

UDC 330.4:519.866]:364.658(477)

JEL Classification: A10, A12, A13, C50, C59, O11, O29

*Ligonenko Larysa, Borysov Yevhen, Gritsyak Lesya***PREDICTORS OF HAPPINESS: REGRESSION MODELING AS A BASIS FOR
DETERMINING THE NECESSARY ACTIONS AND DECISIONS****Kyiv National University of Economics named after V. Hetman, Kyiv, Ukraine**

Identifying predictors of subjective well-being (happiness)-LS is one of the tasks of economics of happiness – a new direction of interdisciplinary scientific research. This is due to the recognition of the happiness of the population as a priority of state policy in accordance with the principle of people-centeredness in the 5.0 economy. The purpose of the study was to conduct a multiple linear regression analysis (MLRA) and identify the most significant predictors, to carry out experimental model calculations for Ukraine in order to determine the vectors and priorities of state efforts. The information base of the study was a sample of data from the World Happiness Report and The IMD World Competitiveness Ranking for 2021 for 54 countries of the world. The originality of the research consists in conducting the MLRA as a whole for all sample cranes and separately for 2 subgroups of countries (“Rich countries” and “Poor countries”), separated by the criterion of objective well-being – the average GDP per capita (40 thousand dollars). Statistically significant regression models with a high value of the correlation and determination coefficient were obtained, which link the dependent variable LS and its predictors. It is statistically confirmed that the predictors of happiness are: SS – social support, HLE – healthy life expectancy, FLS – freedom to make life choices, GDP – GDP per capita; for the subgroup “Affluent countries” – SS – social support, DI – female/male income ratio, InfrHealth – health care infrastructure, G – generosity (listed in descending order of influence). The quality of the built model for the subgroup “Poor countries” is recognized as low, it is recommended to use the general model. Experimental calculations of the predictive value of the dependent variable LS for Ukraine were carried out when individual predictors were changed. The obtained results should be the basis for the development of a state program for increasing the happiness of Ukrainians in the course of the post-war revival of Ukraine.

Keywords: economics of happiness, subjective well-being, happiness, predictors, regression modeling, public policy.

DOI: 10.32434/2415-3974-2022-17-1-60-69

Introduction and statement of the problem

The issue of subjective well-being (the scientific synonym of the concept of “happiness”) has attracted the attention of more and more researchers in recent decades, is recognized as a research mainstream today and a new paradigm for the study of socio-economic systems. Philosophers, anthropologists, psychologists, sociologists, economists, managers, public administration specialists, etc., study various aspects

of this phenomenon – determinants of the formation, manifestation, impact on the results of life activities and the success of both individuals and organizations and even countries. The issue of well-being, happiness and life satisfaction is a priority topic of many scientific studies, as evidenced by the growing number of scientific publications in which the term “subjective well-being” is indicated as a key word. Only in the scientometric database SCOPUS there

© Ligonenko Larysa, Borysov Yevhen, Gritsyak Lesya, 2023



This article is licensed under Creative Commons Attribution 4.0 International License (CC-BY)

Ligonenko Larysa, Borysov Yevhen, Gritsyak Lesya

are more than 12 thousand publications dedicated to this issue. Their number is growing rapidly, and the list of branches of science is expanding. In essence, a new direction of science emerged and is actively developing – the Economics of Happiness – an interdisciplinary study aimed at finding answers to the question – what is happiness, what it depends on, what it affects, how to ensure it.

Great scientific interest in the issue of subjective well-being is associated with the high practical significance of such research. More than 10 years ago, in July 2011, the UN General Assembly resolution 65/309 “Happiness: Towards a holistic definition of development” was adopted, which determined the feasibility of national happiness measurements and the use of these data for the formation of public policy. The resolution clearly declares: “The ultimate goal of every person is happiness, and therefore it is the state, or the government, that must be responsible for creating the conditions that will allow citizens to realize this value, this goal” [1].

This requirement for leaders and governments of states has not lost its relevance until now. In the 5.0 economy, the development of which is the No. 1 priority of the current decade, human-centeredness is recognized as a key principle [2], because every person wants to be happy. Therefore, ensuring the subjective well-being (happiness) of its citizens should become a key guideline for the development of any state.

Now, for Ukrainians, the unconditional predictor of happiness is the restoration of territorial value, the cessation of military aggression by Russia and the genocide of the Ukrainian people. However, in the future, when developing Plans and Strategies for the recovery and development of the economy, it is important to rely on the results of research that explain the phenomenon of subjective well-being (happiness) and determine scientifically based predictors of its achievement.

The high practical significance and value for the development of public policy and the development of humanity determines the interest in the awareness of the determinants of subjective well-being, both at the personal and at the state level. This requires the development of tools for conducting empirical research and economic-mathematical modeling of relationships, identifying determinants and predictors.

