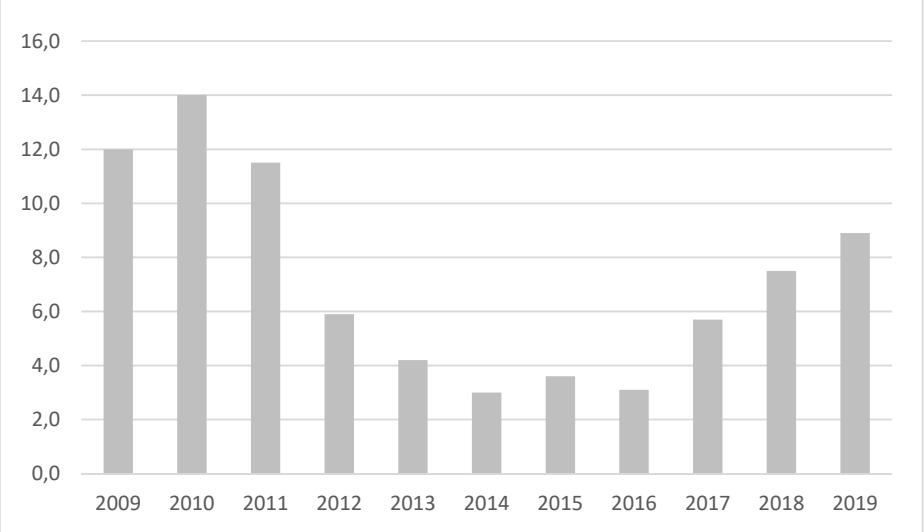
In the period after 2009, the export of services accounts for an average of 24% of the country's total export. Among the services, the biggest share belongs to those classified as *"Travels"* (services provided to foreign nationals in Bulgaria). They account for an average of 43% of the export of services. The other large group – *"Transport"* – has a relative share of nearly 29%. The third group – *"Other services"* – is about 28%. Their disaggregation shows that the biggest share is for *"Telecommunications, computer and information*

services" (10%). They are followed by *"Technical services, trade-related services and other business services"* (7%), and *"Professional and management consulting services"* (4%). Some authors consider that the speed of services and better quality and design of products, which the enterprises offer, will strengthen the company's reputation on the domestic and foreign markets (Georgieva, Vasilska, 2019).

Characteristic of the environment, in which the exporting companies operate, is its high dynamics. One of the indicators that characterize it is "Terms of trade". The indicator compares the prices of exported goods with those of imported ones. It is considered that "terms of trade" is a measure of the trade competitiveness, since the indicator represents how many imports can be obtained per unit of exported goods and services. The indicator refers to the percentage change in 5 years, i.e. the data are expressed as a percentage change from year Y to year Y-5. Its values for the studied period for Bulgaria are presented on Figure 4.

Figure 4

Terms of trade, Bulgaria, 2009-2019



Source: NSI data.

By 2015, the values of the indicator tend to decrease. After 2015, there is a steady growth of the indicator, which outlines an increase in the trade competitiveness of the Bulgarian export. This trend in itself is positive, but the more serious problems with the still unfavourable structure of export remain.

Geographical concentration and geographical sustainability of Bulgarian export

The relation of the Bulgarian exporting companies with the economic situation in other countries – main trading partners, is studied with the geographical concentration of export.

The established "foreign trade relations are stable when foreign trade transactions are sustainable" over the years (Marinov, 2015). It is considered that the choice of the first foreign partner is determined by the existence of previous management experience – those who do not have such experience are more oriented towards geographically and culturally proximate countries (Kolarov, Ivanova, Todorov, 2018). Coefficient for the Geographical Concentration of foreign trade (GCr) is used (Galabova, Nestorov, 2018). It is calculated as the relative share of the sum of the first 5 partner countries in the geographical distribution of export divided to the sum of transactions with all countries. Its mathematical notation is expressed by the following formula:

$$GCr = \frac{\sum_{1}^{5} topD}{\sum_{1}^{n} D} \quad (1)$$

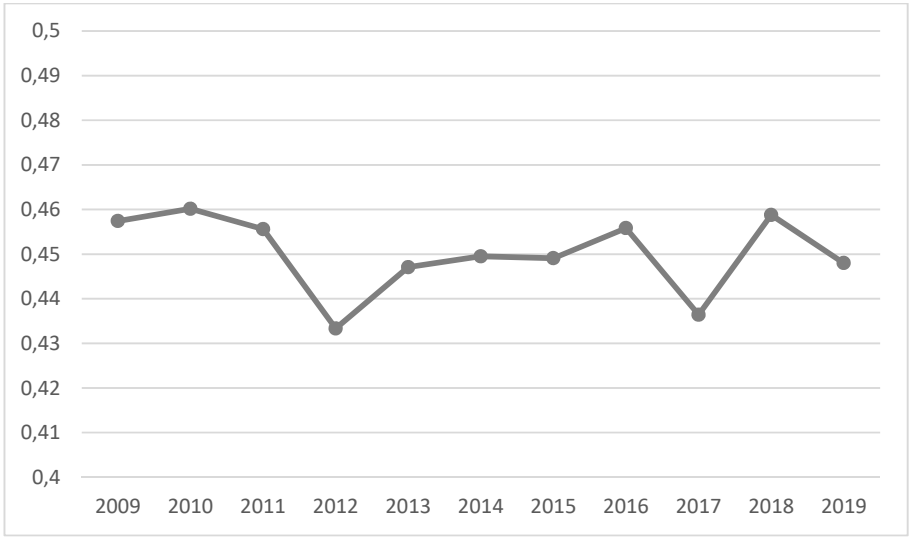
where:

D – value volume of foreign trade transactions with *n* number of countries
top – members of a ranked order of transactions

Its values vary from 0 to 1. The smaller the corresponding value, the lower the geographical concentration, in other words – diversification is achieved. And the opposite, the higher its value, the higher the geographical concentration. The calculations of GCr coefficient of the Bulgarian export for the period 2009-2019 are presented on Figure 5.

Figure 5

Geographical concentration of Bulgarian export, 2009-2019



Source: own calculation with NSI data.

Figure 5 shows that the values of the coefficient of geographical concentration for the studied period vary in the range from 0.43 to 0.46. This corresponds to the share of the 5 leading partner countries in Bulgaria's export. The variation is in a relatively short range, which indicates the absence of turbulent processes. According to the limits of interpretation, it can be assumed that Bulgarian export has a "balanced geographical structure".

The interpretation of the indicator gives information on the degree of dependence of a country on its foreign trade partners and their market terms, political, social and economic environment. It has been proven that a bigger degree of concentration is unfavourable, since it shows a bigger degree of dependence and commitment with fewer foreign trade partners and their terms of trade and vice versa. The bigger degree of diversification is rather favourable, since it reflects bigger independence and a lack of strong commitment. It shows less vulnerability of the country to external shocks and shakes, which can significantly change the geographical distribution of the foreign trade.

The analysis of a country's foreign trade relations should take into account their sustainability over time. To measure the sustainability, the Coefficient of Geographical Sustainability of foreign trade (GSr) to all export is used (Galabova, Nestorov, 2018). The coefficient reflects the changes in the structure that have occurred over time. Its mathematical notation is expressed by the following formula (2):

$$GSr = \frac{\sum_{1}^{5} \frac{C}{m}}{5} \tag{2}$$

where:

C – number of times the partner country has been on the first five positions of the geographical structure by the individual periods
m – number of studied periods

The values of the coefficient vary from 0 to 1. The lower the value, the lower the sustainability of export/import partner countries, in other words – the geographical structure is dynamic. And the opposite, the higher the value of the coefficient, the higher the geographical concentration – the longer the partner countries remain.

The coefficient for geographical sustainability, calculated for Bulgarian export for the period 2009-2019, is to exactly 1. This corresponds to a "highly sustainable geographical structure". Practically, the top 5 partner countries in Bulgaria's export have not changed during the studied period. These are Germany, Italy, Romania, Turkey, Greece. It can be concluded that the established foreign trade relations are extremely stable.

Foreign trade theory and practice prove that bigger sustainability over a long period is a favourable development scenario, since it shows relative stability and predictability. If the partner countries do not change significantly over the years, it can be argued that the implemented foreign trade policy is characterized by a specific geographical direction. On the contrary, with a lower degree of sustainability of the relations, significant changes in the structure of foreign trade are observed. If such changes are made in short periods, this

indicates a lack of stability and predictability of the implemented policy. For these reasons, "the sustainability of the foreign trade relations is one of the important characteristics of the foreign trade" (Tassev, 2012).

High-tech export

In the framework of the economic studies, the share of high-tech export in total export is considered an indicator of a country's export development and its economic growth. That is why an analysis of the Bulgarian high-tech export is conducted. Its composition and structure are studied, as well as the trends and prospects for high-tech export productions.

The definition of "high-tech export" refers to the Organization for Economic Development and Cooperation (OECD). In its qualification, OECD defines high-tech export as "the export of technical products, the production of which involves a high intensity of R&D". Based on the Standard International Trade Classification (SITC), used for foreign trade transactions, some of the products are defined as "high-tech" in classes:

- Aerospace
- Computers and office machines
- Electronics and telecommunications
- Pharmacy
- Scientific instruments
- Electrical machinery
- Chemistry
- Non-electrical machinery
- Armament

For the purposes of the European Statistics, Eurostat adopts and adapts the classification of the high-tech products. Since 2007, the standard indicator "High-tech export in total goods export" for all countries adopting Eurostat rules is being calculated.

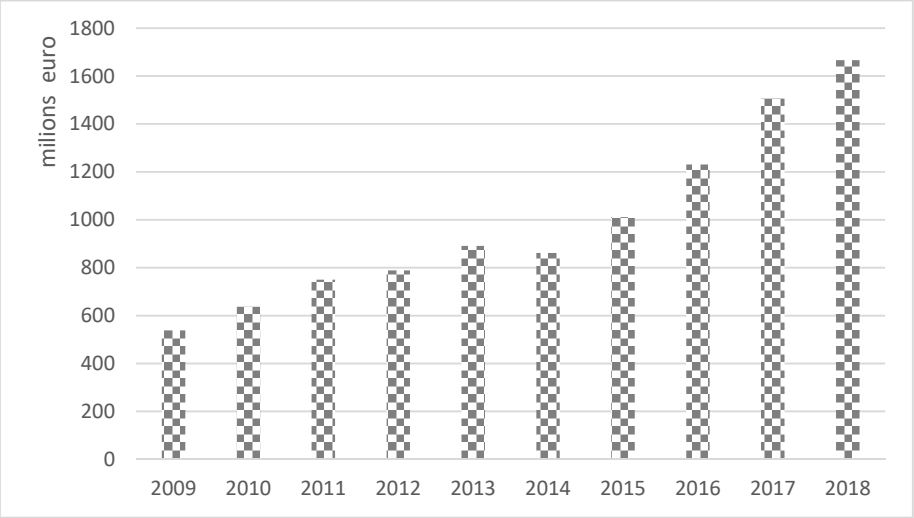
There are also methodological problems. High-tech products are defined by the positions of the SITC nomenclature. While, as a rule, data on foreign trade in Europe are collected according to another international classification – the Combined Nomenclature (CN). For the purposes of the studies, the values of the goods from one nomenclature should pass to the other, with a transition key. Unfortunately, the matching in the scope of the two nomenclatures at item level is not complete and for some positions, recalculations or indirect assessments are required.

The current study is based on data from the National Statistical Institute for the export of products from Bulgaria based on a 6-digit code of the combined nomenclature for the period 2009-2018. All positions are translated to the SITC nomenclature and aggregated at a higher level.

Figure 6 presents graphically the values of high-tech export of Bulgaria.

Figure 6

High-tech export of Bulgaria, 2009-2018



Source: own calculation with NSI data.

Figure 6 shows that Bulgaria's high-tech export is around 538 million EUR in 2009. In the following years it marks sustainable growth (except in 2014). At the end of the studied period (2018) high-tech export reaches a record volume of 1.667 billion EUR.

Figure 7 presents a comparison of the shares of high-tech export of Bulgaria and the EU-28.

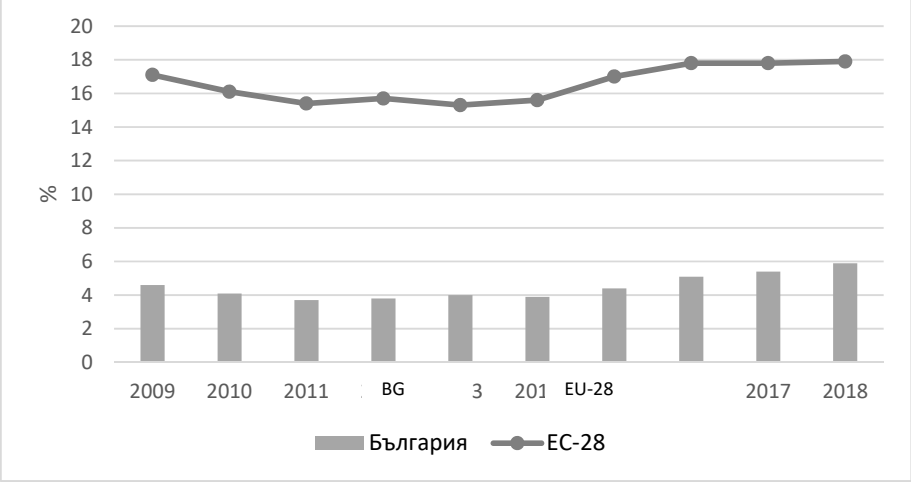
At the beginning of the period, high-tech goods form about 4% of Bulgaria's export of goods. During the studied period, this share increases to nearly 6% (in 2018). At the same time, the average European share (calculated for the 28-EU countries) is way higher than the Bulgarian one. It ranges from 15 to 18%.

Bulgarian high-tech export is also considered in structural terms (Figure 8).

By 2018, the leading group in high-tech export is "Integrated circuits, printed circuit boards, etc." (31%). The second largest group is "Optical elements and electronic devices" (12%). The third group is "Medicines" (10%). The fourth place is occupied by electrical components from group "Boards, panels, consoles" (5%). The group of "Other" includes export on the other positions of the high-tech export, including armament. Direct data on the latter are not available, since they fall under the hypothesis of non-proliferation according to the Statistics Act – Art. 25, para 2. That is why, an indirect assessment was used for the armament. It is noteworthy that the main part of the high-tech export is formed by intermediate components and not by final products.

Figure 7

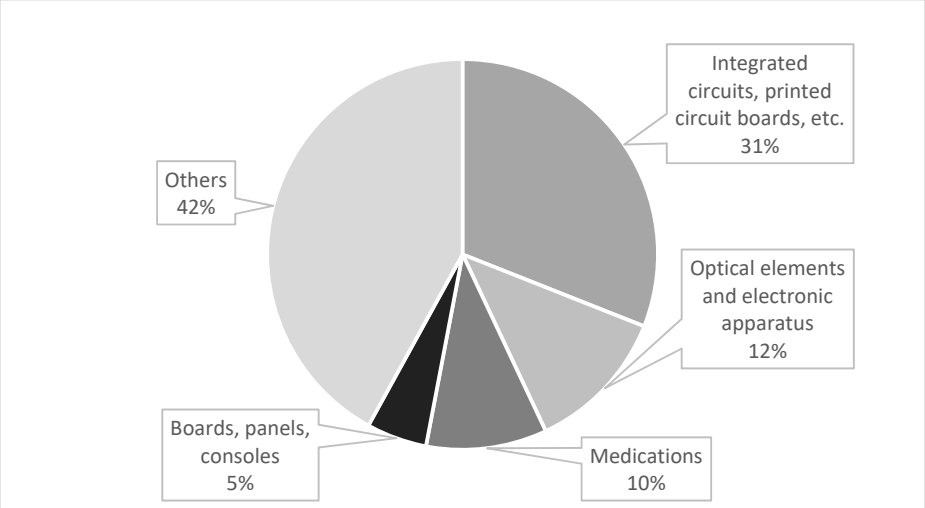
High-tech export in the total export of goods of Bulgaria and EU-28, 2007-2018



Source: NSI; Eurostat.

Figure 8

Structure of high-tech export of Bulgaria, 2018



Source: own calculations with NSI data.

In addition, the export of mainly intermediate components implies a higher dependence of the production and export on the situation of the producers of the final products for which these components are. As a whole, the high-tech export is associated with the innovative activity of companies. Studies show that "Bulgarian companies do not develop high-tech innovations, but mainly partial products and processes" (Georgieva, 2019). Also, companies "face big challenges related to the need for faster progress in the field of innovations" (Galabova, Trifonova, 2018). Meanwhile, another research of authors in the framework of the same project has found that regarding the main opportunities for international business development in the next 2-3 years, the most opportunities are proactive and related to both measures of international and general performance, such as growth by an increase in sales, profits, export, market share (Ivanova, Kolarov, 2020).

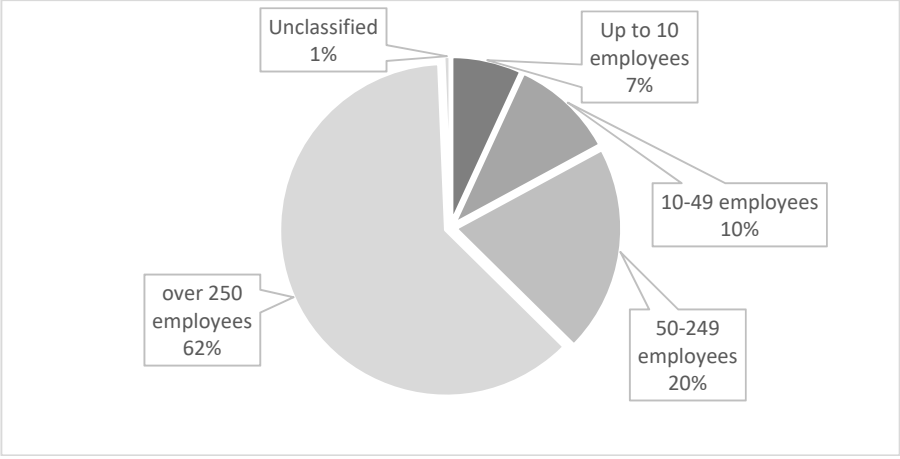
In conclusion, Bulgaria's high-tech export has a lower share than the average European one. There is also a tendency to increase the volumes and to expand the share of high-tech export in the total export of goods. Structurally, products of electronics dominate. The main part of the high-tech export is formed by intermediate components and not by final products. This also predetermines a stronger dependence on the economic situation in the main trading partner countries.

2. Foreign Trade Activity of the Bulgarian Companies

Eurostat collects information on the export of companies by their number of employees (2012-2018). According to the data, the companies are grouped as: up to 10 employees, from 10 to 49 employees, from 50 to 249 employees, over 250 employees. Figure 9 shows the contribution of the different groups of companies to the whole export of goods of the EU (including between the member states).

Figure 9

Export of the companies, by number of employees – EU-27, 2018



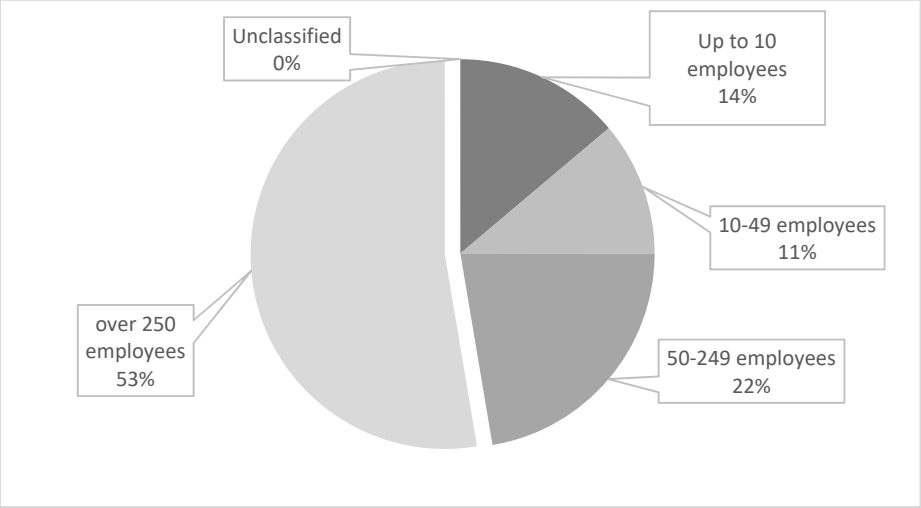
Source: Eurostat data.

Figure 9 shows that micro-companies with up to 10 employees form 7% of export. Small companies (with 10-49 employees) logically form a bigger share (10%). Medium-sized companies (with 50 to 249 employees) export 20% of the goods. Companies with over 250 employees form 62% of the export.

Figure 10 presents the distribution of the data only for Bulgaria.

Figure 10

Export of the companies, by number of employees – Bulgaria, 2018



Source: Eurostat data.

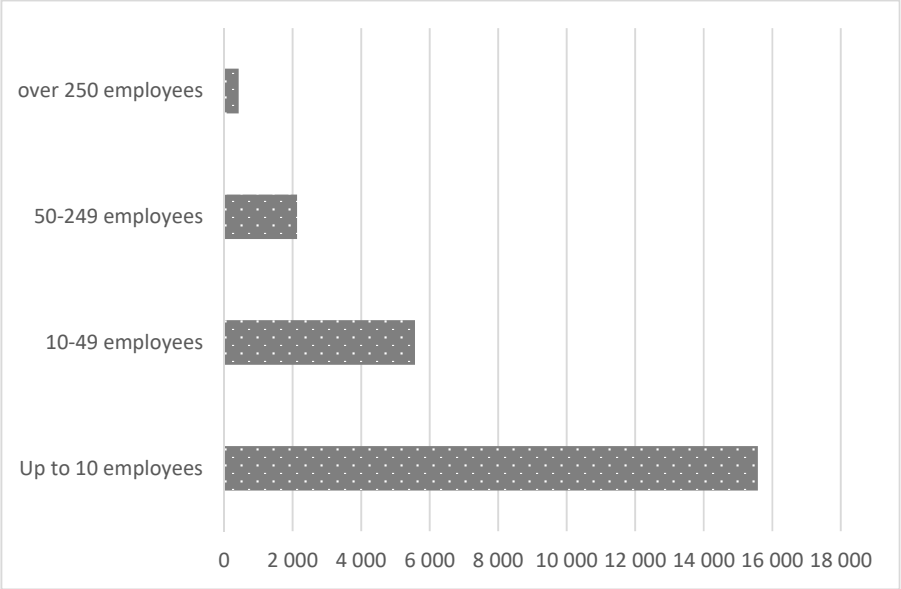
For companies with 10-49 and 50-249 employees, the shares are approximately equal to those of the entire EU. There is a significant difference in the companies with up to 10 employees. Their share in export of goods in Bulgaria is 14%, compared to the EU average of 7%. It is higher at the expense of the share of companies with over 250 employees. For Bulgaria, it is 53%, compared to the EU average of 62%.

Figure 11 shows data on the number of companies exporting goods.

The number of companies with up to 10 employees is the highest (15 500). The companies-exporters with 10 to 49 employees are 5500. The medium-sized companies are over 2000, and the large ones – a little over 400.

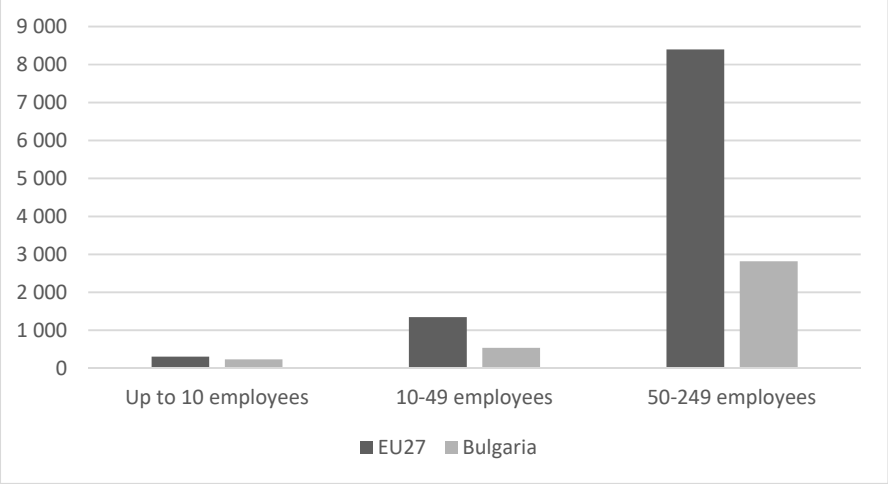
Figure 12 presents the results of the calculations of the average size of export realized by one company.

Figure 11
Bulgarian companies with export in 2018, by number of employees (number of companies)



Source: Eurostat data.

Figure 12
Average size of export of companies in Bulgaria and the EU, 2018, by number of employees and thousand EUR



Source: Eurostat data.

The number of companies with up to 10 employees is the highest (15 500). The companies-

For companies with up to 10 employees, Bulgaria is close to the European average – 238 000 EUR for Bulgarian companies, compared to 306 000 EUR per company for the EU. The highest values are in Ireland (with over 1.4 million EUR) and Cyprus (with over 1 million EUR per company). The lowest values are in Poland (with nearly 120 000 EUR) and Finland (with 130 000 EUR per company).

The situation of companies with more employees is different. Bulgarian companies with 10 to 49 employees are in the last place in the EU (with 539 000 EUR). The closest are the Polish companies (with 560 000 EUR) and the Portuguese ones (with nearly 580 000 EUR). The EU average is over 1.3 million EUR. The companies with the highest average values are from the Netherlands (3.9 million EUR) and Belgium (over 3.8 million EUR).

Bulgarian companies with 50 to 249 employees are also last in the ranking. They export goods on average for over 2.8 million EUR per year. Close in value are the companies from Romania (with over 3.1 million EUR). On average for the EU, the value is 8.4 million EUR of export of goods per company per year. The leading companies are in the Netherlands and Belgium (with respectively over 26.8 million EUR and over 24 million EUR). It is possible that the differences between Bulgarian enterprises and those from other countries can be explained with the difference in the levels of productivity of the enterprises in the different countries.

Eurostat monitors the foreign trade activity of the enterprises, both in terms of size and economic sectors. The distribution by sectors and size of the Bulgarian exporting companies is presented on Table 1.

Unfortunately, to a large extent, this detailed breakdown turns out to be in the hypothesis of the non-dissemination of statistical information, due to the small number of companies in the respective industry. Data on Table 1 show that micro-enterprises (with up to 10 employees) realize totally more export than companies with 10 to 49 employees. However, it is clear that micro-enterprises are dominated by transactions in the Trade sector (with over 3 billion EUR). It clearly leads with nearly 80% of the export of companies with up to 10 employees. It is followed by export transactions from the processing industry (over 200 million EUR). The other sectors have exports around several tens of millions of euros.

Small companies (with 10 to 49 employees) sell less in total than micro-enterprises. Leading again are the transactions of the Trade sector (nearly 1.6 billion EUR). The second place is occupied by Manufacturing, but with larger turnovers (1.1 billion EUR). The other sectors (excluding agriculture) realize smaller turnovers than micro-enterprises in the same sectors.

The situation is similar for medium-sized companies. The leading difference is that the transactions of the Manufacturing exceed those of the Trade sector. In the other sectors, similar and smaller turnovers are realized.

Table 1

Exports of Bulgarian companies, by number of employees, direction and economic sectors, 2018 (thousand EUR)

Export direction, Economic sectors	1-9 employees		10-49 employees		50-249 employees		250+ employees	
	Intra-EU	Extra-EU	Intra-EU	Extra-EU	Intra-EU	Extra-EU	Intra-EU	Extra-EU
Total all activities	3056529	658786	2085384	916580	4425534	1565705	8862183	5261728
Agriculture, forestry and fishing	31942	8112	39680	7103	35059	9200	*n/d*	*n/d*
Mining and quarrying	190	157	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Manufacturing	248368	69202	911195	227083	2896271	828079	8256206	4978212
Electricity, gas, steam and air conditioning supply	56110	4053	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Water supply; sewerage, waste management and remediation activities	3528	3653	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Construction	6807	1050	4028	2237	9078	3627	393	3799
Wholesale and retail trade and repair of motor vehicles and motorcycles	2574347	554709	997884	604972	1374874	689283	466217	74130
Transportation and storage services	18842	2058	7275	4681	8494	7858	6367	5510
Information and communication activities	13020	3394	2949	5475	5574	2287	1225	441
Real estate activities	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Professional, scientific and technical activities	34620	2616	7923	25144	397	658	30	57
Administrative and support service activities	35311	6583	29395	1088	*n/d*	*n/d*	*n/d*	*n/d*
Other activities	30829	2416	2020	350	6394	5027	*n/d*	*n/d*

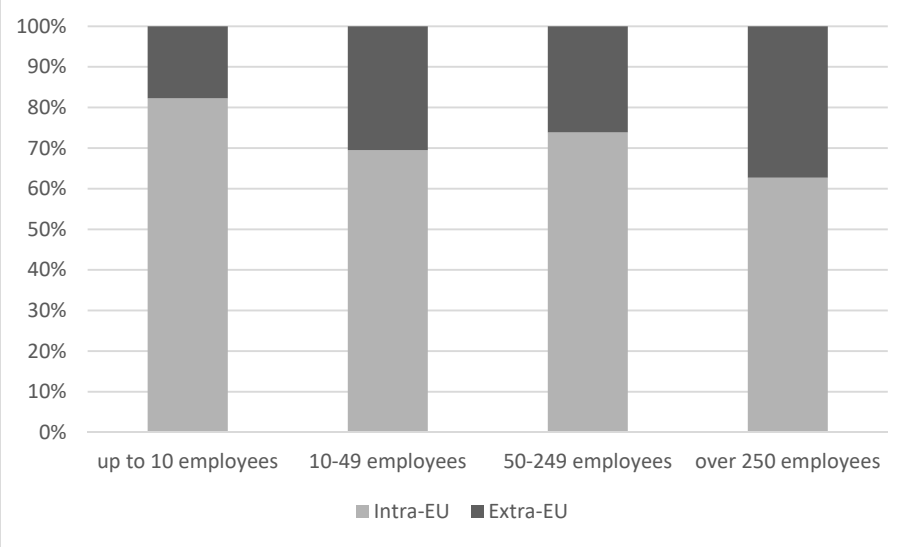
** n/d – No data; Source: Eurostat.*

Data on the large companies with more than 250 employees are scarce. However, the dominant role of the Manufacturing industry, which realizes almost all transactions in the segment of large companies, is clearly visible.

Figure 13 presents the distributions by direction of the transactions – in the EU and to third countries.

Figure 13

Distribution of the volume of export transactions, by direction of export and number of employees in the exporting enterprises, 2018



Source: Eurostat data.

According to the distribution of transactions by sector, the preferences of micro, small and medium-sized enterprises to realize export transactions mainly within the EU are clearly shown. The high concentration of micro-enterprises in the EU is noticeable. Their export transactions to other EU countries are over 80%. For small and medium-sized companies from the studied non-financial sectors, this concentration is about 70%. The large companies have a more balanced distribution of transactions with a ratio of about 60:40 in favour of the EU. These data show that the facilitations, provided by Bulgaria‘s membership in the EU, can be interpreted as an important determinant of the internationalization of SMEs.

The picture of the internationalization of the enterprises is also supplemented by the data on the number of exporting enterprises by sector and number of employees (Table 2).

Table 2

Exporting companies, by number of employees, direction and economic sectors, 2018 (number)

	1-9 employees		10-49 employees		50-249 employees		250+ employees	
Export direction / Economic sectors	intra-EU	extra-EU	intra-EU	extra-EU	intra-EU	extra-EU	intra-EU	extra-EU
Total all activities	13079	4376	4945	2305	1953	1209	380	326
Agriculture, forestry and fishing	392	92	212	59	44	16	*n/d*	*n/d*
Mining and quarrying	4	5	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Manufacturing	2102	741	2342	1106	1247	784	257	233
Electricity, gas, steam and air conditioning supply	20	14	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Water supply; sewerage, waste management and remediation activities	29	17	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Construction	241	47	112	43	54	31	4	5
Wholesale and retail trade and repair of motor vehicles and motorcycles	7735	2894	1750	823	438	264	49	36
Transportation and storage services	815	221	179	107	56	35	17	12
Information and communication activities	387	71	91	45	31	23	14	12
Real estate activities	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Professional, scientific and technical activities	785	129	86	42	15	18	4	6
Administrative and support service activities	226	20	56	15	*n/d*	*n/d*	*n/d*	*n/d*
Other activities	239	66	37	21	20	14	*n/d*	*n/d*

** n/d – No data; Source: Eurostat.*

The data on the realized turnover of the companies in the different sectors are compared with the volumes of exports. This ratio gives an idea of what part of the production of the enterprises is sold abroad.

In turn, the share of exports in the realized turnover can be calculated as:

$$P_{EXP} = \frac{Exp}{Tn} \tag{3}$$

where:

P_{EXP} – percentage of export
Exp – export
Tn – realized turnover

Table 3 presents the results of the calculations.

Table 3

Exports in the turnover of the companies, by number of employees, direction and economic sectors, 2018 (%)

	1-9 employees		10-49 employees		50-249 employees		250+ employees	
Export direction / Economic sectors	intra-EU	extra-EU	intra-EU	extra-EU	intra-EU	extra-EU	intra-EU	extra-EU
Total all activities	9.8	2.1	4.9	2.2	12.8	4.5	20.6	12.2
Agriculture, forestry and fishing	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Mining and quarrying	0.6	0.5	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Manufacturing	16.2	4.5	16.6	4.1	32.7	9.4	40.6	24.5
Electricity, gas, steam and air conditioning supply	4.5	0.3	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Water supply; sewerage, waste management and remediation activities	3.2	3.3	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Construction	0.3	0	0.2	0.1	0.4	0.1	0	0.3
Wholesale and retail trade and repair of motor vehicles and motorcycles	14.2	3.1	4.0	2.4	8.1	4.1	4.2	0.7
Transportation and storage services	0.8	0.1	0.3	0.2	0.4	0.4	0.3	0.3
Information and communication activities	1.1	0.3	0.2	0.4	0.5	0.2	0	0
Real estate activities	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*
Professional, scientific and technical activities	1.6	0.1	0.6	2.0	0.1	0.1	0	0
Administrative and support service activities	4.7	0.9	3.6	0.1	*n/d*	*n/d*	*n/d*	*n/d*
Other activities	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*	*n/d*

** n/d – No data; Source: Eurostat.*

It is clear that in the case of micro-enterprises, the biggest share of the realized export of the total trade turnover is in the Manufacturing industry (nearly 21%). The second place is for Trade sector (over 17% turnover from transactions abroad). The other represented non-financial sectors are less than 10% of the realized transactions abroad.

For companies with 10 to 49 employees, the situation is similar to the ranking of the sectors, but it is noticeable that in general, turnovers of foreign companies have a smaller share compared with micro-enterprises. The manufacturing industry stands out with over 40% of foreign transactions. The other sectors with available data show smaller shares compared to the shares of micro firms.

As expected, data for the large companies are almost completely missing. However, the dominant role of the Manufacturing industry is noticeable, with over 65% of sales abroad.

Some authors consider that the internationalization is an appropriate even necessary strategy for SMEs on a limited domestic market such as Bulgarian one, where the attempts to achieve

success are defined by their competitive performance (Ivanova, Georgieva, Kolarov, Shindarova, 2020).

