THE ANALYSIS OF FACTORS INFLUENCING THE DEVELOPMENT OF SMALL AND MEDIUM SIZE ENTERPRISES' ACTIVITIES

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The paper deals with situation of small and medium size enterprises (SME) dynamics in Latvia. Macro environment factors influencing SME dynamics are investigated and the results are analyzed. Authors have built multifactor linear regression model and have analyzed each of these factors significance.

Key words: small and medium size enterprises, multifactor linear regression

The forecasting issues have become topical in the last decades as external environment changes rapidly and it is difficult to forecast these changes. The purpose of forecasting is not only possible evaluation of research parameters, but also causing thought of what might possibly happen in the external environment and what consequences it might cause. The starting point in economically mathematic modelling is the defining of the researched phenomena factors' system and the structure of causal relationship. Each forecasting method has its advantages and disadvantages. Their application is much more efficient for the short term forecasting. They simplify real processes and with their help, it is possible to acquire results in forecasting. In the long-term forecasting models, it is practically impossible to reflect structural changes constantly taking place in the world.

Under the turbulent conditions of external environment, intuition and imagination are able to become relevant tools for reality perception, supplementing quantitative approaches, which are based only on observed factors. On the other hand, it is comprehensible that purely quantitative method has its disadvantages and that intuition requires major verification using available facts and knowledge. Therefore, it is necessary to provide combined application of these two approaches.

The purpose of correlation analysis is to define the relationship tightness between the factorial and outcome feature. The relationship measuring is based on the matrix of correlation pair coefficients.

Correlation coefficient is a quantitative indicator of relationship tightness between two or more variables. This matrix enables to express opinion on factors' tight bonds with outcome feature and among bonds themselves.

The analysis of the following factors was performed in the research:

Y – The number of companies and business entities per year (without farms and natural persons performing economic activities)

X1 – The number of unemployed, in thousands of residents

X2 – Economically active residents (15-64 years old, in thousands)

X3 - RIGIBOR 6 month average annual interest rate

X4 – GDP growth (% in comparison with previous year)

X5 – GDP per capita (in lats)

X6 – Foreign investment in Latvia (direct investment per capita, received per year, in lats)

X7 – Inflation

X8 – The number of newborns per 1000 residents

X9 – The number of dead per 1000 residents

X10 – The number of registered marriages per 1000 residents

X11 – the number of divorced marriages per 1000 residents

X12 – Subsistence wage consumption basket for 1 resident on average per year (in lats)

X13 – The minimal defined monthly wage in the country (in lats)

X14 – The number of students (social sciences, business administration and law, in thousands)

X15 – The number of foreign travellers' border crossings (in thousands)

X16 – The average expenditure of one traveller per twenty four hours (in lats)

Obtained results:

Table 1. Correlation matrix

	y	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15
y	1,00															
x1	-0,87	1,00														
x2	0,86	-0,80	1,00													
x3	-0,69	0,48	-0,65	1,00												
x4	0,92	-0,92	0,75	-0,42	1,00											
x5	0,97	-0,95	0,91	-0,62	0,94	1,00										
x6	0,87	-0,91	0,82	-0,38	0,87	0,92	1,00									
x7	0,95	-0,72	0,73	-0,61	0,89	0,86	0,75	1,00								
x8	0,92	-0,91	0,88	-0,72	0,84	0,95	0,87	0,77	1,00							
x9	0,74	-0,93	0,77	-0,38	0,87	0,87	0,76	0,60	0,80	1,00						
x10	0,94	-0,98	0,86	-0,58	0,94	0,99	0,93	0,81	0,95	0,89	1,00					
x11	0,66	-0,87	0,49	-0,16	0,77	0,72	0,84	0,54	0,65	0,72	0,81	1,00				
x12	0,95	-0,95	0,92	-0,57	0,94	1,00	0,94	0,85	0,95	0,87	0,98	0,73	1,00			
x13	0,94	-0,79	0,94	-0,68	0,86	0,94	0,78	0,89	0,87	0,77	0,87	0,46	0,93	1,00		
x14	0,77	-0,54	0,84	-0,87	0,57	0,74	0,47	0,73	0,74	0,54	0,64	0,11	0,71	0,89	1,00	
x15	0,97	-0,95	0,89	-0,62	0,95	1,00	0,92	0,88	0,94	0,86	0,99	0,75	0,99	0,93	0,72	1,00
x16	0,96	-0,91	0,85	-0,64	0,90	0,96	0,91	0,85	0,98	0,78	0,96	0,68	0,96	0,89	0,70	0,96

At first the authors will analyze the dynamics of the number of enterprises and the number of unemployed. The researched factor – the number of economically active enterprises – it has increased every year, as well the tendency is up-growing with the coefficient 3142.