Analysis and research of publications

Fundamental studies of the phenomenon and predictors of happiness have not been conducted in Ukraine. In the database “Scientific Periodicals of

Ukraine” [3] 203 scientific articles with the word “shastyia” in the title and keywords were found, but among them the works of historical, cultural or pedagogical direction prevail. There are isolated economic studies aimed at revealing the relationship between happiness and economic factors. Thus, the influence of the level of employment and wages on the satisfaction of economic agents from the standpoint of the «economy of happiness» is presented in the study by O. V. Popadynets [4]; assessment of the factors of human development in the coordinates of the economy of happiness was carried out by N. L. Savytska [5]. Ukraine’s place in international happiness ratings and the necessary correction of public administration (based on the study of the experience of Norway, which in 2017 was recognized as the “happiest” country in the world) became the subject of research by O. O. Butnyk [6]. H. Vereshchagina and F. Shchygol (2020) [7] not only performed a critical analysis of common indicators of happiness and conducted research, but also conducted their own survey in 2 countries of the world. Their result was the construction of a series of correlation-regression models of the dependence of happiness on factors such as creativity, health, wealth, and satisfaction of needs. The assessment of their quality made it possible to conclude that the level of wealth significantly loses to creativity, the connection with which turned out to be significantly denser.

The purpose of the article

The purpose and research objectives of this article are as follows: 1) conduct a multiple linear regression analysis for different samples of the world’s countries and develop regression models that will reveal the most significant predictors acceptable for scenario modeling; 2) conduct experimental model calculations of subjective well-being (happiness) and evaluate the model values of its growth for Ukraine, which will allow to determine the vectors and priority of efforts aimed at increasing the perception of subjective well-being (happiness).

Presentation of the main research material

The research information base consisted of 2 sets of data: the World Happiness Report 2021 [8] and the IMD World Competitiveness Ranking [9].

“The World Happiness Report 2021” was prepared by the world’s leading research institutions, including the United Nations Sustainable Development Solutions Network, the Columbia University Center for Sustainable Development, and the Oxford University Wellbeing Research Center. It contains a rating of the countries of the world according to the level of happiness of their

population, which was compiled on the basis of a comparative analysis of 156 countries according to two groups of indicators that reflect the subjective and objective well-being of the population of these countries.

The source of data on subjective assessments of well-being (happiness) is the results of the 7th wave of the Gallup World Poll "World Values Study" (GWP) of the American Gallup Institute [10]. The international survey Gallup International has been conducted since 1977 on the initiative, methodology and under the leadership of Dr. George Gallup, the Gallup Institute he created and the scientific association World Values Survey. The survey is conducted among 1,000 respondents aged 15 and over in more than 150 countries, making it the largest survey in the world (covering 99% of the world's adult population). The list of survey questions and variables formed on their basis is presented in Table 1.

The second data source of our study was the data on the basis of which the Global Competitiveness Index was calculated [9]. This index and the ranking of the world's countries found on it based on the indicator of economic competitiveness are calculated according to the methodology of the World Economic Forum (WEF). The Global Competitiveness Index is formed on the basis of 113 variables that report the competitiveness of the countries of the world at different levels of economic

development. The set of variables consists of two-thirds of the results of a comprehensive survey of company managers (to cover a wide range of factors that affect the business climate in the countries under study), and one-third of them from publicly available sources (statistical data and research results that are carried out on a permanent basis based on international organizations).

The specific list of variables used in our study is due to the possibilities of using the Reference Database on Global Competitiveness [9] and presented in Table 2.

Taking into account the different list and number of countries in the studies that serve as an information base, the selection of countries was carried out in such a way that the values of all variables for the two studies were available for them. As a result, the sample of countries was reduced to 56 countries.

To conduct the research, the countries were grouped into 2 groups – with income above and below the average for the totality of the countries included in the sample. Taking into account the significant difference from the other countries of the sample, 2 countries were excluded from the information base: Iceland and Singapore. The calculated average (rounded to 40,000 USD) divided the remaining 54 countries into two equal groups of 27 countries each.

Table 1

Characteristics of variables of the World Report on Happiness (2021), which were used in the research process

Variable name	Conditional mark	Meaningful interpretation
Assessment of position on Cantril's ladder (life ladder)	LS	National average response of respondents to the GWP question "Please imagine a ladder with rungs numbered from 0 at the bottom to 10 at the top. The top rung represents the best possible life for you and the bottom rung represents the worst possible life for you. On which rung of the ladder, where do you think you are at the moment?"
Social support	SS	Country average value of binary answers (0 or 1) of respondents to the GWP question "If you were in trouble, do you have relatives or friends you can count on to help you when you need it?"
Healthy life expectancy	HLE	Based on data obtained from the World Health Organization (WHO) Global Health Observatory data repository as of 2020-09-28; if necessary, extrapolation was carried out based on previous data.
Freedom to make life choices	FLC	National average of respondents' answers to the GWP question "Are you satisfied or dissatisfied with your freedom to choose what to do with your life?"
Generosity	G	Residual from the regression of the national mean on the response to the GWP question "Have you donated money to charity in the last month?" on GDP per capita
Perceptions of corruption	PC	The national average value of respondents' answers to 2 questions of the GWP: 1) "Is corruption widespread in the government, officials?" 2) "Is corruption widespread in business or not?"