Value added in export

The share of value added[6] in export is a measure of the importance of export for the Bulgarian economy. The data on the annual activity of companies are available in the NSI information databases. The next calculations are based on 2018 data.

The Percentage of value added (P_{VA}) in the realized turnover in the companies can be defined as the ratio:

$$P_{VA} = \frac{\sum VA}{\sum Tn} \quad (4)$$

where:

VA – value added
Tn – realized turnover

Table 4 presents the results of the calculations.

Table 4

Value added in the turnover of the companies, by economic sectors and number of employees, 2018 (%)

Economic sectors	1-9 employees	10-49 employees	50-249 employees	250+ employees
Total all activities	20	13	19	24
Agriculture, forestry and fishing	*n/d*	*n/d*	*n/d*	*n/d*
Mining and quarrying	22	21	33	55
Manufacturing	28	22	26	19
Electricity, gas, steam and air conditioning supply	37	9	5	31
Water supply; sewerage, waste management and remediation activities	19	11	36	62
Construction	17	21	26	23
Wholesale and retail trade and repair of motor vehicles and motorcycles	10	7	9	9
Transportation and storage services	19	15	24	59
Information and communication activities	40	38	61	56
Real estate activities	68	39		51
Professional, scientific and technical activities	41	32	55	75
Administrative and support service activities	37	26	50	76
Other activities	*n/d*	*n/d*	*n/d*	*n/d*

** n/d – No data; Source: Own calculation with NSI and Eurostat data.*

[6] Everywhere, "value added" means the value of the indicator "value added at factor cost". It includes gross income from operating activities after adjusting for operating subsidies and indirect taxes.

There is a tendency the companies to operate an average of 20% value added, with the exception of small companies with an average of 13%.

If we assume that the share of value added of export is analogous to the share of value added of total output (realized turnover), then the size of Value added in the exports (VA_{EXP}) can be calculated as:

$$VA_{EXP} = Exp.P_{VA} \quad (5)$$

where:

Exp – export

Table 5 presents the results of the calculations.

Table 5

Value added in the exports of the companies, by economic sectors and number of employees, 2018 (thousand EUR)

Economic sectors	1-9 employees	10-49 employees	50-249 employees	250+ employees
Total all activities	725009	388611	111274	3353785
Agriculture, forestry and fishing	*n/d*	*n/d*	*n/d*	*n/d*
Mining and quarrying	77	*n/d*	*n/d*	*n/d*
Manufacturing	89616	256003	971032	2480031
Electricity, gas, steam and air conditioning supply	22417	*n/d*	*n/d*	*n/d*
Water supply; sewerage, waste management and remediation activities	1368	*n/d*	*n/d*	*n/d*
Construction	1362	1313	3247	971
Wholesale and retail trade and repair of motor vehicles and motorcycles	319147	113768	191852	47566
Transportation and storage services	4044	1817	3848	6950
Information and communication activities	6540	3229	4822	938
Real estate activities	*n/d*	*n/d*	*n/d*	*n/d*
Professional, scientific and technical activities	15199	10743	578	65
Administrative and support service activities	15446	7984	*n/d*	*n/d*
Other activities	*n/d*	*n/d*	*n/d*	*n/d*

** n/d – No data; Source: Own calculation with NSI and Eurostat data.*

Through their exports, the micro-companies generate a total of at least 0.5% of the value added generated in Bulgaria, small companies – more than 0.4%, middle-sized companies – more than 1.2%, and large ones – over 2.7%. Should be taken into account that these values are minimal, since they are based only on the available data for the companies.

Conclusion

The analysis shows that the foreign trade activity of the Bulgarian companies is a key to achieving economic growth. Bulgarian economy keeps the established predominant export of raw materials. Also, Bulgaria is an exporter mainly of low value-added goods. In the recent years, there is a trend to increase the share of export of goods with higher value added. The study of the Bulgarian export in the period 2009-2019 shows that they are balanced in terms of their geographical structure. In the different years, the leading 5 main partner countries form between 43 and 56% of the total export of goods of Bulgaria.

At the same time, the export is highly sustainable regarding the main partner countries, as the latter remain unchanged throughout the studied period. A possible explanation could be the many foreign-owned companies in Bulgaria, and in particular their "sales" to parent companies abroad.

It has been found that Bulgarian exporting companies are over 22 000 in number. Concerning companies with up to 10 employees, Bulgaria is close to the average European level regarding the average amount of exports (238 000 EUR per year). The situation for companies with more employees is different. Concerning small companies with 10 to 49 and medium-sized companies with 50-250 employees, the average annual sales abroad are the lowest in the EU (respectively 560 000 EUR and 2.8 million EUR). There is a clear tendency of most Bulgarian foreign trade companies to carry out transactions mainly in other EU countries and less in third countries. It is also noticeable that in the general case, the share of exports in the turnover of the enterprises increases with an increase in the number of employees. There is a tendency for the companies to operate at an average of about 20% value added, with the exception of the small companies with an average of 13%. The calculations show that micro-enterprises with their exports form a total of at least 0.5% of the value added generated in Bulgaria. With their exports, small enterprises generate more than 0.4%, and the medium-sized enterprises – more than 1.2%.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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Vera Pirimova[1]

STRUCTURAL CONVERGENCE OF BULGARIAN FOREIGN TRADE AND EXPORTS TO THE EURO AREA

The study focuses on the structural convergence of foreign trade, and in particular of Bulgarias' exports to the Euro area. By interpreting and systematising theoretical and empirical models, frequently applied methods for analysing the real and structural convergence of exports and imports are summarised. Leading trends, similarities and differences in the dynamics of exports, imports and foreign trade balance of Bulgaria, the Euro area and a group of CEE countries during the period 2002-2018 are highlighted. The values of dissimilarity index by J. Von Hagen and J. Traistaru method and divergence index by C. Van de Coeving method, by commodity groups and the Bulgarian exports as a whole in 2002-2018, are determined. In this regard, export commodity groups are derived, on which Bulgaria has reached a coincidence, convergence or divergence with the similar structural parameters of the Euro area exports (as a whole), entered as reference values. It is concluded that there is a trend of increasing structural convergence of Bulgaria's exports to the Euro area exports in recent years, with greater similarities in some commodity groups. In the study, traditional methods of analysis and synthesis, induction and deduction, methods of descriptive and comparative analysis, structural σ-convergence methods are used.
JEL: B40; F10; F14; O40; P50

Introduction

The consequences of the development and deepening of integration processes within the European Union (EU) are often linked to the achievement of overall coincidence or greater similarity (convergence) in the economic processes in the EU Member States. Convergence can be proved and analysed in terms of the parameters and dynamics of main macroeconomic indicators, to which gradually foreign trade flows for different time frames, geographical regions and a group of countries have been added. In this context, multiple dimensions of convergence can be examined, conditionally distinguishing the directions of economic and trade convergence.

Numerous recent studies have provided well-substantiated evidence that greater similarity between EU countries has been observed since the beginning of the 21st century. It is influenced by a complex and broad set of interrelated factors, including the ever-closer

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linking of economies and the expansion of trade among EU countries, the introduction of the common currency euro in 1999 and the creation of the Euro area (Franks, et al., 2018). The consideration and measurement of the effects of various factors give a tangible impetus to the implementation of theoretical and empirical research, which manifests itself in two main directions. First, there is outlined a gradual focus on convergence issues, especially in the area of foreign trade. It is assumed that greater similarity in exports and imports can have a positive impact on the synchronisation of GDP dynamics and business cycles among member states, as well as on the homogenisation of economic structures. This underlines the close link between economic convergence and trade convergence. Second, comparative analyses are being increased, which introduce different criteria – relevant indicators for groups of countries, the EU as a whole, or the Euro area, are applied in the role of benchmark variables.

The construction of multiple applied models is intended not only to outline similarities or differences, but also to verify some earlier views on the role of trade and the currency used in foreign trade transactions. In this connection, for example, right in 1998, C. Goodhart (1998) perceived that the planned introduction of a common European currency (the euro) would contribute to enhancing convergence, facilitating and stimulating mainly regional trade – among EU member states. J. Frankel and A. Rose (1998) also predict the forthcoming (and subsequently realised) effects on the expansion of trade among EMU member states and within the EU. Their conclusions are based on results obtained from a relatively large-scale and in-depth empirical study. They reveal that there is a strong and markedly positive effect of trade intensity on the income ratio for a group of 21 industrialised countries in the period 1959-1993. However, some of these preliminary hypotheses are rejected or partially revised in more recent analyses, according to which the impact of trade on different countries is not equally and can be a source of divergence.

In recent years, more sophisticated convergence models have been elaborated, focusing on revealing the importance and characteristics of not only real but also structural convergence. By applying a set of econometric methods and techniques, it becomes possible to go deeper into national specifics or regional similarities in the sectoral structure of economies, as well as in the structural characteristics of trade among EU countries. It is recognised that in the current conditions of the 21st century, the process of transition to a new and more similar sectoral structure of the created GDP is expanding, in which the services sector starts to dominate. However, the expansionary development of this sector is ongoing in parallel with an increase in production in the industrial sector, stimulating and leading to an increase in foreign trade flows, in which exports and imports of goods and services between the EU Member States and the Euro area are higher compared to other countries in the world. In doing so, it is important to identify the links, similarities or persistent differences in the commodity structure of exports and imports of EU countries. Thus, the concept of structural convergence as "convergence of industrial structures" is complemented by the concept of structural convergence in foreign trade. Scientific arguments for this are provided by Ben-David (1996) and Mauricio Bittencourt (2004), who confirm the validity of the Heckscher-Ohlin-Samuelson theorem on the countervailing role of trade. According to Ben-David (1996), the achievement of significant income convergence in a particular group of countries is mainly due to the liberalisation of trade among these countries. Mauricio Bittencourt (2004), for his part, refers to the factor of price equalisation of production factors and explains the role of free trade in certain goods in balancing factor prices in different countries. From

the point of view of their connections, economic and trade convergence are sometimes in parallel explored, with an emphasis on their structural characteristics. On this basis, it is possible to carry out conditionally separate or complex analyses of convergence in the area of GDP and of foreign trade, proving the applicability of certain similar methods and approaches.

In some of the studies on the topic of economic, trade and structural convergence, Bulgaria is included, giving it a main or peripheral place. The authors set and follow various dimensions of the convergence. For example, they have deduced some similarities in the dynamics of GDP of Bulgaria, the EU-15 countries and the EU as a whole (Pirimova, 2012, 2014), similarities in the expenditure structure of Bulgaria's GDP and the EU countries (Stattev, Raleva, 2006), which also highlights the contribution to the convergence of foreign trade. Studies of Balkanska (2015, 2017), Totev (2010, 2017), Bobeva (2019) and others are focused on theoretical and empirical perspectives of economic convergence or convergence in the field of industry. Other analyses are concentrated on determining the comparative advantages of manufacturing and exports of different countries, incl. Bulgaria, for the purpose of which differentiated methods and approaches are applied. Some of them also include structural convergence, as advantages are derived and systematised into detached product groups (Pirimova, Peshev, 2018; Pirimova, 2018; Peshev, Pirimova, 2020; Zhelev, 2009; Tullio, 2016). Specific sets of key factors for achieving greater similarity or differences are summarised, but the role of structural features of exports and imports of goods as a significant source of cohesion and economic growth of the EU Member States and the Euro area is confirmed.

In the context of real and structural convergence in the field of foreign trade, the main purpose and tasks of this study are outlined.

The main objective is to study the basic structural parameters of the convergence of foreign trade and exports of Bulgaria to the Euro area countries as a whole.

The study distinguishes theoretical and descriptive empirical parts, in which several specific problems are solved:

- Systematisation of scientific concepts, theoretical and empirical studies of foreign trade convergence, with emphasis on frequently applied methods and approaches for analysing the real and structural convergence of exports and imports;
- By selecting and applying certain methods of descriptive and index analysis to study the structural peculiarities of foreign trade, to identify commodity groups in Bulgaria's exports, on which Bulgaria has reached a coincidence, approximation or there are differences with the reference values of similar structural parameters of the Euro area exports.

In the study, traditional methods of analysis and synthesis, induction and deduction, methods of descriptive and partly comparative analysis, structural σ-convergence methods are applied. Primary statistical information, calculated from the author's derivative indicators and indices based on the Eurostat database, are used. In the second empirical part of the survey, commodity groups in the exports of Bulgaria and the Euro area, according to the Standard International Trade Classification (SITC), Rev. 4. are subdivided. Some comparisons of the

basic parameters of Bulgaria's foreign trade, the Euro area and the EU member states of CEE have been made. It covers the period 2002-2018, for which Eurostat data on an annual basis, on all foreign trade indicators are available.

1. Empirical Studies and Applied Methods

The developed convergence models contain capabilities to apply different methods and indicators to determine the degree of convergence achieved in foreign trade. Each of these methods has specific cognitive abilities, capacity to reveal specific aspects of the real achieved convergence.

In the context of the development and complication of convergent models, the relationship between economic and trade convergence, applied approaches, methods and indicators for foreign trade, a brief systematisation of theoretical and empirical research can be presented.

The role and the importance of the achieved degree of trade openness are highlighted and taken into account in the concept of conditional convergence. Accordingly, when verifying the availability of β-convergence, three indicators can be included in the models as additional variables – the foreign trade ratio (foreign trade as a percentage of GDP), the export ratio (exports as a percentage of GDP) and the import ratio – represented by imports as a percentage of GDP (Marinov, 2006; Pirimova, 2019a). A similar model is constructed and tested empirically, for example, by Rudenko and Zinkovskaya (2015). They've included in their model variables, such as the average value of the foreign trade ratio and the geometric average growth rates of exports of goods and services of the studied economies. In fact, many more variables are involved in this model, accordingly to its main aim in measuring the degree of internationalisation of national economies (see more Pirimova, 2019b). The results suggest that countries with higher FDI inflows and export growth also achieve higher GDP per capita growth rates. This is especially true for developing countries, which are ahead of the growth rates of the higher developed and wealthier countries. Similar conclusions have been reached by Dollar and Kraay (2004) when applying different methods. Despite some criticism of the approaches of these studies (Howard, et.al, 2002; Rodrik, 2000), they have been able, through various methods, to detect a convergence in the economies and foreign trade of a wide group of countries in the world. In addition, the methods for analysing the structural σ-convergence of economies are being improved, which provide certain possibilities for analysing the structural convergence of exports (for example, by applying the dissimilarity index of J. Von Hagen and J. Traistaru (2005) and the C. Van de Coeving divergence index (2003).

In a group of models focused on the two-way causal relationship between international trade and convergence, the Granger causality and cointegration approach is applied. For example, using this approach, Jianhong Zhang (2006) confirms the previously formulated hypothesis that the long-term and causal relationship between trade and cohesion depends on the stage of development of the concerned countries. For the EU, ASEAN and NAFTA countries, Jianhong Zhang comes to two main conclusions. For countries with low levels of development, cause and effect are two-sided, but trade causes differences and diversity leads to trade. For the higher developed countries, causality is also proven and is bilateral, but trade

causes cohesion and cohesion leads to trade. This confirms, in the long run, the manifestation of two earlier dominant conceptions on trade – of Krugman (1979) and Helpman (1981). According to their conclusions, the similarities in income (GDP) between two countries provoke an increase in trade if conditions of monopolistic competition exist and economies of scale are realised. The Granger-causality approach is applied to determine the direction of the causal relation between income and trade convergence also by Teresa Cyrus (2004). She argues that the income gap has a slowing effect on trade, but her conclusion about whether and to what extent trade contributes (to widening or narrowing income differences) is not emphatically. These results are influenced by the large-scale study (1965-2000), the data used at five-year intervals, the large number (56) of countries with different degrees of development (part of the OECD countries as well as countries in Africa, Asia and Latin America).

Applying other approaches and methods to similarly ambiguous conclusions about the role of trade in convergence, also reaches Iader Giraldo (2016). He draws up and investigates a model of endogenous economic growth in an open economy, with a home market effect (HME) and non-homothetical preferences. The model results show trade's contribution to the convergence of economic growth only when it takes place between similar countries. If there are too many differences between countries (they are asymmetric), the opposite is proven – trade leads to divergence, it can even become a source of poverty or induce a so-called „growth drop". The assumption that convergence leads to increased welfare for all trade partners is not confirmed – it is valid for the largest country, but not for its smaller and less developed trading partner. The author emphasises these different effects and distinguishes them from the one-type effect of international trade for the welfare of all countries, which is the usual result of research in a static context, with the preferred CES (constant elasticity of substitution).

Identical methods and similar models of economic growth are constructed and applied in the research of Ben-David (1996) and Guillaume Gaulier (2006). However, their results do not match. According to Ben-David (1996), the probability of convergence is higher for groups of countries with large trading partners than for groups of arbitrarily selected countries. Focusing on assessing the sustainability of this result, Guillaume Gaulier (2006) argues that trade integration alone does not lead to convergence. He does not reject the link between trade and β-convergence, but does not find evidence that trade causes σ-convergence.

Regardless of their specific results, objectives and points of reference, applied methods, studied country groups and other features of the multitude of analyses on the connection between convergence and trade, they can all be considered as the starting point for more in-depth researches. They are being developed in the areas of structural convergence. In this respect, the development of perceptions and models focuses on the presence or absence of convergence in the structures of economies, and in particular in the export and import of goods and services. In this context, the degree of correspondence between the commodity/product structure of exports is considered and sought, which can be implied as a sign of convergence because it contributes to greater similarity in the dynamics of aggregate production (GDP). As Alina Alexoaei and Raluca Robu (2018, p. 2) note, "structural convergence can be achieved after completing the following three processes: the degree of

similarity of economic structures, synchronisation of business cycles and trade integration (foreign trade)".

In the structural convergence models, various other methods are applied, as well as combinations of several econometric methods, in accordance with the goals and objectives of the analyses. Part of this group of models focuses on similarities in the economic structure or in separate sectors, and other part concentrate on the structural aspects of foreign trade convergence.

For example, to measure the similarities (and differences) in the commodity structure of exports and imports of a study group of four countries (Serbia, Romania, Bosnia and Croatia) in the period 2000-2009, Goran Nikolić (2011) applies cosines and the Finger-Kreinin (1979) method. In addition, Goran Nikolić also used the Bray-Curtis Index (1957) to measure similarity. These methods make it possible to outline the specialisation of production and exports, in which more complex products or products with less processing are predominant. On this basis, Goran Nikolić makes summaries for realising economic growth of different quality. According to him, the quality of growth is improved if more significant growth of exports is realised and at the same time the coefficients of similarity increase. Conversely, when growth in exports is accompanied by a reduction in the coefficients of similarity, growth is achieved by resource-intensive products and is of lower quality.

The Finger-Kreinin (1979) method is also used in a comparative analysis of the export similarity index between China and the EU by Pei-Zhi Wang and Xiao-Jing Liu (2015). The obtained index values for the period 2007-2013 show a high level of similarity in exports of China and the EU with exports to the markets of the developed countries, which causes intense competition for export products. In the developing countries, the index tends to decline in value, which is a sign of weakening their trade competitiveness and strengthens the complementarity of trade between the two countries.

Luca De Benedictis and Lucia Tajoli (2007) also apply Bray-Curtis's (1957) semimetric method, which examines the similarity of trade structures between four CEE countries and the EU15, with regard to the EU market. In order to compare export flows, they calculate in particular correlation indices and distance metrics. Through them, they express how the commodity composition of a country's exports has changed over time, as well as in regard to the commodity composition of EU exports. In summary, they emphasise that changes in the overall pattern of exports of countries in transition and greater economic integration in terms of trade flows and manufacturing trade do not always lead to greater similarities in exports.

Using several methods that require a broader set of indicators, a study by Güzin Erlat and Seda Ekmen (2009) differs. They calculate and analyse three similarity indices. The first is the Export Similarity Index (ESI), which they calculate according to the methodology of Finger-Kreinin (1979). Simultaneously they also calculate a product similarity index (PSI) and a price similarity index (PRSI). This study covers a large group of countries, including Bulgaria, using absolute data for exported products up to the 5-digit level, according to SITC Rev. 3. The focus is on Turkey's exports; therefore the "export similarity" between Turkey and other competing countries is measured, both for the industry as a whole and for each sector separately.

In the results of Güzin Erlat and Seda Ekmen make an impression those related to the similarities or differences in exports of Bulgaria and Turkey. According to the values of the ESI index, the greatest similarity between the two countries is found for the commodity group "other industries". Similarities between Turkish and Bulgarian exports in the commodity groups of the „drinks and tobacco products" are also being proven, as it has grown over the years. The PSI index values, however, show a similarity between Bulgaria and Turkey in terms of labour-intensive products, which has increased in recent years. According to the results for the third PRSI index, Turkey and Bulgaria have similarities in products for which Turkish exports have higher prices and therefore Bulgaria would be preferenced as a foreign trade partner. In their summary, Güzin Erlat and Seda Ekmen rank Bulgaria among the countries that are Turkey's main competitors in the export of products to the EU-15 (along with Poland, the Czech Republic, Slovakia and Slovenia).

The ESI export similarity index has also been applied in a number of other studies, such as those of Derado (2007), Benedictis and Tajoli (2007), Crespo et al. (2004), Caetano et al. (2002), Kreinin and Plummer (2007), Langhammer and Schweickert (2006) and others. This index makes it possible to assess the similarities or differences between countries in terms of the commodity composition of their exports, as well as the effects of regional integration. It is based on the share of each product in the total exports of each country and is calculated as the sum of the minimum value for each product. The PSI and the PRSI price index were developed by Antimiani and Henke (2007) on the basis of the G-L index proposed by Grubel and Lloyd (1971). Through the PRSI index can be compared the export prices of industrial products of one country with those of other countries. The inclusion in comparisons of price-related indicators, connected with differences in technology, and the product composition of exports is also a feature of the study by Andreas Joseph and Chiara Osbat (2016). For the period 1995-2013, the G-L Similarity Index of Grubel and Lloyd (1971) is applied by the World Bank, which publishes data for this indicator to determine the degree of similarity in the trading structures of two economies. The index is calculated at the three-digit level, according to SITC Rev. 3, and ranges from 0 to 1. A value close to 1 reveals a greater similarity of trade structure between two countries or two groups of countries (see the similarity in merchandise trade structures of exports, Worldbank, 1995-2013).

Several methods for examining export specialisation and its relation to the convergence have been applied by Ville Kaitila (2013). Through the Herfindahl-Hirschmann index is determined the degree of export specialisation of EU countries and the added value of the industry. The Finger and Kreinin (1979) similarity index is used to measure the degree of structural similarity. This study has a more specific and broader focus as it also includes the convergence of GDP growth rates, which are comparable to similarities in exports. The analysis includes EU 27 countries, 10 CEE countries and Euro area countries, from the 1980s to 2012. Some results from the empirical analysis of Ville Kaitila (2013) also apply to Bulgaria and relate to the following parts of this analysis. Thus, according to Ville Kaitila, exports to the EU-15 (then the Euro area) were more specialised before the introduction of the euro and less specialised thereafter. At a more disaggregated product level, EU-15 exports are more specialised after the introduction of the euro. Most CEE countries generally have low levels of specialisation. For Bulgaria (as well as Malta, Greece and Luxembourg), a conclusion is drawn about relatively higher specialisation at the product level. The export

structures are more similar in the period before the crisis of 2008-2009, but the similarity in the added value of the industry is diminishing after it.

In the development of theoretical models and empirical analyses, the application of a wide variety of methods and structural indicators for foreign trade, according to the purposes of the analyses and the specific degree of disaggregation of exported and imported products, stands out.

2. Descriptive and Empirical Analysis of Structural σ-Convergence of Bulgarian Exports

Methodological parameters

In the subsequent empirical analysis, the summaries, applied methodology and indicators in the interpreted set of scientific concepts and empirical models of real and structural convergence in foreign trade are taken into account.

The geographical scope of the empirical study is consistent with a pre-set focus on Bulgaria and the Euro area countries (as a whole), while the Euro area data are considered as referent values. In addition, separate comparisons with other Central and Eastern European (CEE) countries that are members of the EU are made. The CEE countries are subdivided into two groups – Euro area member states and non-euro area countries and include 11 EU countries – Bulgaria, Czech Republic, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia and Slovenia. These countries join the EU at the latest – in the last three enlargements of the EU in 2004, 2007 and 2013. Five of these countries have introduced the euro – Estonia, Latvia, Lithuania, Slovakia and Slovenia, while the other six countries (including Bulgaria) use their national currency. This further subdivision of the CEECs into two subgroups is intended to show whether there is an impact from the introduction of the euro on foreign trade flows and on its structural convergence with the Euro area countries.

The time span of the empirical analysis is within the period 2002-2018. It is determined by the availability of annual data for all necessary indicators and surveyed groups of EU countries included in the Eurostat statistics database. This period avoids the methodological problems associated with the revaluation according to the ESS, covers the whole period (without interruption) and divides it into two subperiods – before and after the last global crisis. In descriptive and σ-convergence analysis, only annual data for the selected indicators are used. In order to determine the magnitude of some of the indicators pertaining to individual groups of countries and to the reference group of Euro area countries, it was necessary to make own calculations based on primary Eurostat data.

The selection of appropriate indicators is based on the formulation and introduction of several specific goals and objectives for empirical analysis. They follow the already distinguished stages and the logic of constructing, extending the covered indicators and complicating the methodology applied in the empirical models and revealed in the first theoretical part of the study.

The intensity of foreign trade of Bulgaria, CEE countries and the Euro area is initially examined. It is revealed on the basis of the parameters (values) and the peculiarities in the dynamics of the export (and import) of goods and the foreign trade balance. The dynamic characteristics are derived by comparing the start and end years of the period, the rate of change (increase or decrease) of exports and imports of goods, on the basis of 2015. This allows us to identify realised expansion (or restriction) of foreign trade flows, such as a sign of a possible deepening of integration processes with a closer linking of the foreign trade of the CEECs, the EU and the Euro area during the study period. The greater similarity (or differentiation) in the rate of change of the foreign trade flows of Bulgaria, the CEECs and the Euro area can be considered as one of the initial prerequisites for achieving greater convergence or divergence, in the field of foreign trade and in the economies of these countries.

The assessment of achieved foreign trade convergence also requires a calculation of the relative share of exports in GDP, i.e. the export ratio, and the relative share of imports in GDP, i.e. the import ratio. The interpretation and comparison of the results obtained in the three groups of countries take into account the degree of openness and interconnectedness of the economies. At the same time, these indicators are also applied in the framework of the subsequent structural σ-convergence analysis, decomposing and presenting them in separate groups of goods.

In connection with the convergence of the structural parameters of foreign trade, we summarise, analyse and compare another set of indicators. These include the value of exports and imports by commodity groups, with an appointed degree of disaggregation; the relative shares of exports by commodity groups in the total value of exports of Bulgaria and the Euro area countries as a whole. The study applies export/import commodity structure according to the Standard Foreign Trade Classification (SITC), Rev. 4. This data is also used in many other studies, which facilitates comparisons of the obtained empirical results.

The conclusions of the descriptive analysis are supplemented and refined after performing an additional analysis in which σ-convergence methods are applied. To characterise structural convergence in the field of exports, we use a modified type of dissimilarity index by J. Von Hagen and J. Traistaru (2005) and the divergence index by C. Van de Coeving (2003). As a rule, they are used in structural convergence analyses of GDP, but after some adjustment, they can also be applied to structural convergence analyses in foreign trade.

First, we apply the basic formula of J. Von Hagen and J. Traistaru (2005), which is subject to partial modification. In their original form, they calculate a dissimilarity index (DISSIM) to represent the structural divergence or convergence of the economy of one country to the Euro area. To this purpose, J. Von Hagen and J. Traistaru compare the relative share of each economic sector in a country's gross value added with the share of the same sector in the Euro area GVA. This index is adapted to structural convergence in exports, whereby the equation retains its general form:

$$DISSIM_{nx} = -\sum \left| E_{nx} - E_{EZx} \right| \quad (1)$$

where, however, data are now being entered and used as follows:

E_{nx} is the relative share of a commodity group x in the exports of the respective EU country n, in the case of Bulgaria;

E_{EZx} is the relative share of the same commodity group x in Euro area exports (EZ – country reference group).

Second, we also calculate the divergence index (DIV) proposed by C. Van de Coeving (2003). In its original form, this index is determined by the formula:

$$DIV_{nx} = -\sum \frac{(Enx - E\ EZx)^2}{E\ EZx} \quad (2)$$

where, after adjusting to the structural convergence of exports, the values explained in formula (1) for E_{nx} and E_{EZx} are applied.

The Dissimilarity Index and the Divergence Index are calculated for Bulgaria, for each of the seven commodity groups classified in the SITC, Rev. 4, for each year of the research period 2002-2018. In addition, the aggregate values of the two indices for Bulgaria's exports as a whole, for each year were calculated and summarised. For ease of interpretation, the specific index values are presented in absolute value, summarised in tables and illustrated with graphs.

When interpreting the significance of the results obtained, it is borne in mind that when the Dissimilarity index (DISSIM) of J. Von Hagen and J. Traistaru accepts higher values, there is a higher degree of structural distinction, i.e. there is more limited similarity and convergence. Conversely, lower values of the DISSIM index, which tend to zero, are indicative of greater convergence (or identity at DISSIM=0) of exports of a particular commodity group from Bulgaria to exports of the same commodity group from the Euro area as a whole.

Concerning the second divergence index (DIV) of C. Van de Coeving, the conclusions are similar, also taking into account several cases of its values obtained. If DIV_{nx}=0, the relative share of the respective commodity group x in Bulgaria's exports changes similarly to that in the Euro area. The lower absolute value of the index is indicative of a higher structural convergence of the country's exports to that of the Euro area. If the value of the index is higher, there are more significant differences, there is divergence rather than convergence in the commodity structure of Bulgaria's exports to the reference group of Euro area countries.

Descriptive analysis for Bulgaria

In the context of convergence or divergence in foreign trade, the values and dynamic characteristics of Bulgarias' (and CEECs') exports, imports and foreign trade balance can be compared with the same indicators for the Euro area reference group of countries.

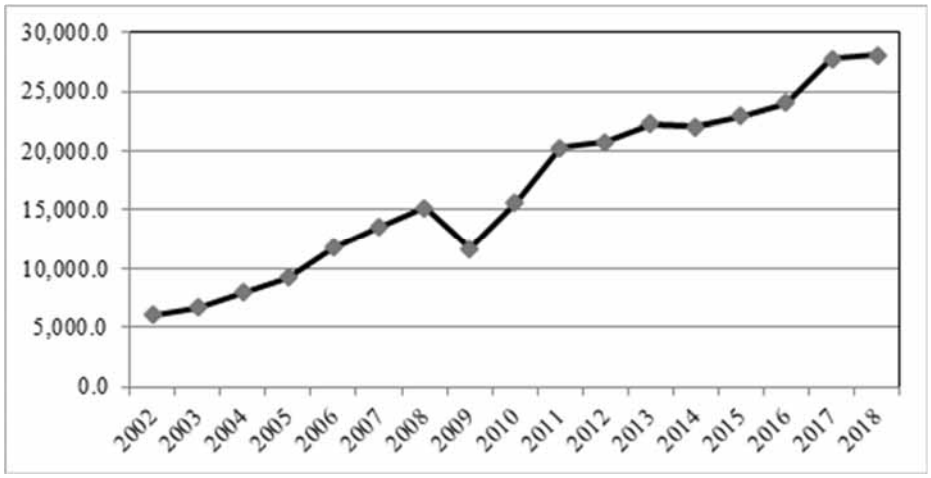
Bulgaria's foreign trade with countries from Europe and the world has increased significantly over the past years. This shows a comparison of exports and imports of goods in the first and in the last year of the period (2002-2018). Both exports and imports have fallen sharply during the crisis in the Bulgarian economy in 2009. Over the remaining years, though inconsistent and uneven, flows of exported and imported goods have increased. As a result,

more realised gains are accumulated and by 2018, the export of goods is more than 4.5 times higher than its value at the beginning of the period, amounting to EUR 28 095,7 mln. Imports were maintaining similar dynamics, rising to more than 3.8 times in the whole period and reached to EUR 32 104.7 mln. However, imports are growing faster and exceeding exports of goods, according to Eurostat data, the Bulgarian trade balance is negative throughout all years. This balance has a negative, retarding effect on GDP growth, including hence on the convergence in growth dynamics (see Pirimova and Peshev (2018); Pirimova (2019). More significant differences in export and import values can be seen in the years immediately before and after 2007. This can be attributed to the accelerating impact of the intensive preparation, the initial signals for Bulgarian accession to the EU and subsequently the already realised membership of the country in the EU. Due to Bulgaria's deepening involvement in the integration process, a closer linking of Bulgarian foreign trade with other EU countries after 2007, we can expect a relatively greater similarity with the dynamics of export and import flows of other European countries through the second half – after the middle and towards the end of the period under review.

Comparison of Bulgaria's exports (Figure 1) with those of the Euro area reference group of countries (Figure 2) shows a relatively large similarity in the aggregate dynamics. But at the same time, there are differences in the pace of the gains and mainly in the trade balance.

Figure 1

Exports of Bulgaria, 2002-2018, EUR million



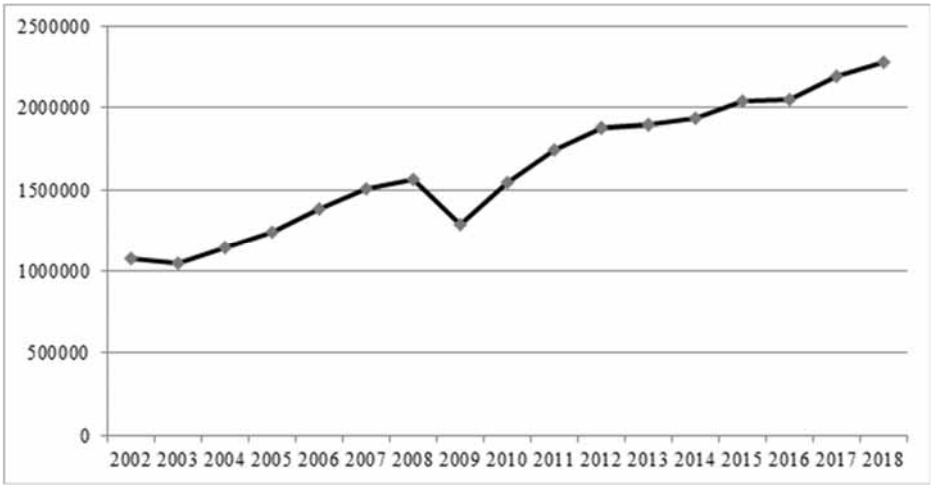
Source: Eurostat data; own calculations.

Over the same period, the foreign trade variables of the Euro area countries also have increased. In summary, the growth in exports and imports in the Euro area is more limited (compared to that of Bulgaria). However, this estimate is only valid for the percentage change in foreign trade flows, since they show a significant increase in absolute terms. Exports and imports of these countries have increased about 2 times, reaching respectively EUR 2 282

900.2 mln (for the exports) and EUR 2 087 824.7 mln (for imports) by 2018. After 2012 and until the end of the period, the trade balance of these countries is positive. Although in previous years it is characterised by fluctuations and even a negative sign within a certain number (six) of years. This arranged the exports of goods among the main (external) sources of growth in the Euro area in recent years. Both flows of exported and imported goods fall through the crisis in the higher developed countries of the Euro area in 2009 (which coincides with the crisis in Bulgaria). Exports overcome the crisis faster and recover, showing steady growths until the end of the period, while the dynamics of imports remain divergent.

