ANALYSIS AND MODELING OF THE SOCIAL SECURITY INDEX IN UKRAINE, LITHUANIA, AND SCANDINAVIAN COUNTRIES

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Abstract. *The social security of acountry is a situation which is positively regulated by legal norms where the government uses all democratic management practices to maintain decent living standards and ensure the ability to meet basic needs for the development of the country and society.*

The Scandinavian economic model provides for a comprehensive social protection and social benefits to all segments of the community. That is why we used a comparative analysis and the modelling of the social security index in Ukraine, Lithuania, and Scandinavian countries.

In the paper, we identify a unique method for calculating the indicator of social security, using three main components: income, demographic situation, and labour market.

We have studied the impact of macroeconomic indicators on the level of social security, made an analogy with the Nordic countries, and determined which model should be used for the best results in ensuring the social protection of society.

The research has shown that high tax rates combined with a full public confidence in the government and a transparent system of income redistribution are important factors in the development of socially-oriented Scandinavian countries.

A regression analysis was conducted to analyse the relationship of tax revenues and social security index; the models of dependence for each country were constructed.

We have defined the basic types of taxes and their impact on the economic situation in a country. It is concluded that, in most cases, increasing tax rates should lead to negative changes in the social security of a country.

Key words: *social security, public policy, fiscal policy, stability, society*

Introduction

The financial crisis in 2008 has created a lot of problems associated with the decreasing business activity and, accordingly, budget revenues. Governments are trying to conduct a number of economic reforms to prevent the deterioration of living standards. However, it hasn't been achieved yet. It should be noted that many countries suffer a deterioration of social conditions, leading to an outflow of population, natural reduction of the popu-

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lation, impaired social stability and security of citizens, rising unemployment, and the further stratification of society.

In this paper, based on the experience of Ukraine, Lithuania, and Scandinavian countries (Denmark, Sweden, Finland, Iceland, and Norway), we make an attempt to answer the main question: *What do we need to change in the economic policy to improve living standards and to ensure an acceptable level of the social security of society*?

The determination of the social security level is an integral part of economic policy. A great contribution to such analysis has been made by scientists: H. Zymmel (1890), S. Doyl (2008), O. Novikova (1997), E. Libanova (2004), O. Ilyash (2011), I. Mazur (2004), P. Shevchuk (2003), O. Bazhenova (2006), A. Stavytskyy (2012), T. Zatonatska (2009), S. Pyrozhkov (2011), O. Shtelmah (2006). Analyzing the social security index, we can determine which factors are the most influential as compared with to similar parameters in other countries, and draw conclusions on the necessity of immediate economic and social reforms in the country.

However, it may be noted that this issue is still not fully researched so for. In particular, the problem of social security is not developed and highlighted enough; but we'd like to identify national differences and threat to public welfare. For this reason, we propose our own concept of social security analysis, which can be measured numerically. Of course, the social security concept is a very broad issue, and this research deals with only some aspects of it.

Scandinavian countries were selected for a comparative analysis for several main reasons:

- living standards in these countries are among the highest in the world, providing a full protection of all social groups;
- the development of socio-oriented countries is based on the availability of a large part of the middle class, which contributes to the stability of the economy;
- a huge part of total revenues of a country with a highly developed economy have tax-sufficient budget revenues; this phenomenon should be analysed in the light of fiscal problems in Europe;
- these countries occupy leading positions in most ratings, compiled by international organizations.

The purpose of this article is to study the essence of social security at the national level, to analyse the problem of social security of Ukraine, Lithuania, and Scandinavia.

To achieve this goal, the following tasks were solved:

- the main factors that affect the index of social security in the world have been determined;
- the econometric models that show the dependence of social security on other macroeconomic indicators have been built;

- the macroeconomic parameters that have the greatest impact on the social security of the countries have been assessed;
- the measure of the influence of the main factors on the social security of Ukraine, Lithuania and Scandinavia, using the coefficient of elasticity has been defined;
- the priorities for the advancement of social security of Ukraine and Lithuania were formulated.

Econometric analysis was used to prove the possibility of applying models of social security in practice and testing the statistical accuracy of the obtained models.

The information sources were reporting materials of the State Statistics Committee of Ukraine, the Ministry of Economic Development and Trade of Ukraine, the National Bank of Ukraine, the official websites of Statistics of Lithuania, Sweden, Denmark, Norway, Finland, and Iceland, the official website of the World Bank and other official websites of international organizations.

The subsequent presentation of the material is structured in the following way. The first section presents the concept of social security; the second section is dedicated to developing models for assessing the level of social security in the world. The third part examines the impact of macroeconomic factors on the level of social security. Finally, the fourth part contains a discussion of strategies to guarantee an acceptable level of social security in the countries surveyed.