Source: statistical appendix to section 2 of the Report [11]

Table 2

Characteristics of the variables of the Global Competitiveness Index-2021, which were used in the research process

Variable name	Conditional mark	Meaningful interpretation
GDP per capita	GDPpc	Gross domestic product, USD per capita
Pension funding	Pens	Pension funding is adequately addressed for the future (Executive Opinion Survey based on an index from 0 to 10)
Equal opportunity	EO	Equal opportunity legislation in your economy encourages economic development (Opinion Survey based on an index from 0 to 10)
Disposable Income	DI	Female / male ratio. (Based on gross income minus social security contributions and income taxes)
Use of big data and analytics	BigData	Companies are very good at using big data and analytics to support decision-making (Competitiveness Executive Opinion Survey based on an index from 0 to 10)
Image abroad or branding	Brand	The image abroad of your country encourages business development. (Competitiveness Executive Opinion Survey based on an index from 0 to 10)
Digital transformation in companies	Digital	Digital transformation in companies is generally well implemented (Competitiveness Executive Opinion Survey based on an index from 0 to 10)
Health infrastructure	InfrHealth	Health infrastructure meets the needs of society. (Competitiveness Executive Opinion Survey based on an index from 0 to 10)

Source: statistical appendix to section 2 of the Report [11]

Table 3

Descriptive statistics on the formed groups of countries

Variable	A group of countries with a GDPpc level below the average				A group of countries with a higher, average GDPpc level			
	Minimum	Maximum	Average value	Standard deviation	Minimum	Maximum	Average value	Standard deviation
LS	3.82	6.33	5.61	0.64	4.31	7.84	6.72	0.73
GDPpc	5174	37548	23805	10464	41903	78530	54634	10566
SS	0.60	0.95	0.86	0.07	0.77	0.95	0.91	0.05
HLE	56.90	72.60	67.00	3.50	50.83	76.82	71.38	4.84
FLS	0.58	0.92	0.79	0.09	0.65	0.96	0.85	0.09
G	-0.29	0.54	-0.09	0.15	-0.26	0.23	-0.03	0.13
PS	0.71	0.94	0.83	0.07	0.18	0.87	0.57	0.21
Pens	0.53	5.56	3.22	1.40	2.40	8.24	4.99	1.41
EO	2.18	6.85	4.84	1.25	5.14	8.37	6.74	0.91
DI	15.62	85.84	66.63	16.56	0.00	94.93	71.69	22.00
BigData	3.75	6.71	4.86	0.76	3.31	6.68	5.31	0.89
Brain	1.15	7.41	4.88	1.71	5.11	8.87	7.06	1.02
Digital	4.21	6.73	5.32	0.77	4.50	7.52	6.03	0.92
InfrHealth	1.01	7.43	4.25	1.70	4.89	8.92	7.37	1.10
N valid observations	27				27			

Source: calculated by the authors using SPSS

Table 3 presents descriptive statistics characterizing each group of countries.

Research results

To achieve the first research task, a multiple linear regression analysis was conducted for different samples of countries: 1) total sample – 54 countries;

2) 27 countries with a level of GDP per capita above the average level (40 thousand dollars) – hereafter “Prosperous countries”; 3) 27 countries with GDP per capita below the average level (\$40,000) – hereafter “Poor countries”.

Predictors of happiness: regression modeling as a basis for determining the necessary actions and decisions

The computer program IBM SPSS Statistics 22 was used to process statistical data. SPSS Statistics is a recognized computer program for static data processing, one of the market leaders of statistical products for conducting applied research in the field of social sciences [12].

A step-by-step method of selecting predictors was applied. The simulation results are as follows.

1. The total sample is 54 countries. The SPSS program built 6 models (model 1.1-1.6) by "rejecting" insignificant factors. The simulation results are presented in Table 4.

All models have a significance of less than 0.001. This means that the probability that the obtained result is random is less than 0.001 (0.1%).

The largest coefficient of multiple regression has the model 1.6 – $R=0.914$, that is, according to the Chaddock scale, the strength of the connection can be estimated as very high (strong) [13]. Therefore,

Model 1.6 is recognized as the best, which included such predictors as: SS, HLE, FLS, GDPpc (Table 4). The coefficient of determination is $R\text{-squared} = 0.836$, i.e. 83.6% of the dependent variable (LS) is due to variable independent changes (predictors) that are included in the model. Detailed characteristics of the model 1.6. presented in Table 5.