Figure 2

Euro-area exports, 2002-2018, EUR million



Source: Eurostat data; own calculations.

Comparison of the indicators of exports and imports of the Euro area countries with those of Bulgaria in the second subperiod (2010-2018) demonstrate specificity and differences, and some lagging of Bulgaria from the trends of convergence. Exports and imports of goods in Bulgaria are growing at a higher pace than those in the Euro area, but they can be explained from a formal point of view, with differentiated scales of their absolute parameters being significantly smaller for Bulgaria. Imports of goods are increasing at a higher pace than exports. Accordingly, the foreign trade balance remains negative, even the gap is growing over the last two years of the period under review. The relative share of Bulgarian exports in the total exports of the Euro area countries amounts to only about 1%, while, for example, Poland's exports are almost 10% of that of the Euro area for 2018. Certain positive importance and impact can be attached to the predominance and concentration of a major part of Bulgarian foreign trade flows with the EU and the Euro area countries. For example, in 2018, 68.6% of Bulgarian exports and 64.6% of Bulgarian imports are related to trade with EU countries, which, in addition to the growing and high degree of trade openness of the

Bulgarian economy, is sometimes regarded as a sufficient sign of convergence (Kaneva, 2018, p. 82).

Some conclusions about Bulgaria can also be made on the basis of comparisons of the characteristics and dynamics of foreign trade of Bulgaria and the countries of CEE.

Growth in foreign trade flows is also characteristic of the other 10 CEE countries that are members of the EU. With regard to the balance of trade, they establish specificity. In four of these countries, the balance was positive at the end of the period, with its previous negative sign being overcome at different times – exports began to permanently exceed imports of goods in the Czech Republic since 2005, in Hungary – since 2009, and most recently later in Slovakia and Slovenia – since 2012. For the most part of the period and for 2018, Poland's trade balance is also positive (excluding three years – 2015-2017). Thus, a total of six CEE countries – Bulgaria, Estonia, Croatia, Latvia, Lithuania and Romania – remain with a negative trade balance for all years of the period, including the last one. The contribution of the introduction of the euro to achieving a preponderance of exports over imports in the CEECs is not clear and unambiguous. As in three of the latter separate group of countries (namely Bulgaria, Croatia and Romania), the national currency is still used, while in the other three (Estonia, Latvia and Lithuania), the euro is introduced. It can be argued that in these six countries, the effects of others, and especially of specific internal (national) factors, prevail. It is likely that the commodity structure of their foreign trade flows is not sufficiently optimised – which differs and diverges from the commodity structure of exports and imports of the Euro area countries as a whole. If the differences in this structure are prevalent, it is a sign of moving away from the achievement of real convergence. This could also be attributed to the still unsatisfactory degree of involvement of the six countries in the real integration of their economies with the Euro area and the EU.

According to data, the trade openness of all CEE countries, as measured by the export prism, has increased in 2002-2018. It exceeds the increase in exports to the Euro area countries. While exports from the 11 CEE countries have increased nearly 4 times, Euro area exports are 2 times higher. As a result, from 8.4% in 2002, CEE exports amounted to 18.5% of the Euro area countries' exports in 2018. Slovakia and Romania have contributed most to this, reaching the highest relative shares (over 10% and 8.6% respectively) in the CEE exports in 2018. The contribution of Bulgaria's exports is smaller – only about 3.6%, but it can be attributed mainly to the different dimensions of the economies of these three countries. The simultaneous effects of internal and external factors have a greater impact on the export flows of the CEECs. In particular, these are the market transformations and their effects, along with the accession to the EU and the deepening involvement in integration processes. Although part of the Eastern European countries (five of them) belong to the Euro area, apparently, their more intensive export flows did not have a sufficiently stimulating and decisive influence on export trends in the Euro area.

Some similarities, but also differences, can be deduced in terms of the commodity and geographical structure (within CEE countries) of the exports of the two compared groups of countries. They have a starting importance for a stronger or slighter structural convergence in foreign trade.

When calculating the relative shares in the exports of the seven commodity groups (according to SITC, Rev. 4), an identical leading position is established for two of them simultaneously in the exports of the CEECs and the Euro area. Exports of „machinery and transport equipment" and „other manufactured goods" account for the largest relative share of exports of goods in the CEECs and in the Euro area countries. However, their shares are higher for the Euro area (38% and 25% respectively) and smaller for the CEE countries (22.4% and 21.8%, respectively). The data clearly shows the large difference of almost 13 percentage points in the group of "machinery and transport equipment", while for "other manufactured goods" it is more limited and amounts to only about 1,4 percentage points. Such commodity characteristics of exports are indicative to a certain extent of the specifics of the sectoral structure of economies, of the superiority and competitiveness of the types of production carried out in the Euro area and the CEECs. On the other hand, the least represented in exports of the Euro area are "commodities and transactions not classified elsewhere in the SITC" (1.2%), followed by „raw materials" (3%) and "mineral fuels, lubricants and related materials" (5.9%). This creates some opportunities for more exports of these three product groups from the CEE countries – which have been used to some extent, as the results of their comparison show. Because in the exports of the CEE countries, these three commodity groups occupy a relative share of 6.8%, 20.6% and 13%, respectively. It should also be noted that during the period, all commodity groups in CEE exports registered a significant increase – the largest being more than 6 times for "food, drinks and tobacco"; more than 5 times for "chemicals and related products, n.e.s."; almost 5 times for „machinery and transport equipment", between 4 times and 3 times for other product groups. Geographically, by relative share, Poland's exports ranked first in the CEE countries in the first six commodity groups, Czech Republic ranked first in "commodities and transactions not classified elsewhere in the SITC". The Czech Republic ranked second on three of the product groups, Hungary on two, and Romania on the other two. The most expressed is Poland's leading position in the "food, drinks and tobacco" group (7.7% of CEE exports as a whole), also in the „raw materials" – where its relative share is smaller (4.3%), but with a considerable preponderance over other CEE countries.

Bulgarian exports account for about 0.7% of the Euro area countries exports in 2018. This is mainly due to the smaller scale of the Bulgarian economy, rather than to a limited volume or unfavourable dynamics. The arrangement of the separate commodity groups in Bulgarian exports is about the same as in the CEE region and in the Euro area, but of course with different relative shares. The most represented in the Bulgarian exports in 2018 are the group of „other manufactured goods" with a share of 36.6% and the group of "machinery and transport equipment", whose share amounts to 22.7%. On third place with a share of 11.7% are "food, drinks and tobacco", the other commodity groups have smaller shares (from 10% and less than 10%). With the lowest relative share of 2.8% in Bulgarian exports is the group of "commodities and transactions not classified elsewhere in the SITC" and in the penultimate position with a share of 7.6% are "raw materials". The comparison between Bulgaria and the CEE region shows that in three of the commodity groups, higher relative shares in Bulgarian exports in the last 2018 compared to the CEE as a whole are achieved – these are the groups of "other manufactured goods", "machinery and transport equipment", "chemicals and related products, n.e.s.". In one large part of the types of goods, these three

groups are dominated by those with higher added value, which can be considered as a positive trend, with a greater contribution to the growth of Bulgarian exports.

Therefore, it is found from the descriptive analysis that over the period, more similar tendencies have developed in the dynamics of the studied indicators for Bulgaria and the Euro area, while maintaining some national and regional specifics. For Bulgaria (and for the CEE countries as a whole), the export variables demonstrate signs of gradual convergence, with some minor differences in the dynamics by individual years. There are more differences in the foreign trade balance due to the lower similarity in imports. In Bulgaria, imports of goods are increasing at a faster pace than exports in most years of the period. Among the main reasons for this are the increasing imports of both consumer goods and raw materials, components of products with a higher degree of processing. They are influenced by the dominant in the period consistent increase of incomes and purchasing power of Bulgarian households for Bulgarian and foreign goods, the increase of production and the need for more domestic and imported raw materials, the increase of income and profits of the companies in the conditions of more sustainable economic growth.

Structural σ-convergence of Bulgaria's exports to the Euro area

An additional empirical analysis of the structural convergence/divergence of Bulgaria's exports to the exports of the Euro area was performed on the basis of the adapted variants of equations (1) and (2). Eurostat data and additionally calculated relative indicators for Bulgaria and the Euro area exports, for seven commodity groups, based on the SITC, rev. 4. were used. The commodity groups are: 1) food, drinks and tobacco; 2) raw materials; 3) mineral fuels, lubricants and related materials; 4) chemicals and related products, n.e.s.; 5) other manufactured goods; 6) machinery and transport equipment; 7) commodities and transactions not classified elsewhere in the SITC.

The values of the dissimilarity index (DISSIM) and the divergence index (DIV) for the Bulgarian exports of the seven commodity groups compared to those for the Euro area, for each year in the period 2002-2018 were calculated. The values of the indices are presented in absolute values. They are summarised in Table 1 and Table 2 and illustrated with graphs in Figure 3 and Figure 4. The values of the indices allow to achieve certain conclusions about the real convergence or the presence of divergence.

In cases where the values of the indices are smaller and closer to zero, this is a sign of lower divergence and, therefore, higher structural convergence to the Euro area. If the indices are of greater or different value for Bulgaria and the Euro area, the differences prevail, i.e. there is a divergence in the exports of the respective commodity groups from Bulgaria compared to the Euro area. This interpretation makes it possible to highlight more clearly the commodity groups in respect of which a larger, respectively smaller, similarity has been achieved or a specificity and difference with the Euro area benchmarks are still available.

In addition to the annual indices for each of the seven product groups, summary indices for Bulgaria's exports for each year have been calculated. On the basis of the aggregated DISSIM and DIV indices, the general tendency in the structural convergence of the Bulgarian exports as a whole to the exports of the Euro area is derived.

Table 1

Dissimilarity index (DISSIM BG) by commodity groups for Bulgaria's exports to the Euro area, 2002-2018 (by absolute value)

Year/ Index	DISSIM BGF	DISSIM BGR	DISSIM BGMI	DISSIM BGCH	DISSIM BGO	DISSIM BGMA	DISSIM BGCO
2002	0.02681	0.03642	0.0302	0.07356	0.22219	0.29893	0.05702
2003	0.00695	0.03522	0.02522	0.07694	0.26311	0.28866	0.03524
2004	0.01429	0.03503	0.0461	0.08867	0.26115	0.2933	0.02674
2005	0.01298	0.0408	0.05877	0.08051	0.23239	0.2606	0.00285
2006	0.0004	0.04574	0.08232	0.09251	0.23289	0.25948	0.00768
2007	0.00157	0.03978	0.09625	0.08359	0.20195	0.24718	0.00473
2008	0.02184	0.04017	0.09828	0.07896	0.15354	0.22784	0.00604
2009	0.0425	0.05084	0.07618	0.10264	0.14425	0.20168	0.00864
2010	0.0441	0.06214	0.07523	0.0959	0.1239	0.2009	0.00766
2011	0.0308	0.07455	0.06682	0.09227	0.12316	0.19489	0.00722
2012	0.03653	0.06311	0.08466	0.08971	0.1113	0.19544	0.00928
2013	0.04688	0.06284	0.07121	0.09201	0.10172	0.18206	0.00751
2014	0.03816	0.05301	0.05655	0.08261	0.11085	0.17342	0.0015
2015	0.03653	0.04857	0.05018	0.07831	0.11098	0.17628	0.00853
2016	0.03986	0.04972	0.04163	0.07633	0.1008	0.17486	0.01938
2017	0.02511	0.0434	0.0424	0.07666	0.11396	0.17385	0.02584
2018	0.02994	0.04595	0.02659	0.0813	0.11357	0.15115	0.01661

Designations used:
DISSIM BG – Index DISSIM for Bulgaria
DISSIM BGF – Index DISSIM for commodity group "Food, drinks and tobacco"
DISSIM BGR – Index DISSIM for commodity group "Raw Materials"
DISSIM BGMI – Index DISSIM for commodity group "Mineral fuels, lubricants and related materials"
DISSIM BGCH – Index DISSIM for commodity group "Chemicals and Related Products, n.e.s."
DISSIM BGO – Index DISSIM for commodity group "Other manufactured goods"
DISSIM BGMA – Index DISSIM for commodity group "Machinery and transport equipment"
DISSIM BGCO – Index DISSIM for commodity group "Commodities and transactions not classified elsewhere in the SITC"
Source: Own calculations.

In the results and conclusions from the structural σ-convergence analysis, some similarities with the conclusions from the previous descriptive analysis stand out, but there are also differences between them.

The previous descriptive analysis highlighted the leading role in Bulgaria's exports in 2018 of three commodity groups. The largest relative share in exports have „other manufactured goods", followed by „machinery and transport equipment" and third are „food, drinks and tobacco" (see Table 3). Commodity groups can also be ranked based on the results of the structural σ-convergence analysis. According to the values of both the DISSIM and DIV indices, Bulgaria has the greatest similarity with the exports of the Euro area in two product groups – „commodities and transactions not classified elsewhere in the SITC" and „food, drinks and tobacco". In the third place are two different commodity groups – according to the DISSIM index, these are "raw materials", while according to the DIV index, they are "chemicals and related products, n.e.s.". These several commodity groups show the highest relative resemblance to the similar groups for the Euro area, since in absolute terms, the indices are the smallest, tending to zero.

Table 2

Divergence index (DIV BG) by commodity groups for Bulgaria's exports to the Euro area, 2002-2018 (by absolute value)

Year/ Index	DIV BGF	DIV BGR	DIV BGMI	DIV BGCH	DIV BGO	DIV BGMA	DIV BGCO
2002	0.0090663	0.0513518	0.03053365	0.03594204	0.18176876	0.21105634	0.168024827
2003	0.0005992	0.0479864	0.01933866	0.03896889	0.2585311	0.19886538	0.056861612
2004	0.0026603	0.0450312	0.06280171	0.05106429	0.25381214	0.20639369	0.033506448
2005	0.0022081	0.0600736	0.07234841	0.04095445	0.20285896	0.16703731	0.00050108
2006	2.157E-06	0.0705139	0.12668877	0.05439586	0.19977073	0.16952406	0.003740165
2007	3.263E-05	0.0525033	0.18016458	0.04377726	0.1503384	0.15407765	0.001535546
2008	0.006015	0.0536446	0.146016	0.03933553	0.08953827	0.13564428	0.001921095
2009	0.0199014	0.0913324	0.10941539	0.0588776	0.08058581	0.10992601	0.00374747
2010	0.0229152	0.1201051	0.09454649	0.05251419	0.05997972	0.10966419	0.002541169
2011	0.0112425	0.1639924	0.0631083	0.04958794	0.05909454	0.10457342	0.002823857
2012	0.0155041	0.1215031	0.08802893	0.04666793	0.05023394	0.10587868	0.004592981
2013	0.0243678	0.1247667	0.06402606	0.04881698	0.04187526	0.09181674	0.00344323
2014	0.0162014	0.0923451	0.04517449	0.03919598	0.04907433	0.08196919	0.000136695
2015	0.0148502	0.0812623	0.04677749	0.03455294	0.04917969	0.08122814	0.004385829
2016	0.0172961	0.0874453	0.03849527	0.03295028	0.04036806	0.07872302	0.021183553
2017	0.0069855	0.0629953	0.03416496	0.03335844	0.05148213	0.07871402	0.045670698
2018	0.010294	0.0711149	0.01205093	0.03623932	0.05109188	0.0604608	0.023681725

Designations used:
DIV BG – Index DIV for Bulgaria
DIV BGF – Index DIV for commodity group "Food, drinks and tobacco"
DIV BGR – Index DIV for commodity group "Raw Materials"
DIV BGMI – Index DIV for commodity group "Mineral fuels, lubricants and related materials"
DIV BGCH – Index DIV for commodity group "Chemicals and Related Products, n.e.s."
DIV BGO – Index DIV for commodity group "Other manufactured goods"
DIV BGMA – Index DIV for commodity group "Machinery and transport equipment"
DIV BGCO – Index DIV for commodity group "Commodities and transactions not classified elsewhere in the SITC"
Source: Own calculations.

Table 3

Classification of commodity groups in Bulgaria’s exports, for 2018

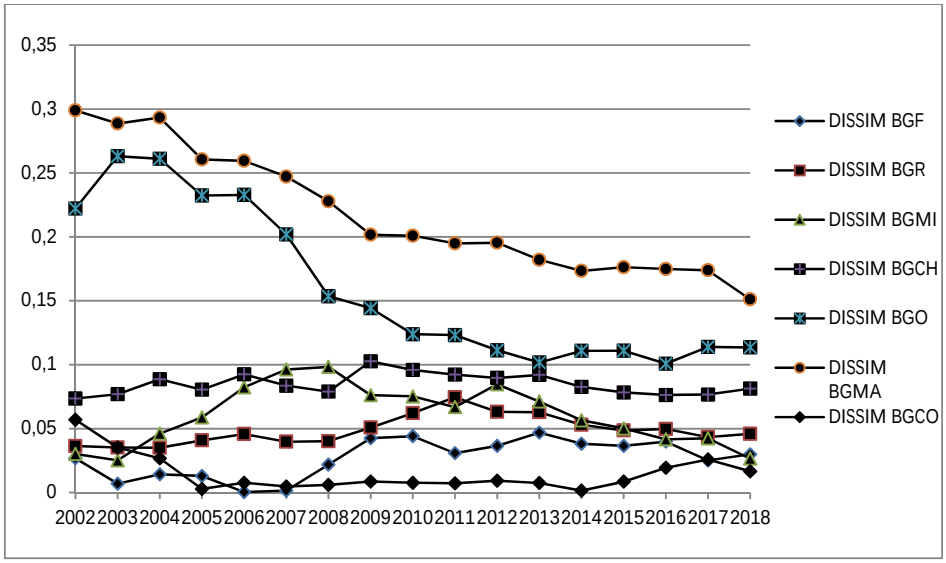
Position	By relative share of the commodity group in the export of Bulgaria (descriptive analysis)	By biggest similarity to the Euro area according to the DISSIM index	By biggest similarity to the Euro area according to the DIV index
1	other manufactured goods	commodities and transactions not classified elsewhere in the SITC	commodities and transactions not classified elsewhere in the SITC
2	machinery and transport equipment	food, drinks and tobacco	food, drinks and tobacco
3	food, drinks and tobacco	raw materials	chemicals and related products, n.e.s.

Source: Eurostat; own calculations.

The graphically depicted results (in Figure 3 and Figure 4) for the DISSIM and DIV indices make it possible to identify clearly the similarities/differences and their peculiarities over the period.

In Figure 3, the DISSIM index lines for the three commodity groups with the biggest similarity to the Euro area, are the lowest, closest to the abscissa – as the DISSIM values tend to zero. Structural convergence is most pronounced for the group of "commodities and transactions not classified elsewhere in the SITC". Their line develops as almost parallel and very close to the abscissa (almost coinciding with it) during the predominant part of the period. Relatively slight deviations from it were observed at the beginning and end of the study period. The lines of the DISSIM index for the other two commodity groups, which rank second and third in importance for the structural convergence of Bulgaria's exports to the Euro area, are situated higher. But they also have a more smooth deployment, with relatively minor deviations. All three of these leading commodity groups do not present a pronounced impact of the 2009 crisis – it did not cause a sharp pull up or down of the curves in 2009, i.e. the main reasons for the relatively limited deviations in some years are other. Some widening of the gap with the Euro area has been observed since 2009 in the „food, drinks and tobacco" product group and since 2011 in „raw materials".

Figure 3
Dissimilarity index (DISSIM BG), by absolute value, by commodity groups for Bulgaria's exports to the Euro area, 2002-2018



Source: Own calculations.

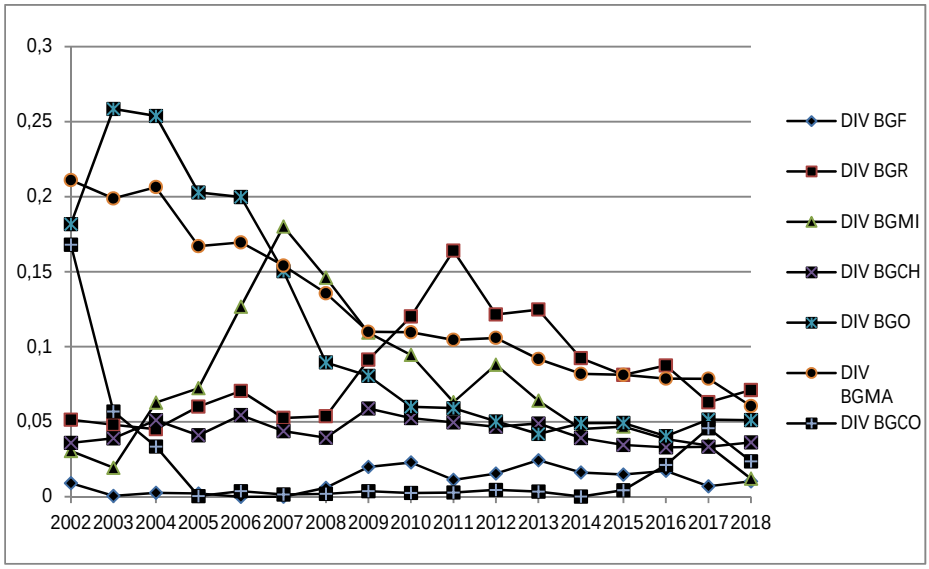
Regarding the commodity groups, for which the difference with the Euro area is greatest, is established specificity by years and subperiods. At the beginning of the period, there was a

marked difference, a weakest convergence in the product groups of "machinery and transport equipment" and "other manufactured goods". The lines of their DISSIM indices are in the first years well above the DISSIM lines of the other product groups. At the same time, however, it is noticeable that their change over the years is characterised by a positive and consistent trend – narrowing the gap, gradually lowering it and bringing the lines closer to those of the other product groups. However, these two commodity groups continue to be at the top of the gap and divergence in 2018 (when they remain highest, above the lines of the other commodity groups).

According to the results for the Divergence Index DIV (see Figure 4), the largest divergence with the Euro area was found for "other manufactured goods" at the beginning of the period. Their line is then highest situated and even rises. However, since 2003-2004 it has started to go down sharply, the gap with the Euro area has been narrowed. After 2010, the index for this product group is changing more gradually, the line becomes lower, the index remains relatively low until the end of the period. Second in terms of divergence at the beginning of the period is "the machinery and transport equipment". This second product group is characterised by a slower and more gradual descent of the index line until the end of the period.

Figure 3

Divergence index (DIV BG), by absolute value, by commodity groups for Bulgaria's exports to the Euro area, 2002-2018



Source: Own calculations.

According to the DIV Index, for two of the product groups more negative trends are identified. Both groups of „raw materials" and „mineral fuels, lubricants and related materials" are initially distinguished by minor differences with the Euro area – their lines are

near the abscissa. Subsequently, however, they deepened – in 2009 and 2011-2012, their index lines rose sharply and rapidly. However, after these crucial years, their trend has reversed and the lines are declining, with achieving a relatively greater similarity to the Euro area for the group of „mineral fuels, lubricants and related materials“ at the end of the period.

Initially, the divergence indices of „other manufactured goods“ deteriorated sharply. Until 2006-2007, they remain the biggest difference with the Euro area. However, the trend of reducing the gap started from 2003-2004. It proved to be lasting, continuing until the end of the period.

According to the DIV results, two commodity groups indicates the most pronounced and consistent trend of reducing the difference with the referent values for the Euro area – these are „machinery and transport equipment“ and „other manufactured goods“.

Different trends develop according to the divergence index for the other commodity groups. For example, the group of “commodities and transactions not classified elsewhere in the SITC” starts the period with a very large difference, which is reduced later and approaches the Euro area referent values quickly. However, this continues until 2015, after which the gap widens again. With smooth deviations are highlighted “food, drink, tobacco”, which is also characteristic of the third category of „chemicals and related products, n.e.s.“.

Several conclusions can be made based on the values and graphs of the DISSIM and DIV indices. The lines of change during the period of the two indices reveal a clearly pronounced identical and downward trend. They contain signs of a gradual declining of the differences and a noticeable approximation to the Euro area referent values. This is a general characteristic of the indices of all commodity groups. Therefore, there are more structural differences in exports in the first years of the study period, which are reduced over time and at the end of the period. Thus, a tendency for greater convergence is achieved and emphasised. In the last few years and for 2018, closer values of Bulgaria’s export to the Euro area have been reached according to the DIV index, while regarding the DISSIM index, there are relatively higher deviations.

Along with the annual values of the dissimilarity index and the divergence index for the different commodity groups, aggregated indices of structural convergence of exports have been calculated (see Table 4). Based on the aggregated DISSIM index and the aggregated DIV index, resumptive conclusions about the trends in the dynamics of the general convergence in the structure of Bulgaria’s exports to the Euro area can be made (see Figure 5). They can be considered as indicative of the achievement of a certain structural convergence or the presence of divergence in Bulgaria’s exports. As shown in the table and figure, the values and therefore the conclusions of both methods and both indices are similar.

Table 4

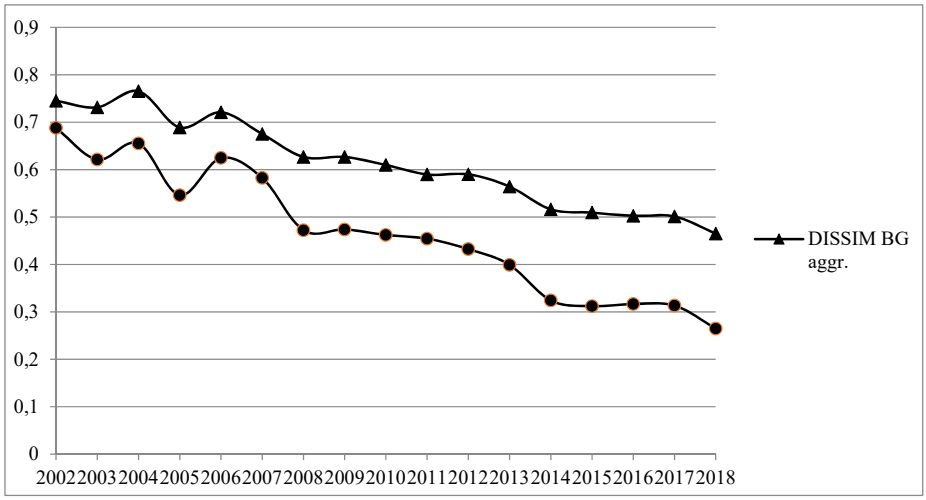
Aggregated DISSIM and DIV Index for Bulgaria's Exports to the Euro Area, 2002-2018

Year	Aggregated DISSIM BG	Aggregated DIV BG
2002	0.74513	0.68774369
2003	0.73134	0.621151247
2004	0.76528	0.655269804
2005	0.6889	0.545981953
2006	0.72102	0.624635641
2007	0.67505	0.582429337
2008	0.62667	0.472114705
2009	0.62673	0.47378603
2010	0.60983	0.462266049
2011	0.58971	0.45442293
2012	0.59003	0.432409714
2013	0.56423	0.399112785
2014	0.5161	0.324097195
2015	0.50938	0.312236624
2016	0.50258	0.316461566
2017	0.50122	0.313371066
2018	0.46511	0.264933619

Source: Own calculations.

Figure 5

Aggregate structural convergence of Bulgaria's exports to the Euro area according to the DISSIM and DIV index, 2002-2018



Source: Own calculations.

As can be seen from Figure 5, the structure of Bulgaria's exports for 2002-2018 is not similar to that of the Euro area. The lines of both indices are located far above the abscissa. However,

there is a persistent process of reducing the differences (the two lines are descending downward), which is uneven. Until 2006, for both the dissimilarity index and the divergence index alternate years of deepening and reducing the discrepancies, with the average values of the two indices varying around 0.7 and about 0.6, respectively. From 2006 to 2015, the deviations from the average level for the Euro area marked a significant decline, as in 2014, DISSIM reached 0.51 and DIV – 0.32. Over the next three years, discrepancies with the structure of exports to the Euro area remained almost unchanged, which is more pronounced for DIV. In 2018, a new strengthening of the convergence process was registered, which is judged by the decrease in the indices of dissimilarity and divergence to 0.46 and 0.26, respectively.

The results for the yearly and the aggregated indices and the conclusions drawn from them can be used to concentrate measures in the field of stimulating the export of certain commodity groups from Bulgaria and increasing the contribution of exports to the structural convergence of Bulgaria to the Euro area.

Conclusion

As a result of the performed theoretical, methodological, descriptive and structural σ-convergence analysis, the structural characteristics of convergence in foreign trade and mainly in Bulgaria's exports to the Euro area were derived.

The systematisation of the theoretical and empirical models showed that there are opportunities for the application of a wide set of indicators for foreign trade, as well as similar approaches and methods for the analysis of economic and trade structural σ-convergence.

From the results of the descriptive analysis, it was concluded that the parameters of Bulgaria's exports contain signs of gradual and greater convergence with the exports of the Euro area. The trends in it were confirmed and specified by their structural features on the basis of the performed analysis of the structural σ-convergence in exports. For these purposes, adapted variants of the approaches and methods for the analysis of the structural σ-convergence of GDP, developed and used by J. Von Hagen and J. Traistaru (2005) and by C. Van de Coeving (2003), were applied.

From the analysis of the dissimilarity index (DISSIM) and the divergence index (DIV) for the period 2002-2018, it can be concluded that Bulgaria and the Euro area have a growing degree of export similarity and a relatively achieved convergent structure of exports. The convergence trend is more pronounced with respect to some of the product groups. The more important aspects, reasons, and prerequisites for these results are summarised and reduced as follows:

1) Bulgaria achieved its EU membership in 2007, and in 2009 was hit by the global economic crisis, simultaneously with the Euro area countries. In the post-crisis period, the countries have gradually recovered their economic growth, the import-export flows are intensifying again, Bulgaria has deepened and expanded its participation in the integration processes and trade with the EU and the Euro area countries. This leads to lower values of the dissimilarity and divergence indices, which indicate a greater

convergence in the export structure of Bulgaria and the Euro area by the end of the period. On this basis, competitive pressure has intensified, hence the need to raise the competitiveness of production, quality, technical and price characteristics of the goods involved in Bulgarian exports to the EU and the Euro area is increasing.

2) Bulgaria's export structure is not yet sufficiently optimised, hindering an increase in return on export and its transformation into a stable and lasting source of economic growth. This conclusion is based on greater similarity in lower processing and value-added products, which are more labour-intensive, while convergence in capital and technology-intensive products is lagging behind. This is illustrated by the several commodity groups that have the maximum resemblance to the Euro area, simultaneously according to the DISSIM index and the DIV index. In particular, they are the commodity groups „food, drink and tobacco", „raw materials", „chemicals and related products", „commodities and transactions not classified elsewhere in the SITC". Inducements for bigger production and export of higher value-added products – machinery and equipment, transport equipment, new technologies can lead to more significant effects on convergence, the total value of exports and economic growth.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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ASSESSING INTEGRATED BACK AND FORTH RELATIONSHIP IN BULGARIAN CLUSTER SUPPLY CHAINS

Cluster supply chain is enterprise network with a feature of cluster and supply chain and is an important channel for enterprises close to the knowledge, resources, markets, and technologies. The research into cluster supply chains focuses on the theory of industrial clusters and plays an important role in their development and competitiveness. The aim is to study the relations along the supply chain – both back and forth, which will boost the development of clusters. The idea for the present research emerged from the conference "China and Central & Eastern Europe", International Scientific Forum in 2020, where the author presented a report on strengthening the cooperation between Bulgaria and China by building back and forth supply chain relationships.

The methods of research analysis are: method for analysing the strength of the back and forth relations along the supply chain; questionnaire method; statistical method for research of relations and dependencies. The total number of clusters included in the questionnaire are 42 and they are the main performing clusters in Bulgaria. Of the clusters under consideration, those with the highest share are the ones whose business is in the field of electrical engineering – 12% and ICT – 11.8% of the total number. Almost 5% is the share of the clusters in the field of machine building, textile and sewing industry – 4.8%, tourism and health industry – 4.5%. The Likert scale is used to assess the results from the questionnaire study. The study was conducted in the period between 2018 and 2020.

In conclusion, it can be stated that clusters in Bulgaria have not built well developed back and forth relations along the supply chain because the results from the analysis of the strength of the inner-cluster relations in terms of sales, back and forth along the supply chain illustrate low importance and insufficient development. A statistically significant relation exists between the availability of a logistics company and the general evaluation of the cluster related to the degree of development of the relations back and forth along the supply chain. The use of modern digital technologies (cloud technology, big data, multichannels, omnichannels, blockchain etc.) is not at a high level and can further be developed, which will push development back and forth along the supply chain in the clusters in Bulgaria.

This study explores and uncovers, for the first time, back and forth cluster supply chain relationship in Bulgaria. This study provides insights to clusters managers and for their strategies.

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Introduction

Supply chain management integrates suppliers, manufacturers, customers to improve the long-term performance of individual firms and partnership, integration, Information sharing, Information quality (SunHee Youn, Paul Hong, Abraham Nahm, 2008, pp. 438-456; Bowersox, Closess, Cooper, 2002; Ellram, Cooper, 1993). Successful supply chain management requires the integration of these value chain entities to create a cooperative and collaborative environment that facilitates information exchange and shared decision-making across the value chain (Berry, Hill, Klompmaker, 1999, pp. 3599-3618).

Clusters have long been a feature of economic geography, but their influence on competition has grown with the shifting nature of competition and the restructuring of how companies operate. Competition in advanced economies is increasingly driven by knowledge and skill, with low-cost labour and other resources accessed in cheaper locations. Clusters are important because they play a fundamental role in knowledge creation, innovation, the accumulation of skills, and the development of pools of employees with specialised expertise (Porter, 2007). It may be observed that industries tend to be geographically "clustered." Well known examples of clusters include the concentration of information technology firms, wineries, finance and investment banking, fashion products, or computer products. It is also very often for corporate functions to be clustered. This phenomenon was originally observed and explained by the British economist Alfred Marshall (1920) in his classic work Principles of Economics. Joining a cluster means getting a lot of advantages. A company can choose the way to be more competitive by getting bigger and bigger. However, a cluster may be an optimal balance between the complexity and bureaucracy that hamper innovation in large enterprises and the lack of scale that holds back smaller firms. In a dynamic environment, when innovation and fast market response are the keys to competitive advantage, the tacit communication and trust-building between smaller firms (and between their employees, who share culture and extensive personal contact) allow them to participate in joint learning and adoption of best practices (Rześny-Cieplińska 2016, pp. 161-172).

Cluster supply chain (CSC) is a kind of enterprise network with a feature of cluster and supply chain and is an important channel for enterprises close to the knowledge, resources, markets, and technologies. The research into cluster supply chains focuses on the theory of industrial clusters and plays an important role in their development and competitiveness. The aim is to study the relations along the supply chain – both back and forth, which will boost the development of clusters. The research began with a report presented by the author of the International Scientific Forum "China and Central & Eastern Europe", 2020, dedicated to cooperation between Bulgaria and China by building back and forth supply chain relationships.