Methods of studying the social security of a country

It is generally believed that social security is realized through a complex of organizational and legal standards and security institutions, financial instruments and instruments of social protection of individuals, society and the state from internal and external threats, an adequate provision of established social standards and guarantees, which determine the quality of society life according to the report of World Health Organization (2012).

Sukhorukov, Vorobyov, Krupelnytska (2003) have stated that the aim of social security is to maintain the stability in society, to prevent social tensions arising from economic, racial, cultural, social inequality, manifested in strikes and acts of civil disobedience..

Social security must guarantee better living standards to satisfy human needs; the state and society should timely and adequately respond to crises and conflicts.

One of the theoretical bases of social security, the formation and development of the idea of sustainable development is the theory of social conflict by G. Zymmel (1890). He has proved that the socio-cultural process is accompanied by a number of conflicts at different levels of the cultural life of society.

As a result, a clear social instability can be seen, which leads to an increase of social insecurity. This interpretation of the term "social security" shows that social stability cannot be the same for all countries.

American scientist S. Doyle (2008), who has quite thoroughly explored the issue of social security, states that when a country is able to "make arrangements for the development of social services, education and economy without external interference, to provide its citizens with housing, food, work, protect their civil rights and freedom," then it is in social security.

V. Kutsenko, P. Udovychenko (2011) in their report looked at the definition of social security by S. Pyrozhkov. He interprets social security as a result of effective social policies that should warn society from social unrest, open and hidden expressions of civil disobedience and other conflicts, help to improve the competitiveness of the employees according to the European and international standards.

However, achieving a high level of social security does not include the total elimination of all threats. All factors of social security can be divided into internal and external.

V. Heyets, M. Kizim, T. Klebanov, O. Cherniak (2006) have defined that external factors include political, economic, international and social factors where the main impact has the government policy, the behaviour of competitors and partners with international agreements and treaties, relations with international agencies.

The majority of foreign scholars believe that external social threats are caused by unemployment, deskilling of labour force, increase of disadvantaged people and technological backwardness of the economy. External factors are associated with changing conditions in domestic and international markets, the political situation, the process of inflation, the activity of the state.

Among the internal factors of influence on the social security of the country, the major one is the regional development inequalities at the macro level (industrially developed regions, developing regions, regions with a predominantly agricultural development) and the meso level (urban and rural, depressed area, administrative centres, etc.).

So, social security can be considered as:

- the ability to maintain at a level above the minimum allowable key indicators related to the natural reproduction of the population;
- the ability to maintain a high level of the health of the population and to prevent socially dangerous diseases;
- the ability to provide high living standards;
- the ability to support the necessary quality parameters of the social environment, which directly affects the safety of an individual;
- the ability to withstand the migration outflow of the population.

Calculation of the social security index for a country

Basically, the problem of determining the social security index is important for countries with a high level of social and demographic threats. So, it is necessary to consider the

basic methods of calculating the level of social security in the world, to highlight the main factors of social security.

According to W. Lorenz, the main feature of the Scandinavian model is solidary and the universal system of social protection, as it was stated in the report of H. Hansen, H. Jensen, C. Larsen, N. Nielsen (2002). Another important condition is employment provided by the state, including the active involvement of women into employment. This model is successfully represented in Sweden and Denmark.

E. Bukodi and R. Robert (2007) distinguish six types of a European welfare state, and the highest among them is defined as socio-democratic – characterized by universality, a high degree of the flexibility of employment, a high level of social security and unemployment benefits (Sweden, Denmark, Iceland Finland, Norway, and the Netherlands).

The basis for funding the social sector is a well-developed public sector, which means the existence of a very high taxation level. According to this model, the state:

- ensures regular transfer payments to support the elderly, the disabled, the unemployed, large families;
- provides universal social, health, educational services, child care;
- realises national policy to achieve full employment at the national level through macroeconomic and sectorial policies;
- has a strong civil society;
- has social trust;
- provides significant revenues, the main component of which is tax revenue.

Thus, to calculate the social security index in Ukraine, Lithuania, and Scandinavia, it is advisable to use the following indicators:

- unemployment, defined by the ILO, % (Un);
- total expenditures per capita, USD (Ct);
- total revenue per capita, USD (*Rt*);
- food consumption per capita, USD (*Cf*);
- the average salary in the country, USD (*Aw*);
- the number of immigrants, persons (*Em*);
- the number of emigrants, persons (*Im*);
- the number of births per 1,000 inhabitants (*Lb*);
- the number of deaths per 1,000 inhabitants (*D*);
- GDP per capita, USD (*GDP*).

All variables were previously standardized to be comparable. The coefficients were selected based on the analysis of relationship between the quality of life and the related variables; the expert method was used to determine specific values.