That is, the obtained multiple linear regression model has the following form

$$LS = -5.011 + 5.548 \cdot SS + 0.05 \cdot HLE + 2.852 \cdot FLS + 0.00001291 \cdot GDP \text{ pc} \quad (1)$$

A high correlation coefficient of $R=0.914$ and a significance level of p less than 0.001 indicate that the constructed regression model is statistically significant. All coefficients for independent variables (predictors) as well as the constant have a significance of less than 0.001. This means that the probability

Table 4

Results of regression modeling for the total sample (54 countries)

Model	Predictors	R	R-squared	Adjusted R-square	Standard error of estimation
1.1	SS	0.744	0.553	0.545	0.59403
1.2	SS, PC	0.837	0.701	0.689	0.49093
1.3	SS, PC, HLE	0.871	0.758	0.744	0.44583
1.4	SS, PC, HLE, FLS	0.899	0.809	0.793	0.40027
1.5	SS, PC, HLE, FLS, GDPpc	0.915	0.837	0.820	0.37328
1.6	SS, HLE, FLS, GDPpc	0.914	0.836	0.822	0.37138

Explanation: R is the coefficient of multiple correlation, reflecting the connection of a set of predictors with the criterion. R Square is the coefficient of determination, equal to the share of the variance of the dependent variable caused by the influence of independent changes.

Adjusted R-squared - the corrected value of R^2 (the value that is closer to the actual results).

standard error is the standard deviation of the expected value of the dependent variable.

F is the ratio of the mean square of the regression to the mean square of the residual.

Sig. (significance) is the probability that the result is random.

Source: calculated by the authors using SPSS

Table 5

Coefficients of the model 1.6

Model	Predictors	Unstandardized Coefficients		Standardized coefficients
		B	Standard Error	Beta
1.6	(Constant)	-5.011	0.982	
	SS	5.548	0.947	0.412
	HLE	0.050	0.013	0.266
	FLS	2.852	0.568	0.306
	GDPpc	1.291E-5	0.000	0.275

Explanation: B are the coefficients and constant of the regression equation.

The standard error is a measure of the stability coefficients of B and is equal to the standard deviation of their values calculated for a larger number of elections.

Beta – standard regression coefficients that reflect the relative degree of influence of each of the predictors.

t is the ratio of coefficient B to its standard error.

Sig. (significance) is the probability that the result is random

Source: calculated by the authors using SPSS

Ligonenko Larysa, Borysov Yevhen, Grytsyak Lesya

that the obtained result is random is less than 0.001 (0.1%).

All numerical coefficients for variables in this model are positive. That is, we have a direct correlation with the dependent variable (criterion). The level of happiness (LS) is most influenced by the SS predictor - social support, followed by (in descending order of influence): HLE (Healthy Life Expectancy), FLS (Freedom to make life choices), GDPpc (GDP per capita).

2. “Rich countries” group (GDP per capita over 40,000 dollars). The SPSS program built 4 models (model 2.1-2.4) by «rejecting» insignificant factors. The simulation results are presented in table 6. Explanations to the parameters of Table 6 are similar to Table 4.

All models have a significance of less than 0.001, that is, the probability that the obtained result is random is less than 0.001 (0.1%).

Model 2.4 has the highest coefficient of multiple regression: coefficient $R=0.924$, that is, according to the Chaddock scale, the strength of the connection can be estimated as very high (strong) [13] Model 2.4 is recognized as the best, which included such predictors as: SS, G, InfrHealth, DI. The coefficient of determination is $R\text{-squared}=0.854$, i.e. 85.4% of the dependent variable (LS) is due to variable independent changes (predictors), which are included in the model. Detailed characteristics of the model 2.4. presented in Table 7.

The resulting multiple linear regression model has the following form

$$LS = -6,237 + 13,25 \cdot SS + 1,5 \cdot G + 0,228 \cdot \text{InfrHealth} - 0,11 \cdot \text{Di} \quad (2)$$

A high correlation coefficient of $R=0.924$ and a significance level of p (Sig.) less than 0.001 indicate that the constructed regression model is statistically significant.

All coefficients for independent variables (predictors) as well as the constant have a significance of less than 0.005. This means that the probability that the obtained result is random is less than 0.005 (0.5%).

Considering the fact that the coefficient of determination for this model is $R^2=0.854$, which is greater than the similar coefficient in the best model built for the total sample of countries $R^2=0.836$ (model 1.6), it can be argued that for the countries included in the group of “Rich countries” it is advisable to use model (2) as a regression model. All numerical coefficients (except the coefficient for variable Di) in this model are positive. The level of happiness (LS) is most influenced by the SS predictor – social support, followed by (in order of decreasing influence) DI (female / male income ratio), InfrHealth (Healthcare infrastructure), G (Generosity). We emphasize that the predictor of GDPpc on the level of happiness for the population of these countries is not significant.