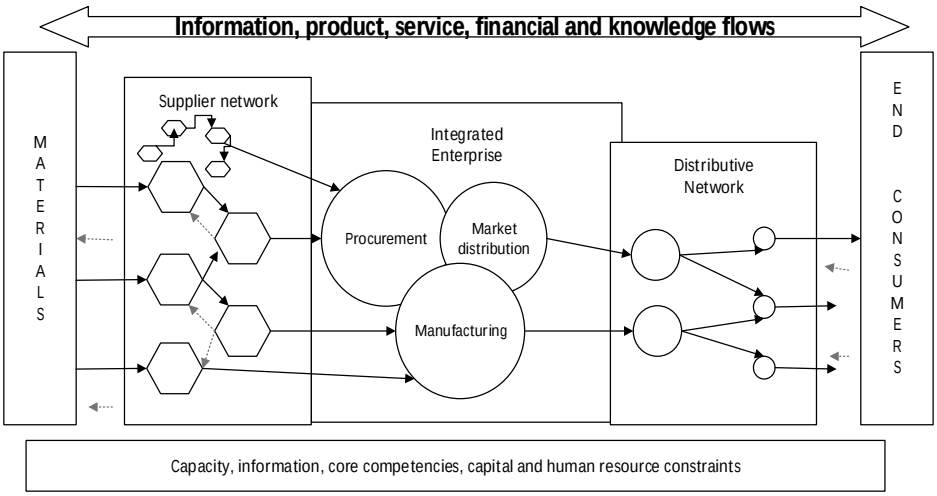
Literature Review

The general concept of an integrated supply chain is typically illustrated by a line diagram that links participating firms into a coordinated competitive unit. Bowersox, Closess, Cooper

illustrates a generalised model adapted from the supply chain management program at Michigan State University (Bowersox, Closess, Cooper, 2002, p. 5).

Figure 1

Generalised supply chain model



Source: Bowersox, Closess, Cooper, 2002, p. 6.

The generalised supply chain arrangement illustrated in Figure 1 logically links a firm and its distributive and supplier network to end customers. The message conveyed in the figure is that the integrated value-creation process must be managed from material procurement to end-customer product/service delivery (Bowersox, Closess, Cooper, 2002, pp. 5-6). According to Donald Waters (Donald Waters, 2003, p. 8) the simplest view of a supply chain has a single product moving through a series of organisations, each of which somehow adds value to the product. Taking one organisation's point of view, activities in front of it – moving materials inwards – are called "back"; those after the organisation – moving materials outwards – are called "forth". The "back" activities are divided into tiers of suppliers. A supplier that sends materials directly to the operations is a first-tier supplier; one that sends materials to a first-tier supplier is a second-tier supplier; one that sends materials to a second-tier supplier is a third-tier supplier, and so on back to the original sources. Customers are also divided into tiers. One that gets a product directly from the operations is a first-tier customer; one that gets a product from a first-tier customer is a second-tier customer; one that gets a product from a second-tier customer is a third-tier customer, and so on to final customers (Donald Waters, 2003, p. 8). According to the presented generalised supply chain, practically all entities are involved, which include mining companies, processing companies, wholesale and retail trade organisations, service organisations, logistics service providers and others. The supply chain will be successful, and will have a synergistic effect, if all the described participants back and forth in the supply chain take part. An interesting question is related to the integrated back and forth relationship in clusters. There is no research data to investigate

how having a logistics company in the cluster would affect the integrated supply chain back and forth. According to Dragomirov, conditions for building effective technological interaction among logistics companies and their customers have been created.

Currently, the overall level of use of various information solutions can be assessed as insufficient, which is primarily due to lower requirements by contracting authorities or they are sought by a small part of them. This means that as soon as there is a greater need for such solutions, logistics service providers are likely to implement them (Dragomirov, 2016, pp. 76-86).

For SME the cooperation with other enterprises is often the only possibility to become part of global value chains. Forms of cooperation used are downright diverse and of different intensity, however, all forms of rather complex cooperation between businesses need one thing for their efficient and effective operation (Scheer, von Zallinger, 2007). Partnerships can lead to changes in operations. For example, the stability of a partnership might encourage suppliers to specialise in one type of product. They give such a commitment to the alliance that they reduce their product range, make these as efficiently as possible, and concentrate on giving a small number of customers a very high-quality service. They share information with customers without the threat that this will be used to get some form of trading advantage. At the same time, customers reduce their number of suppliers, as they no longer need to look around to get the best deals. Donald Waters described Japanese companies were among the first to develop strategic alliances, and at the time when Toyota had formed partnerships with its 250 suppliers, General Motors was still working separately with 4000 suppliers (Waters, 2003, p. 47).

Some factors that contribute to a successful partnership include a high level of achieved service, real cost savings, a growing amount of business, compatibility of cultures, and so on. Donald Waters and Lamber, Stock (Waters, 2003; Lambert, Stock, 2001) gave a more general list of key factors as management commitment, a contract specifying costs and responsibilities, agreed performance indicators, agreed objectives, shared culture and ***joint information systems***. Lambert et al. (Lambert, Stock, 2001) summarised these as:

- *drivers*, which are the compelling reasons for forming partnerships, such as cost reduction, better customer service, or security;
- *facilitators*, which are the supportive corporate factors that encourage partnerships, such as compatibility of operations, similar management styles, common aims, and so on;
- *components*, which are the joint activities and operations used to build and sustain the relationship, such as communication channels, joint planning, shared risk and rewards, investment, and so on (Waters, 2003, p. 48).

If an organisation wants to go beyond partnerships, it has to own more of the supply chain. One common arrangement has an organisation taking a minority share in another company. This gives it some say in their operations, but it does not necessarily control them. A manufacturer, for example, might take a minority share in a wholesaler to get some influence in the way that its products are distributed. Another option is for two organisations to start a joint venture, where they both put up funds to start a third company with shared ownership. A manufacturer and supplier might together form a transport company for moving materials

between the two. The most common arrangement has one organisation simply buying other organisations in the supply chain. This increases its level of vertical integration (Waters, 2003, p. 49). By closing the loop, something bigger than an incorporation of back and forth flows is emerging. In closed-loop supply chains is also incorporated the phase of design and construction of products as well as the life cycle assessment (Mihova, 2019, pp. 411-418).

In many ways, the existence of clusters today is surprising. In the past, such agglomerations enabled communications (Sheffi, 2012). Sheffi described two major types of relationship that contribute to the success of clusters could be defined as "vertical" and "horizontal" (Sheffi, 2012). Vertical relationships are links between trading partners. Trading partner relationships are important because the lion's share of value most non-service businesses offer to their customers is obtained through the procurement of parts and services from suppliers. On the procurement side, commercial enterprises interact with a network of material and parts suppliers and an array of service providers. On the sales side, they interact with distributors, customers, and other service providers. Managing these relationships is of prime importance, especially as firm move away from vertical integrations and increasingly outsource many functions and stages of production. The horizontal relationship is between firms at the same stage of production, such as automobile manufacturing plants in Detroit, Michigan, or film studios in Hollywood, California. These firms both compete and cooperate with each other along dimensions that benefit them. Horizontal relationships also exist between functions in firms of the same or different industries. Thus, human resources, legal, procurement, finance, and supply chain management functions may collaborate across companies and industries (Sheffi, 2012).

Clusters are defined too broadly if they are aggregates such as manufacturing, services, consumer goods, or "high tech." Here, the connections among included industries are weak at best, and discussion about cluster constraints and potential bottlenecks will tend to gravitate to generalities. Conversely, equating a cluster with a single industry misses the crucial interconnections with other industries and institutions that strongly affect competitiveness. Clusters occur in many types of industries, in smaller fields, and even in some local industries such as restaurants, car dealers, and antique shops (Porter, Michael, 2000). They are present in large and small economies, in rural and urban areas, and at several geographic levels (e.g., nations, states, metropolitan regions, cities). Clusters occur in both advanced and developing economies, although clusters in advanced economies tend to be far more developed (Porter, 1998, pp. 38-63). Cluster boundaries rarely conform to standard industrial classification systems, which fail to capture many important actors in competition and linkages across industries. According to Porter, clusters were defined as geographic concentrations of interconnected companies and institutions in a particular filed. Traditional regional cluster theory has often emphasised the physical components of a cluster, identifying the density of players in a common industry as the critical factor in achieving cluster productivity and economic advantage. In an industrial cluster, the necessary components are often analogous to the supply chain of the industry, with specialised resources close at hand: knowledgeable workers, industry experienced service providers, professionals and managers, appropriate forms of financing, supportive government policies and access to appropriate transportation, distribution and ultimately customers. In a cluster of innovation, industry concentrations certainly may exist, but are not definitive. It is rather both the nature and the behaviour of the components that is distinctive (Engel, 2014, p. 10). According to Mary Jo

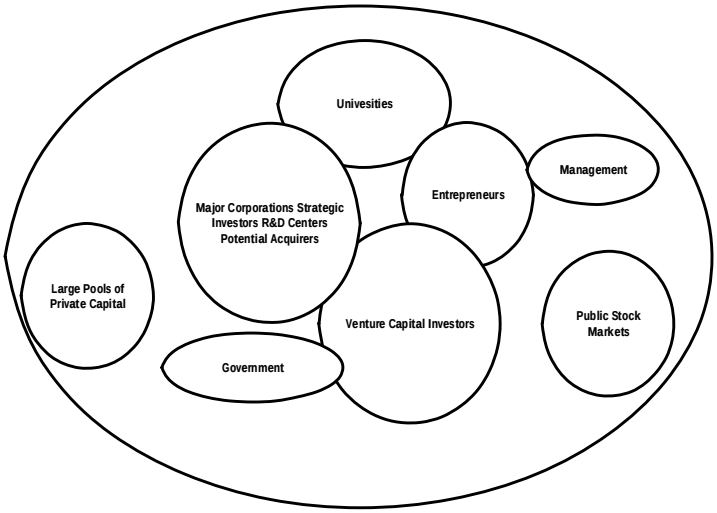
Waits, clusters of world-class firms in related industries are the most important economic development customers in the global economy. These clusters, rather than individual companies or simple industries, are the source of jobs, income, and export growth (Waits, 2000, pp. 35-50).

Cluster development initiatives are seen as actions aimed at accelerating the growth and competitiveness of emerging communities of enterprises within a region. These actions can be undertaken by the government (or regional authorities), the cluster enterprises and the research community.

Figure 2 illustrated the main components of a cluster of innovation. The reason clusters are relevant for innovation is that when there is a critical mass in a location of a sector or industry, the different actors can support each other, and resources can be arranged and rearranged in flexible ways. But the critical mass is not enough; the actors must be connected in various ways and there must be the mobility of resources and skills, including technological spill-overs (Ketels, Lindqvist, Sölvell, 2012, p. 38).

Figure 2

The components of a cluster of innovation



Source: Engel, 2014, p. 11.

Industrial clusters form because they yield certain advantages, as noted by many economists. Some of these advantages included trust between cluster inhabitants, tacit knowledge exchange, a collaborative environment, support for research and educational institutions, and availability of a supply base. As mentioned by Marshall in 1920, clusters attract suppliers who see advantages in locating next to their customers. Even in today's environment, the opportunities for unstructured and chance interactions with customers, the opportunities to learn where their business is heading. According to Sheffi, the opportunities to forge strong, trusting and collaborative relationships with customers are very important when firms make

location decisions. From the customers' point of view, a strong supplier base with multiple suppliers bodes well for competitive pricing and supplier innovation, which are crucial for competitiveness (Sheffi, 2012). Back integration is a form of vertical integration in which a company expands its role to fulfil tasks formerly completed by businesses up the supply chain. Complete vertical integration occurs when a company owns every stage of the production process, from raw materials to finished goods/services. Forth integration is also a type of vertical integration, which involves the purchase or control of a company's distributors. There are not enough research data on the development of integration back and forth relationship along the supply chain in the Bulgarian clusters. A well developed integrated back and forth relationship Bulgarian cluster supply chain will increase the competitiveness of the cluster itself and will accelerate the development of the enterprises participating in them, creating favourable external conditions. Velev (2007) proposed a model of the cluster approach to increase competitiveness.The model covers an analysis of the strength of the relationship in the cluster, analysing two main types of links – forth and back along the supply chain. According to Velev (2007, p. 108), once the clusters are identified, they must be evaluated and analysed. The aim is to clarify the state and importance of the cluster, to identify strengths and weaknesses, opportunities and their potential for future development. From the customer's point of view, a strong supplier base with multiple suppliers bodes well for competitive pricing and supplier innovation, which are crucial for competitiveness (Rześny-Cieplińska, 2016, pp. 161-172). Some researches show that the essence of an industrial cluster is tightly related to the supply chain. The components of a cluster of innovation are inclined toward adaptation of new technologies, creation of new markets and addressing of large, global market, illustrated by Jerome Engel (2014, p. 11) entrepreneurs, mature corporations, universities, industrial research centres, venture capital, service providers, management, government.

According to Wojciech Piotrowicz and Richard Cuthbertson, the changes at the clusters supply chains management are driven by new technologies, such as smart mobile devices (smartphones and tablets) and related software (apps, mobile payments, e-valets, e-coupons, digital flyers, location-based services). There are changes in the IT provision, reduced cost, and access to technology (big data and cloud computing), which allow for personalisation and price optimisation. There are also new in-store technologies available (virtual screens and aisles, virtual mirrors-fitting rooms, digital signage, intelligent self-service kiosks, vending machines and dynamic menus), as well as QR codes, in addition to mobile devices brought to the shop by customers. Studies of Wojciech Piotrowicz and Richard Cuthbertson focused on the impact of technology in three areas: 1) multi-channel and in-store retailing and development of new business models; 2) mobile technologies; 3) customer experience and supplier relationships. Supply chain investments are perceived as a key issue in channel integration. When the retailer is considered a hub for retail activities, the supply chain design should reflect this. Issues such as product availability, returns, delivery options, backflows, and inventory management across channels should be addressed. Because online and traditional channels are often managed separately, integration of both physical and information flows is required. However, different options may also be considered, such as "showrooming," in which products are just viewed and "experienced" in-store and then delivered directly to the customer. The mix of traditional and online options will be the most likely solution: for smaller items, the "click and collect" option (buy online, collect in-store),

and the "showroom," supported by interactive screens, for items that need space for storage and exhibition. All such options should be supported by redesigned end-to-end distribution and delivery systems; there should also be an integration of marketing and supply chain management to ensure product availability across channels and a pull-order system from the product manufacturers (Piotrowicz, Cuthbertson, 2014).

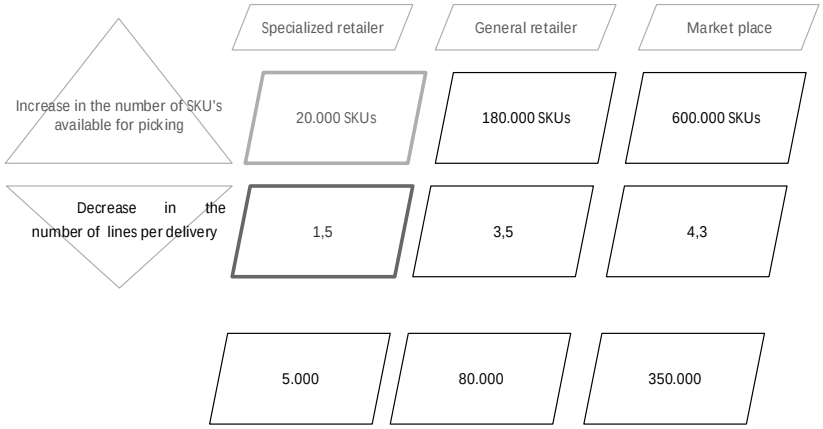
A number of studies have shown the relationship between information technology and the supply chain in trade and manufacturing organisations. According to Dragomirov, modern e-commerce platforms are more than a software solution for the presentation of the company products in the webspace. Now they have real potential for their transformation into small-sized ERP systems, which are not limited just to the organisation. They are open to the supply chain members and to online integration with their information systems which is a prerequisite for developing basic SCM practices in the supply chain and achieving better competitiveness of supply chain members. This evolution stage of the e-commerce platforms is a signal for the appearance of alternatives for flexible SCM software solutions (Dragomirov, 2020), pp. 250-261). However, there is a lack of in-depth research on the relationship between digital technologies and development integrated back and forth Bulgarian supply chain cluster organisations.

It is important to carry out research together with cluster members to determine which services are already available in the market and which must be developed and offered by cluster management (subsidiarity). Existing products and services should simply be integrated into the cluster's range of products and services, with special conditions negotiated with the providers for cluster members (demand bundling). The cluster managers should try to consolidate the various services in an integrated **"**cluster service system" for which the cluster management office acts as a sort of "one-stop-shop" (Scheer, Zallinger, 2007, p. 34). Figure 3 illustrates the increase in the average number of stock-keeping units (SKUs), the decrease in the average number of line items per delivery, and the increasing number of sales orders per channel a traditional retailer should be prepared to expect when engaging in e-commerce (Kourimsky, Berk, 2014).

Making the received goods available for immediate sale is a key challenge for retailers switching to having the distribution centre ship goods directly to the end customer. In most distribution centres, the stock is sorted before being put away, so that it can be easily found and grouped for picking (Kourimsky, Berk, 2014). It is therefore important to look at the relationship back and forth in cluster supply chains. There aren't studies that analyse the integrated relationship back and forth in Bulgarian cluster supply chains. According to Binghua He**,** cluster supply chain (CSC) is a special kind of enterprise network with a double feature of cluster and supply chain and is an important channel for enterprises close to the knowledge, resources, markets, and technologies. Cluster supply chain (Figure 4) has a special network structure and network relational, which are different from general cluster and supply chain. In a particular industry cluster region, all kinds of enterprises and non-enterprise organisations around the core enterprises are connected to form local integration of supply chain through "trust and commitment" informal or formal contract (He, 2016, pp. 751-762).

Figure 3

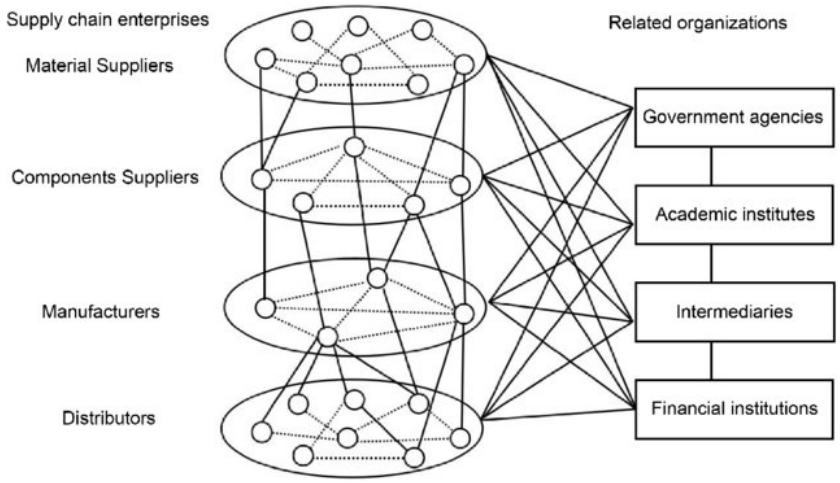
Fundamental effects of e-commerce engagement on a traditional retailer's supply chain



Source: Kourimsky, van den Berk, 2014.

Figure 4

Cluster supply chain structure



Source: He, 2016, pp. 751-762.

The majority of authors studied agree that the aim of supply chain management (SCM) is to boost company competitiveness and profitability, both along the entire supply chain and for the end consumer. The integration of the processes in the supply chain and the reorganisational initiatives should aim to increase the total efficiency and effectiveness of the supply chain in the clusters. Since the supply chain encompasses all stages from supplying resources to selling the ready product to the end consumer, the analogy used is that of a flow,

where organisations, positioned close to the source of resources, are defined as being at the beginning of the supply chain or the upper end of the flow. And the opposite – those organisations that are close to the end-user are organisations that are at the end of the supply chain or in the lower part of the flow.

By accepting the entire concept of the supply chain, the participants in it represent all companies and organisations with which a given company collaborates directly or indirectly with through its suppliers and clients from the point of production of the raw materials to the point of product consumption. It can be pointed out that the structure of the supply chain is the network of participants and the relations among them. The key processes are those that involve the manufacture of certain products and add value for the consumer. The management components include the managerial changes through which these processes are integrated and managed in the supply chain. It is important that the participants along the back and forth supply chain be identified. The interrelations in the cluster characterise the degree, to which the companies in its composition collaborate in terms of their trade relations. The supply chain network structure will have a different look depending on who is the focal company in the cluster. Both back and forth integrations are vertical integration strategies to gain better control of the value chain, reduce dependence on the suppliers and increase business competitiveness. Therefore, having a logistics company as a member of the cluster could improve the back and forth relationship in the cluster. All industries, both in industry and in the service sector, need to participate in inter-company cooperation back and forth supply chain (Velikova, 2012, p. 18). There is a research in the field of logistics in the energy sector in Bulgaria, which examines issues related to compressed natural gas (CNG) physical distribution management to daughter CNG refuelling stations (Stefanov, 2018, p. 17), but the existence of cluster forms of interaction between participants in the energy supply chain have not been studied. There is still a serious shortage of primary data on the establishment and functioning of the supply chain in clusters in Bulgaria, on the strength of back and forth relationship for the cluster, as well as on the impact of their influencing environmental factors and more efficient use of innovation potential at national and international level.

In well-industrialised countries, as well as in developing ones, the efficient operation of clusters can be seen. Companies forming clusters can help business entities, small and medium-sized enterprises, in particular, improve their competitive edge. Regardless of an industrial sector or branch in which they operate, companies grouped in clusters have better opportunities for development, identification of production niches, access to export markets and recruitment policy than they have while operating alone (Rześny-Cieplińska, 2016, pp. 161-172).

The geographic scope of a cluster refers to the territorial extent of the firms, customers, suppliers, support services, and institutions that are embedded in the ongoing relationships and interdependent activities that characterise the cluster. The geographic span of a cluster can range from a small area within a city to areas encompassing much of a nation (Enright, Sun Hung Kai, 2000, pp. 1-21).

Methodology

The object of this research is the Bulgarian clusters, which, according to data provided by the Bulgarian Small and Medium-sized Enterprises Promotion Agency (BSMEPA), amount to 300 cluster organisations in total, the majority of which are organised in non-for-profit organisations under the Bulgarian legislation. According to research conducted by Slavova, Bankova and Ivanov, the span of cluster structures is limited – the majority of clusters (approximately 50% of those studied) have a limited number of members – between 11 and 20 and they are mostly representatives of business; just 23 clusters have as their members universities, scientific organisations, schools; and only 9 clusters have municipalities, NGOs and other organisations in their structure. The number of cluster members and their structure show that the clusters under consideration are not developed in terms of the width of the cluster structures. The management of the cluster initiatives does not differ – the clusters have a standard managerial structure [General Meeting and Board of Directors]. The goals that cluster state on their websites are numerous and can be classified into four segments, most commonly stated: (1) enhancing the competitiveness of members/industry; (2) training and qualification of employees; (3) expansion of market positions, including internationalisation; (4) promoting innovation (products, technology, technology); (5) cooperation between cluster members (Slavova, Bankova, Ivanov, 2018, pp. 14-28).

The methods of research analysis are:

- Method for analysing the strength of the back and forth relations along the supply chain;
- Questionnaire method;
- Statistical method for research of relations and dependencies.

The total number of clusters included in the questionnaire are 42 and they are the main performing Bulgarian clusters. Of the clusters under consideration, those with the highest share are the ones whose business is in the field of electrical engineering – 12% and ICT – 11.8% of the total number. Almost 5% is the share of the clusters in the field of machine building, textile and sewing industry – 4.8%, tourism and health industry – 4.5%. The Likert scale is used to assess the results from the questionnaire study. The study was conducted in the period between 2018 and 2020.

Working hypotheses

H1 – Bulgarian clusters have well developed back and forth relations along the supply chain.

H2 – There is a relation between the availability of logistics companies as cluster members and the development of the back and forth relations along the supply chain.

H3 – There is a relation between the use of modern digital technologies (cloud, big data, multi-channels, omni-channels, blockchains etc.) and the development of back and forth relations along the supply chain in the cluster organisations.

To prove Hypothesis 1 an Indicator for gauging the strength of the back and forth relations in the clusters, including the two indices, will be used: (Velev, 2007, p. 134).

1. Analysis of the strength of the inner-cluster relations related to sales along the supply chain

$$I_s = \frac{\sum_{i=c}^{r}\sum_{j=c}^{r} x_{ij}}{S_c+\cdots+S_r}100,$$

Where:

I_s is intensity of sales within the cluster as a percentage of the sales of all industries in the cluster to other industries;

c – the leading cluster industry;

r – total number of industries in the cluster;

x_{ij} – volume of production expressed as a value which the i sector (i=c-r) provides to the j sector (j=c-r). The element of the matrix of the balance of intersector relations.

$S_c + \cdots + S_r$ – the sum of sales of all industries in the cluster to other industries (to industries in the cluster and to industries outside the cluster).

2. Analysis of the strength of the inner-cluster relations related to purchases, i.e. back supply chain

$$I_p = \frac{\sum_{i=c}^{r}\sum_{j=c}^{r} x_{ij}}{P_c+\cdots+P_r}100,$$

Where:

I_p is intensity of purchases in the cluster as a percentage of production purchases in all industries in the cluster (%)

c – the leading cluster industry;

r – total number of industries in the cluster;

x_{ij} – volume of production expressed as a value, which the i sector (i=c-r) provides to the j sector (j=c-r). The element of the matrix of the balance of intersector relations.

$P_c + \cdots + P_r$ – the sum of purchases for production in all industries in the cluster from other industries (from industries in the cluster and from industries outside the cluster)

3. Analysis of the strength of inner cluster relations in the back supply chain

$$I_{\text{вр}} = \frac{\sum_{i=1}^{q} \quad \sum_{j=c}^{r} x_{ij}+\sum_{j=c}^{r} \text{CT}_j+\sum_{j=c}^{r} IM_j}{P_c+\cdots+P_r}100,$$

Where:

$I_{\text{вр}}$ is intensity of external purchases – total (%)

4. Analysis of the strength of intercluster relations forth along the supply chain.

$$I_{\text{ВЗ}} = \frac{\sum_{i=c}^{r} \quad \sum_{j=1}^{q} x_{ij} + \sum_{i=c}^{r} K_i + \sum_{i=c}^{r} C_i + \sum_{i=c}^{r} E_i}{S_c^o + \cdots + S_r^o} 100,$$

Where:

$I_{\text{ВЗ}}$ is intensity of external purchases total %.

5. Analysis of the strength of the uncommercial relations between the enterprises and their associates in the cluster. The following fields will be evaluated under Mladen Velev's methodology:

№	Fields of analysis
1.	Analysis of the cooperation relations in conducting joint activities by enterprises in the cluster
2.	Analysis of the intensity of informal contacts
3.	Analysis of the trust between the participants in the cluster

To prove the second hypothesis a Chi-squared test will be used to study the dependence between the availability of logistics organisation in the cluster and the general evaluation of the cluster in terms of the development of the back and forth relations along the supply chain**.**

***To prove the third hypothesis, we will use the Indicator "use of contemporary digital technologies when managing the supply chain", which includes the following fields*:**

№	Fields of analysis
1.	Extent at which cloud technologies are used in the supply chain
2.	Extent at which big data is used along the supply chain
3.	Extent at which multi- and omni-channels are used along the supply chain
4.	Extent at which blockchain is used along the supply chain

Results of research

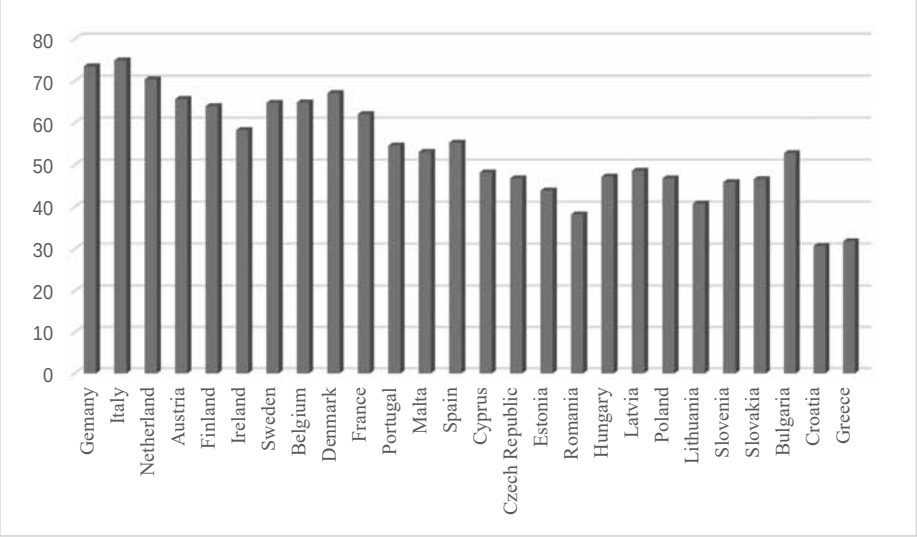
According to research conducted in Bulgaria, there are 300 registered clusters. Sofia is the main centre of clusterisation, with nearly 150 clusters. A number of cluster organisations are created in Plovdiv, Varna, Burgas and Russe. The Bulgarian clusters are not saturated since they include a small number of companies with a relatively small sales volume and the companies have a different level of specialisation and their members rely on common infrastructure and development strategies.

The companies in the clusters are mostly family-owned businesses with 100% equity capital. This guarantees independence and gives them the possibility to make quick changes and make flexible decisions, but along with that, this is a restrictive factor in terms of easy access to external financing and fast growth. The members of the cluster organisations are companies with similar, interrelated or complementary activities and specialisation. From the point of view of business sustainability, there are also well-established companies with extensive market experience. The total number of people employed in the clusters averages 1000 for the country. The cluster members are predominantly medium-sized and small companies with over 80% of the employed people working in the middle-sized companies.

According to a study by S*ala, Maticiuc, Munteanu* (Sala, Maticiuc, Munteanu, 2016, pp. 10-17), Looking at the score obtained by each country, we can see that cluster development in the western countries of Europe is seen more pregnant than in the east part of the continent. In the same time, we can say that state of cluster development in the developed countries is significantly better than in the developing ones. Figure 5 illustrated the score for state of cluster development. The top positions are occupied by 13 of the 15 European Union states that joined the European Union by 2004. Malta is the state which is intercalated in the rankings, displacing Spain, while Greece is occupying the last position of the ranking. The top-ranking is occupied by Italy, Germany and the Netherlands.

Figure 5

Score for the state of cluster development in European Union Countries in 2019



According to the methodology of EAPSMEB (Executive Agency for Promotion of Small and Medium Enterprises in Bulgaria), Bulgarian clusters are classified according to the stage of development, which is illustrated in Figure 6.

There are four developed Bulgaria clusters in the following sectors: machine building, furniture production, extractive industry, electrical engineering and telecommunications. There are 21 developing clusters in total and there are 18 clusters, that are at an initial stage. There are nonclassified clusters in the categorisation, which amount to 15% or 12 clusters and it should be pointed out that there are not logistics clusters.

The cluster approach is based on the requirement for geographically located chains of independent organisations, but this principle is not widely advocated in Bulgarian organisations. The methodology for cluster categorisation includes a system for assessing the potential of the sub-sectors of the Bulgarian economy, which contains the five factors, illustrated in Figure 7.

Figure 6

Categorisation of Bulgarian clusters by stage of development

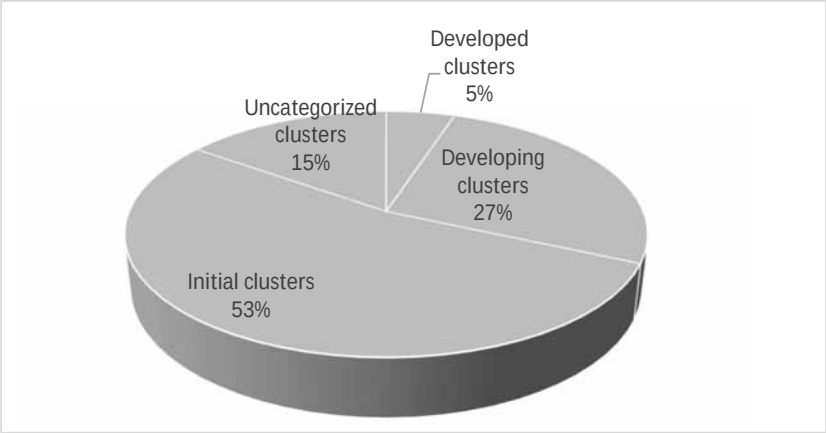


Figure 7

Factors for assessing the potential of the sub-sectors in the Bulgarian economy

Based on these criteria, the most promising subsectors in Bulgaria are fruit and vegetable processing; ICT; textile articles; wine-making; General engineering; energy; tourism; woodworking and furniture, auto parts; high technologies; Transport and Logistics. The transport and logistics sectors are included in this classification, but there are only ***two logistics clusters in Bulgaria***. Cluster organisations, on the other hand, Automotive-bw (Germany), Bayern Innovativ (Germany), Clúster de la Indústria d'Automoció de Catalunya (Spain), Galician Automotive Cluster (Spain), European Automotive Strategy Network (The Netherlands), Automotive Cluster Bulgaria Association (Bulgaria), Pôle Véhicle du Futur

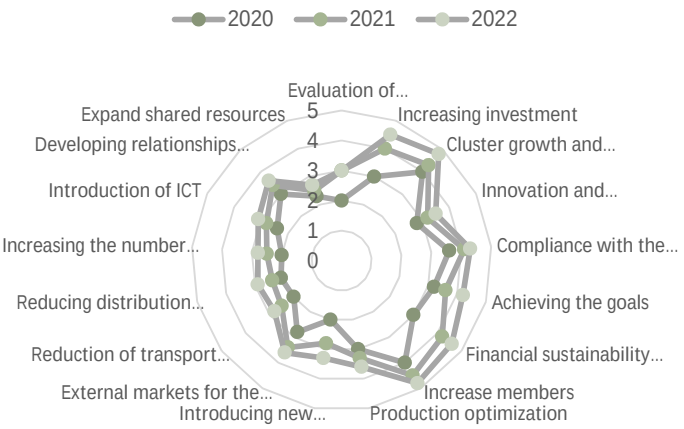
(France), Serbian Car Cluster (Serbia) and Silesia Automotive & Advanced Manufacturing (Poland) are teaming up with the European Automobile Cluster Network (EACN) to set goals that aim to be awarded the Smart Specialization Award as a European Strategic Cluster Partnership (ESCP) and building and/or increasing trust between partners and their members. The clusters listed include more than 1,400 members – companies and research institutes, of which more than half are small and medium-sized enterprises (SMEs). In total, EACN member clusters have over 300,000 employees. The partners will concentrate their joint efforts on Industry 4.0 – Factory of the Future – Industrial Modernization.

In the automotive industry, technical necessity, political sensitivities and market variation have kept final vehicle assembly, and by extension, much of parts production, close to end markets. Powerful lead firms and industry associations, largescale employment and relatively high rates of unionisation, and the iconic status of motor vehicles in the minds of consumers (and policy-makers) in many countries increase the political clout of the automotive industry. As a result, regional and national production structures remain surprisingly strong and coherent in comparison to another volume good producing industries where global sourcing of parts and materials is the norm and worldwide demand for finished goods can be met from a handful of giant production clusters. As a result, political pressures go a long way toward explaining patterns of direct investment in the automotive industry (Sturgeon, Biesebroeck, Gereffi, 2008, pp. 297-321).

The main priorities of cluster goals in Bulgaria are first and foremost related to modernisation, growth and optimisation of the supply chain, followed by growth and investment (Figure 8).

Figure 8

Radar chart of cluster efforts over the next years



The set goals are implemented through appropriate projects that companies bring within the cluster, as well as projects with producers from other countries, such as long-term

cooperation in the production of equipment, parts and finished products, servicing and after-sales services with local partners and joint appearance on third markets, expanding cooperation on new products and new partners in other countries and testing capabilities to enter neighbouring markets.