The equation for calculating social security is as follows:

$$SS_t = 0.65 \cdot \frac{(Lb_t - D_t)}{D_t} + 0.45 \cdot \frac{(Im_t - Em_t)}{Em_t} + 0.55 \cdot \frac{Aw_t}{Rt_t} - 0.45 \cdot \frac{Ct_t}{GDP_t} -$$
$$-0.35 \cdot \frac{Rt_t}{GDP_t} - 0.45 \cdot \frac{Cf_t}{Ct_t} - 0.40 \cdot Un_t$$

where:

- SS_t – index of social security during the period t;

- $\frac{(Lb_t - D_t)}{D_t}$ – shows how much fertility prevails over mortality. Of course, if the indicator is negative, then the country is characterized by depopulation and as an ageing nation;

- $\frac{(Im_t - Em_t)}{Em_t}$ – shows the situation in the external migration in the country. As in the previous case, the negative results lead to a deterioration of the demographic situation in the country;

- $\frac{Aw_t}{Rt_t}$ – shows the share of the salary in the total income of a person. The greater the proportion, the worse the level of social security of the country;

- $\frac{Ct_t}{GDP_t}$ – the ratio of per capita expenditures to GDP per capita. It helps to determine the part of income that should complete the savings of society;

- $\frac{Rt_t}{GDP_t}$ – the ratio of income per capita to GDP per capita in the same period;

- $\frac{Cf_t}{Ct_t}$ – determines the share of expenditures on food consumption in total expenditures. The lower the figure, the higher the level of social security of the country;

- Un_t – unemployment by the ILO methodology. It measures the share of the unemployed in the total economically active population. The lower this figure, the better is the situation typical of the labour market.

We have determined the formula which is necessary for our research, and applied it to calculate the level of social security in Sweden, Finland, Denmark, Norway, Iceland, Lithuania, and Ukraine. Using data from 2002 to 2012 with a quarterly frequency, we got the results which are presented graphically in Fig.1:

The index of social security varies within [−15, 15]. Countries with a negative index are characterized by the general deterioration of living standards, the demographic situation and welfare system. Therefore, we can conclude that the governments of Ukraine and Lithuania should conduct radical and rapid changes in social policy to improve the quality of life of their citizens.
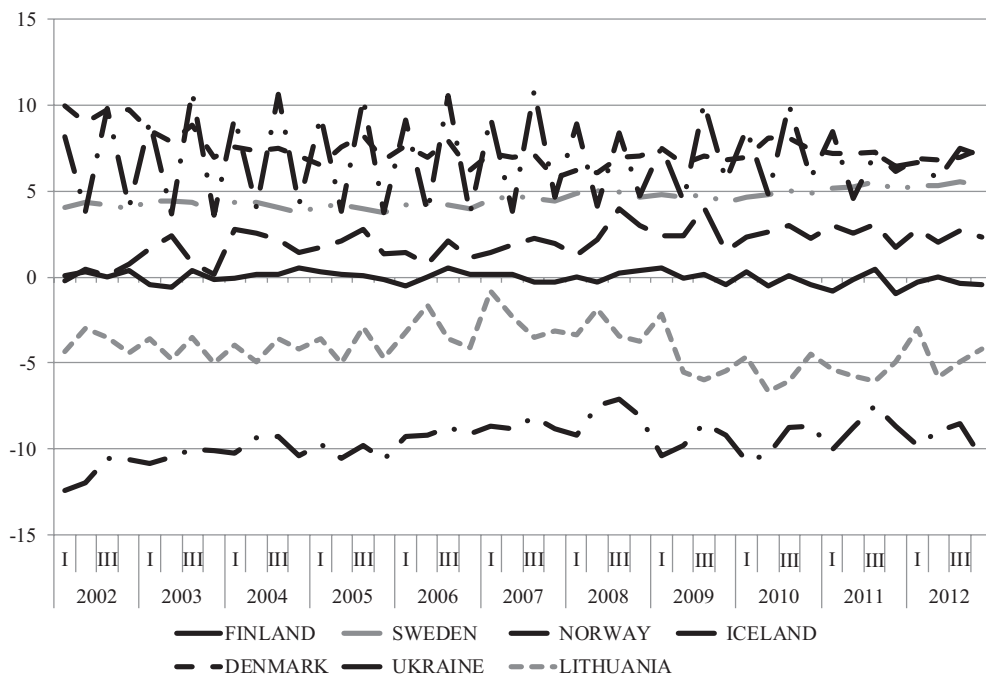
FIG. 1. **The index of social security in Ukraine, Lithuania, and Scandinavian countries**

Sources: State Statistics Service of Ukraine (2012), Statistics Denmark (2012), Statistics Iceland (2012), Statistics Norway (2012), Statistics Finland (2012), Statistics Sweden (2012), Statistics Lithuania (2012), World Bank (2012), Eurostat (2012).