3. “Poor countries” group – GDP per capita is less than 40,000 dollars. After conducting a similar analysis for the “Poor countries” group, we obtained a model that included only two predictors Di – the

Table 6

Results of regression modeling for the group “Affluent countries”

Model	Predictors	R	R-squared	Adjusted R-square	Standard error of estimation
2.1	SS	0.778	0.605	0.589	0.46765
2.2	SS, G	0.842	0.708	0.684	0.40992
2.3	SS, G, InfrHealth	0.883	0.780	0.752	0.36331
2.4	SS, G, InfrHealth, DI	0.924	0.854	0.827	0.30302

Source: calculated by the authors using SPSS

Table 7

Coefficients of the model 2.4.

Model	Predictors	Unstandardized Coefficients		Standardized coefficients
		B	Standard Error	Beta
2.4	(Constant)	-6.237	1.320	
	SS	13.250	1.427	0.877
	G	1.500	0.483	0.261
	InfrHealth	0.228	0.056	0.343
	DI	-0.011	0.003	-0.317

Source: calculated by the authors using SPS

Predictors of happiness: regression modeling as a basis for determining the necessary actions and decisions

Table 8

Results of regression modeling for the "Poor countries" group

Model	Predictors	R	R-squared	Adjusted R-square	Standard error of estimation
3.1	DI	0.704	0.496	0.476	0.46182
3.2	DI, HLE	0.770	0.593	0.559	0.42334

Source: calculated by the authors using SPSS

ratio of women's / men's incomes, HLE – healthy life expectancy. The simulation results are presented in Table 8.

All models have a significance of less than 0.001, that is, the probability that the obtained result is random is less than 0.001 (0.1%).

As you can see, the best of the built models (model 3.2) has a relatively low coefficient of determination $R^2=0.593$.

It is significantly lower than the coefficient of determination in model 1.6, which is constructed for all sample countries (54 countries). This gives reasons to recommend using model 1 (model 1.6.), which was obtained for all 54 countries, as a regression model for the "Poor countries" group.

The second research task involves conducting experimental model calculations of subjective well-being (happiness) and evaluating the model values of its growth for Ukraine.

Ukraine belongs to the "Poor countries" group, so we use model 1.6 for forecast calculations (regression modeling result for the total sample of 54 countries). The independent variables (predictors) included in this regression model for Ukraine are respectively equal to: $SS=0.888$ $HLE=64.902$, $FLS=0.724$, $GDPpc=14220.97$.

Substituting these numerical data into the regression model 1.6 we will get the following result:

LS (subjective well-being (happiness) – evaluation of the position on the Cantril ladder (life ladder) Ladder score)=5.409.

The actual value of the level of happiness of Ukrainians according to the latest data (2021) is lower than the model and become 4.875. The discrepancy can be explained by the small size of the sample (due to the limitation of data by country and the short time period of the study), as well as the influence of other factors that were not included in the study.

Using the obtained model, it is possible to calculate how the level of happiness will change when individual or all predictors are changed..

After analyzing the obtained model, we come to the conclusion that the variable SS (social support) has the greatest impact on the level of happiness for Ukrainians; the least impact is the GDPpc variable

(level of GDP per capita). So, if the variable SS increases by 10 percent, then LS will increase by 9 percent. When GDPpc increases by 10 percent, the feeling of happiness will increase by only 3.7 percent.

That is, to ensure the growth of the feeling of happiness (LS) for Ukrainians, a system of measures and actions at the state and local level aimed at building family values of mutual help and support, the development of friendly relations and corporate collectivism at enterprises and organizations, and the further development of support for social entrepreneurship is of priority importance, volunteering and charity.

Targeted efforts at all levels to increase GDPpc, including per capita, are also absolutely necessary, since a significant influence of the material factor on the feeling of subjective well-being (happiness) takes place. Moreover, it is precisely these efforts that will allow Ukraine to "move" into the group of "Prosperous countries". This, in turn, will require a change in the priorities of further efforts – ensuring real gender equality in income and free time, taking into account the unpaid "work" of women in households and raising children (DI (ratio of incomes of women / men)), development of a modern health care system and insurance medicine (InfrHealth (Infrastructure of health care)).

Conclusions

Economic-mathematical modeling conducted by us made it possible to reveal that predictors of happiness depend on the factor of objective well-being (GDP per capita) and are different for the general sample of countries and a subgroup of wealthy countries of the world.

Statistically significant and qualitative regression models (high coefficient of determination $R^2>0.8$) were obtained, which connect the dependent variable – LS (subjective well-being (happiness)) with the predictors that condition it. It is statistically confirmed that the predictors of happiness are: SS – social support, HLE – healthy life expectancy, FLS – freedom to make life choices, GDPpc – GDP per capita; for the subgroup "Affluent countries" – SS – social support, DI – female/male income ratio, InfrHealth – health care infrastructure, G – generosity (listed in descending

order of influence).