The cluster supply chain is built by groups of market participants at different levels, government institutions and other organisations of related and supporting sectors on whose joint efforts the development of the cluster and the sector as a whole depends. The retailers are the last unit in the supply chain before the end consumers. Although some companies (for example, big European chains) set up their own distribution networks (to establish their own brands on the market) as part of their strategy for vertical integration, they manage to keep the focus on the production activities. The smaller market participants actively perform distribution and communication activities, typical of the upper levels of the supply chain aiming to receive a market share. According to Velev (2007), the indicator of the intensity of the forth internal relations along the supply chain characterises the degree of importance of the cluster, reflecting the market of manufacturing production of the companies in the cluster. The indicator of sales intensity inside the cluster reflects the progress made in the clusters in Bulgaria and strengthening the relations between the organisations in the cluster.

The main indicator used to determine the strength of the trade relations along the back supply chain is the intensity of the internal purchases, which show the relative share of purchases of the cluster from organisations inside the cluster from the total volume of its purchases needed for manufacture. This indicator illustrates a low degree of development of the trade relations related to purchases in the clusters under consideration.

The main indicator of the strength of the cluster external relations in terms of the purchases (along the back supply chain) shows the relative share of purchases in the cluster by external industries from the entire volume of purchases needed for production. The study uses the formula for regional clusters since it does not include national clusters. The importance of the indicator is higher than 50%, which shows that the external deliveries have a higher value than the deliveries from the industries inside the cluster. The quality of the products or services and consequently their competitiveness on the market depend largely on the quality of the work of its suppliers. The low-quality products or services purchased by suppliers result in either unjustified expenses or losses for the company or to the dissatisfaction of the end consumers with the products delivered by the company. Both the former and the latter affect adversely the company's performance. Therefore, it is important that clusters have reliable relations back along the supply chain, which is capable of delivering products or services which correspond to the agreed characteristics – price, place and terms of delivery, availability of documents proving products/services compliance.

The key indicator used to analyse the strength of the cluster internal relations in terms of sales, i.e. forth along the supply chain shows the relative share of the cluster outbound sales, including to other sectors, for end consumption and export, from the total sales volume (i.e. of the total value of the products manufactured in the cluster). The results from the analysis show that external sales have a larger share of the sales in the cluster. This indicator discloses the relations of the cluster with external consumers as a supplier. Indicator, used to gauge the

strength of the relations in the cluster, the following indicators are included illustrate in Table 1.

Table 1

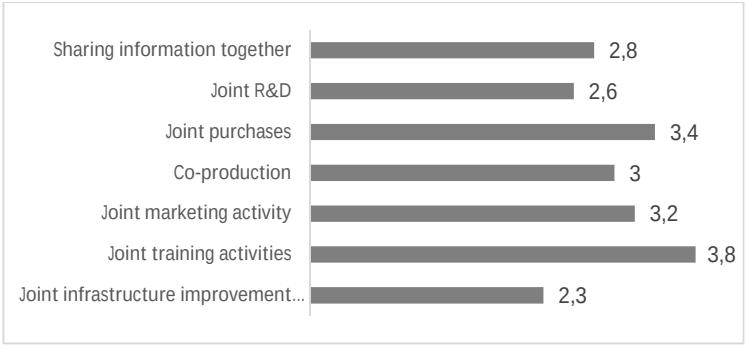
Indicator, used to gauge the strength of the relations in the cluster (%)

Indicator, used to gauge the strength of the relations in the cluster, the following indicators are included	Mean for the clusters studied for 2019	Mean for the clusters studied for 2018	Mean for the clusters studied for 2017
Analysis of the strength of the relations in the cluster in terms of sales, forth along the supply chain	38	35	30
Analysis of the strength of the relations in the clusters in terms of purchases, i.e. back along the supply chain	45	43	38
Analysis of the strength of the relations between clusters forth along the supply chain	62	65	68
Analysis of the strength of the relations between clusters back along the supply chain	72	67	64

The competitiveness of cluster partnerships is determined to a great extent by product specialisation, on the one hand, and on the other – by the organisation of the cluster network of members and partners, by the quality of the interrelations between them and by their recognisability on the international markets. The analysis of the strength of the non-commercial relations between enterprises and their associates in the cluster underlie the building up of a synergy effect and embody the high potential for speeding up innovative processes. Three research areas in non-commercial relations are included. The first area is ***an analysis of the cooperation relations related to conducting joint activities of the enterprises in the cluster***, which, the analysis shows, lack cooperation in terms of the joint activity for gathering information and informing each other, joint research and development, joint production and joint activity focused on improving infrastructure. The low degree of cooperation stands out in the field of joint activities of the enterprises in the cluster related to joint educational activities, joint purchases and joint marketing activities (Figure 9).

Figure 9

The links of cooperation on the implementation of joint activities of enterprises in clusters

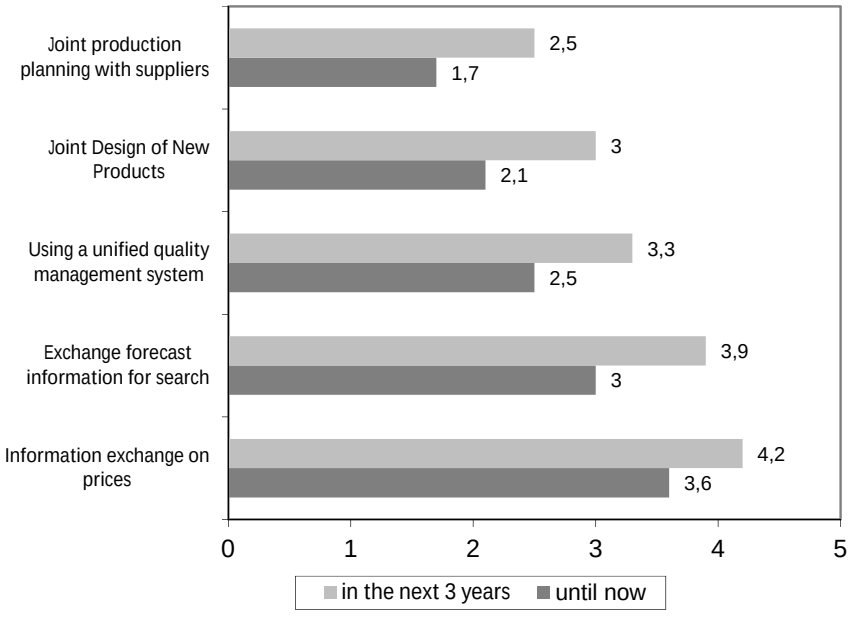


The communication mix elements most actively used are personal sales in the stores, trade fairs, open door days and demonstrations in the production workshops, direct marketing, as well as word-of-mouth communication. A common communication means among all cluster members are brochures and catalogues (common for the cluster and individual for the members) and the trade stalls where they present their capacity and production. The websites of individual companies do not contain comprehensive and regularly updated information, navigation and visualisation of the individual components – they are static without active online stores and different foreign language versions.

Clusters in Bulgaria develop public relations mainly through interviews in local and national media and organising events, but these activities are still quite limited. The messages are rather sporadic, not constant, which does not facilitate the creation of a sustainable position and trust in the mind of the target groups of clients and partners. Some of the most actively implemented activities are the participation of the cluster members, jointly and individually, in various conferences, seminars and trainings. No investments are made in the supply chains as well as in broadening the relations between the cluster members. The more widely represented trend in the supply chain partnerships are the ***vertical partnerships***. The vertically integrated clusters include companies connected through sellers-buyers relations within the supply chain. A number of international studies point out that partnerships in the supply chain are related to sharing information aimed at improving and increasing the existing production capacity. A key competitive advantage can be the joint planning of production, but it is not actually implemented, as shown in Figure 10.

Figure 10

Areas of cooperation between cluster members



Producers exchange information with the suppliers about the inventory but they still ignore the transfer of information to them about future promotions and programmes aimed at improving customer service. Producers do not share information with suppliers about sales, plans about development and growth and do not undertake activities related to planning joint activities.

Currently, the sector can be described as exhibiting insufficient levels of cooperation, communication and coordination along the entire supply chain – nowadays, key sub-sectors perform in isolation and to a great extent chaotically. The weak relations between the different units along the supply chain and the limited coordination result in the fact that producers depend mostly on import materials, are not in a position to sign collective contracts for larger orders of raw materials and vice versa – to produce collectively large output in shorter periods of time. Transportation costs are generally high due to the fact that raw materials are imported in small quantities. Generally, the geographic proximity between the companies within the individual clusters and the intensification of the cooperation between them provide an opportunity for overcoming such limitations. Since individual small and medium-sized companies could not encompass the entire range of activities, they should adopt strategies to cooperate both vertically and horizontally in order to fulfil larger orders from abroad, to keep wider and more inclusive inventory, to reduce costs related to the supply of materials, to conduct joint advertising activity and maintain a joint partnership network.

Vertical production relations between small firms facilitate production relations between firms. Where production processes can be vertically disassembled, an inter-firm division of labour based on process and product specialisation, can have positive consequences for economies of scale and scope. Specialisation reduces the capital constraints faced by individual enterprises by distributing capital costs across small firms within the chain. Vertical subcontracting and a specialised division of labour was observed in varying degrees in most of the small firm clusters (Nadvi, Schmitz, 1993).

Intense competition is an important hallmark of horizontal inter-firm relations within small firm clusters. Intense horizontal competition within the cluster does not, necessarily, preclude horizontal cooperation. Such cooperation can take place in pre-competitive areas such as the provision of infrastructure or training between potentially competing producers and can also arise where firms share large or critical production orders by pooling production capacity. This practice, frequently termed as “capacity contracting”, is often viewed as part of a survival or coping strategy. It reflects an organisational response on the part of small firms faced with severe capital constraints and market uncertainty which limit their ability to expand capacity.

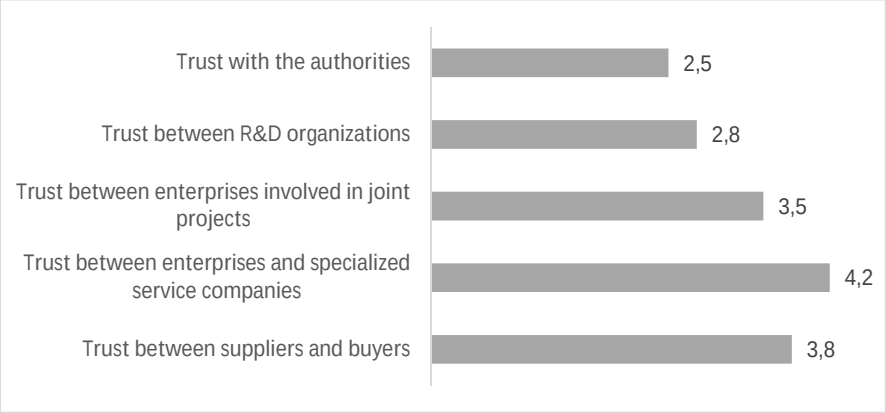
The second field of analysis of the strength of the non-commercial relations between the enterprises and their partners in the cluster is an ***analysis of the intensity of the informal contacts***. These contacts between the people in the cluster are the most difficult to evaluate but are of great interest because they can distribute the unencrypted knowledge that is of great importance to innovations. The intensity of the informal contacts depends on the proximity of the companies, the availability and activity of organisations that are common for the clusters and factors related to the place of residence, social environment, the way spare time is spent, personal preferences (Velev, 2007).

The results from the analysis show that there are no contacts between those working in other companies in the cluster, or such contacts are extremely rare and sporadic. These contacts can become a fact when there are family relations between those working in different companies in the cluster.

The third area of analysis of the strength of the non-commercial relations between the enterprises and their partners in the cluster is an ***analysis of the trust between cluster participants***, shown in Figure 11. It is trust that underlies the building of clusters as unified economic bodies and this is the basis for strengthening the cooperation between individual organisations and individuals.

Figure 11

Analysing trust between cluster participants



The analysis results show that the strength of the internal relations in the clusters under consideration is underdeveloped, both the back and forth ones along the supply chain. The conclusions based on the analysis do not support hypothesis 1, i.e. the clusters in Bulgaria have not developed back and forth relations along the supply chain according to the ***indicator for gauging the strength of the relations in the clusters***. An interesting fact to be pointed out is that only 11% of the studied clusters feature logistics companies (Third Party Logistics Provider – 3PL) as part of the cluster member companies. Logistics companies present a wide variety from the point of view of the services provided – from companies providing several packaged services to companies providing the entire range of services needed to manage and deliver the logistic services to the clients – for example, management of delivery and/or management of distribution. A special type of a third party in logistics is the so-called Lead Logistics Provider (LLP). These are companies, that provide one point of contact for the clients coordinating the activity of several 3PL providing comprehensive solutions to their clients. These logistics providers are the most appropriate members of the cluster organisations, as well as the so-called supply chain integrators (Fourth Party Logistics provider – 4PL). The fourth partner in logistics is an integrator that incorporates resources, capabilities and technologies of its own organisation with the ones of other organisations in order to design, build and maintain comprehensive solutions for the supply chain. It is

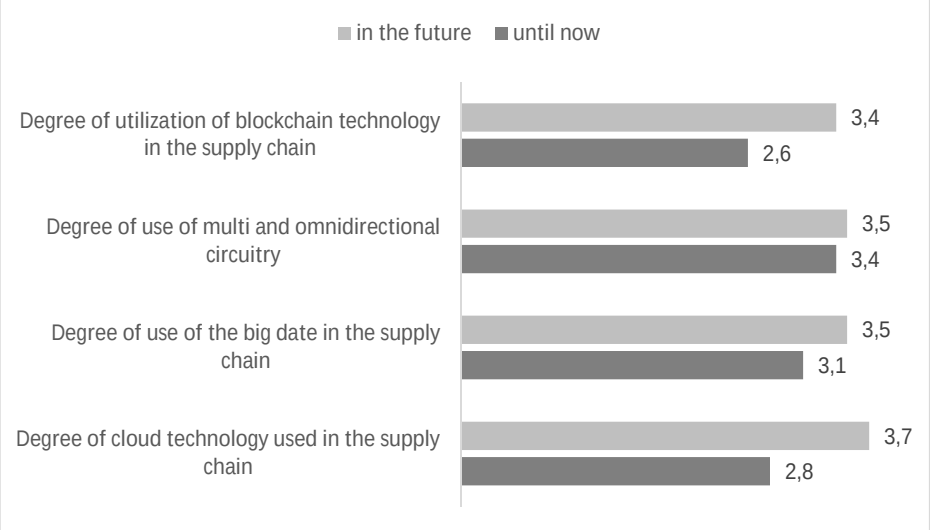
common for the fourth party companies in logistics to be highly competent in the field of supply chain management combined with an appropriate software solution. All this can justify the need for such an organisation as part of the clusters for the development of the back and forth relations along the supply chain. The results show that this hypothesis should be accepted since there is a statistically significant relation between the existence of a logistics company and the general evaluation of the cluster in terms of the degree of development of the forth and back relations along the supply chain. This conclusion is justified by the level of significance of Chi-Square Pearson, which is 0.00346. Cramer's coefficient is 0.45802. What is more, the two conditions needed for the implementation of Chi-Square, in this case, are met.

A small number of the companies in the clusters under consideration have built their own distribution network. Those that make an exception are the companies manufacturing their own trademarks. They depend on a limited number of concept stores, operating under their own brand, which, however, do not invest sufficiently in promoting merchandising, customer service and advertising. Online trade is not developed at all, or it is underdeveloped in the clusters in Bulgaria. Companies do not promote actively online stores where they can offer their production to both domestic and foreign markets. Apart from being distribution channels, concept and online stores could perform communication function to promote products. The cluster does not feature a functioning distribution network of retailers which can meet the cluster standards (for location, range of products, trade mark, service standard, type of customer base etc.) and to show interest in orders of different trademarks.

The Indicator ***use of modern digital technologies in supply chain management*** is used to prove the third hypothesis with several fields of analysis described in Figure 12.

Figure 12

Degree of use of modern digital technologies in supply chain management



The mean value of the use of modern digital technologies is approximately 3 for the indicator, which includes four fields. The multi-channel and omni-channel supply chains are not widely spread in the clusters in Bulgaria. The introduction of multi-channels will do away with the inconsistencies and will create a common system for better customer service. This means that the existing systems will have to be integrated in order to guarantee flawless fulfilment of orders. 3PL companies are not members of the cluster, but they could integrate the long supply chains and become an integral part of the cluster.

Relatively low usage of information systems and technologies in the Bulgarian enterprises is found in other researches and they mention that this problem will be resolved by the implementation of basic solutions in the beginning and more advances in the future (Dragomirov, 2014, p. 169). Digitalisation and implementation of information technologies along the cluster supply chain will contribute to the forth and back development of the supply chain in the cluster. The digitalisation along the supply chain will lead to shortening the chain through the incorporation of units within the cluster.

The creation of an online-based network used to manage the supply chain will result in better awareness and resource allocation, will save time and allow companies to focus on their core activity. According to expert evaluations, the implemented SCM cluster system facilitates: the reduction of costs of material and their storage in the organisations in the cluster by 5 – 35%. The conclusions based on the study show that modern digital technologies (cloud technology, big data, multichannels, omnichannels, blockchain etc.) are not actively used in the management of the supply chain in the clusters under consideration in Bulgaria. To justify the relation between the use of modern digital technologies (cloud technology, big data, multichannels, omnichannels, blockchain etc.) and the forth and back development along the supply chain in the clusters in Bulgaria Chi-Square Pearson is used, which is 0,00359. The results show that this hypothesis should be accepted since a statistically significant relation exists.

The conclusions based on the analysis show that it is necessary to broaden the strength of the inner-cluster relations related to sales, forth along the supply chain and to be directed towards the joint collection of information and mutual informing, joint research and development, joint production and joint activities to improve infrastructure. The joint production planning can be the key competitive advantage. To broaden the relations, conditions should be created to include more suppliers of materials in the clusters, as well as the possibility to sign collective contracts for larger orders for raw materials, when these are imported. Emphasis should be placed on the development of informal contacts in the cluster organisations, primarily on the trust between the cluster participants. The successful management of the cluster chains depends on the existence of a logistics company, that should coordinate the logistics processes both forth and back along the supply chain and they could integrate the long supply chains and become an integral part of the cluster.

Conclusion

In conclusion, it can be stated that clusters in Bulgaria have not built well developed forth and back relations along the supply chain because the results from the analysis of the strength

of the inner-cluster relations in terms of sales, forth and back along the supply chain illustrate low importance and insufficient development. A statistically significant relation exists between the availability of a logistics company and the general evaluation of the cluster related to the degree of development of the relations forth and back along the supply chain. The use of modern digital technologies (cloud technology, big data, multi-channels, omni-channels, blockchain etc.) is not at a high level and can further be developed, which will push development back and forth along the supply chain in the clusters in Bulgaria.

Possibilities to improve the supply chain management can be seen in the creation of successful partnerships between cluster participants, which are fully integrated electronically and are capable of satisfying the clients' needs. The partnerships formed in the supply chain are related to the development of relations back and forth along the supply chain. The development possibilities are based on building common strategies along the horizontal axis for providing jointly a broader and deeper product range through common channels for production realisation, including breaking into foreign markets. Such a form of cooperation can be conducted in clusters, which specialise in the production of similar products and complement each other and can develop common sales channels.

Attracting more members manufacturing products at different levels along the supply chain would guarantee greater independence, fast order completion, flexibility and competitiveness of all companies in the cluster. Apart from attracting new members, this effect could be achieved to a great extent if the existing members of the cluster share their partnerships networks along the entire supply chain: from finding the needed raw materials, processed materials, to the production of a wide variety of goods. Companies, which specialise in supporting and finishing activities could participate in the partnership network.

Attracting logistics companies in the cluster organisations would result in higher efficiency of the logistic processes. By 3PL and 4Pl cooperation, the relations in the cluster will be developed and improved by improving the service and providing faster and better communication between the companies. The cluster organisation will benefit from using 3Pl and 4Pl solutions, working together by reducing the price and providing improved services and processes which aim at guaranteeing clients' maximum satisfaction with the entire process along the supply chain.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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THEORETICAL FRAMEWORKS OF RESPONSIBLE INNOVATIONS

The article is devoted to the development of scientific provisions on responsible innovations that will contribute to the development of an enterprise. An increase in the failure probability contributes to the search for new management solutions in the face of challenges and threats. In particular, one of the tools that will adapt to the new business environment is the introduction of responsible innovations. The research focuses on the analysis of the theoretical framework of "responsible innovation" in a dynamic environment. The article analyses the theoretical basis for the definition of "responsible innovation" and related definitions. The review of 65 scientific articles laid the foundation for the analysis and systematisation of the research on responsible innovation, social and sustainable innovation, as well as responsible research and developments. Summarising these articles made it possible to refine the definition of "responsible innovation". The implementation of these recommendations will increase the efficiency of enterprises in the context of adaptation to an economic space oriented to success.
JEL: F6; M14; O35

Introduction

Responsible innovations when being implemented at an enterprise affect its activity, transforming it, and also increase its level of competitiveness. This is a fairly new trend that will promote the development of the enterprise, which, in turn, will achieve its sustainable development. In particular, this is due to the fact that the activities of the enterprise are aimed

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at reducing the environmental impact, the development of society, increasing ethical responsibility, etc.

A considerable number of studies in contemporary economic literature are devoted to the development of the concept-categorical apparatus of the conception of sustainable development and corporate social responsibility. However, in order to further improve the activities of enterprises, it is necessary to deepen the theoretical basis, to develop practical recommendations for the implementation of the definition of "responsible innovation" within the framework of these concepts. The use of responsible innovation as a basis for the study of innovative processes highlights a wide range of diverse aspects required for innovation at social enterprises (Lubberink, 2017). Therefore, it is advisable to form a single theoretical basis for the analysis of this definition, namely, "responsible innovation".

The purpose of this article is to deepen the theoretical framework of responsible innovations, based on a thorough analysis of theoretic efforts of scientists on approaches to the consideration of the concept of responsible innovations and related concepts.

The findings of this work can be used to provide guidance on how to achieve responsible innovation in the development of business concepts of organisations.

For this purpose, we follow a similar approach to this article as published in Lubberink et al. (2018), which consists of three steps:

Stage 1: A literature reviews to explore approaches to defining responsible innovation; to describe the initial framework of responsible innovation. In the future, this will become the basis for identifying and analysing the sources, in which the research on the enterprise innovation activities has been conducted, in particular, responsible innovations in the face of external challenges and threats to the sustainable development of the society.

Stage 2: Systematic review of sources for responsible innovations in the formation of theoretical frameworks. The literature on the theoretical frame of responsible innovations as well as sustainable and social innovations, responsible research and developments, published between 2000 and 2020, was reviewed. In addition, sustainable and social innovations, responsible research and developments were considered, since, in some sources, responsible innovation is similarly defined. Accordingly, this led to the formation of requirements for the above concepts.

Stage 3: Synthesis. We use this method to review the literature on the theoretical frame of responsible innovation, as our research aims to clarify this base as well as provide practical guidance to businesses engaged in innovation. This improvement will be based on the generalisation of the information received, the source of which is the existing research that has been analysed. This will lead to the improvement of the frame of responsible innovation and a clearer understanding of responsible innovation by enterprises engaged in innovation activities, in particular, certain aspects of implementing the theoretical frame of responsible innovation.

The rest of this article is structured as follows. The first stage presents a review of the literature on responsible innovations and their relationship with aspects of business activities. The second stage explains why these sources were selected for their analysis, and their quality

was evaluated. At the third stage, an analysis of the definitions of responsible innovations in the context of the implementation of the theoretical frame. The concepts of sustainable and social innovations, responsible research and developments are also analysed to determine the boundaries between these definitions and responsible innovations.

It should be noted that the aspects for considering the theoretical frame of responsible enterprise innovation include the impact of the following socio-economic and environmental phenomena. In particular, the role and influence of the concepts of society, ethics, ecology and other concepts related to the functioning of the company in the conditions of dynamic transformation not only in the economic but also socio-political environment, taking into account the economic interest of all economic entities.

The end of the article discusses these suggestions and conclusions that will be useful for researchers and business leaders interested in responsible innovation in the process of forming and implementing the theoretical frame of their companies activities in a turbulent environment.

1. Literature Review

The research on the issues of developing and implementing responsible innovation in the activities of industrial enterprises has been scientifically contributed by such economists as Blok, Chatfield, Stahl, Popper, Scholten, Voegtlin, Shilina, Pavie, Arnaldi, Reber, Ceicyte, Petraite and others.

In particular, Blok (2014) explored the issue of developing the conception that would encourage the dialogue between stakeholders involved in responsible investing.

Chatfield et al. (2017a) conducted an analysis of the enterprises' awareness of information and communication technologies in relation to responsible investments, identified the main barriers arising during the operation of enterprises, as well as factors contributing to their overcoming.

Shilina (2017) conducted the study of responsible innovation within the concept of corporate social responsibility.

Pelle and Reber (2015) investigated the moral aspect of responsible innovation in the context of corporate social responsibility. In particular, the concept of liability was discussed in detail, the approaches to corporate social responsibility (CSR) and the implications of this concept for responsible innovation were developed.

Popper, Popper and Velasco (2017) provided practical guidance on the assessment and management of responsible innovation in Europe. The author's vision contributes to improving the understanding of critical issues related to innovation (barriers, incentives, opportunities and threats) and relationships with stakeholders, as well as their management, which will, in turn, contribute to the sustainable development and transformation of social and technical systems.

Scholten and van der Duin (2015) conducted research on the ability of responsible innovation to absorb external knowledge for the better use of innovation. The authors concluded that the potential for absorption increases with the participation of stakeholders and social responsiveness, while the realised absorption capacity moderately increases through social responsiveness.

Voegtlin and Scherer (2017) argued that a responsible innovation environment is scalable in three dimensions. They also explored how legislation, governments and international organisations influence responsible investments. The recommendations in the work will contribute to complement national and international legislative provisions on innovation activities.

Ceicyte and Petraite (2016), conducted the research of responsible, innovative concepts, in particular an emphasis was placed on the formation of the state policy and innovative business activities.

Pavie, Scholten and Carthy (2014) analysed the concepts of responsibility, innovation, and their impact on the activities of the enterprise. On the basis of the conducted research, the main problems of the introduction of responsible innovation were determined.

Arnaldi and Gorgoni (2016) researched the development of the concept of responsible innovation, its political and economic context.

In his article, van Oudheusden (2014) analysed the concept of responsible innovation at the level of the European Union policy. In addition, the political issues arising in the framework of this concept were highlighted and the ways of their contemplation were proposed.

Reber (2018) considered responsible research and innovation as a link between technology and ethics.

In general, the opinions of these scientists, in our viewpoint, require further study of the theoretical basis in terms of distinguishing the definition of "responsible innovation" as a part of the process of interaction between companies in the same business environment.

2. Systematic Review of Sources for Responsible Innovation

2.1. Methodology

This study provides a systematic review of existing literature on responsible innovations, as well as relatively sustainable, social innovations and responsible research and developments. For this purpose, the algorithm of scientific literature search was used, followed by critical evaluation. In our opinion, this approach is quite transparent, which allows us to confirm the quality of the conducted research (Tranfield, et al., 2003). According to Denyer et al. (2009), five steps were taken to conduct the study, such as: formulating questions; conducting research; selection and evaluation of scientific sources of information; analysis and synthesis; conclusions with results.

2.1.1. Question Formulation

The literature review is designed in such a way that it reflects the research of scientists in accordance with innovations (sustainable, social, responsible), which were considered in the business context. This literature includes sources on responsible, sustainable, social innovations and responsible research and developments.

The analysis of literary sources was conducted on the basis of an approach guided by the answer to the question "How do responsible innovations affect the enterprise activities?"

The list of questions, that are arising during the study is as follows:

1) What definitions of the definition of "responsible innovation" do scientists provide?
2) Are responsible innovations related with society, ethics, ecology?
3) What definitions are provided by the scientists who aimed to explore sustainable, social innovations, responsible research and developments?

In accordance with the formulated questions, the following research hypotheses were identified:

H1. Responsible innovations affect society.

H2. Responsible innovations affect ethics.

H3. Responsible innovations affect ecology.

H4. Responsible innovations are related to related definitions (sustainable innovation, social innovation, responsible research and development).

Based on the questions raised, a qualitative analysis of the scientific literature was conducted, in which innovative activities at the enterprise were considered. Therefore, we believe that this approach is more appropriate than other methods, such as statistical ones.

2.1.2. Locating Studies

A background search was first used to find the literary sources related to the definition of innovative activity, including responsible innovation. After that, an analysis of the selected sources was made to ensure that these articles answer the questions raised. For this purpose, it was evaluated whether responsible, sustainable, social innovations, as well as responsible research and developments, were mentioned in the articles. Search queries were found to include different keywords. At this stage, a research methodology specialist, who specialises in systematic literature reviews, was involved. Under his leadership, keywords and phrases were developed and refined for research.

To conduct the research, a systematic search was conducted in electronic databases, in particular, such as: Web of Science and Scopus. Library search engines and manual information retrieval were used to better reach the sources of information on innovation enterprise activities.

The obtained results of the search and analysis of the literature are given in the discussion.

2.1.3. Study Selection

There were distinguished the following types of literature for conducting this research: articles, conferences, book chapters, reviews of articles. The main criteria for the inclusion of sources were the following: articles including information on the introduction of innovative activity at the enterprise; empirical articles; articles covering responsible, sustainable, social innovations, responsible research and developments; articles on Responsible Innovation. Exclusion criteria: articles written in languages other than English or awkwardly translated into English; articles on policy and innovative activity; articles that are journalistic in nature; articles concerning state regulation of enterprise innovation activities; articles of inadequate quality and content.

As a result of the literature analysis, the articles with corresponding titles, abstracts and keywords were selected. Four researchers searched for relevant articles. Then they discussed the search results and the possibility of including the selected material in the study. After that, the authors further engaged in the selection of relevant literature. Making a unanimous decision on the relevance of the article was followed by the source-for-match keyword evaluation of the source.

2.1.4. Evaluation

Subsequently, all the articles that were selected during the discussion were evaluated for their quality. This was done on the basis of a method that allows assessing quality on the basis of the following questions: whether innovative issues may be useful in the study; whether the studies are presented in a way that can be used by other researchers; whether the research is well done using the methodology; whether the study is consistent with the goal (Walshe, Luker, 2010).

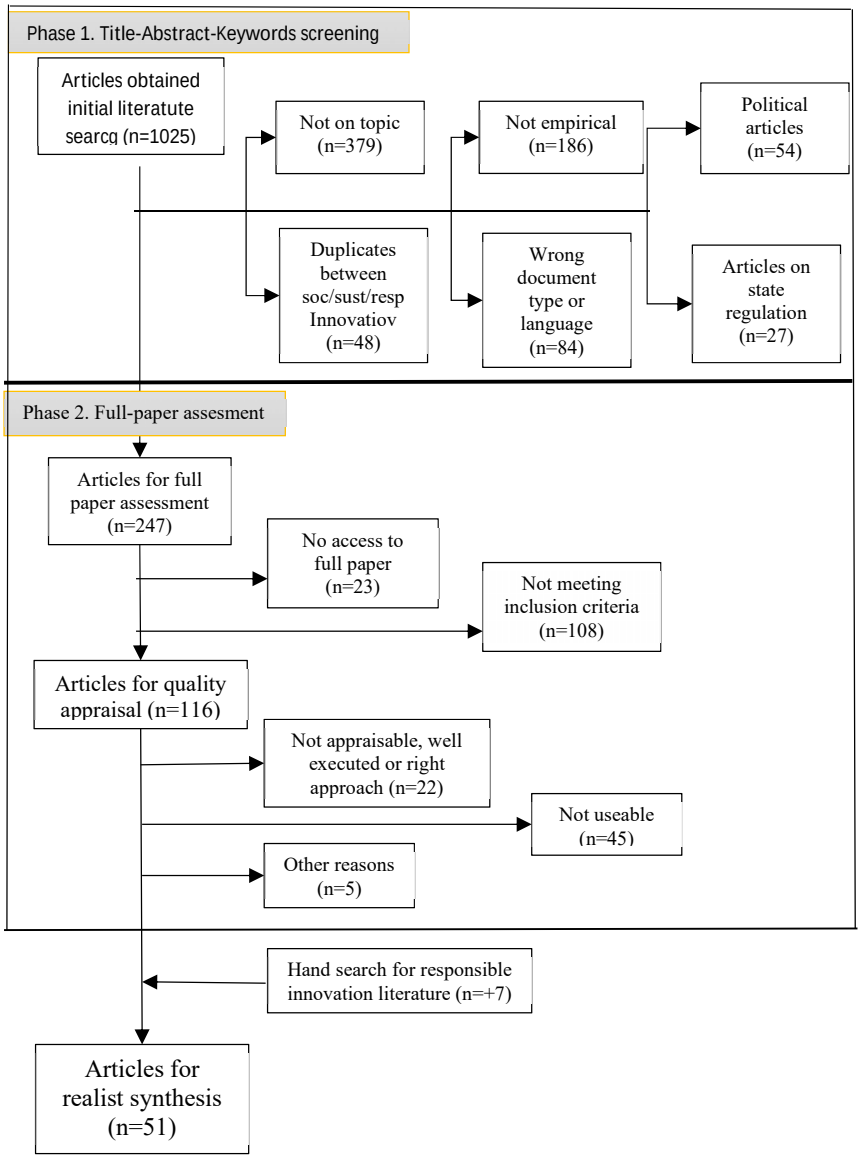
To evaluate the quality of literature sources, initially, the first question was asked. If the article did not meet this criterion, then no further steps were taken regarding it.

2.2. Descriptive Summary

At the beginning of the search for sources for the study, 1025 articles were obtained. The title, abstract, and keywords were downloaded for each of them. Subsequently, 778 articles were excluded based on inclusionary and exclusionary criteria. In total, 247 articles were evaluated. Of these, 108 articles did not meet the inclusion criteria and were excluded. Also, 23 articles could not be retrieved via the Internet or libraries. Thus, as a result, 116 articles were downloaded. Of these, 27 articles did not meet the quality criteria and were therefore excluded. Another 45 articles were decided not to be included as they were not considered useful after evaluating their content. The last stage was a re-search for scientific sources, as long as this topic is relevant and new articles constantly appear. This step resulted in additional 7 articles. Therefore, the research is based on 51 scientific sources. The graphical representation of the described process is presented in Figure 1.

Figure 1

Block diagram of the choice of scientific sources for the research



3. Defining Responsible Innovation in the Theoretical Frameworks

When analysing approaches to defining the frame of "responsible innovation", it was discovered that there is no consensus among modern scholars about it. In the course of our study, it was discovered that there are several approaches to this framework, in particular, those based on the selection of the following determinants: social, ethical, ecological.

3.1. Responsible innovation and society

The first approach to defining the frame of "responsible innovation" is based on the fact that the innovation activity of a particular enterprise is viewed only as an instrument for improving its social sphere.

Ravesteijn, Liu and Yan (2015, p. 675) indicate that "responsible innovation is a new and promising approach in addressing social problems through new technology and in dealing with diverging values in particular, thus addressing the dilemmas of sustainable development".

Brand and Blok (2019, p. 7) note in their study, that "the aim of RI is that innovators also take responsibility for the impact of their products on society as a whole".

Von Schomberg (2011, p. 47) identifies that "responsible innovation" is:

A transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).