Analysing the graph, we conclude that the level of social security is more or less stable in the countries under study. The index of social security is the highest in Denmark, Norway and Sweden. Iceland and Finland require a detailed consideration; we have to analyse the external and internal policies of each country.

An important part of the social security index is the community income. In economic terms, income growth is a result of economic, GDP, tax revenues, jobs and major investments into modernizing the economy growth, which leads to better working conditions, better society that reduces mortality and the number of immigrants.

We have determined the rate of social security in all countries selected for the analysis; it is necessary to identify the main macroeconomic influential factors and try to predict the level of social security in Ukraine, Lithuania, and Scandinavia for the next period.

The impact of economic factors on the level of social security in Lithuania, Ukraine and Scandinavian countries

In the previous section, we have the defined macroeconomic indicators which that have the greatest impact on the index of social security. We applied econometric models to

estimate the influence of macroeconomic factors on the level of social security of the surveyed countries. To compare the results, we tried to specify our models with nearly the same set of parameters.

It has been determined that Denmark is characterized as a country with the highest rate of social security, followed by Norway, Sweden, Iceland, Finland, Lithuania, and Ukraine.

According to the Statistics Denmark (2012), Denmark is an industrial-agricultural country with a high level of development. The share of industry in the national income is more than 40%. The country ranks the first in the world in terms of foreign trade turnover per capita. Denmark has one of the most stable economies in Europe, characterized by a balanced budget, a stable currency, low interest rates, and a low inflation.

The following indicators were used to analyse the impact of macroeconomic indicators on the level of social security:

- gross domestic product – most clearly describes the state of the economy of any country;
- balance of payments – we studied separately the impact of imports and exports on the overall social protection;
- internal and external public debt – the general negative trend of the external debt of the country has a direct impact on the social security of society;
- gross fixed capital formation (growth of non-financial assets for a long time used in the production process) – characterizes the industry of the country.

During the analysis and modelling of the social security index of each country, all data that were used had been standardized, so the coefficients in front of the independent variables can be defined as the effect of each of the indicators on social security in the country.

For the econometric analysis of the social security of Denmark, we used data for the period 1999–2012 with a quarterly frequency:

$$DSS_t = \alpha_0 + \alpha_1 \cdot \frac{\Delta GFCF}{GFCF_t} + \alpha_2 \cdot \frac{Exp_t - Imp_t}{Exp_t} + \alpha_3 \cdot \frac{\Delta SFD}{SFD_t} + \alpha_4 \cdot DSS_{t-1} + \varepsilon_t,$$

where DSS_t is the social security index during the period t; Exp_t is export during the period t, USD; $GFCF_t$ is gross fixed capital formation during the period t, USD; Imp_t is the import during the period t, USD; SFD_t is the debt of the Social Security Fund during the period t, USD; values with the time lag $t – 1$ correspond to the studied macroeconomic indicators during the period $t – 1$; ε_t are the residuals of the model.

If we substitute the real value of the dependent and independent variables, we will obtain:

$$DSS_t = 2.07 - 0.34 \cdot \frac{\Delta GFCF}{GFCF_t} + 0.28 \cdot \frac{Exp_t - Imp_t}{Exp_t} - 0.15 \cdot \frac{\Delta SFD}{SFD_t} + 0.73 \cdot DSS_{t-1}; R^2 = 0.887.$$
$$\underset{[0.777]}{} \quad \underset{[0.084]}{} \quad \underset{[0.109]}{} \quad \underset{[0.091]}{} \quad \underset{[0.103]}{}$$

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The chosen model is considered to be adequate and stable. All regression coefficients are significant; there is a strong relation between the dependent and independent variables.

The level of social security in Norway is only somewhat lower than the same indicator in Denmark, so we construct a model for the country and define the main independent variables in the same way.

For the econometric analysis we used data for the period 1999–2012 with a quarterly frequency:

$$NSS_t = \alpha_0 + \alpha_1 \cdot \frac{\Delta Exp}{Exp_t} + \alpha_2 \cdot \frac{\Delta GED}{GED_t} + \alpha_3 \cdot NSS_{t-1} + \varepsilon_t,$$

where NSS_t is the social security index during the period t; Exp_t is export during the period t, USD; GED_t is the gross external debt of the country during the period t, USD; values with the time lag $t-1$ correspond to the studied macroeconomic indicators during the period $t-1$; ε_t are the residuals of the model.

$$NSS_t = 13.47 + 0.58 \cdot \frac{\Delta Exp}{Exp_t} - 0.31 \cdot \frac{\Delta GED}{GED_t} - 0.98 \cdot NSS_{t-1}; R^2 = 0.945.$$
$$\underset{[0.419]}{} \quad \underset{[0.166]}{} \quad \underset{[0.163]}{} \quad \underset{[0.058]}{}$$

The selected model is considered to be adequate and stable. All regression coefficients are significant; there is a close relation between the dependent and independent variables.