The experimental calculations of the feeling of happiness for Ukraine made it possible to estimate the model value of the dependent variable LS (subjective well-being (happiness)), which turned out to be higher than the actual value (respectively, 5.409 and 4.875), which can be explained by the small size of the sample and the time period of the study, as well as the influence of other factors that were not included in the researched.

The developed regression model made it possible to develop a number of proposals regarding priority areas and solutions that will make Ukrainians happier. In the conditions of the post-war revival of Ukraine, after all the trials and enormous losses that befell Ukrainians, this is an extremely important and socially significant task.

The conducted research lays an objective information basis for programming its solution. Research in this direction should be conducted on a systematic basis and supplemented by the results of own empirical studies, which take into account the mentality of Ukrainians and specific factors that likely affect the feeling of happiness and satisfaction with one's own life.

REFERENCES

1. UN General Assembly (2011). Happiness: towards a holistic approach to development: resolution / adopted by the General Assembly. *GAOR, 65th sess., Suppl. no. 49*. Retrieved from <https://digitallibrary.un.org/record/715187> [in English].
2. European Commission, Directorate-General for Research and Innovation, Мyller, J. (2020). *Enabling Technologies for Industry 5.0 : results of a workshop with Europe's technology leaders*, Publications Office. DOI: <https://data.europa.eu/doi/10.2777/082634> [in English].
3. Sait natsionalna biblioteka Ukrainy im. V.I. Vernatskoho [Site National Library of Ukraine]. *www.irbis-nbuv.gov.ua*. Retrieved from http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=F&I21DBN=UJRN&P21DBN=UJRN [in Ukrainian].
4. Popadynets, O. (2013). Vplyv rivnya zaenyatosti ta oplaty pratsi na zadovolenist ekonomichnykh ahentiv z pozytsiyi “ekonomiky shchastya” [The influence of the level of employment and wages on the satisfaction of economic agents from the standpoint of the “economics of happiness”]. *Visnyk Natsionalnoho tekhnichnoho universytetu “KhPI”. Tekhnichnyy prohres ta efektyvnist vyrobnytstva – Bulletin of the National Technical University «KhPI». Technical progress and production efficiency*, 66, 76-80. Retrieved from http://nbuv.gov.ua/UJRN/vcpitp_2013_66_13 [in Ukrainian].
5. Savytska, N. (2011). Lyudskyy rozvytok u koordynatakh ekonomiky shchastya [Human development in the coordinates of the economy of happiness]. *Naukovyy visnyk Poltavskoho universytetu ekonomiky i torhivli. Seriya: Ekonomichni nauky – Bulletin of the Poltava University of Economics and Trade. Series: Economic sciences*, 4(2), 27-32. Retrieved from [http://nbuv.gov.ua/UJRN/Nvpushk_2011_4\(2\)_5](http://nbuv.gov.ua/UJRN/Nvpushk_2011_4(2)_5) [in Ukrainian].
6. Butnyk, O. (2017). Doslidzhennya indeksu shchastya naseleennya v konteksti efektyvnoho derzhavnoho upravlinnya [Research of happiness index of the population in the context of effective public administration]. *Investytsiyi: praktyka ta dosvid – Investments: practice and experience*, 22, 73-75. Retrieved from http://nbuv.gov.ua/UJRN/ipd_2017_22_18 [in Ukrainian].
7. Vereshchahina, H., & Shigol, F. (2020). Theoretical foundations, practice, and empirical approaches to assessing the economy of happiness. *Development Management*, 18(2), 33-42. DOI: [http://dx.doi.org/10.21511/dm.18\(2\).2020.04](http://dx.doi.org/10.21511/dm.18(2).2020.04) [in English].
8. Helliwell, John F., Richard Layard, Jeffrey Sachs, & Jan-Emmanuel De Neve, eds. (2021). *World Happiness Report 2021*. New York: Sustainable Development Solutions Network. Retrieved from: <https://worldhappiness.report/ed/2021/> [in English].
9. Site IMD (World Competitiveness Center). *worldcompetitiveness.imd.org*. Retrieved from <https://worldcompetitiveness.imd.org/> [in English].
10. Haerpfer, C., Inglehart, R., Moreno, A., Welzel, C., Kizilova, K., Diez-Medrano, J., Lagos, M., Norris, P., Ponarin, E., & Puranen, B. (eds.). (2022). *World Values Survey: Round Seven – Country-Pooled Datafile Version 5.0*. Madrid, Spain & Vienna, Austria: JD Systems Institute & WWSA Secretariat. DOI: 10.14281/18241.20. Retrieved from <https://www.worldvaluessurvey.org/wvs.jsp> / [in English].
11. John F. Helliwell, Haifang Huang, Shun Wang, & Max Norton (2021). Statistical Appendix 1 for Chapter 2 of *World Happiness Report 2021*, 18.03.2021. *happiness-report.s3.amazonaws.com*. Retrieved from <https://happiness-report.s3.amazonaws.com/2021/Appendix1WHR2021C2.pdf> [in English].
12. Aldrich, J. O. (2018). *Using IBM Statistics. An Interactive Hands On Approach*. Third edition. California State University. Northridge, USA: SAGE Publications, Inc. [in English].
13. Chaddock, R.E. (1925). *Principles and Methods of Statistics* (1st Edition). Houghton Mifflin Company, The Riverside, Press Cambridge. p.248; p.303 [in English].