In the viewpoint of Rip (2014a), "responsible research and innovation implies changing roles for the various actors involved in science and technology development and their embedding in society".

Grinbaum and Groves (2013, p. 132) note that "the innovator, as bearer of a political responsibility specific to his or her social role, has to ask herself about the wider social and political significance of what she intends to accomplish, and what her actions may accomplish despite her intentions".

For example, Chen (2016, p. 14) reckons that "sustainable innovation indicates the process of which within a long period, depending on the continuous learning of its employees, the enterprise continuously implements innovative integration of its key resources (knowledge, production, and market) to obtain uninterrupted growth and sustainable development".

These definitions, in our opinion, are, to some extent, of one-sided nature, since they take into account, first and foremost, the social component of the enterprise. In the framework of this approach, the authors use the term "responsible innovation" in the sense of "social development". However, we believe that responsible innovation is a complex category that can not be reflected only by one side of the enterprise activities.

3.2. Responsible innovation and ethics

Some authors consider only the ethical aspect of the theoretical framework of "responsible innovation".

Van den Hoven (2013, p. 82) defines "responsible innovation" as (social and ethical determinants):

An activity or process which may give rise to previously unknown designs either pertaining to the physical world (e.g. designs of buildings and infrastructure), the conceptual world (e.g. conceptual frameworks, mathematics, logic, theory, software), the institutional world (social and legal institutions, procedures and organisation) or combinations of these, which when implemented expand the set of relevant feasible options regarding solving a set of moral problems.

In their work, Chorus, van Wee and Zwart (2012) emphasise that "responsible innovation is an innovation that minimises unwanted side-effects of the production and use of innovation and integrates social, environmental and ethical aspects in the innovation process". It focuses on the development of social, environmental and ethical components.

L'Astorina and Fiore (2017, p. 164) note that "ethics in RRI focuses on research integrity: the prevention of unacceptable research and research practices, and on the ethical acceptability of scientific and technological developments in the society".

Burget, Bardone and Pedaste (2017) adhere to the same approach. They suggest understanding "responsible innovation" as "to include all the stakeholders and the public... to increase the possibilities to anticipate and discern how research and innovation can or may benefit society as well as prevent any negative consequences from happening" (Burget, et al., 2017, p. 15).

The analysis of the approaches to defining the frame of "responsible innovation" has shown that the attention of researchers is focused mainly on the development of entrepreneurial activities, based on the introduction of measures to improve the ethical sphere. However, the introduction of measures to implement responsible innovation in the activities of the enterprise should contribute to the development of other areas of its activities as well.

3.3. Responsible innovation and ecology

The report of the European Commission (2012) with the account of social and ecological constituents gives the following definition: "responsible innovation means taking care of the future through collective stewardship of science and innovation in the present".

Based on the selection of social, economic and environmental determinants, Tihon and Ingham (2011) suggest their definition. The authors assume that "responsible (product) innovation strategy is the voluntary integration of social and environmental concerns in the development, production and marketing of new products, their underlying processes and relationship with stakeholders, that lead to superior (economic and non-economic) performances and enable to meet present needs without compromising the capability for future generation to meet their own needs".

In particular, Sutcliffe (2013) notes that "responsible innovation" is implemented "to achieve social or environmental benefits. Assessing the effectively prioritising social, ethical and environmental impacts, risks and opportunities both now and in the future, alongside the technical and the commercial".

Ceicyte and Petraite (2014, p. 404) give the following definition:

Responsible innovation meet the criteria of evaluation taken in several stages in the development of innovative solutions as a balanced whole, based on the interaction with the stakeholders; manifested through an organisational profile in the innovation process, the assessment and provision of social, ecological, economic and ethical responsibility to society and the environment.

The presented interpretations of this definition are much more meaningful, but all the same, scientists emphasise only certain components of responsible innovation.

In our opinion, it is still advisable to define the notion of "responsible innovation" on the basis of a systematic approach, that is, the one that combines all the identified determinants (social, economic, ecological, ethical).

3.4. Responsible innovation and other definitions

Table 1

The key content of the theoretical frameworks "responsible innovation" and related economic categories

Economic concepts	Factors influencing making decisions as for the importance of the implementation into the enterprise's activities	Major outcomes of the implementation
Responsible innovation	Challenges arising from the innovation activities of enterprises	Acquisitions resulting from the activities of innovation that promote the development of the enterprise in economic, social, ethical and environmental spheres
Sustainable innovation	Solving issues related to the negative impact on the environment, profit from activities related to the implementation of the principles of sustainable development (Adams, 2016; Charter, 2007; Franceschini, 2016; Lubberink, 2018; Schiederig, 2012; Ozaki, 2011; Hargadon, 2015; Maxwell, 2009)	The result is an innovation, that takes into account social, economic and environmental trends (Boons, 2013; Chalmers, 2013; Draper, 2013; Lubberink, 2018; Schiederig, 2012; Smith et al., 2010; Alvaro, 2018; Boons and Lüdeke-Freund, 2013; Larson, 2000)
Social innovation	Certain processes taking place in society, unresolved social issues (Burget, 2017; Lubberink, 2017; Mulgan, 2007; Repo et al., 2019; Unceta et al., 2016; Huczek and Smolarek, 2018; Bitencourt et al., 2016)	Innovation that allows the introduction of measures that will facilitate the resolving of certain social issues (Burget, 2017; Lubberink, 2017; Sharra, 2009; van der Have, 2016)
Responsible research and development	Innovative activity, which arises as a result of research on the basis of responsible activity (Burget, 2017; Lubberink, 2018; Ribeiro, 2016; Stilgoe, 2013; Von Schomberg, 2011; Wickson, 2014)	Development of innovative activities of the enterprise, based on the introduction of certain decisions grounded on the principles of responsible attitude (Lubberink, 2018; Von Schomberg, 2011; Blok et al., 2018; Stahl et al., 2017)

Source: compiled by the authors on the basis of literature analysis.

In order to avoid the false interpretation of the theoretical frame of "responsible innovation", it is necessary to carry out its analysis with related definitions. Some scholars in their work offer the following definitions along with responsible innovation: innovation, social innovation, responsible research and developments. Therefore, in order to specify the content of the category "responsible innovation", it is necessary to conduct an analysis with the identified economic categories, to identify the key differences (Table 1).

The results shown in Table 1 allow concluding that the main features indicating the difference between the identified related categories are: the factors that determine the need for certain activities at the enterprise; implications of the implementation of the proposed measures.

Discussion

Consideration and research of the formulated scientific hypotheses showed:

According to the first hypothesis, it was suggested that responsible innovations affect society. The study found that the definition of "responsible innovation" has an impact on social processes.

Accordingly, the second hypothesis was that responsible innovations might affect the ethical component of the enterprise. This hypothesis is also confirmed, as other authors also emphasise the ethical behaviour of the enterprise.

The third hypothesis was that the relevant innovations affect the environment. Many authors are currently concerned about the environmental component of business activities. We believe that in defining the concept of "responsible innovation" it is worth noting their impact on environmental issues.

In formulating the fourth hypothesis, it was noted that in addition to the concept of "responsible innovation", some authors operate with related or related concepts. However, the concepts of "responsible innovation", "sustainable innovation", "social innovation", "responsible research and development" should be distinguished. Therefore, this hypothesis cannot be accepted, because in the process of research, a number of differences between these definitions were identified.

Consequently, based on our analysis, we believe that responsible innovation is an interactive process of creating and implementing innovation based on the empirical combination of determinants (social, economic, ecological, ethical) that motivates all stakeholders involved in the innovation process to be responsible to society and the environment for the result of their innovation activities.

Conclusions

The development of the global economy and the deepening of integration processes, especially in Europe, lead to the improvement and emergence of new economic processes in a turbulent environment.

As a result, we highlight the core theoretical frameworks of responsible innovation:

- at the stage of creating the idea of the responsible innovation, it is necessary to think strategically about the perspective needs of society, and not only about personal profit in the market;
- the success of responsible innovation depends, among other things, on the willingness of society to perceive this innovation as a market necessity and not as a trend of the rivalry of innovators;
- successful responsible innovations can only be achieved if they are environmentally sound;
- the essence and purpose of responsible innovations must be in accordance with the principles of ethics;
- success in implementing responsible innovations is not constant and requires continuous monitoring and appropriate response to changes in the market environment;
- the success of responsible innovation is partly accompanied by uncertainty, so innovators should be prepared not only for success but also for failure;
- quite often, the success of responsible innovation is influenced by the factor of credibility, but it should not be expected

The scientific novelty of the research is to develop the theoretical frameworks of "responsible innovation" based on the definition of the main determinants of this process, the identification of the related categories and the development of measures for the implementation of responsible innovation in the activities of enterprises.

However, there are several limitations to this study that must be considered in interpreting the results of these scientific advances. For example, a systematic review of literature takes a long period of time, and the interval between the search for literature, the systematisation, the evaluation of the literature, and the publication of these research results is quite significant. Therefore, as a limitation, it may be argued that perhaps the most recent research on responsible innovation may have been overlooked. Another limitation is the exclusion from the study of empirical articles that are not written in English. Thus, some of the achievements in this field have been omitted on the one hand, and on the other – substantial scientific research is published in English to attract the attention of the scientific community of different countries of the world.

In our opinion, further research may be conducted to study practical international experience in the development and implementation of a system for making managerial decisions in the context of responsible innovations implementation by enterprises, as an integral part of the organisation strategic management.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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DIGITALIZATION AND THE NEW LEGAL AND ECONOMIC CHALLENGES TO EMPLOYERS IN IMPLEMENTING INTERNAL CONTROL

The study examines the main aspects and issues related to personnel management in the context of digitalization of the work process. The economic analysis is based on a study of the obligations of employers arising from the current regulations in the country. People are the main economic resource through which all basic management goals and objectives of any company are achieved. The internal control processes in the enterprises are regulated by sources of the state legislation, as well as by various internal normative acts specific for the respective enterprise or branch. HRM (Human Resource Management) systems are considered as part of this management process. The legal part of the study focuses on the characteristics of control according to the current labour legislation, focusing on the problems arising from the processes of digitalization, respectively the risks of affecting the subjective labour rights of employees. Based on the performed complex economic and legal analysis, conclusions with theoretical and practical orientation are formed, leading tendencies in the area of control are identified and recommendations for legislative adjustments are made.
JEL: K29; K31; M41; M42

Introduction

The modern digital age is associated with positive effects in all spheres of society, including labour relations. There are indisputable benefits expressed in quality and productivity increase, facilitation of risk-involving labour, etc. At the same time, digitalization has an impact on processes directly and indirectly related to the performance of the workforce. The focus of this study's authors is the internal control exercised by the employer for employees' compliance with labour legislation. The issues of control have been the subject of scientific interest and have been studied in their various aspects in the economic (Donev, 1990; Nedyalkova, 2020; Blagoycheva, 2019), as well we in the legal

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theory (Andreeva, Yolova, 2011; Andreeva 2009; Andreeva, Yolova, 2018; Andreeva, Dimitrova, 2019). At the same time, digitalization in the labour process requires a new managerial and legal perspective to cover, assess and regulate current aspects of control, taking into account the risks and trends in this area caused by the involvement of technology and on this basis to give a new economic model of the internal control and to propose an update of the legal framework regulating control. The analysis of these issues, as well as the proposal of managerial and legal solutions to the issues of internal control is not only of theoretical, but also of great practical importance, which is conditioned by an objective social need. Currently, our country and the world are going through a situation of crisis, caused by the global pandemic, which, combined with the dynamics of digitalization processes requires employers to impose both an increased level of internal control and take greater care of their workers and employees. The employer, as the organizer of the work process, is committed to comply with all provisions of labour law, inseparably integrated with the special provisions concerning the type of the specific labour process and to create working conditions, aimed at protecting the health of the worker or employee (Blagoycheva, et al., 2019). New technologies often disrupt, supplanting older ways of doing things and rendering old skills and organizational approaches irrelevant (Manyika, et al., 2013).

The legal protection of labour relations is carried out by the legislator through the use of a complex approach, combining measures of different legal nature, among which control occupies a key place. An analysis of the various aspects of this protection system, as well as a good knowledge of the processes taking place in the system of internal control, will significantly contribute to the protection of the subjective labour rights of workers and employees, and the quality of the performed work.

Control has an important role also in terms of compliance with labour law, and despite the disparity of the parties in the legal relationship, it is a natural function of employers' legal capacity. Different types of control for compliance with the labour legislation exist in law. They determine the efficiency of combining different forms, directed to the two parties of the legal labour relationship: on the one hand, control over employers is carried out by the competent state authorities, while control over workers and employees represents internal control exercised by the employer in their capacity as leader of the work process. The effectiveness of control is embedded in the complex exercise of its various types, thus monitoring the strict implementation of the obligations of the parties, ensuring the prevention of offences, respectively bringing offenders to justice.

The subject of this study is the internal control for compliance with the obligations of workers and employees, analyzed both through the prism of management processes and through legislative mechanisms for impact and prevention, regulated in labour law. At the heart of the study are issues related to the economic and legal aspects of control; the authors have conducted the study around two interrelated axes, giving a perspective at topical issues related to control, concerning problems, trends and challenges in the context of digitalization**.**

The aim of the study is to consider the main aspects of the problems related to personnel management in the context of digitalization of the management process. The economic and legal analysis is based on a study of the obligations of employers arising from the current

regulations in the country. Emphasis is placed on the problems arising from the processes of digitalization, respectively the risks for infringing the subjective labour rights of employees. On the basis of the performed complex economic and legal analysis, conclusions are formed with theoretical and practical value, leading tendencies in the area of control are identified and recommendations for legislative amendments are made.

The above aim is achieved through the fulfilment of the ***following tasks:***

- to study and formulate the main problems in personnel management with the help of HRM systems, part of the ERP systems upon exercising internal control;
- to formulate typical traits characterizing internal control in view of compliance with labour law;
- to study the main risks and issues upon exercising internal control in the conditions of labour digitalization;
- on the basis of the comprehensive economic and legal analysis, to make conclusions intended to help employers exercise efficient internal control;
- to make recommendations *de lege ferenda* aimed at the improvement and updating of labour law as a whole and of its principles in particular, accounting for the methods and forms of control impact in order to make labour law adequate to the current technological processes.

In terms of subject matter, the authors have set some limitations that would contribute to the better interaction of the economic and legal analyses. The economic part of the study presents the technology of the control process through the application of the HRM (Human Resource Management) system, which is part of the generally established ERP system. Internal control is presented as the main management tool, through which the main management goals and objectives are achieved.

In the legal part, the authors have addressed only the basic problems and risks arising from the digitalization processes, leaving out of scope the detailed analysis of the current labour law framework. In order to achieve the set goal and the related tasks in the study, traditional scientific methods applicable in economic and legal research have been used, namely: induction and deduction, current normative analysis, etc.

The study takes into account the legislation, practice and relevant economic and legal literature up to 30.08.2020.

1. Problems in Personnel Management with the Help of the HRM Systems, Part of the ERP Systems when Exercising Internal Control

Personnel control should be seen as a complex process, which should start indirectly during the recruitment of staff for a given position and should continue throughout the period during which staff carry out their activities in the company. Therefore, internal control over staff is a multi-layered and multi-directional process that is aimed at:

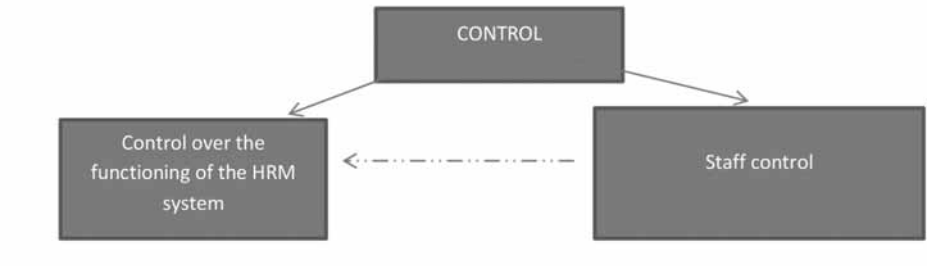
- Improving the overall activity of the enterprise in order to optimize and minimize production costs.
- Establishment of violations and deviations from compliance with labour legislation.
- Assisting the employer in the implementation of digital personnel management processes, also targeted at the accurate work measurement and reporting.
- Supporting the processes of documenting the processes, that affect the change of staff structure and qualification.

According to various scientific studies, the quality of internal control improves significantly (i.e. by about 80%) through the established and implemented HRM (Human Resource Management) systems (Snell, Youndt, 1995), as the respective system has advanced functional modules; in addition to staff reporting and salary calculation, the respective HRM has a number of other options, namely: executing the relevant staffing table; maintaining an online digital document flow related to staff (orders, employment contracts, staff requests, memos, payslips, etc.); calculation of salaries; calculation and determination of allowances, deductions and compensations; processing of quantitative data and derivation of quantitative indicators. The HRM system outputs mainly quantitative data, with a functional limitation for displaying non-quantitative data. With a good organizational structure and providing access to the system to relevant stakeholders, including access to internal controllers, the system can properly achieve its functional purpose, which is aimed at supporting the company by making the right management and control decisions.

In relation to the purpose, tasks and functions of internal control, its scope can cover two main directions (Figure 1).

Figure 1

Types of internal control



The two types of internal control are different in terms of procedures, applied methodology (which includes means and methods of control), persons involved in the control process, etc. The control that is exercised over the functioning of the HRM system should be considered as part of the system control that is carried out in the enterprise itself. The control over the HRM system very much depends on the circumstance, whether the respective system for the enterprise functions separately or it is part of the general ERP

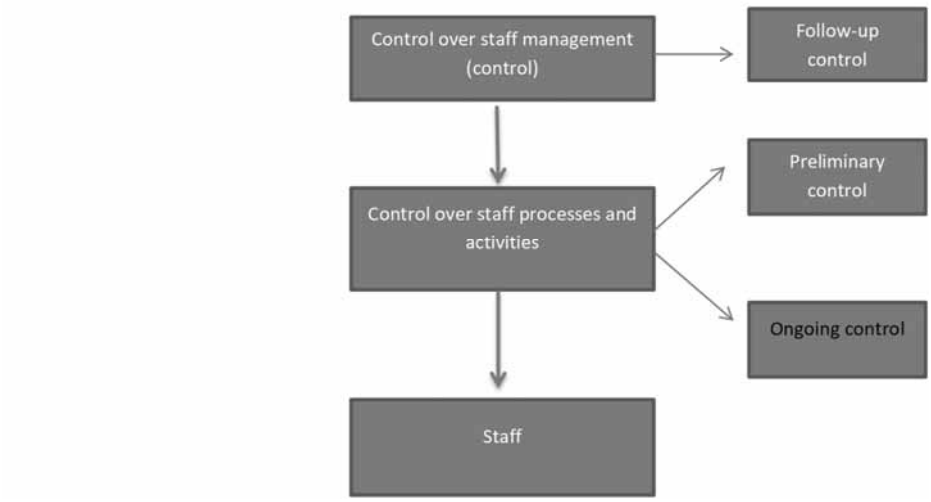
(Enterprise Resource Planning) system. When the HRM system is part of the ERP system, the control takes place together with the general control over the whole ERP system.

The overall control of the systems includes constant monitoring and surveillance of the processes. Such control is performed by both data controllers and data users (directors, managers, external individuals, etc.) (Mahdi Salehi & Marziyeh Farzaneh, 2018). Control by the data controllers is aimed at optimal use of the system, increasing staff productivity and significantly reducing the possibility of making mistakes. Data controllers can perform ongoing, follow-up and preliminary controls, while data users, depending on their powers, carry out follow-up control, with the exception of the company's managers, whose powers allow them to carry out not only follow-up control, but also preliminary and ongoing controls.

The second type of control is very specific for each company, namely the control over the personnel and the subsequent control over the management of the personnel. Both controls provide information in the established HRM system, which automatically summarizes and displays quantitative indicators of the effectiveness of control, and indicators that analyze the overall condition of staff, such as: obligations to staff; staff turnover analysis; analysis of staff satisfaction and problems in the work environment; analysis of risk factors regarding safety at work, analysis of staffing for each activity of the enterprise and analysis of the distribution of human resources. The two types of control are performed sequentially, (Tomov, 2007) (Figure 2).

Figure 2

Control over staff management and control over staff processes and activities



Follow-up control over staff management is exercised by senior officials, usually persons who have not participated in and/or have not been involved in the direct control (management) of personnel. Follow-up control can also be carried out by external

controllers, such as inspectors at the General labour Inspectorate Executive Agency, the National Revenue Agency (NRA), experts at the court, etc.

Typically, the HMR system is built on a modular basis, with each module including separate functions and procedures for a given area of personnel management. Each module is fully integrated with the other modules and the input of certain information in the respective module is automatically related and presented in the other modules. Therefore, the HRM system is convenient from the point of view of controllers who exercise direct internal control over personnel management, as the information derived from direct monitoring of processes and procedures in the company is documented and presented online in the approved HMR system. In this way, the follow-up control over personnel management can be carried out very easily, as the information from the performed preliminary and current control is available in the respective HMP system.

With the introduction of HMP systems, the internal control in the enterprises significantly changed its scope, the control procedures changed, and changes also occurred in the control inspections documentation and in entering the results thereof. There is a significant difference in control activities before the introduction of HMP systems and after the introduction of HMP systems. Internal control has significantly shifted its focus from direct financial monitoring to checking the behaviour of staff and compliance with and implementation of specific standards and rules in the company. ***In addition to human resources (staff)***, internal control inspections ***also encompass***: remuneration; verification of the accrued social, health and tax liabilities related to salaries; verification of the accrued and paid compensations; check on the accrual and payment of paid annual leave; verification of the presentation and disclosure of the financial relations with the staff in the financial statements of the company, etc. ***New internal control areas are the audits of***: "the processes related to the movement and change of staff within the company; communications, connections and lines of interaction with staff; staff risk assessment" (Apostolov, 2019).

The technology of internal control changes significantly after the implementation, introduction and validation of the HRM system, as the application of analysis as a means of control is facilitated by the use of the functions of the HRM system. In addition to the legality checks aimed at checking compliance with regulatory requirements, policies and processes in personnel management, the control is also aimed at checking indicators such as: average number of staff; number of occupied or vacant jobs in the company; the number of complaints lodged by staff and the nature of such complaints; number of employees leaving and establishing the reasons for staff turnover, etc. The technology of the internal control over staff has also changed in the direction of providing a final assessment of the condition of the controlled object. Accordingly, this has given a new impetus to the development of internal control, as the top management of the company relies on internal control not only to identify violations and irregularities, but also to provide management with an overall assessment of the current state of the inspected object and opportunities for its development, assessing and taking into account future risk factors.

The process of internal control over staff goes through the following stages:

1. *Determining the goals, tasks, scope of internal control and the starting positions of the internal controllers*. In this first stage, the persons who are engaged in the control process are identified, it is determined whether during the control process the staff will make a self-assessment regarding the risk factors, the expectations for development in the company, evaluation of their work, etc. Accordingly, at this stage, it should be determined whether in the final stage of the control process, the controllers should derive their self-assessment of the past control process. In principle, this requirement is applicable to state enterprises, i.e. the internal auditors are obliged to perform their self-assessment for the audited entity in accordance with the requirements of ***Standard 1311 Internal Assessments (International Standards for the Professional Practice of Internal Auditing)***. Private companies are not required to carry out internal self-assessments, which, on the other hand, would have improved their activities and, from the staff's point of view, the relevant self-assessments would have identified a number of problem areas that have not been established by the company's management.

2. *Determining the norm of control* – the norm of control "reflects certain relations related to the behaviour of objects and regulates rules of conduct corresponding to the objective needs and requirements of applicable public laws. As an analogue of reality, it is a specific means of detecting deviations in the behaviour of the individual, the enterprise, etc." (Donev, 2010). "All written and unwritten rules, including internal regulations, orders, instructions, decrees, etc." (Nedyalkova, 2019) are also included in the norm of control. It can be assumed that the norm of control, reflecting the legal aspect of the control process, determines the direction in which the whole control process will take place, as well as the possible results in relation to the respective regulatory scope.

3. *Determining and assessing the actual condition of the controlled object*: from a temporal point of view, this stage is the longest, and very often, it is at this stage that significant inaccuracies are incurred on the part of controllers, whole hasty actions usually lead to incorrect determination of the current state of the controlled object. Very often, during the control process, the inherent risks of the company, which affect staff development and impact the overall control environment in the company, are not properly identified. This stage is also essential since the results of the next control stages depend thereon and are determined thereby. Determining the actual condition of the site, in addition to using the HRM system, can be done using the methods of factual and documentary control. The HRM system can provide information about: the access system of the company (i.e. the time of starting and finishing work); display of information on the observance or non-observance of the work schedules; conducting internal trainings; information on the staff incentive systems, etc. The HRM system guides controllers in carrying out internal controls, but cannot replace the actual factual on-the-spot inspection. Very often, the internal controllers develop questionnaires, through which information on the staff's current condition is displayed. This information should be well analyzed and examined using different methods.

4. *Comparison and/or juxtaposition*: this is the fourth stage of the internal control process. The controllers should compare the current condition of the site with the approved regulatory requirements. In terms of staff control, this means that the internal control persons should compare the condition of the controlled object not only with the

established state normative requirements such as: labour Code (LC), Social Security Code (CSR), Income Tax Act of natural persons (PITA), the application of accounting standards (IAS/IFRS or NSS), etc., but also with the approved internal regulations, procedures and instructions of the company itself, such as: Rules of internal labour order, Internal remuneration rules, Rules for safe working conditions, etc.

Each company, according to the specifics and peculiarities of its activity, has a different work organization. The different organization of work also influences the ways of calculating remuneration. From the point of view of internal control, the most common are violations related to the calculation and payment of remuneration, as well as violations related to the determination of tax and social security liabilities. From the point of view of the HRM systems for determining and calculating remuneration, depending on whether the respective enterprise applies IAS/IFRS or NSS, respectively, they are adapted to the relevant accounting standards, ie. IAS 19 Employee Benefits or NSS 19 Employee Benefits. In addition to the above standards, a company's internally approved HRM system is adapted to the requirements of the labour Code and other regulations: Social Security Code, Personal Income Tax Act, etc.

The connection of the HRM systems with the legislative acts has had a positive effect on the development of the internal financial control; however, this has not resulted in exempting companies from this type of control. On the contrary, it is during this fourth stage of the control process that the controllers should very carefully determine, in relation to the type and form of work, what types of remuneration and tax liabilities should be charged to the staff. In principle, HRM systems allow for automatic accrual of wages, according to the requirements of regulations, but controllers should carefully monitor and determine whether for an individual the so-called "short-term benefits, retirement benefits, compensation or other long-term income" should be charged according to IAS 19 or "termination benefits, post-employment benefits, unconditionally acquired employee benefits, short-term employee benefits, employee benefits or respectively it is a question of current service cost" according to NSS 19. The specificity of HRM systems is that already during the administrative entry of the information on the employment record of the respective employee, the system automatically sets options for selection for calculation and determination of remuneration. It is very often here that technical errors are made by data operators and these errors are reflected in the payroll. The internal controllers should compare the situation with the regulatory requirements at this stage, but also make a de facto control of the relevant HRM system regarding the presentation of the information therein.

5. Establishing and deriving a result from the data obtained from the comparison and juxtaposition of the data performed during the fourth stage. When comparing the actual condition of the site with the specified regulatory requirements, respectively, the results can be: coincidence or deviation (positive or negative). When the internal controllers establish a match, it means that the control object meets all regulatory requirements and it respectively reflects the qualitative legal and economic aspects financially, in terms of accountancy and economically. In case the control persons establish during the control process that there is a deviation between the norm of the control and the established current state of the controlled object, i.e. a discrepancy exists, which can be both in

positive and in negative values and dimensions, then accordingly the controllers should identify and analyze the reasons for these deviations. Example of a positive deviation can be when the accrued remuneration exceeds the actually earned, illegal accrual of benefits in favor of staff, etc.; examples of negative deviations: less calculated working days for work done by workers/employees, less accrued remuneration, less accrued compensation, less accrued additional remuneration, etc. When such discrepancies are found, the control process should continue in the direction of searching for the reasons and the culprits who have allowed these discrepancies.

6. Implementation of a system of impacts: this is the final stage of the control process. It is characterized by the fact that the powers of the internal control persons for a given enterprise are limited in comparison with the persons who carry out external control. In case of deviations and irregularities internal controllers should provide guidelines and instructions to the management of the company regarding the elimination of violations, and the management of the company decides whether to hold the respective culprits responsible, imposing personal material and / or disciplinary liability. In external control, controllers have greater powers. Accordingly, they can directly seek liability in the form of administrative and criminal liability or material liability.

2. Legal Aspects of the Challenges Facing Employers in Carrying Out Internal Control in the Context of Digitalization

Compliance with labour legislation and the subjective obligations of the parties in the employment relationship is carried out through control. Control is a basic, specific legal guarantee for compliance with labour law. The special control mechanism for the protection of labour relations is necessary and reflects the high social significance of the human benefits protected by labour law (Andreeva, Yolova, 2011).

In the current Bulgarian labour legislation, a complete and comprehensive legal framework of control was set with the adoption of the labour Inspection Act (LIA – SG № 102, 2008). In the years before the adoption of this regulation, the law, respectively, the legal doctrine, used different concepts and, accordingly, introduced a different set of measures for exercising the types of control (Labor Code, CMD No.15, 12.05.1973, Law on the Prosecutor's Office). The historical roots of control can be traced back to the 1990s and are associated with the nascent capitalist relations in the country, respectively, the industrial processes.[4] During the years of its centuries-old development, control has undergone an evolution in the legal system, following the dynamics of social processes and the spirit of the labour law framework, built in accordance with the leading social processes in the country. The term "control" has been established in the current labour legislation and doctrine, since it most accurately reflects the essence of this authoritarian activity. One of the approved classifications of control subdivides it in view of the position occupied by the

[4] In the first decade of the 20th century the foundations of the labour legislation and the control activity related to its observance were laid, and a number of normative acts were adopted: the Law on Women's and Child labour in Industrial Establishments (SG, № 66, 1905); The labour Inspectors Act (SG, № 238, 1907); The Occupational Hygiene and Safety Act (SG, № 129, 1917), etc.

control bodies in relation to the controlled object. This criterion underlies the grouping of internal and external control (Dimitrova, Mateeva). The present study analyzes some of the main legal aspects of internal control, linking it to digitalization and the risks, respectively trends, that are evident as a result of the technological processes. Such control is carried out within the relevant organization or enterprise, i.e. it is employer control in its various aspects and specialized subtypes, through which the employer monitors compliance with labour laws within the employer's authority granted to them. Internal control is part of the general system of control, and in this unity it should correspond to the common state policy in this area. Precisely due to the need for coordination of the subjects performing functions of internal and external control, the legislator has granted a guiding and coordinating function to the Minister of Labour and Social Policy, which derives from the norm of Art. 6, item 1 of the Labour Inspection Act.[5]

The internal control carried out by the employer is a complex process covering a number of activities aimed at strict compliance with the overall organization in the respective company or organization, at the same time, it is timed so as to cover the various stages of the activity in order to prevent offences and rectify the damage caused.

In view of the criterion 'time of implementation', control is divided into preliminary, ongoing and follow-up. Ongoing control occupies the most important place in the system of internal control, i.e. it ensures that the labour process is carried out in accordance with the regulations of the labour legislation, in compliance with the labour rights of the parties in the employment relationship.

At the current stage of development of labour relations resulting from the dynamics of processes related to the introduction of artificial intelligence (AI) and new technologies, one of the important challenges for labour law doctrine, respectively for the legislator, is to adapt control mechanisms in a way that creates a real guarantee to protect the right to work. Socio-economic rights are subject to international law and, accordingly, the sources of control for compliance with labour law follow the international regulatory framework and the leading trends (Yanylov, 2000).

Drawing a clear line between the personal and professional lives of employees is not an easy task, given the transformation that the labour market is undergoing and, accordingly, the penetration of technology in all areas of labour performance. The employer expands the forms of internal control, supplementing the familiar ones with new ones, based on information technology. In this way, on the one hand, the employer protects its own interests and, on the other hand, seeks to ensure the normal functioning of the labour process. The nature of the employment relationship is such that it is synallagmatic in nature, which implies the interconnectedness of the rights and obligations of the parties, respectively, their interests. In the hypothesis of internal control, dependence is preserved because through technology, the employer protects its own interests and at the same time, the rights of workers. At the same time, the legislation lacks clear regulation of the level of

[5] Art. 6. In order to achieve the objectives of this law: 1. the Minister of labour and Social Policy shall manage and coordinate the activities for implementation of: a) the overall control for observance of the labour legislation: b) integrated control for ensuring healthy and safe working conditions; c) specialized control under the Employment Promotion Act and the Disability Act.

admissible internal control, so that the employer does not trespass from the official to the personal sphere of the employee.

In this regard, we shall note some of the main problems with a practical focus, which are not yet subject to legislative regulation.

Communication in the modern digital society is carried out mainly by e-mail. Employers are increasingly introducing a new form of control, namely over their employees' correspondence through the office e-mail. On the one hand, this is reasonable in order to create a "safe" virtual environment, as well as to ensure prevention against infection with computer viruses, but seen from another angle, this internal control may be illegal and/or in violation of moral and ethical norms.

At the international level, Art. 8 of the Convention on the Rights of Man[6] proclaims the inviolability of private and family life, home and the secrecy of correspondence. Accordingly, in item 2 the hypotheses of admissibility of control by the state authorities in the exercise of this right are considered.

In order to introduce control that is effective, but does not violate the subjective rights of workers, in the first place, it is necessary for employers to provide the forms and limits of this control activity in their internal acts: for example, as part of the Internal labour Rules or in a specially issued act (instruction, order, etc.). In addition, the issue of the ethical side of online communication should not be overlooked. Many employers in areas where there are codes of ethics make additions to their rules, stipulating rules for communication and respectively ensuring the possibility of bringing the person to justice in case of non-compliance. At this stage, however, our national legislation lacks rules governing this type of relationship between the parties in the employment relationship. On the one hand, this is considered normal given the equality of the parties and the leading role of the employer in the labour process. At the same time, however, the modern digital environment presupposes communication that has long gone beyond the real dimensions of "physical" communication, and this presupposes legislative guarantees for regulating the employer-employee relationship in this regard. We consider it necessary for the legislator to introduce ***a new labour law principle of "ethics" in electronic communication***. Based on it, an update can be made in the individual labour law institutes to ensure compliance with the said principle.

The second aspect of control is related to the technical capabilities which employers use to control the behaviour of their workers and employees, for example: filtering incoming and outgoing correspondence, tracking visited Internet sites, access to correspondence content, etc. Unfortunately, Bulgaria lacks a rich experience in this area, there is scarce court and administrative practice which can give an answer about the admissible level of by

[6] Art. 8 of the Convention on the Rights of Man
1. Everybody has the right to privacy and family life, to housing and to the secrecy of communication.
2. The interference of the state authorities in the exercise of this right is inadmissible, except in the cases envisaged in the law and necessary for a democratic society in the interest of its national and public security or of the country's economic welfare, for preventing unrest or offences, for protection of the health and morals or the rights and freedoms of others.

employers in the digital environment through modern technical means. This question has been raised in its different aspects in the legal doctrine (Andreeva, 2019; Yaroslava, 2010), however, no comprehensive study of control in the digital environment and the related risks, respectively propositions for legal safeguards of the parties' rights has been carried out so far. In the practice of the European Court of Justice, cases related to employers' internal control over their employees' correspondence are no exception[7].