Comparing this model with a similar model for Denmark, we can see that the effect of the same factors on the rate of social security is almost the same.

In accordance with Statistics Norway (2012), Norway, as noted above, is characterized by cyclical fluctuations due to the export orientation of the economy: seasonal export revenues lead to an uneven distribution of the GDP and incomes in different quarters of the year.

The Swedish model is based on the proposition that the decentralized market system is effective. The state does not interfere in the manufacturing activity, and active labour market policies have to minimize the social costs of the market economy.

The aim of this approach is to maximize the growth of the private sector, the government redistribution of income through the tax system and the public sector to improve the living standards, as defined in Statistics Sweden (2012). This led to a comparatively large role of the state in the distribution, consumption, and redistribution of national income through taxes and government spending, reaching the record levels.

For the econometric analysis, we used data for the period 1999–2012 with a quarterly frequency. Analysing the impact of the key macroeconomic indicators on the level of social security of Sweden, we have defined the following form of the model:

$$SSS_t = \alpha_0 + \alpha_1 \cdot \frac{\Delta GFCF}{GFCF_t} + \alpha_2 \cdot \frac{Exp_t - Imp_t}{Exp_t} + \alpha_3 \cdot \frac{GED_t}{GDP_t} + \alpha_4 \cdot SSS_{t-1} + \varepsilon_t,$$

where SSS_t is the social security index during the period t; Exp_t is export during the period t, USD; $GFCF_t$ is the gross fixed capital formation during the period t, USD; Imp_t is the import during the period t, USD; GED_t is the gross external debt of the country during the period t, USD; GDP_t is the gross domestic product of the country during the period t, USD; values with the time lag $t - 1$ correspond to the studied macroeconomic indicators during the period $t - 1$; ε_t are the residuals of the model.

If we substitute the real value of the dependent and independent variables, we shall obtain:

$$SSS_t = \underset{[0.342]}{0.79} - \underset{[0.035]}{0.13} \cdot \frac{\Delta GFCF}{GFCF_t} + \underset{[0.041]}{0.07} \cdot \frac{Exp_t - Imp_t}{Exp_t} - \underset{[0.054]}{0.11} \cdot \frac{GED_t}{GDP_t} + \underset{[0.079]}{0.82} \cdot SSS_{t-1}; R^2 = 0.925.$$

The model is considered to be adequate and stable. All regression coefficients are significant; there is a strong interrelation between the dependent and independent variables.

One can notice that the level of social security in Sweden is influenced by macroeconomic indicators such as gross fixed capital formation, exports and imports, gross external debt relative to gross domestic product.

Let us analyse the index of social security of Finland and its relationship with the main macroeconomic indicators. According to the statistics Finland (2012), the economy of Finland is completely focused on export, which is over one third of the GDP; export comprises more than 80% of the country's production (machinery, paper, shipbuilding, electronics). It should be noted that most of the country's GDP is created by small and medium-sized business employing more than 60% of the economically active population.

For the econometric analysis, we used data for the period 1999–2012 with a quarterly frequency:

$$FSS_t = \alpha_0 \cdot \frac{\Delta GFCF}{GFCF_t} + \alpha_1 \cdot \frac{\Delta Exp}{Exp_t} + \alpha_2 \cdot \frac{\Delta GED}{GED_t} + \alpha_3 \cdot \frac{CGD_t}{GDP_t} + \varepsilon_t,$$

where FSS_t – social security index during the period t; Exp_t – export during the period t, USD; $GFCF_t$ – gross fixed capital formation during the period t, USD; CGD_t – gross internal debt of the country during the period t, USD; GED_t – gross external debt of the country during the current period t, USD; GDP_t – gross domestic product during the period t, USD; values with the time lag $t - 1$ correspond to studied macroeconomic indicators during the previous period $t - 1$; ε_t – residuals of the model.

If we substitute the real values of the dependent and independent variables, we shall obtain:

$$FSS_t = \underset{[0.067]}{0.17} \cdot \frac{\Delta GFCF}{GFCF_t} + \underset{[0.068]}{0.22} \cdot \frac{\Delta Exp}{Exp_t} - \underset{[0.092]}{0.25} \cdot \frac{\Delta GED}{GED_t} - \underset{[0.089]}{0.15} \cdot \frac{CGD_t}{GDP_t}; R^2 = 0.713.$$

The model is considered to be adequate and stable. All regression coefficients are significant; there is a closer relation between the dependent and independent variables. It can be used in practice to predict and analyse the impact of macroeconomic indicators on the level of social security of the country.

In accordance with the Statistics Iceland (2012), the economy of Iceland is typical of Scandinavian countries and has a low unemployment, a developed system of social protection, and a fair income distribution. The economy is based on fishing industry which provides 70% of the country's income from exports, and the rate of social security in the recent years has a general tendency of improvement.