Received 24.03.2023.

ПРЕДИКТОРИ ШАСТЯ: РЕЗУЛЬТАТИ РЕГРЕСИВНОГО МОДЕЛЮВАННЯ ТА ПРАКТИЧНІ ВИСНОВКИ*Лігоненко Лариса, Борисов Євген, Грицяк Леся*

Виявлення предикторів суб'єктивного благополуччя (щастя) - LS є одним з завдань економіки щастя – нового напрямку міждисциплінарних наукових досліджень. Це зумовлено визнанням щастя населення пріоритетом державної політики відповідно до принципу людиноцентризму в економіці 5.0. Метою дослідження було виконання множинного лінійного регресійного аналізу (MLRA) та виявлення найбільш значущих предикторів, здійснення експериментальних модельних розрахунків для України за-для визначення векторів і пріоритетів державних зусиль. Інформаційною базою дослідження стала вибірка даних з *World Happiness Report* та рейтингу *The IMD World Competitiveness Ranking* за 2021 р. для 54 країн світу. Оригінальність дослідження полягає у здійсненні MLRA в цілому для усіх країн вибірки та окремо для 2-х підгруп країн («Заможні країни» та «Бідні країни»), виокремлених за критерієм об'єктивного благополуччя – середнього ВВП на душу населення (40 тис. дол.). Отримані статистично значимі регресивні моделі з високим значенням коефіцієнта кореляції та детермінації, які пов'язують залежну змінну LS та її предиктори. Статистично підтверджено, що предикторами щастя є: SS – соціальна підтримка, HLE – очікувана тривалість здорового життя, FLS – свобода робити життєвий вибір, GDPpc – ВВП на душу населення; для підгрупи «Заможні країни» – SS – соціальна підтримка, DI – співвідношення в доходах жінки/чоловіки, InfrHealth – інфраструктура охорони здоров'я, G – щедрість (перераховується в порядку зменшення впливу). Якість побудованої моделі для підгрупи «Бідні країни» визначена низькою, рекомендовано використовувати загальну модель. Виконано експериментальні розрахунки прогнозного значення залежної змінної LS для України при зміні окремих предикторів. Отримані результати мають бути покладені в основу розробки державної програми зростання щастя українців в перебігу післявоєнного відродження України.

Ключові слова: економіка щастя, суб'єктивне благополуччя, щастя, предиктори, регресійне моделювання, державна політика.

PREDICTORS OF HAPPINESS: REGRESSION MODELING AS A BASIS FOR DETERMINING THE NECESSARY ACTIONS AND DECISIONS*Ligonenko Larisa*, Borysov Yevhen, Gritsyak Lesya*

Kyiv National University of Economics named after V. Hetman, Kyiv, Ukraine

*e-mail: Larisa.ligonenko@kneu.edu.ua

Larisa Ligonenko ORCID: <https://orcid.org/0000-0001-5597-5487>Yevhen Borysov ORCID: <https://orcid.org/0000-0001-8273-8655>Lesya Gritsyak ORCID: <https://orcid.org/0000-0002-8847-0482>

Identifying predictors of subjective well-being (happiness) - LS is one of the tasks of economics of happiness – a new direction of interdisciplinary scientific research. This is due to the recognition of the happiness of the population as a priority of state policy in accordance with the principle of people-centeredness in the 5.0 economy. The purpose of the study was to conduct a multiple linear regression analysis (MLRA) and identify the most significant predictors, to carry out experimental model calculations for Ukraine in order to determine the vectors and priorities of state efforts. The information base of the study was a sample of data from the *World Happiness Report* and *The IMD World Competitiveness Ranking* for 2021 for 54 countries of the world. The originality of the research consists in conducting the MLRA as a whole for all sample countries and separately for 2 subgroups of countries ("Rich countries" and "Poor countries"), separated by the criterion of objective well-being – the average GDP per capita (40 thousand dollars)). Statistically significant regression models with a high value of the correlation and determination coefficient were obtained, which link the dependent variable LS and its predictors. It is statistically confirmed that the predictors of happiness are: SS – social support, HLE – healthy life expectancy, FLS – freedom to make life choices, GDP – GDP per capita; for the subgroup "Affluent countries" – SS – social support, DI – female/male income ratio, InfrHealth – health care infrastructure, G – generosity (listed in descending order of influence). The quality of the built model for the subgroup "Poor countries" is recognized as low, it is recommended to use the general model. Experimental calculations of the predictive value of the dependent variable LS for Ukraine were carried out when individual predictors were changed. The obtained results should be the basis for the development of a state program for increasing the happiness of Ukrainians in the course of the post-war revival of Ukraine.