The calculation of the correlation coefficient reveal the fact that the number of enterprises is directly influenced by the number of economically active residents, GDP growth, GDP per capita, foreign investment in Latvia, inflation, the number of newborn, the number of registered marriages, subsistence wage consumption basket for 1 resident on average per year, the minimal defined monthly wage in the country, the number of students in social sciences, business administration and law areas, the number of foreign travellers' border crossings, the average expenditure of one traveller per twenty four hours, however there are 2 factors with statistically negative correlation coefficients, i.e. the ones that reduce the number of enterprises – the increase of unemployed on 1000 residents and the increase of RIGIBOR 6 months average annual interest rate.
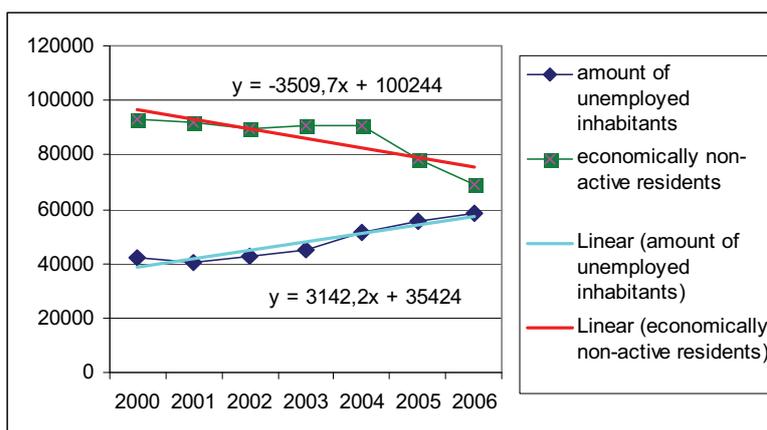

$y = -3509,7x + 100244$

$y = 3142,2x + 35424$

Fig.1.

It is obvious that the number of unemployed decreases more rapidly than the number of enterprises increases. In the authors' opinion it could be explained by several reasons, however the flow of economically active residents to the other EU countries is of relevant importance

According to Central Statistical Bureau data, in 2006 Latvia „obtained" 805 young men at the age up to 19, but „lost" 2207 at the age of operational capability and 365 residents at the age of retirement [1], higher activity is observed in age groups from 20 – 40. The real data on immigrants could be even more frightening, since not all employed persons have registered themselves at the competent authorities of the admission country in accordance with established procedures defined in the normative acts. The

evidence of that is also small registered statistics of Latvia.

According to the data of the Ministry of Economics of Republic of Latvia, most of Latvia labour force leaves Latvia for Ireland, Great Britain and Germany. This number is approximately 5% of all Latvia active labour force, which is characteristic to the new EU member states. According to official data, approximately 60 000 people have left Latvia to find jobs in the EU, and 25 000 of them are located in Ireland. Considering non-official data and research works, the number of the departed people might range within 30%. The research performed by Ireland claims that more and more Latvian people try to find legal employment possibilities [2]. It is envisaged that till 2015 approximately 200 000 of economically active inhabitants will gradually leave, which will even more reduce the labour supply in Latvia. In this case in long term perspective it is necessary to consider notable decrease of production outcome – approximately for 15% in comparison with the situation if these people would have stayed in Latvia [3].

The authors ascertained that there is tight and inverse connection (which was verified with the help of correlation coefficient) between the number of economically active residents and the number of unemployed persons (the coefficient is -0,8). The same – very tight and inverse connection is between the number of unemployed and both GDP growth and GDP per capita, and foreign investment in latvja, and inflation, and the number of newborns, and the number of dead, and the number of registered marriages, and the number of divorced marriages, and subsistence wage consumption basket for 1 resident on average per year, and the minimal defined monthly wage in the country, and the number of students, and the number of foreign travellers' border crossings, and the average expenditure of one traveller per twenty four hours.

Besides directly and at average tightness the number of unemployed is influenced by RIGIBOR index % rate – the less is the number of unemployed, the higher is RIGIBOR rate and vice versa.