Analysing the impact of the key macroeconomic indicators on the level of social security of Iceland, we have defined the following form of the model:

$$ISS_t = \alpha_0 + \alpha_1 \cdot \frac{\Delta GED}{\Delta GDP} + \alpha_2 \cdot \frac{\Delta Exp}{Exp_t} + \alpha_3 \cdot ISS_{t-1} + \varepsilon_t,$$

where ISS_t is the social security index during the period t; Exp_t is export during the period t, USD; GED_t is the gross external debt of the country during the period t, USD; GDP_t is the gross domestic product of the country during the period t, USD; values with the time lag $t - 1$ correspond to the studied macroeconomic indicators during the period $t - 1$; ε_t are the residuals of the model.

For the econometric analysis, we have used data for the period 1999–2012 with a quarterly frequency:

$$ISS_t = 0.78 + 0.13 \cdot \frac{\Delta GED}{\Delta GDP} + 0.36 \cdot \frac{\Delta Exp}{Exp_t} + 0.57 \cdot ISS_{t-1}; R^2 = 0.672.$$
$$\underset{[0.241]}{} \quad \underset{[0.141]}{} \quad \underset{[0.144]}{} \quad \underset{[0.119]}{}$$

The model is considered to be adequate and stable. All regression coefficients are significant; there is a strong interrelation between the dependent and independent variables.

Now, it is worth to describe the connections between social security and the main macroeconomic indicators of Ukraine.

For the econometric analysis, we used data for the period from 2002 to 2012 with a quarterly frequency:

$$USS_t = \alpha_0 + \alpha_1 \cdot \frac{Exp_t - Imp_t}{Exp_t} + \alpha_2 \cdot \frac{GFCF_t - GFCF_{t-1}}{GFCF_t} + \alpha_3 \cdot \frac{SFD_t - SFD_{t-1}}{SFD_t} + \alpha_3 \cdot USS_{t-1} + \varepsilon_t,$$

where USS_t – the social security index during the period t; Exp_t – export during the period t, USD; $GFCF_t$ – gross fixed capital formation during the period t, USD; Imp_t – import during the period t, USD; SFD_t – debt of theSocial Security Fund during the period t, USD; values with the time lag $t - 1$ correspond to the studied macroeconomic indicators during the period $t - 1$; ε_t – residuals of the model.

Let us present the given model in a more usable form:

$$USS_t = \alpha_0 + \alpha_1 \cdot \frac{Exp_t - Imp_t}{Exp_t} + \alpha_2 \cdot \frac{\Delta GFCF}{GFCF_t} + \alpha_3 \cdot \frac{\Delta SFD}{SFD_t} + \alpha_3 \cdot USS_{t-1} + \varepsilon_t.$$

If we substitute the real value of the dependent and independent variables, we shall obtain:

$$USS_t = \underset{[0.133]}{0.58} \cdot \frac{Exp_t - Imp_t}{Exp_t} + \underset{[0.126]}{0.03} \cdot \frac{\Delta GFCF}{GFCF_t} - \underset{[0.134]}{0.05} \cdot \frac{\Delta SFD}{SFD_t} + \underset{[0.013]}{0.99} \cdot USS_{t-1}, R^2 = 0.988.$$

The model is considered to be adequate and stable. All regression coefficients are significant; there is a strong relation between the dependent and independent variables. It can be used in practice to predict and analyse the impact of macroeconomic indicators on the level of social security in the country.

The last country in which we analysed the economic-mathematical model of the dependence of the social security on key macroeconomic indicators was Lithuania.

For the analysis, we applied the same macroeconomic indicators that were used for other EU countries.

$$LSS_t = \alpha_0 + \alpha_1 \cdot \frac{Exp_t - Imp_t}{Exp_t} + \alpha_2 \cdot \frac{GFCF_t - GFCF_{t-1}}{GFCF_t} + \alpha_3 \cdot \frac{CGD_t - CGD_{t-1}}{CGD_t} + \alpha_3 \cdot LSS_{t-1} + \varepsilon_t,$$

where LSS_t is the social security index during the period t; Exp_t is export during the period t, USD; $GFCF_t$ is gross fixed capital formation during the period t, USD; Imp_t is import during the period t, USD; CGD_t is the Central Government Debt during the period t, USD; values with the time lag $t-1$ correspond to the macroeconomic indicators under study during the period $t-1$; ε_t are residuals of the model.