Keywords: economics of happiness, subjective well-being, happiness, predictors, regression modeling, public policy.

REFERENCES

1. UN General Assembly (2011). Happiness: towards a holistic approach to development: resolution / adopted by the General Assembly. *GAOR, 65th sess., Suppl. no. 49*. Retrieved from <https://digitallibrary.un.org/record/715187> [in English].
2. European Commission, Directorate-General for Research and Innovation, МӀller, J. (2020). *Enabling Technologies for Industry 5.0 : results of a workshop with Europe’s technology leaders*, Publications Office. DOI: <https://data.europa.eu/doi/10.2777/082634> [in English].
3. Sait natsionalna biblioteka Ukrainy im. V.I. Vernatskoho [Site National Library of Ukraine]. www.irbis-nbuv.gov.ua. Retrieved from http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=F&I21DBN=UJRN&P21DBN=UJRN [in Ukrainian].
4. Popadynets, O. (2013). Vplyv rivnya zaenyatosti ta oplaty pratsi na zadovolenist ekonomichnykh ahentiv z pozytsiyi “ekonomiky shchastya” [The influence of the level of employment and wages on the satisfaction of economic agents from the standpoint of the “economics of happiness”]. *Visnyk Natsionalnoho tekhnichnoho universytetu “KhPI”. Tekhnichnyy prohres ta efektyvnist vyrobnytstva – Bulletin of the National Technical University «KhPI». Technical progress and production efficiency*, 66, 76-80. Retrieved from http://nbuv.gov.ua/UJRN/vcpitp_2013_66_13 [in Ukrainian].
5. Savytska, N. (2011). Lyudskyy rozvytok u koordynatakh ekonomiky shchastya [Human development in the coordinates of the economy of happiness]. *Naukovyy visnyk Poltavskoho universytetu ekonomiky i torhivli. Seriya: Ekonomichni nauky – Bulletin of the Poltava University of Economics and Trade. Series: Economic sciences*, 4(2), 27-32. Retrieved from [http://nbuv.gov.ua/UJRN/Nvpushk_2011_4\(2\)_5](http://nbuv.gov.ua/UJRN/Nvpushk_2011_4(2)_5) [in Ukrainian].
6. Butnyk, O. (2017). Doslidzhennya indeksu shchastya naselennya v konteksti efektyvnoho derzhavnoho upravlinnya [Research of happiness index of the population in the context of effective public administration]. *Investytsiyi: praktyka ta dosvid – Investments: practice and experience*, 22, 73-75. Retrieved from http://nbuv.gov.ua/UJRN/ipd_2017_22_18 [in Ukrainian].
7. Vereshchahina, H., & Shigol, F. (2020). Theoretical foundations, practice, and empirical approaches to assessing the economy of happiness. *Development Management*, 18(2), 33-42. DOI: [http://dx.doi.org/10.21511/dm.18\(2\).2020.04](http://dx.doi.org/10.21511/dm.18(2).2020.04) [in English].
8. Helliwell, John F., Richard Layard, Jeffrey Sachs, & Jan-Emmanuel De Neve, eds. (2021). *World Happiness Report 2021*. New York: Sustainable Development Solutions Network. Retrieved from: <https://worldhappiness.report/ed/2021/> [in English].
9. Site IMD (World Competitiveness Center). worldcompetitiveness.imd.org. Retrieved from <https://worldcompetitiveness.imd.org/> [in English].
10. Haerpfer, C., Inglehart, R., Moreno, A., Welzel, C., Kizilova, K., Diez-Medrano, J., Lagos, M., Norris, P., Ponarin, E., & Puranen, B. (eds.). (2022). *World Values Survey: Round Seven – Country-Pooled Datafile Version 5.0*. Madrid, Spain & Vienna, Austria: JD Systems Institute & WWSA Secretariat. DOI: 10.14281/18241.20. Retrieved from <https://www.worldvaluessurvey.org/wvs.jsp> / [in English].
11. John F. Helliwell, Haifang Huang, Shun Wang, & Max Norton (2021). Statistical Appendix 1 for Chapter 2 of World Happiness Report 2021/, 18.03.2021. [happiness-report.s3.amazonaws.com](https://happiness-report.s3.amazonaws.com/2021/Appendix1WHR2021C2.pdf). Retrieved from <https://happiness-report.s3.amazonaws.com/2021/Appendix1WHR2021C2.pdf/> [in English].
12. Aldrich, J. O. (2018). *Using IBM Statistics. An Interactive Hands On Approach*. Third edition. California State University. Northridge, USA: SAGE Publications, Inc. [in English].
13. Chaddock, R.E. (1925). *Principles and Methods of Statistics* (1st Edition). Houghton Mifflin Company, The Riverside, Press Cambridge. p.248; p.303 [in English].