A **generalized conclusion** can be drawn that when it is a matter of official correspondence and the respective employer has stipulated in its internal rules clear instructions for the implementation of this type of control, the ECHR usually finds that there is no violation of Article 8 of the Convention, i.e. if we transfer this experience, it can be recommended for Bulgarian employers to exercise such control over the activities of their employees, because in this way with the care of a good manager they would seek to protect their business and professional secrets, to protect the personal data of contractors, to guarantee the rights of all parties involved. At the same time, this process should be regulated in the internal acts which employees should be made aware of, both at the time of establishing the employment relationship and on an ongoing basis, at the time of updating the respective regulation. Given the risk that such forms of control activity affect the personal subjective labour rights of employees, it is advisable to invite trade union representatives in the process of discussing the acts. This is not stipulated as an explicit requirement in the applicable labour law, however, we believe that it would only create an atmosphere of trust and effectiveness of control.

It is evident that the introduction of new technologies in the conditions of permanent digitalization of processes is a trend that needs a strict regulatory framework to regulate the processes of employer control within the limits of human rights. A brief look at EU legislation presupposes the establishment of forms of interdepartmental and, most often, ongoing control to follow established European Community values. In this regard, decisive guidance, outlining the framework of tolerable impact should be sought in the fundamental acts that cannot be overruled with the mechanisms of national legislation – in particular, the Charter of Fundamental Rights of the EU and the European Pillar of Social Rights. In the EU Charter of Fundamental Rights (2016/C 202/02)[8] the inviolability of human dignity, physical and, above all, mental integrity, working conditions, protecting the health, safety and respect for the dignity of the worker, definition of clear boundaries between personal and professional life, guaranteeing the level of the general right to protection of personal data, is stipulated as a basic framework for exercising the right to work and by analogy,

[7] ECHR decision on the Barbulescu v Romania case (61496/08); the Libert v. France (588/13) case; Copland v. UK (62617/00) case

[8] As a reflection of the European Union's commitment to the protection of human rights and as a consequence of the Treaty of Lisbon (01.12.2009), the Charter of Fundamental Rights of the European Union (2010 / C 83/02) introduces into Union law a set of personal, civil, political, economic and social rights of citizens and permanent residents of the EU with a direct state commitment to implementation and advocacy.

when applying control mechanisms. At the level of personal data protection, a requirement is stipulated for the respective national legislator that these data (including for the needs of the control impact – authors' note) be processed in good faith, for specific purposes and on the basis of the consent of the person concerned or by virtue of another legitimate ground provided by law, whereby the person to whom the data relate has the right of access to them, as well as the right to request their correction.

The European Pillar of Social Rights[9] as a fundamental document for further development of a wide range of individual subjective rights, respectively their development in the direction from the first and second to the third generation also presupposes concrete initiatives at a Community level, and at the same time – their strict observance and further development in the acts of the national legal systems. Fundamentally focused on employment and social protection issues, as well as on adapting the European social model to the challenges of the digital society, the social pillar has also been established as a normative framework for evolution in the development and upholding of basic human rights by supporting fair and dignified forms of realization of the right to work. In the spirit of its tendency to serve as a benchmark for well-functioning labour markets and social systems, it reinforces the Community's understanding of the dignified exercise of the right to work with appropriate protection of personal data in the context of employment.

Along these lines, there are many acts of the community institutions aimed at protecting the identity of workers in the conditions of aggressive digitalization of work processes and the need to exercise control over the performance of labour functions. In this sense, a wide range of measures are deployed in the direction of guaranteeing and protecting the right to safety of workers in the digital revolution, giving rise to threats to personality and pathologies, which are qualitatively different in nature and are especially typical for remote work. In this regard, for example, it is assumed[10] that "social dialogue at European, national and sectoral level is a useful tool to examine in more detail whether and to what extent the health and privacy of workers need additional protection in times of ubiquitous digital mobile communication and what measures are appropriate in this regard." A means of preventing them is e.g. the so-called right to detach from the working atmosphere, recognized in France and applied in certain sectoral and company collective employment

[9] Its development dates back to the speech of the President of the European Commission Jean-Claude Juncker in 2015 "On the state of the Union", further developed at the Social Summit on Equity for Employment and Growth in Gothenburg on November 17, 2017 when the Interinstitutional Proclamation between the EC, the Council and the EP was signed. The pillar is based on existing legislation at EU and international level. There are borrowings in particular from the Community Charter of the Fundamental Social Rights of Workers of 1989, the European Social Charter of 1961, the revised European Social Charter of 1996 and the European Social Security Code of the Council of Europe. The principles also take into account the relevant conventions, recommendations and related protocols of the International labour Organization (ILO) and the United Nations Convention on the Rights of Persons with Disabilities.

[10] Opinion of the European Economic and Social Committee on 'Skills building and development, including digital skills', in the context of new forms of employment - new policies and the development of roles and responsibilities (2017/C 434/06).

agreements in certain EU countries.[11] The forthcoming direction of the evolution of this right is its assessment and further development at the European level, taking into account the need to comply with the provisions concerning working hours, rest and leave of absence, on the one hand, and on the other – in view of applying the new approach and philosophy of balance between professional and personal life. In this sense, it is obvious and indisputable that whatever control measures are applied, they should be established within the limits between the need to exercise control impact for the performance of work functions and the limits of the individual's privacy. The latter is particularly typical of new types of employment contracts concerning remote work, privacy and professional engagement, which are still being established, both as a framework and as an adaptability to the legal model.

A steady trend at a Community level is the increased activity of institutions in developing ***ethical frameworks in the use of artificial intelligence***, including such related to the application of control mechanisms.[12] Thus, in the European Parliament Resolution on a comprehensive European industrial policy in the field of artificial intelligence and robotics (2018/2088(INI)), 12 February 2019[13] explicit emphasis is placed on the need to create ethical rules ensuring the development of AI decision-making systems which are human-oriented and ensure accountability and transparency. In this sense, and not without reason, concern is expressed about the use of AI applications, including those related to face and voice recognition, in programs for the so-called "emotional observation", i.e. monitoring the mental state of workers with the understanding that "these programs are inherently contrary to European values and norms protecting the rights and freedoms of individuals."

The guidelines aimed at creating adequate ethical and legal frameworks are fully subordinated to the understanding that artificial intelligence actions and applications should be in accordance with ethical principles and the relevant national, Union and international law. If we look at them through the prism of labour ***law and employer control, we can summarize them in the following aspects****:*

1. *Integration of the principles of security and protection of privacy* already in the design of policies related to robotics and artificial intelligence, in strict compliance with the right to protection of privacy and the right to protection of personal data provided in Art. 7 and 8 of the Charter of Fundamental Rights and in Art. 16 of the Treaty on the Functioning of the European Union;
2. *Data processing procedures* should be in line with the applicable law, confidentiality, anonymity, fair treatment, privacy and data protection;

[11] In France, a law has been passed on the right to detach from the work atmosphere, and in Italy there is a debate on this issue and it is recognized in some collective employment agreements.
[12] Motion for a European Parliament resolution containing recommendations to the Commission on civil law concerning robotics (2015/2103 (INL)), based on a report from 27.01.2017, Communication "Artificial Intelligence for Europe" to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions, COM (2018) 237 final, White Paper on AI - Europe in search of excellence and an atmosphere of trust (Brussels, 19.2.2020 COM (2020) 65 final), etc.
[13] https://www.europarl.europa.eu/doceo/document/TA-8-2019-0081_BG.html.

3. *Revision of the rules, principles and criteria* regarding the use of cameras and sensors in accordance with the Union legal framework for data protection;
4. *Any future EU regulatory framework on AI* should ensure privacy and the confidentiality of communications, the protection of personal data, including the principles of legality, fairness and transparency, personal security and other fundamental rights, such as the right to freedom of expression and of information;
5. It is especially important in the application of control measures to emphasize *the requirement for clear, unambiguous and informed consent by individuals*, while requiring confidentiality, anonymity, fair treatment and destruction of related personal data;
6. *Ensuring that the consent given* by the data subject will generate data only for the intended purposes.

At the same time, in the course of developing future principles and rules, compliance with Regulation (EU) 2018/1807 of the European Parliament and of the Council on a framework for the free movement of non-personal data in the European Union of 14 November, 2018, as well as with the General Regulation on Data Protection should always be sought in order to ensure a high standard of personal data protection with adequately applied default measures.

It is obvious that the creation of a comprehensive, permanently established and applied normative framework, guaranteeing a regulated control mechanism protecting the freedoms and dignity of the individual, is still a starting process both at the European and subsequently on a national level. It is an indisputable fact, however, that the introduction of digitalization in labour processes, on the one hand, dramatically increases the possibilities and methods for control measures and mechanisms applied by employers, but on the other, it is an extremely vulnerable area of adequate regulation and a fair legal framework from the point of view of individual freedoms.

Our proposals in this direction at the level of introduction of labour law principles and, in particular, the introduction of practices and norms in the internal normative acts can be summarized in the following aspects:

1. *Introduction of a strict and mandatory legal framework for the level of admissible internal control* with the use of technological means in accordance with the common European documents and the General Regulation on data protection;
2. *Establishing in the rules of internal order* and their respective ethical charters procedures for the forms of control with the help of artificial intelligence within the optimal aspect, taking into account the needs of the control impact, with possible inclusion in the individual and collective employment contracts;
3. *Strictly observed adequate level of social dialogue* in establishing, applying and using data in the types of ongoing control applied by the employer;

4. *Level of informing employees about the exercised forms of control* in accordance with the control mechanism with guaranteed protection of personal data and non-admission of exercise of control in the absence of consent;
5. *Introduction of the principle of ethics in the electronic communication and the digital environment* in general, in the exercise of control of official correspondence with counter-commitments to prevent misuse of information, dissemination of information and data.
6. *Strict observance of the established principle of balance between professional and personal life* and non-admission of control impact, setting tasks and controlling their implementation within the established periods of rest. The latter should be guaranteed even in the case of remore work contracts and, in the general case, through interdepartmental rules and practices also safeguarded through sectoral agreements with the social partners.

Conclusion

The joint study of economic and legal aspects of internal control exercised by the employer for compliance with labour legislation on the part of employees is aimed at emphasizing both the management side of the issue concerning the labour process and certain risks and challenges to the law, related to the digitalization processes, requiring adequate legal protection of the subjective labour rights of workers and employees.

The study places special emphasis on the topicality, necessity and legal changes in the field of internal control. The technical means not only contribute to the better organization of work and increase its quality, but they are also a powerful tool for exercising control by the employer over the activities of its workers and employees. Very often, this exceeds the permissible limits of employer powers and interferes with the privacy of individuals. This merging of professional and private life through controls carried out through modern technological possibilities is a particularly worrying trend and requires urgent legislative intervention in order to respect workers' rights, as well as to ensure the implementation of other related labour-law institutions: holiday, working hours, leave, etc.

Legislative changes are currently needed to clearly regulate the boundaries of internal employer control in order to protect the rights of employees and create guarantees for non-interference in their private lives. The tendencies of increased activity at a European level are a fact and are undoubtedly the next step and challenge before the Bulgarian legislator. In this line, an update of the labour law sources should be made, which should cover the acts of the different hierarchical levels, starting from the main general act in the labour law, the labour Code and reaching the employer‘s internal acts. At the legal level, we believe that new labour law principles governing relations in the digital environment should be added, as well as new subjective obligations should be introduced for both parties to the employment relationship, failure to comply with which should trigger the mechanisms of liability.

Along these lines are the proposals made delege ferenda for the introduction of the principles of "ethics in the digital environment", "optimality of internal control", awareness and prior consent, use of data exclusively for the needs of control, etc.

Internal control is different for each company, as it reflects the internal rules and procedures adopted by each company. This diversity and non-uniformity of internal control activities are due to the lack of precise regulations by various legal institutions, which is a prerequisite for the lack of uniform and accurate standardization of internal control. HRM systems support the control process, but they cannot fully standardize this process for all enterprises. Their scope is again reduced to the respective enterprise. Accordingly, this again brings to the fore the question of the importance and significance of the overall management of the company i.e. the extent to which the employer has a clearly established concept of staff management and how, respectively, the management exercises direct and indirect control over personnel. Also, the implementation of proper and effective control over staff is a prerequisite for achieving good added value for the company, since human resources are the main factor in achieving the strategic goals of the company.

It is indisputable that the need to exercise employer control, on the one hand, and to respect and guarantee the limits of personal freedom and inviolability, on the other, are divided by an extremely fine line challenging the law in the new digital society. It presupposes the establishment of limits in the exercise of basic human rights: the right to work on the one hand and the right to personal freedom, freedom of opinion and dignity on the other.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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STRATEGIC PATTERNS OF NATIONAL POSTAL OPERATORS' INTERNATIONALIZATION: A NETWORK AND RESOURCE-BASED VIEW APPROACH

The paper builds on previous research about the importance of the international market for the development of national postal operators (NPOs) and the inter-organizational nature of their participation in international business and studies how they could further expand the latter. By integrating theories in the fields of strategic management and international business, in particular the resource-based view and the network approach to internationalization, the author outlines the relation "networks – resources", thus highlighting the role of networks in terms of providing access to resources that facilitate the expansion of international operations. The theoretical foundations of the research serve as the basis for proposing a view on the internationalization of NPOs: a process of building positions in traditional and new networks through penetration as well as extension and integration, with access to resources available in these networks being at the heart of the process. Then, a framework for expanding NPOs' international activities is provided; it consists of three strategic patterns that represent combinations between the networks used and the international operations applied. Thus, the paper addresses the general lack of research concerning the internationalization of these companies, among other contributions.
JEL: F23; L32; L87; M16

Introduction

There is a great variety of businesses providing delivery services: national postal operators, private operators, courier and express delivery companies, parcel integrators, freight-forwarders and consolidators, fulfilment houses, companies offering green logistics solutions by using bicycles and electric vehicles, etc. Regardless of the existing differences, these services are to a large extent substituted, which results in an intensifying coopetition both nationally and internationally.

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National or designated postal operators (NPOs) are organizations that are legally obliged to provide the universal postal service, i.e. delivery of a range of postal shipments (letters, small packets, parcels, etc.) at affordable prices and in accordance with defined quality targets and frequency. These companies have distinct positions on their home markets and in the international business environment due to a number of reasons which differentiate them from the rest of the above-mentioned players. As a representative of the public sector and an instrument of national economic and social policies, they have played a key role in providing citizens, businesses and institutions with a basic and accessible means of communication. NPOs used to have a monopoly position on the relevant domestic markets, and today they have an obligation to provide a certain range of services, which is an expression of their traditional social functions. The interconnectedness of national networks has created a global network for delivery of various shipments, which adds crucial international dimensions to the activities of designated operators. Moreover, the postal sector is highly regulated and has a well-developed institutional framework, with the companies themselves being integrated into international organizations on a global and regional level. This determines the application of uniform rules for postal operators' activities and a high degree of standardization of the services provided.

Market reforms, the growth of international trade, technological development, competitive pressures and changing customer preferences, among others, challenge the traditional positions of designated operators. They alter their functions in terms of serving the relevant internal markets and facilitating the internationalization of national economies; they impact the balance between the pursuit of economic and social goals and bring to the fore new international business opportunities. This requires looking for patterns of further internationalization of NPOs in view of repositioning them in today's business environment and guaranteeing their sustainable development.

Objectives and Methodology

The aim of this paper is to propose a framework on how NPOs can expand their international business operations.

The following research objectives will facilitate the achievement of the aim:

1. To build the theoretical foundation of the research study by summarizing and integrating theories in the fields of strategic management and international business.
2. To present a view on the internationalization process of NPOs.
3. To outline the strategic patterns of expanding NPOs' activities abroad that constitute the framework.

The core proposition of the paper is that postal operators can follow different patterns to expand their international operations depending on the networks they choose to build positions in and the degree to which they integrate the resources available in these networks.

The importance of the research study is determined by the specific positions of NPOs both at home and abroad, as explained in the introduction; by the growing integration of the global

economy and the need to take into account the threats and opportunities stemming from the international market when formulating corporate strategies, plans; by the increasing diversity of participants in international business, including state-owned enterprises (SOEs), and the growing interest of researchers in the role of the state as an "entrepreneur" in international business. The research results can be used by various organizations involved in the postal sector in relation to the policies, strategies, plans, etc., that are developed and implemented.

Although various postal sector studies exist, and some of them touch upon the presence of operators on foreign markets, none of them adopts a general international business approach. They have been conducted by international postal organizations such as the Universal Postal Union (UPU), the Association of European Public Postal Operators (PostEurop), the International Post Corporation (IPC), or by the European Commission, etc., and focus on diverse aspects such as the evolution of the universal postal service market, regulations, employment, entry into new business lines and development of new services, remuneration systems for international mail, implementation of new technology, consumer attitudes, etc.

In view of the above, the starting point of the paper is previous research by the author, which demonstrates the inter-organizational nature of designated operators' participation in international business. In line with it, an assumption of this paper is that NPOs are SOEs. Despite the fact that there are privatized operators as a result of the ongoing postal reform, the number of companies that are 100% privately held is still small. For example, out of the 32 national operators of the member states of the European Union and the European Economic Area only 4 are 100% privately held, and 21 companies are 100% state-owned; the state is a minority shareholder in 1 operator and a majority shareholder in 6. At the same time, the European postal sector is considered as the most advanced from the perspective of the postal reform. Then, a theoretical perspective regarding this process is proposed on the basis of a literature review of applicable theories in the fields of strategic management and international business. The choice of the latter is influenced by the findings of Toteva (2019) about the basic model and postal operators' interaction with various market players in traditional and new networks and by existing papers that explore the importance of networks for providing access to resources that facilitate international operations, for example, Elango et al. (2007) and Chetty et al. (2003). Thus, the methodological basis of the research is shaped by the interdisciplinary and systematic approaches, and a number of methods of theoretical and empirical analysis are used, such as analysis and synthesis, abstraction and generalization, deduction and induction, comparison, classification, etc.

The paper is structured as follows. First, some key aspects of the international activities of designated operators based on previous research are summarized. Second, the theoretical foundations of the research study are laid. Third, a view on the internationalization process of NPOs is proposed. Fourth, the relation "networks – resources" is explored by offering a classification of the resources facilitating operators' internationalization. Fifth, a framework on how they can expand their international operations is presented. Finally, the main conclusions are summarized and suggestions for future research are outlined.

1. Basic Model for National Postal Operators' Participation in International Business

Toteva (2019) argues that designated operators' participation in international business is an inter-organizational phenomenon, i.e. the basis of this process is the interaction of operators with various organizations in traditional and new networks. The operations of NPOs have always displayed important international dimensions as they facilitate communications between individuals, businesses and institutions both at home and abroad. The ***basic model*** for operators' international activities, as defined by Toteva (2019), involves the provision of services for international delivery of shipments of various contents (documents, goods, samples, etc.), dimensions, weight or delivery times, and between diverse types of customers (C2X, B2X, G2X, where X stands for the recipient – individual customers (C), business customers (B) and governmental institutions (G)).

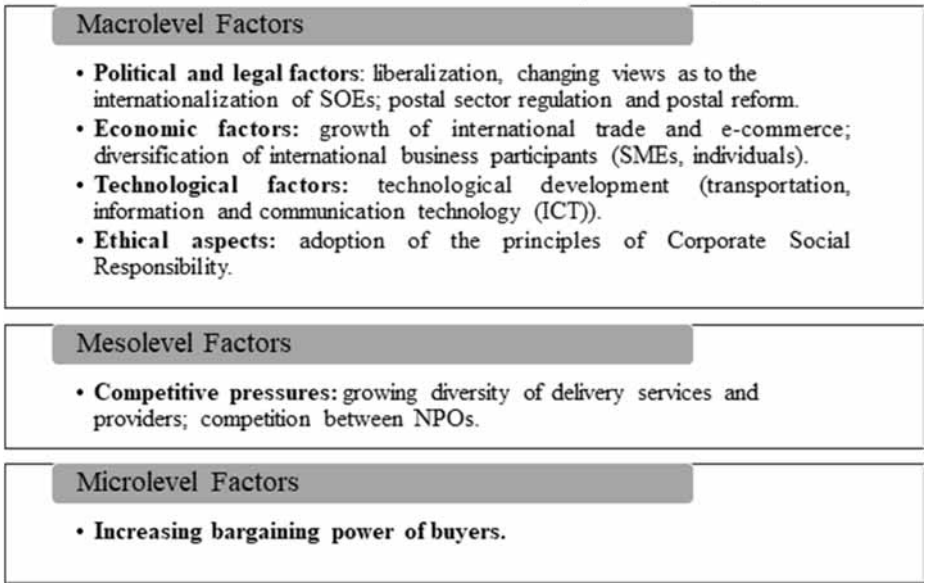
This model, which has contributed to establishing national operators as a key representative of the group of facilitators in international business (according to the classification by Cavusgil et al. (2012)), exhibits the following main features. First, NPOs focus on providing the described services to local customers while displaying a relatively passive attitude to foreign markets. Second, the model is shaped by the interaction between national operators as leading business partners in accordance with the regulations and practices negotiated within the global postal network. This interaction resembles relations between customers and suppliers, and is based on the principles of cooperation and non-competition. Access to markets abroad is indirect and is gained through the relevant designated operators. In view of the classification of international business operations into traditional and complex (Karakasheva, et al., 2005; Karakasheva, 2011), Toteva (2019) draws a parallel between the basic model and the international sale as a major cross border operation and intermediary operations as its variants. The latter implies a low degree of commitment between partners in the global postal network as they retain their legal, economic and production autonomy. There is a high level of standardization in terms of implementation procedures, documentation used, etc., with the risks that participants are exposed to being relatively limited.

Toteva (2019) argues that the basic model is influenced by two groups of factors. Historically, it has been shaped by the administrative heritage (as considered by Bartlett, et al., 2000) of NPOs. This relates to their participation in two ***traditional networks*** where the state is present – the system of state institutions in each country and the global postal network in its capacity as a business and intergovernmental network, and the interaction with organizations in them (foreign postal operators, state institutions, the UPU[2], etc.). Nowadays, a range of macro, meso- and micro-level factors of the business environment, as shown in Figure 1, create conditions for the expansion of NPOs' international operations, and challenge the basic model. Thus, further internationalization requires interaction with a wider range of market players (competitors, business customers, e-tailers, software developers, etc.), building new relationships and entering ***new networks***.

[2] The UPU is a specialized agency of the United Nations. The organization is the main forum for cooperation between the various players in the postal sector, where they agree upon the regulations for provision of international mail delivery services. http://www.upu.int/en.html (accessed 31.08.2019).

Figure 1

International business environment factors – a postal sector perspective



Source: Toteva, 2019.

2. Theoretical Foundation: Resource-Based View of the Firm and Network Approach to Internationalization

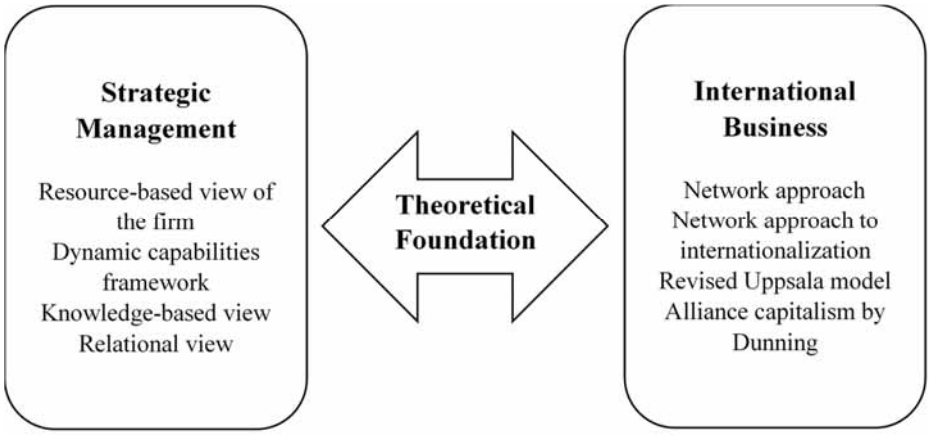
This section contains the theoretical foundation of the research study, which is the basis for proposing a view on the internationalization of NPOs and the strategic patterns that they can follow to expand their operations on foreign markets. The author integrates applicable theories in the fields of strategic management and international business, in particular the resource-based view of the firm (RBV) and the network approach to internationalization, and outlines a transition from considering the internationalization process as an intra-organizational phenomenon to considering it as an inter-organizational one.

2.1. Internationalization as an intra-organizational process

Various theories in the fields of strategic management and international business consider a firm's competitive position from the perspective of intra-organizational conditions. The RBV and its variants (dynamic capabilities, knowledge-based view, relational view) describe the company as a collection of productive resources and study the dependence between firm performance and the resources it possesses (Barney, 1991; Lockett, 2005). A key assumption is resource heterogeneity which can persist for a long period of time as resources may not be perfectly mobile.

Figure 2

Theoretical foundation – integrating the RBV and the network approach to internationalization



Source: prepared by the author.

Barney (1991) defines firm resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc., controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness", and identifies physical, human and organizational capital resources. According to Barney (1991), a firm resource must be valuable, rare, imperfectly imitable, and must not have strategically equivalent substitutes that meet the first three criteria to have the potential to create a sustainable competitive advantage. He puts the focus on resources already controlled by the company.

Some authors distinguish between resources and capabilities. Grant (1991) views resources as all "inputs into the production process", and classifies them into 6 groups: financial, physical, human resources, technological, organizational and reputation. He defines capabilities, which are the foundation of competitive advantages, as what a company can achieve by bringing resources to work together. Moreover, other researchers distinguish between capabilities ("zero level") and dynamic ("higher-order") capabilities, with the former permitting the firm to work in the short term and the latter allowing it to develop and modify the zero level ones, thus enabling it to respond to the dynamic business environment in the long term (Lockett, 2005; Teece, et al., 1997). According to the dynamic capabilities framework (Teece, et al., 1997), the sources of a firm's competitive advantage are "managerial and organizational processes, shaped by its (specific) asset position, and the paths available to it", for example, assets that cannot be purchased on the market and are difficult to imitate (technological, reputational assets, etc.). The knowledge-based view identifies knowledge as a key resource, with the main aim of the company being to develop, protect and transfer it (Lockett, 2005). It argues that firms are better at protecting knowledge from imitation and expropriation compared to markets. Other research studies underline the

role of resources such as information technology, strategic planning, human resources management, trust, organizational culture, skills of top managers, etc. (Priem, et al., 2001).

Despite the diverse approaches, it is important to note that in a highly competitive environment and given the evolving customer requirements, a firm's competitive position, also internationally, depends on its ability to enhance its resource base, moving to more complex and specialized resources that are difficult to imitate (Grant, 1991).

In addition, theories of international business posit that having a specific or unique advantage underlies the internationalization process of the company, with many of these theories focusing on its creation internally. According to Hymer, the rationale behind international operations lies in the fact that markets are imperfect and companies are not homogeneous in terms of the resources they possess (Rugman, et al., 2011; Daneshka, 2012). He refers to those resources by the term "firm-specific advantages" (FSAs), and argues that they are created on the national market, and help the company to offset the liability of foreignness when operating abroad. Examples of FSAs are the ability to achieve product differentiation and vertical and horizontal integration, marketing and distribution skills, trademarks, access to raw materials, access to capital, economies of scale, patents, etc. (Rugman, et al., 2011). Kindleberger talks about monopolistic advantages, and Caves highlights the importance of intangible assets created as a result of a company's innovation capacity (Daneshka, 2012). Internalization theory explains foreign market entry with the ability of the company to reduce transaction costs by replacing inefficient arm's length transactions by internal ones, especially when it comes to transferring abroad intermediate outputs with a high share of tacit knowledge, etc. (Rugman, et al., 2011; Daneshka, 2012). Within the framework of the eclectic paradigm, Dunning (2000) identifies the following key ownership advantages: "possession and exploitation of monopoly power"; "possession of a bundle of scarce, unique and sustainable resources and capabilities, which essentially reflect the superior technical efficiency of a particular firm", and "the competencies of the managers of firms to identify, evaluate and harness resources and capabilities from throughout the world, and to coordinate these with the existing ones". The Uppsala model also studies the internationalization process from the perspective of the possession of resources, in particular experiential knowledge.

2.2. Internationalization as an inter-organizational process

Following the discussion about the importance of resources for a firm's competitive position at home and abroad, in this sub-section, the focus shifts to inter-organizational conditions, i.e. resources embedded in existing and potential networks.

Gulati et al. (2000) argue that the RBV does not provide a full understanding of the resource creation process as the latter should also be studied outside the boundaries of the firm. The ability of the company to build and maintain relations with other market players is studied as a resource in its own right by the relational view. The latter proposes a different perspective as regards the generation of economic rents and the creation of a competitive advantage in view of the widespread establishment of strategic alliances. This view looks at pairs or networks of companies and resources embedded in interfirm routines and processes rather than at those owned by a single company (Dyer, et al., 1998). The authors posit that

companies that choose to bring together their resources in specific ways can gain an advantage over competitors and identify 4 potential sources of inter-organizational competitive advantage: investments in relation-specific assets; interfirm routines for transferring, combining and creating specialized knowledge; combining complementary, scarce resources and capabilities to jointly create new products, technology, etc., and effective governance mechanisms that reduce transaction costs (Dyer, et al., 1998). Gulati et al. (2000) denote the set of relations that companies build with various organizations as strategic networks. These ties are long-term and can be in the form of joint ventures, strategic alliances, buyer-supplier partnerships, etc. According to Gulati et al. (2000), the network itself can be considered as a valuable, rare, hard-to-imitate resource with no substitutes, but at the same time, it provides the company with access to diverse (network) resources and capabilities. Despite the benefits that networks provide, Gulati et al. (2000) point out the potentially negative impact of a firm being locked in inefficient relations, thus preventing it from taking advantage of new business opportunities.

The network approach to internationalization offers new insights as to the importance of inter-organizational conditions for this process. Firms build relations, usually long-term, with other companies, and a big part of business exchange takes place within these relations (Johanson, et al., 2006). Johanson et al. (1987) define interfirm relations as "a mutual orientation of two firms towards each other" based on exchange and adaptation processes; each firm is ready to work with the other one and expects the same. Besides, both parties have mutual knowledge about each other (resources, strategies, needs, capabilities, etc.), and are willing to take into account to a certain degree the other party's interests. The interaction between companies results in the creation of networks, with a firm being involved in a network of business relations (direct and indirect) with various organizations, e.g. customers, customers' customers, suppliers, agents, consultants, competitors, state institutions, etc. (Johanson, et al., 1990). Therefore, companies work in "webs of connected relationships" called business networks (Johanson, et al., 2009). According to Johanson et al. (1987) and Johanson et al. (1990), bonds of diverse nature are developed: technical, economic, social, administrative, etc. Both relations of cooperation and complementarity of competition can be established (Leite, et al., 2015). Johanson et al. (1987) argue that networks tend to be stable over time, but they also evolve as new relations are built and existing ones are broken.

The rationale behind the creation of networks is that companies are not homogeneous (Johanson, et al., 2006; Johanson, et al., 2009). Johanson et al. (2009) view the establishment of relations as an investment, which takes time and effort. These relations are key assets, which provide companies with benefits such as access to resources, facilitation of product sales, reduction of production costs, development of knowledge of other firms, gaining control over them, etc.

Johanson and Mattson argue that the internationalization of a firm can be understood by studying the networks that it is engaged in (Chetty, et al., 2003). At first, the internationalizing company is part of a domestic network, and subsequently, it builds relations in networks abroad; this can be accomplished by international extension, international penetration and international integration (Johanson, et al., 1990). According to Johanson et al. (1990), a company's existing relations can serve as bridges to networks on foreign markets, and sometimes such relations can force the firm to enter new networks.

These bridges, which can be direct or indirect, may facilitate the initial stages of the internationalization process or further expansion to new markets. Moreover, the internationalization process depends on the degree of internationalization of the company itself and on that of the networks it is engaged in (Gebert-Persson, et al., 2014).

The propositions of the network approach to internationalization led to the revision of the Uppsala model. The latter views the company as the main driving force of the internationalization process, while the network approach focuses on the diverse business relations it has established and the importance of the resources, activities and experience of its network partners (Björkman et al., 2000). Moreover, the majority of a firm's assets can be located on the home market, but nevertheless, it can be a key international network player, i.e. internationalization is not just a matter of moving production facilities abroad but also of using existing and potential relations internationally (Björkman, et al., 2000).

Therefore, Johanson et al. (2009) define internationalization as "a multilateral network development process" which requires a reciprocal commitment between the company and its partners, and introduce the "liability of outsidership" concept. A firm that is well established in a network is called "an insider", which means that it has access to information about its partners as mentioned above and to the benefits that arise from that. A company, which does not have a position in a relevant network is called "an outsider"; when it attempts to enter an overseas market, it will be hampered both by the liability of outsidership and the liability of foreignness, with the latter making it more difficult for the firm to become an insider (Johanson, et al., 2009). This may have a negative impact on the internationalization process. However, if another company, which works on the relevant foreign market and has an established network position, requests a service from the focal firm, the latter will have the opportunity to join the network. According to Johanson et al. (2009), this will trigger the three groups of activities carried out in networks, which underlie business and international operations development: learning and knowledge accumulation, building trust and commitment, and identification and exploitation of opportunities.

The authors confirm the importance of experiential knowledge for the internationalization process, and additionally introduce the concept of "relation-specific knowledge", which is created through the interaction of companies. It includes "knowledge about each other's heterogeneous resources and capabilities" but also knowledge about the development and coordination of international relations. Moreover, interaction results not only in acquiring existing knowledge from the other party but also in jointly creating new knowledge. Since each firm has business relations with other actors, it participates in a learning process that goes beyond direct partners. In contrast to the original Uppsala model, Johanson et al. (2009) highlight the importance of trust for building relations and networks as this contributes to predicting the behaviour of counterparts, sharing information and building common expectations. Trust results in commitment, and ultimately they "produce outcomes that promote efficiency, productivity and effectiveness". Also, Johanson et al. (2009) put more emphasis on the opportunity development aspect; due to the partners' having privileged knowledge as a result of their interaction, they are better positioned to identify new opportunities in comparison to other players. The process can be unilateral, bilateral or multilateral.

An additional aspect that needs to be considered is that of cooperation and competition in business networks, i.e. vertical and horizontal networks, given the diverse competitors that NPOs are faced with. Chetty et al. (2003) and Leite et al. (2015) point out that vertical networks (relations with customers, suppliers, distributors) have been the main focus of research while horizontal ones, i.e. relations with competitors, have not been studied in-depth. According to Chetty et al. (2003), competitors can be a source of complementary resources and critical information in a dynamic business environment. Moreover, Bengtsson et al. (2000) and Leite et al. (2015) explain that literature on competitors' interaction has been directed either towards cooperation or competition but not towards a combination of both types of relations due to their contradictory logics, i.e. hostility stemming from conflicting interests as opposed to friendliness resulting from common goals. Competition is usually studied from the perspective of neoclassical economic theory and different market structures; it is considered to be the main driving force behind innovation and enhancing a firm's competitive advantage, with the pressure to improve performance relative to other actors increasing as the number of competitors grows (Bengtsson et al., 2000). However, strategic alliances research proves that relations of cooperation can also provide competitors with advantages such as improving production efficiency, new products development, entering new markets, reducing costs, transferring technology, better risk management, etc.