For the econometric analysis, we used data for the period from 2002 to 2012 with the quarterly frequency:

$$LSS_t = \underset{[0.218]}{0.13} \cdot \frac{Exp_t - Imp_t}{Exp_t} + \underset{[0.225]}{0.29} \cdot \frac{\Delta GFCF}{GFCF_t} - \underset{[0.229]}{0.34} \cdot \frac{\Delta CGD}{CGD_t} + \underset{[0.049]}{0.95} \cdot LSS_{t-1}; R^2 = 0.912.$$

The model is considered to be adequate and stable. All regression coefficients are significant; there is a tight close relation between the dependent and independent variables.

Thus, we examined the models of relationship between indicators of social security and the main macroeconomic indicators for all seven countries.

Now, we may present all results in Table 1 by using only two of the proposed econometric models:

$$* - SS_t = \alpha_0 + \alpha_1 \cdot SS_{t-1} + \alpha_2 \cdot \frac{Exp_t - Imp_t}{Exp_t} + \alpha_3 \cdot \frac{GFCF_t - GFCF_{t-1}}{GFCF_t} + \alpha_4 \cdot \frac{GED_t - GED_{t-1}}{GED_t},$$

$$** - SS_t = \alpha_0 + \alpha_1 \cdot SS_{t-1} + \alpha_2 \cdot \frac{Exp_t - Exp_{t-1}}{Exp_t} + \alpha_3 \cdot \frac{GFCF_t - GFCF_{t-1}}{GFCF_t} + \alpha_4 \cdot \frac{GED_t - GED_{t-1}}{GED_t}.$$

TABLE 1. **Coefficients of the model**

Country	DK*		NO**		SE**		IC*		FI**		UA**		LT*	
	coef	p-val	coef	p-val	coef	p-val	coef	p-val	coef	p-val	coef	p-val	coef	p-val
a_0	2.44	0.00	13.46	0.00	0.48	0.07	0.95	0.00	N/A	N/A	-2.77	0.001	-3.63	0.00
a_1	0.68	0.00	-0.99	0.00	0.90	0.00	0.48	0.00	0.08	0.05	0.70	0.00	0.12	0.00
a_2	0.32	0.01	0.62	0.00	0.07	0.06	0.19	0.06	0.15	0.04	0.45	0.00	0.68	0.07
a_3	-0.36	0.00	N/A	N/A	N/A	N/A	0.07	0.07	0.13	0.07	0.07	0.07	0.07	0.06
a_4	N/A	N/A	-0.31	0.06	N/A	N/A	N/A	N/A	-0.11	0.03	N/A	N/A	N/A	N/A
F	0.000		0.000		0.000		0.000		0.025		0.000		0.000	
R-square	0.868		0.943		0.902		0.732		0.657		0.718		0.791	

Sources: State Statistics Service of Ukraine (2012), Statistics Denmark (2012), Statistics Iceland (2012), Statistics Norway (2012), Statistics Finland (2012), Statistics Sweden (2012), Statistics Lithuania (2012), World Bank (2012), Eurostat (2012).

As one can see, in all countries there are some common relationships between the indicators of social security and macroeconomic indicators:

- an increased external debt, domestic debt and the debt of the Social Security Fund negatively affect the overall social security in the country;
- export growth leads to an increasing level of social security of the country;
- if the rate of the trade balance is positive, it also means an increase of social security;
- growth in gross fixed capital formation should lead to the growth of social security.

In Denmark, on the contrary, the growth of accumulated capital should lead to a deterioration of the level of social security in the country. Referring to the definition of gross fixed capital formation, it can be assumed that the level of capital accumulation in Denmark is so high that the attraction of new investments leads to an overall reduction of social protection of the population; the increase of capital accumulation does not lead to a general increase in the level of economic and social development (as in Central and Eastern Europe).

At the same time, each country is characterized by its specific features. The extent of the influence of the same factors on the overall social security is different among the countries and can be analysed using the obtained regression coefficients.

The problem that must be solved nowadays is the effect of each of these indicators on the level of social security and the actions the government should take in order to improve the overall level of society's life.

The effects of tax revenues on the level of social security

Norway, Sweden, Finland, Denmark, and Iceland are examples of the countries where incompatible things are rather successfully combined (the developed innovative economy based on the spirit of entrepreneurship and a high tax burden). Scandinavians have managed to build a comprehensive system of social security due to the homogeneity of their societies.

One of the lowest stratifications between rich and poor in the world in these countries has led to the fact that all population uses services of actually the same quality. This avoids the phenomenon of tax evasion as treasury recharge depends on the effectiveness of medicine and health care to all citizens and not just to its unsecured parts.

In order to analyse the relationship between tax revenue and the social security level, we should use regression techniques and construct a model of this addiction.

Analysing the impact of tax revenues on the level of social security, we have defined the following form of the model:

$$SS_t = \alpha_0 + \alpha_1 \cdot \frac{Taxes\_income_t}{GDP_t} + \alpha_2 \cdot \frac{Taxes\_g+s_t}{GDP_t} + \alpha_3 \cdot \frac{Soc\_contr_t}{GDP_t} +$$

$$+ \alpha_4 \cdot \frac{Taxes\_trade_t}{GDP_t} + \alpha_5 \cdot \frac{Taxes\_property_t}{GDP_t} + \varepsilon_t,$$

where $Taxes\_income_t$ are revenues from taxes on income during the period t, USD; $Taxes\_g + s_t$ are revenues from taxes on goods and services during the period t, USD; Soc_contr_t are revenues from social security contributions during the period t, USD; $Taxes\_property_t$ are revenues from taxes on property during the period t, USD; $Taxes\_trade_t$ are revenues from taxes on trade (import) during the period t, USD; GDP_t is the gross domestic product of the country during the period t, USD.

TABLE 2. **Coefficients of the model**

Country	DK*		NO**		FI**		SE**		IC*		UA**		LT*	
	coef	p-val	coef	p-val	coef	p-val	coef	p-val	coef	p-val	coef	p-val	coef	p-val
α_0	7.75	0.00	6.77	0.00	0.01	0.00	4.30	0.00	2.26	0.00	-9.47	0.05	-4.30	0.01
α_1	-0.13	0.03	-0.54	0.05	-0.17	0.05	-0,22	0.00	-0,41	0.00	-0.94	0.00	-0.62	0.01
α_2	-0.47	0.00	-0.37	0.01	0.24	0.04	-0.19	0.00	-0.29	0,08	-0.11	0.00	-0.04	0.03
α_3	0.61	0.01	-0.18	0.02	N/A	N/A	-0.37	0.00	-0.20	0.01	-0,70	0.04	-0.13	0.07
α_4	N/A	N/A	N/A	N/A	0.12	0.07	N/A	N/A	0,15	0.06	N/A	N/A	N/A	N/A
α_5	-0.45	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F	0.000		0.006		0.000		0.000		0.007		0.000		0.006	
R-square	0.793		0.743		0.632		0.873		0.765		0.821		0.681	

Source: State Statistics Service of Ukraine (2012), Statistics Denmark (2012), Statistics Iceland (2012), Statistics Norway (2012), Statistics Finland (2012), Statistics Sweden (2012), Statistics Lithuania (2012), World Bank (2012), Eurostat (2012).

According to Table 2, in all countries there is a reverse relationship between the social security level and tax revenues (excluding taxes on imports – thereby the government stimulates domestic production).

It is clear that higher taxes lead to a reduction of income of each person, but it is more important not just to pay a significant part of the profit to the state, but to redistribute tax revenues correctly and fairly. If citizens understand that their money works for them, then they will be willing to give part of their income to the state. The main task of the state is to be able to apply tax policies correctly to achieve the required standards of living in the country.

Conclusions

At present, the system of calculating the index of social security is improving; there are different ways of evaluating the living standards and describing the impact of social security on the economy of the state and the region.

However, now it is evident that approaches to measuring social security in different countries is different and based on various indicators, and the interpretation of the index itself is quite different. In this article, the main approaches to the analysis of the level of social security for Ukraine, Lithuania, and Scandinavia were formulated and the influence of each factor on this index was defined.

We have chosen one common method for calculating the rate of social security in Ukraine, Lithuania, and the Nordic countries. There are three main components of social security: income, demographics, and the labour market, which were defined.

We have analysed the coefficients from the model for determining the relationship between the level of social security and macroeconomic indicators and have come to the following conclusions:
- there is a direct correlation between the increase in exports and the rate of social security;
- an increased external debt, domestic debt, and the debt of the Social Security Fund negatively affect the overall social security in the country (inverse relationship);
- if the rate of the trade balance is positive, it also means an increase of social security;
- the growth in gross fixed capital formation should lead to the growth of social security (an inverse relationship in Denmark was analysed separately);
- the level of social security in the Nordic countries is much higher than in Ukraine and Lithuania.

It has been discovered that taxes are the main source of financial resources for the government to fulfil socially necessary and legislatively established requirements. The

econometric model was applied to analyse the relationship between the tax revenues and the social security index. All countries have shown a reverse relationship between the social security level and tax revenues (excluding taxes on imports – thereby the government stimulates domestic production).

By the way, it should be noted that due to the nature of the social security index, it can be correlated with numerous economic variables. Therefore, one must be careful when applying conclusions about these relationships; we need further research in this area.

The analysis of considered models has shown that the Scandinavian model is functioning well in the Nordic countries. But its application in other countries should be exercised in accordance with the development of economy and society in these countries, because it is completely based on a correctly chosen tax policy – the optimal combination of high rates of taxation with an even distribution of income among citizens.

In future, it is worth reviewing the impact of public spending on redistribution in the country and to analyse what part of tax expenditures each citizen can, directly or indirectly, receive from the government in the form of social expenditures and high quality services.

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