Therefore, Bengtsson et al. (2000) argue that a single relation between competitors can involve at the same time both competition and cooperation, and propose the term "coopetition". This complex interaction can be of diverse nature depending on the degree of cooperation and competition (Bengtsson et al., 2000). In some cases, the unique resources that a firm possesses allow it to meet customers' expectations better than competitors while in others these resources can be used more efficiently when combined with the resources of a competitor. Bengtsson et al. (2000) posit that a competitive relation brings together the advantages of cooperation and competition such as access to resources, knowledge, reputation, sharing the costs for product development, etc., while retaining the pressure to constantly improve performance. Building various relations is a prerequisite for preserving a firm's network position and thus achieving its strategic objectives.

Other theories of international business also recognize the importance of inter-firm cooperation, for example, the eclectic paradigm. According to Dunning (1995), the world economy has moved to a new phase of market-based capitalism called "alliance capitalism" (in contrast to "hierarchical capitalism") which "portrays the organization of production and transactions as involving both cooperation and competition between the leading wealth creating agents". He argues that in this new phase, the decision-making process is more likely to be based on consensus between the actors involved. The author revises the 3 groups of advantages of the paradigm to take into account the costs and benefits of interfirm cooperation, e.g. strategic alliances and networks, the possibility to organize activities more efficiently and to distribute related risks, the availability of "immobile local complementary assets" such as business districts, science parks, etc.

2.3. Relations with State Institutions and Access to Political Resources

In view of the participation of designated operators in the state-dominated traditional networks, access to political resources by means of building and maintaining relations with state institutions is considered. Li et al. (2013) argue that market capabilities are not the only success factor, especially when it comes to environments where markets and governments are of equal importance and underline the need to develop capabilities to manage government relations as well. They introduce the term "market-political ambidexterity" to embrace both groups of capabilities, which can be valuable, rare, and hard to imitate, thus creating a competitive advantage. In addition, Baron (1995) posits that a company's external environment is composed of market and non-market components, with the latter increasing in importance when business opportunities are controlled by the government or are challenged by the public, the media or other stakeholders. Therefore, it should develop market and non-market capabilities and implement an integrated strategy to address both components. Oliver et al. (2008) argue that strategic political management can contribute to improving the performance or competitive advantage of a firm. Building dynamic capabilities for political management is a prerequisite for implementing various strategies in response to political requirements and expectations with the aim of creating or sustaining value. Peng et al. (2016) analyze the RBV from the perspective of SOEs, and challenge its focus on market-based resources and capabilities. Given the ownership of the capital and the executives' connections with government officials, the authors argue that political resources and capabilities can be an important source of differentiation, promoting their reputation and legitimacy and increasing their bargaining power with state institutions and other stakeholders. Thus, it is the combination of both market and non-market resources and capabilities that promote SOEs' growth and theirs building a competitive advantage in an increasingly dynamic global economy (Peng, et al., 2016).

Pan et al. (2014) study the impact of political factors embedded within the firm, in particular government ownership and political ties, on the internationalization process and integrate them with existing theoretical frameworks. Though they focus on the level of ownership in an overseas subsidiary from the perspective of transaction costs and risk tolerance, they posit that these factors provide companies with better access to resources and various tangible and intangible benefits that facilitate internationalization, for example, government incentives and assistance at home and abroad, participation in the law-making process, access to information, building networks of relationships, prestige, etc.

3. A View on the Internationalization of National Postal Operators

Further to the theoretical concepts discussed in the previous section, ***the author views the expansion of NPOs' participation in international business as a process of building positions in traditional and new networks through penetration as well as extension and integration, with access to resources available in these networks being at the heart of the process.***

Thus, several key aspects of the internationalization process of the studied companies can be highlighted from the perspective of the relation "networks – resources".

First, ***the internationalization of operators depends on their ability to build positions in networks***. The opportunities for expanding the international activities of NPOs are considered in terms of developing and maintaining long-term relations with various market players as well as of the way in which the studied companies interact with organizations in traditional and new networks. Following the definition of the internationalization process proposed by Johanson et al. (1990) and depending on the use of both types of networks, the process of expanding designated operators' participation in international business can take place as follows:

- Penetration: strengthening the relations within traditional networks in a way that builds on the basic model (e.g. partnering with organizations that the operator has not worked with previously or has worked with only ad hoc, or use of new forms of cooperation).
- Extension and integration: working with organizations within traditional networks as well as developing relations with players from new ones.

Johanson et al. (1990) view extension and integration as independent internationalization paths, while this paper considers a combination of them for two reasons. First, NPOs continue to function predominantly as SOEs, but even in the case of private ownership, they retain certain social functions, thus preserving their relations with state institutions and access to political resources. Second, the global postal network as one of the two traditional networks is the backbone of the postal sector, and the development of NPOs' international operations does not exclude its use.

Also, Johanson et al. (1990) discuss the international dimension of these paths. In line with Björkman et al. (2000), this paper does not consider the process of building networks only in terms of foreign markets. Establishing relations with players on the home market can also contribute to expanding the international operations of the studied companies, for example, by developing relations with e-tailers or competitors and thus getting access to their networks abroad. Therefore, the degree of internationalization of partners and their networks is also important.

Second, ***NPOs have different positions in the two groups of networks*** in accordance with the "liability of outsidership" concept. They are insiders in traditional networks and benefit from the advantages and resources they provide. The existing relations between the organizations in these networks are the result of long-standing cooperation, commitment and reciprocity in relations, which is a prerequisite for further developing their international operations. NPOs are outsiders as far as new networks are concerned, which restricts their access to the resources available in them. Taking advantage of the new business opportunities, arising from the constantly changing environment, requires building positions in these networks as well.

Third, ***the above-mentioned view highlights the variety of relations that support designated operators' international business activities***. The expansion of the latter requires cooperation with organizations of diverse profiles, while the network approach to internationalization and the revisited Uppsala model emphasize the importance of business networks. Operators' administrative heritage and its role in establishing the basic model, as explained by Toteva (2019), require that account be taken of relations with state institutions and their evolution as

well. The business environment factors analysis made by Toteva (2019) testifies to the importance of horizontal and vertical business networks and the opportunities for cooperation with competitors, large business customers, software developers, etc., and that of developing relations, which involve cooperation and competition simultaneously. Moreover, relations between national operators within the global postal network traditionally resemble links between customers and suppliers, but nowadays, they evolve towards coopetition, as explained by Toteva (2019).

Fourth, ***the internationalization process is driven by access to resources provided by traditional and new networks***. The diverse participants' profiles determine the heterogeneity of the resources that NPOs can use. Traditional networks provide access to resources that are fundamental to the operators' international activities, but the evolving business environment demands enhancing the resource base.

Fifth, the above-mentioned paths for expanding the international operations of NPOs underline ***the varying degrees of commitment that may exist between partners,*** as will be further explained.

4. Access to Resources in Traditional and New Networks and Lock-In Effect

In view of the relation "networks – resources" and the discussion about the RBV and its variants (namely, the resource groups by Barney (1991); the resource categories defined by Grant (1991) and further developed by Chetty et al. (2003); the concept of Teece et al. (1997) about organizational and managerial processes and asset positions, and the consideration of political resources as part of the RBV by Peng et al. (2016)), a classification is made of the resources available in traditional and new networks that facilitate the development of designated operators' international activities (Figure 3).

This classification demonstrates the complementarity between the two groups of networks and the resources they provide access to. Although traditional networks have played a fundamental role as to NPOs' internationalization, they may prevent them from taking advantage of new business opportunities and may have a negative impact on their competitiveness compared to other market players due to the discussed lock-in effect. The following sources of this effect from the perspective of the two networks can be identified:

- System of state institutions: an assured customer base due to the monopoly market position and reliance on budget financing in the past; lack of international experience and relevant experts resulting from the focus on home markets.
- Global postal network: a "myopia" situation in line with Levitt (1960), i.e. a relatively limited positioning of designated operators as participants in the postal sector which isolated them from the growing diversity of competitors for a long time; lack of sufficient customer orientation, with customers being considered merely as senders and recipients; compromised integrity of the global postal network and therefore of the quality of international delivery services due to the varying levels of development of the countries and their national postal networks as demonstrated by the UPU's Integrated Index for Postal Development (UPU, 2017); slow response to market requirements due to the

UPU's lack of sufficient flexibility and slow decision making process (UPU, 2016); UPU's inability to address a growing number of stakeholders (UPU, 2016); UPU's difficulties in securing funds which poses risks to achieving the strategic goals of the Union and to implementing key projects for improving the interoperability of national networks.

Figure 3

Classification of resources in postal operators' traditional and new networks

TYPES OF NETWORKS AND AVAILABLE RESOURCES			
	TRADITIONAL NETWORKS	System of state institutions	**Political resources**: tangible and intangible benefits such as information not publicly available, participation in the legislative process and in formulating state policies, government funding, financial aid, support from embassies and commercial offices abroad, participation in major national and international projects, business opportunities in the framework of bilateral and multilateral cooperation, etc.
		Global postal network	**Organizational resources**: agreed rules, procedures and practices within the UPU that underlie operators' business processes and product portfolios and shape the interaction between operators and between them and other organizations (e.g. customs authorities, air carriers, etc.). **Technological resources**: software solutions developed by the Postal Technology Centre facilitating the provision of international delivery services. **Business partners**: a network of "natural" partners around the world, i.e. NPOs, built on trust, reciprocity and mutual adaptation. **Reputation** as a socially responsible member of the global community arising from the operators' historical role to provide access to communication means and social services, and from the UPU's commitment to economic and social development. **Knowledge, know-how**: covering a wide spectrum of areas (regulations, product development, new technology, etc.), with exchange being based on formal and informal mechanisms. **Financial resources**: project financing (quality of delivery services, financial management, disaster risk management, etc.). **Political resources**: political support for implementation of programmes and projects on an international level and its impact on national priorities, policies and legislation.
	NEW NETWORKS		**Organizational resources**: adopting partners' procedures and practices to reorganize business processes and develop product portfolios in response to new market requirements. **New markets**: access to new markets and market segments (in terms of geographical locations, e.g. China; sectors, e.g. e-commerce; customer profiles, e.g. e-tailers, SMEs). **Reputation** as a market player aligned with new market trends as a prerequisite for repositioning. **Technical and technological resources**: access to partners' software solutions or joint development of solutions. **Financial resources**: joint investments, access to favourable financing conditions based on partners' reputation, etc. **Mutual access to existing infrastructures** resulting in cost savings and shorter periods for launching new products. **Knowledge, know-how**: covering a wide spectrum of areas (corporate culture, customer service, marketing, market research, ICT, etc.) **Partnership experience and access to new potential partners and their networks**.

Source: prepared by the author.

NPOs can overcome the negative consequences of the lock-in effect and expand their international activities by building relations with market players outside the traditional networks, as this will provide them with access to the resources presented in Figure 3. Although the relations between the participants in traditional networks are evolving, the dynamic business environment requires that operators' resource bases are enhanced more speedily. Further to the analysis of the business environment factors made by Toteva (2019), a few types of organizations can be highlighted as key potential partners of operators. First, business customers, large as well as SMEs, can generate considerable mail volumes, especially companies involved in e-commerce and those establishing an online sales channel in addition to physical ones. Business customers influence the choice of delivery services on the basis of the ones they make available to end-users, but they also take into account the needs of the latter and transform them into requirements to their delivery partners. Second, competitors offering substitute services are important as gaining access to their existing networks can contribute to expanding an operator's international activities without considerable investments. Third, further to direct competitors, partnering with other organizations from the logistics field such as integrators, consolidators, companies providing warehousing services, producers of equipment, etc., is a prerequisite for developing new solutions. Fourth, given the importance of modern technology NPOs need to cooperate with software developers, startups, R&D centres, laboratories and others in order to test and implement innovative solutions.

5. Strategic Patterns of National Postal Operators' Internationalization

Designated operators' choice regarding the networks in which they build positions and the forms of cooperation, which determine the use of the resources available in them, are the basis for defining the framework on how they can expand their international operations. A matrix called "Strategic Orientation – Resource Integration" is created (Figure 4); it identifies 4 types of NPOs. The latter are 4 patterns of participation on the international market; the first one (the white box) is the discussed basic model, while the others refer to developing international operations beyond it. These three alternatives constitute the ***framework for expanding postal operators' international operations***.

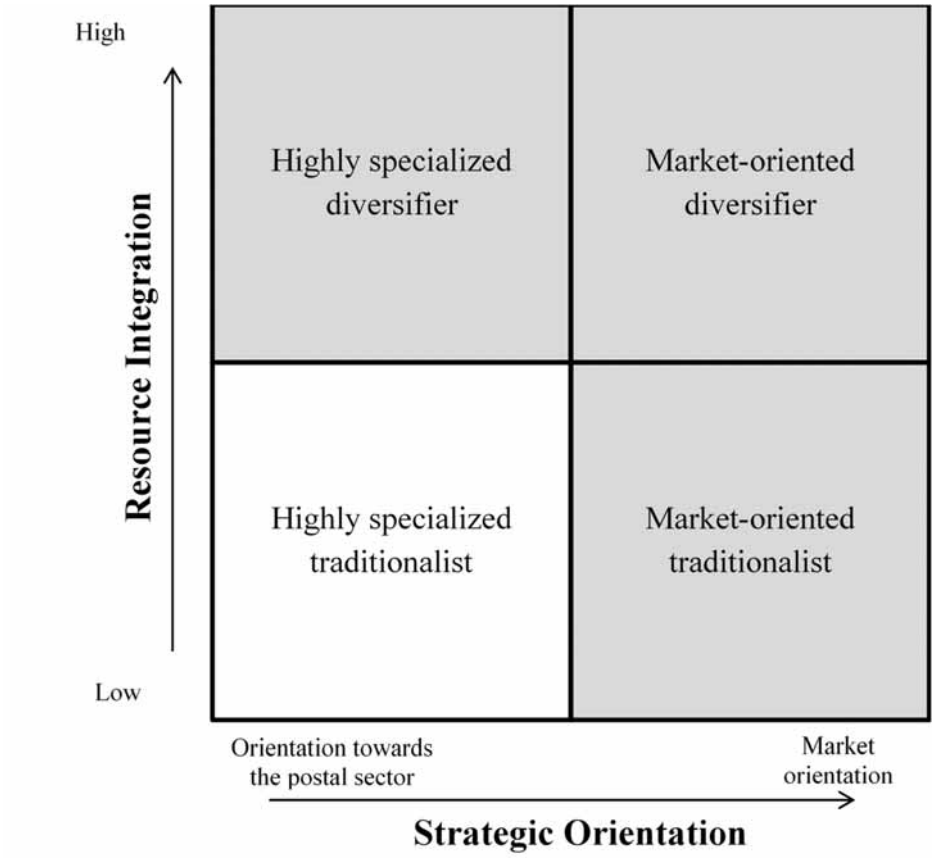
The matrix is based on two criteria which refer to the administrative heritage of the studied companies and the factors of the international business environment as analyzed by Toteva (2019). The first criterion, ***strategic orientation***, expresses the operators' aspiration for expanding their international activities as part of traditional networks (***orientation towards the postal sector***) or by combining the latter with networks of market players outside the postal sector (***market orientation***). It highlights the internationalization paths presented earlier: penetration as well as extension and integration.

The second criterion, ***resource integration***, refers to the extent to which national operators integrate into their activities the resources they have access to via the networks in which they participate as identified in the previous section. This criterion has two extreme values: ***low*** and ***high integration*** and identifies with the applied international business operations. The latter indicate varying degrees of interdependence between the participants and their

resources. The author adopts the classification proposed by Karakasheva et al. (2005) and Karakasheva (2011), according to which international business operations fall into two groups: traditional and complex.

Figure 4

Strategic Orientation – Resource Integration Matrix



Source: prepared by the author.

The choice of the types of international business operations as the basis for this criterion is explained by the parallel drawn by Toteva (2019) between the international sale as a major cross border operation and the basic model for postal operators' participation on the international market in the form of provision of international delivery services. Both are characterized by a low level of commitment between partners and a high degree of standardization in terms of implementation procedures, documentation used, etc. As partners retain their legal, economic and production autonomy, there is a low degree of resource

integration. In contrast, complex international business operations imply a higher degree of resource integration as a variety of relations between partners are developed: investment, production, commercial, technological, etc. These operations may be established on a contractual or capital basis and are of a long-term nature. In view of existing classifications of international business operations according to different criteria (Karakasheva, et al., 2005; Karakasheva, 2009; Karakasheva, 2011; Lozanov, 2015), of the environment factors, having an impact on the postal sector and of the identified partners in traditional and new networks, the following types of operations are considered of key importance: operations that involve the transfer of the right to use an intellectual product (a licensing agreement, a consulting contract, franchising) or a tangible product (international leasing), joint ventures, etc.

By combining the two criteria, the following types of NPOs, respectively strategic patterns of internationalization, are identified: a highly specialized traditionalist, a highly specialized diversifier, a market-oriented traditionalist and a market-oriented diversifier. They represent 4 extreme cases but also mixed ones can be distinguished, and over time operators may move from one quadrant of the matrix to another in case their strategic orientation or the applied international business operations change.

5.1. Highly specialized traditionalists

The group of highly specialized traditionalists comprises NPOs that carry out international operations by partnering with organizations in traditional networks. This type of cooperation resembles import and export operations; it is of a commercial nature and closer relations in other areas are not established. The companies' involvement in international business follows the basic model for the provision of international delivery services with operations being carried out with other national operators. Designated operators strive to serve customers on their home markets and are not present on foreign markets. Highly specialized traditionalists focus on the operational aspects of service provision and on adherence to the implementation procedures in accordance with established rules. Their innovative capacity is relatively limited, and product portfolios typically comprise the mandatory international delivery services adopted within the global network. It is expected that the described lock-in effect will have a strong impact on the development of their international operations.

5.2. Highly specialized diversifiers

The group of highly specialized diversifiers comprises NPOs that carry out complex international business operations and strengthen their cooperation with partners in traditional networks. Therefore, they follow a penetration strategy and achieve a higher level of integration of the resources they have access to in traditional networks. The operations can be carried out on a bilateral or multilateral basis, and sometimes they may be in the form of a higher level of cooperation with the UPU as the governing body of the global postal network and/or with relevant state institutions.

An example of a complex multilateral operation is the Interconnect programme of the International Post Corporation[3]. It is a strategic partnership on a contractual basis and aims to better position participating NPOs in the e-commerce segment by building on traditional delivery services in response to customer requirements. Examples of complex operations on a bilateral basis include Ascendia, a joint venture of the French and Swiss postal operators providing e-commerce, business correspondence and direct mail solutions as well as the merger of the Danish and Swedish operators striving for better positioning on the Scandinavian market. There are multilateral and/or bilateral programmes and pilots that testify to higher levels of cooperation with the UPU in relation to its social goals and with the relevant state institutions regarding the economic and foreign economic policy pursued. Examples include the Easy Export Programme facilitating the international expansion of SMEs and the ECOMPRO and Ecom@Africa programmes for e-commerce development promoted by the UPU.

Unlike the first group, highly specialized diversifiers strive to develop their product portfolios by providing not only the mandatory delivery services but also the optional ones as well as by expanding the field of applicability of traditional delivery services, for example, in terms of trade facilitation, social and financial inclusion, e-commerce, etc. They may also be present on overseas markets. Given the prevalence of state ownership in the sector, it is expected that NPOs will cooperate mainly on a contractual basis while capital operations would be more limited and of regional importance. Despite the use of new forms of cooperation, their international activities may also be influenced by the lock-in effect.

5.3. Market-oriented traditionalists

Market-oriented traditionalists also carry out traditional international business operations but they partner with organizations in both traditional and new networks, i.e. the internationalization process follows an extension and integration strategy. Thus, they show greater consideration for the factors of the business environment and integrate new resources into their activities. They build on the basic model and cooperate actively with market players of different profiles in their own countries and abroad in order to increase the volume of inbound, outbound and transit shipments. They create both horizontal and vertical networks. Like the first group of NPOs, they are not present on foreign markets. However, market-oriented traditionalists are more innovative. They provide traditional delivery services but also develop their product portfolios by adding new solutions based on modern ICT; they introduce new sales channels, etc.

An example of international operations expected to be applied by market-oriented traditionalists is found in Lithuania. The designated operator, Lietuvos paštas, strives to position itself in the e-commerce delivery segment by building vertical links with companies outside the postal sector. In 2014, the operator signed an agreement with CLEVY, an international logistics and transport company providing consulting services to Chinese

[3] The International Post Corporation is an association of 23 NPOs. It develops solutions that strive to improve the interoperability between national networks and the quality of the services provided. https://www.ipc.be/en/aboutIPC (accessed 31.08.2019).

companies to develop their international operations. Under this agreement, Lietuvos paštas facilitates the delivery of shipments from Chinese e-tailers to end-users in EU countries, Russia and Belarus. It also signed a similar agreement with SP Express, an integrated express logistics service provider in China[4]. Thus, the Lithuanian operator gains access to the biggest e-commerce market in Asia and to the European one, to knowledge and know-how, experience in establishing new relations, etc., which is a prerequisite for revenue growth from international operations. Another example is the partnership between the Irish operator An Post and the logistics provider DB Schenker allowing Irish SMEs to export goods to business customers in Europe[5]. This is a horizontal type of cooperation whereby An Post targets a new group of customers and enters a new business line, namely logistics solutions for SMEs, gains access to the partner's network suited to the B2B segment as well as to their knowledge and know-how.

5.4. Market-oriented diversifiers

The group of market-oriented diversifiers comprises NPOs that carry out complex international business operations both within traditional and new networks, i.e. they partner with a wider range of market players in new ways and thus achieve a higher level of resource integration. They follow an extension and integration strategy to expand their international operations. They take advantage of both regional and global opportunities and engage in horizontal and vertical networks. Through strategic partnerships and mergers and acquisitions, these operators build networks that exist in parallel to the global postal network and offer services and solutions not typical of the sector, for example, global logistics solutions targeted not only at the B2C but also at the B2B segment; e-commerce fulfilment solutions; express services, etc. They are present on foreign markets where they compete directly with local NPOs acquiring part of their market share.

Examples of operations typical of market-oriented diversifiers are found in Germany. Deutsche Post DHL operates globally in the fields of express, logistics and freight-forwarding services. The development of its business activities was marked by a series of acquisitions: of the American express service provider DHL, completed in the period 1998-2002; of the Swiss logistics provider Danzas and the American service provider in the field of international airfreight, AEI, in 1999, and of the British logistics company Exel in 2005.[6]

Conclusion

Given the increasing importance of the international market for the sustainable development of NPOs and building on the conclusions regarding the basic model and the inter-

[4] Website of AB Lietuvos paštas, https://www.post.lt/en (accessed 31.08.2019).
[5] Postal and Parcel Technology International, http://www.postalandparceltechnology international. com/awards_business_2017.php (accessed 31.08.2019).
[6] Website of Deutsche Post DHL, http://www.dpdhl.com/en/about_us/history.html (accessed 31.08.2019).

organizational nature of their internationalization, the paper provides a novel framework on how these companies can expand their international operations.

To achieve the defined aim and to confirm the core proposition the following objectives are met. First, the author builds the theoretical foundation of the research study by integrating theories in the fields of strategic management and international business and outlines the relation "networks – resources". The RBV and its variants view performance as dependent on the company's possessing specific resources. In addition, theories of international business study the internationalization process from the perspective of having a specific or unique advantage. In both cases, the focus is put on creating such resources or advantages internally. The network approach to internationalization defines this process as establishing relations and entering the networks of other market players at home and abroad. Bringing together the two groups of theories contributes to highlighting the importance of networks in terms of providing access to resources that facilitate the expansion of international operations. The author further considers coopetition in business networks and access to political resources. Next, a view on the internationalization of NPOs is proposed, namely that this is a process of building positions in traditional and new networks through penetration as well as extension and integration, with access to resources available in these networks being at the heart of the process. Finally, a framework for expanding designated operators' international activities is provided; it consists of 3 strategic patterns that build on the basic model and represent combinations between the networks used and the international operations applied. This framework is based on the "Strategic Orientation – Resource Integration" matrix which is an expression of the interplay between the operators' administrative heritage and the business environment factors. Strategic orientation refers to the companies' aspiration to expand their international activities by partnering with organizations within the traditional networks or by combining them with networks of players outside the postal sector. Resource integration is an expression of the extent to which NPOs integrate into their activities the resources they have access to via the networks, and identifies with the applied international business operations.

Therefore, it can be concluded that relations and networks are an instrument for enhancing NPOs' resource base so that they can expand their presence on the international market. Both types of networks, traditional and new, provide access to resources of key importance for the internationalization process: political, organizational, technological, financial, business partners, knowledge and know-how, etc. The heterogeneity of the available resources requires developing a set of vertical and horizontal relations. However, the historical cooperation within traditional networks results in the lock-in effect which can be mitigated by establishing relations with organizations in the new ones. Further to this, operators can expand their international activities by establishing positions in the two groups of networks either by penetration or by extension and integration. Access to resources is at the core of this process as well as the extent to which they are used, i.e. the international business operations applied.

A number of contributions of the research study can be outlined. First, it addresses the lack of research concerning the internationalization of NPOs by proposing a view on this process and a framework on how they can expand their international operations. Second, the paper adds to the relatively scanty research on SOEs' participation in international business, and

extends the field of applicability of the network approach in terms of the type of company studied, i.e. beyond SMEs and international entrepreneurship. Third, it offers a comprehensive perspective as to network participation by considering simultaneously the importance of business networks (vertical and horizontal) and networks with state institutions for the internationalization process.

Future research may propose a set of criteria so that the presented framework and the "Strategic Orientation – Resource Integration" matrix could be applied to real business cases to identify the internationalization patterns currently followed by postal operators and to provide them with guidelines for further development. Also, an internationalization "snapshot" of the global postal sector could be made by studying a sample of operators, and regional differences could be analyzed. Future research may offer a dynamic aspect of designated operators' internationalization by studying the paths they follow over time, i.e. the movement between the quadrants of the matrix.

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SUMMARIES

Rossitsa Rangelova

ECONOMIC GROWTH AND DEVELOPMENT OF THE CONCEPT OF CONVERGENCE – THEORETICAL BASIS

The aim of the study is to outline the theoretical foundations of the concept of convergence related to economic growth, as well as to systematise the different types of convergence. The development of the concept of convergence, which is a result of many applied researches worldwide on the connection between growth and convergence, has been theoretically traced. The specifics of neoclassical and endogenous theories of economic growth are briefly presented as the basis of the concept of convergence, including its types – alpha (absolute), beta (relative), "club" and sigma convergence. The types of convergence that appeared in these studies are critically analysed – structural, based on labour productivity, regional, price, monetary, business cycle, and others. For EU countries, the interaction between nominal and real convergence has been studied.
JEL: E13; F63; N10; O11

Roger Tsafack Nanfosso
Juliana Hadjitchoneva

THE EUROPEAN UNION FACING THE CHALLENGES OF GLOBALISATION

The article presents a study of the phenomenon of globalisation, which connects the whole world favoured by the development of free trade, the specialisation in international trade and the prodigious advances of technical progress, and results in challenges unfolding in a triple modality: intensification of commercial exchanges and the interconnection of economies, massification of capital exchanges, and increase in international migration. These developments run many risks globally and also on the European Union level. The objective of the article is to analyse the challenges arising from the triple modality attached to the globalisation with a focus on the European Union and the instruments and mechanisms of governance and control in an attempt to systemise an integrated approach for reduction of the risks and optimisation of the potential gains. The methodological framework makes use of existing statistical and factual data and the institutional analysis of the means of control applied to the material (goods), immaterial (capital), and people (migration) flows.
JEL: F10; F21; F22; F60

Ignat Ignatov

UNRAVELLING THE EU DEBT KNOT OVER 2000-2019: AN INJECTION-LEAKAGE APPROACH

Against the backdrop of a negative relation between the public debt and the economic growth in the EU over 2000-2019, the government budget constraint could clearly outline the transmission channels at work. Firstly, the debt stock weakens the fiscal policy of the government. It is emphasized that a debt stock surpassing 100% of GDP is critical for any government as it renders the budget impulses incapable to generate at least a proportional change in GDP. This conclusion is further strengthened by the proposed decomposition of the expenditure multiplier into several terms. They unambiguously reveal that its value is negatively affected by the budget surplus, the debt ratio's growth rate and the

output gap. Secondly, the effects of the public indebtedness are tracked down to the overall economy. Initially, the private sector's cyclical behaviour is found to weaken the higher the average debt position of a country which accounts for the lower economic growth in a high debt environment. Eventually, the nonlinear relationship between the debt ratio and the net private savings is explored by estimating a TAR model for each EU country over 2002-2019. It is inferred that while in the first regimes, the injections and leakages take turns, in the second regimes, the leakages exceed the injections. Furthermore, it is concluded that the higher the debt ratio, the greater the number of regimes a country might fall into and the greater the number of the autoregressive terms suggesting a persistent change in the private agents' behaviour.
JEL: E60; E62

Mitko Dimitrov
Alexander Tassev
Nedyalko Nestorov

CONTRIBUTION OF SMEs TO THE BULGARIAN EXPORT

The paper presents the findings of a study on the contribution of small and medium-sized enterprises (SMEs) to the Bulgarian export. The study compares the structures of the exporting companies from Bulgaria with the companies in other EU member states. The preferences of the companies for trade in the EU and with third countries are also taken into account. The picture of the internationalization of the Bulgarian enterprises is supplemented by an analysis of the structure of the exporting companies by economic sectors. The study contains also estimates of the amount of the value added in the export realized by different categories of companies.
JEL: P45; D22; F23; L25

Vera Pirimova

STRUCTURAL CONVERGENCE OF BULGARIAN FOREIGN TRADE AND EXPORTS TO THE EURO AREA

The study focuses on the structural convergence of foreign trade, and in particular of Bulgarias' exports to the Euro area. By interpreting and systematising theoretical and empirical models, frequently applied methods for analysing the real and structural convergence of exports and imports are summarised. Leading trends, similarities and differences in the dynamics of exports, imports and foreign trade balance of Bulgaria, the Euro area and a group of CEE countries during the period 2002-2018 are highlighted. The values of dissimilarity index by J. Von Hagen and J. Traistaru method and divergence index by C. Van de Coeving method, by commodity groups and the Bulgarian exports as a whole in 2002-2018, are determined. In this regard, export commodity groups are derived, on which Bulgaria has reached a coincidence, convergence or divergence with the similar structural parameters of the Euro area exports (as a whole), entered as reference values. It is concluded that there is a trend of increasing structural convergence of Bulgaria's exports to the Euro area exports in recent years, with greater similarities in some commodity groups. In the study, traditional methods of analysis and synthesis, induction and deduction, methods of descriptive and comparative analysis, structural σ-convergence methods are used.
JEL: B40; F10; F14; O40; P50

Maria Vodenicharova

ASSESSING INTEGRATED BACK AND FORTH RELATIONSHIP IN BULGARIAN CLUSTER SUPPLY CHAINS

Cluster supply chain is enterprise network with a feature of cluster and supply chain and is an important channel for enterprises close to the knowledge, resources, markets, and technologies. The research into cluster supply chains focuses on the theory of industrial clusters and plays an important role in their development and competitiveness. The aim is to study the relations along the supply chain – both back and forth, which will boost the development of clusters. The idea for the present research emerged from the conference "China and Central & Eastern Europe", International Scientific Forum in 2020, where the author presented a report on strengthening the cooperation between Bulgaria and China by building back and forth supply chain relationships.

The methods of research analysis are: method for analysing the strength of the back and forth relations along the supply chain; questionnaire method; statistical method for research of relations and dependencies. The total number of clusters included in the questionnaire are 42 and they are the main performing clusters in Bulgaria. Of the clusters under consideration, those with the highest share are the ones whose business is in the field of electrical engineering – 12% and ICT – 11.8% of the total number. Almost 5% is the share of the clusters in the field of machine building, textile and sewing industry – 4.8%, tourism and health industry – 4.5%. The Likert scale is used to assess the results from the questionnaire study. The study was conducted in the period between 2018 and 2020.

In conclusion, it can be stated that clusters in Bulgaria have not built well developed back and forth relations along the supply chain because the results from the analysis of the strength of the inner-cluster relations in terms of sales, back and forth along the supply chain illustrate low importance and insufficient development. A statistically significant relation exists between the availability of a logistics company and the general evaluation of the cluster related to the degree of development of the relations back and forth along the supply chain. The use of modern digital technologies (cloud technology, big data, multichannels, omnichannels, blockchain etc.) is not at a high level and can further be developed, which will push development back and forth along the supply chain in the clusters in Bulgaria.

This study explores and uncovers, for the first time, back and forth cluster supply chain relationship in Bulgaria. This study provides insights to clusters managers and for their strategies.

JEL: M21; L15

Tetiana Ivanova
Iryna Manaienko
Marina Shkrobot
Yuriy Tadeyev

THEORETICAL FRAMEWORKS OF RESPONSIBLE INNOVATIONS

The article is devoted to the development of scientific provisions on responsible innovations that will contribute to the development of an enterprise. An increase in the failure probability contributes to the search for new management solutions in the face of challenges and threats. In particular, one of the tools that will adapt to the new business environment is the introduction of responsible innovations. The research focuses on the analysis of the theoretical framework of “responsible innovation” in a dynamic environment. The article analyses the theoretical basis for the definition of “responsible innovation” and related definitions. The review of 65 scientific articles laid the foundation for the analysis and systematisation of the research on responsible innovation, social and sustainable innovation, as well as responsible research and developments. Summarising these articles made it possible to refine the definition of “responsible innovation”. The implementation of these

recommendations will increase the efficiency of enterprises in the context of adaptation to an economic space oriented to success.
JEL: F6; M14; O35

Plamena Nedyalkova
Andriyana Andreeva
Galina Yolova

DIGITALIZATION AND THE NEW LEGAL AND ECONOMIC CHALLENGES TO EMPLOYERS IN IMPLEMENTING INTERNAL CONTROL

The study examines the main aspects and issues related to personnel management in the context of digitalization of the work process. The economic analysis is based on a study of the obligations of employers arising from the current regulations in the country. People are the main economic resource through which all basic management goals and objectives of any company are achieved. The internal control processes in the enterprises are regulated by sources of the state legislation, as well as by various internal normative acts specific for the respective enterprise or branch. HRM (Human Resource Management) systems are considered as part of this management process. The legal part of the study focuses on the characteristics of control according to the current labour legislation, focusing on the problems arising from the processes of digitalization, respectively the risks of affecting the subjective labour rights of employees. Based on the performed complex economic and legal analysis, conclusions with theoretical and practical orientation are formed, leading tendencies in the area of control are identified and recommendations for legislative adjustments are made.
JEL: K29; K31; M41; M42

Kalina Toteva

STRATEGIC PATTERNS OF NATIONAL POSTAL OPERATORS' INTERNATIONALIZATION: A NETWORK AND RESOURCE-BASED VIEW APPROACH

The paper builds on previous research about the importance of the international market for the development of national postal operators (NPOs) and the inter-organizational nature of their participation in international business and studies how they could further expand the latter. By integrating theories in the fields of strategic management and international business, in particular the resource-based view and the network approach to internationalization, the author outlines the relation "networks – resources", thus highlighting the role of networks in terms of providing access to resources that facilitate the expansion of international operations. The theoretical foundations of the research serve as the basis for proposing a view on the internationalization of NPOs: a process of building positions in traditional and new networks through penetration as well as extension and integration, with access to resources available in these networks being at the heart of the process. Then, a framework for expanding NPOs' international activities is provided; it consists of three strategic patterns that represent combinations between the networks used and the international operations applied. Thus, the paper addresses the general lack of research concerning the internationalization of these companies, among other contributions.
JEL: F23; L32; L87; M16