Annually the tendency of economically active residents' growth increases with the coefficient 7,2, which basing on correlation analysis is very tightly connected both with GDP growth, and GDP per capita, and foreign investment in Latvia, and inflation, and and the number of newborns, and the number of dead, and the number of registered marriages, and the number of divorced marriages, and subsistence wage consumption basket for 1 resident on average per year, and the minimal defined monthly wage in the country, and the number of students, and the number of foreign travellers' border cross-

ings, and the average expenditure of one traveller per twenty four hours.

The number of economically active residents is negatively influenced by RIGIBOR 6 months average annual interest rate – the lower is this.

The number of economically active residents is negatively influenced by RIGIBOR 6 month average annual interest rate – the lower is this interest rate, the more economically active residents there are, which gives evidence of the residents' willingness to take credits at lower interest rates and therefore legalize their activity.

RIGIBOR 6 months average annual interest rate has some connections with other, not only previously mentioned factors. The notable correlation coefficients reflect the situation that RIGIBOR interest rate is inversely proportional to GDP per capita, inflation, the number of newborns, the minimal defined monthly wage in the country, the number of students and the number of foreign travellers' border crossings, and the average expenditure of one traveller per twenty four hours.

In authors' opinion, considering the data of 2007, the tendency or the slope of linear trend might change.

GDP growth (in % compared to the previous year) has a positive growth tendency with the coefficient 0,8, and that is closely but inversely connected with the number of unemployed, however it is directly connected with the number of economically active residents, GDP per capita, foreign investment in Latvia, inflation, the number of newborns, the number of dead, the number of registered marriages, the number of divorced marriages, the subsistence wage consumption basket for 1 resident on average per year, the minimal defined monthly wage in the country, the number of foreign travellers' border crossings, and the average expenditure of one traveller per twenty four hours.

GDP per capita increases every year (coefficient 462,75) and it is most tightly connected with the increase of subsistence minimum and increase of the number of foreign travellers' border crossings (correlation coefficients are very close 1), however there is also very tight connection with other factors, including foreign investment in Latvia.

Foreign investment has an increasing trend; however it is substantially influenced by different political decisions, which cannot be included in the quantitative model. Foreign investment is closely connected with many factors (see correlation matrix), however they have only average tightness connection with the number of students, which gives evidence that at the moment investment is attracted to the industries, manufacturing products and providing services for low added value.

The increase of inflation most of all affects the growth of the number of economically active residents, the increase of subsistence wage consumption basket, the minimal defined monthly wage in the country, the number of students, the average expenditure of one traveller per twenty four hours, it is connected with the number of foreign travellers' border crossings and foreign investment in Latvia. The inflation increase is influenced also by GDP growth, the number of newborns and the number of registered marriages.

The inflation is reduced by the increase of unemployed and by the increase of RIGIBOR 6 month average annual interest rate.

Both the number of newborns and the number of dead have upward trend, however the number of dead increases more slowly than the number of newborns, which is testified by the data of Central Statistical Bureau of the Republic of Latvia. Despite the negative natural growth of the population on 1000 residents, the predominance of the number of dead is decreasing.

Both birth-rate and death rate is negatively influenced by the increase of unemployment and high credit interest rates. The increase of the rest of factors' values has a positive influence on birth-rate.

Every year the number of both registered and divorced marriages increases. The trend gives evidence that the number of the registered marriages increases more rapidly (coefficient 0,39) than the number of the divorced marriages (coefficient 0,09), which testifies the increase of the population's welfare.

The subsistence wage consumption basket per 1 resident increases annually. The trend coefficient is positive and comparatively high (5,6).

Alongside with the increase of the subsistence wage, the minimal wage also increases, besides with more rapid tendency than the subsistence wage consumption basket for 1 resident. The coefficient of the trend is 6,4.

The maximum number of studious at business management and law sciences was reached in 2004 – altogether 71,3 thousand of students, in 2005 it was only 300 less and in 2006 it was 400 less. The willingness of the population to study these sciences gives evidence that society would like to be engaged in business.

The correlation coefficient matrix reflects also dependence of students' number in social, business and law sciences on other factors – the most substantially the growth of the number is influenced by increase of minimal monthly wage and low RIGIBOR interest rate.

After Latvia joining the European Union there is flourishing of the tourism industry in Latvia. Therefore it is not surprising that the number of foreign travellers' border crossings rapidly increase (coefficient 443,69) – from 1,9 million in 2000 up to 4,6 million in 2006 – the increase is 242%. The growth of GDP has the strongest influence. Alongside with the increase of tourists' number, the average expenditure of one traveller in 24 hours increases.

The analysis of regression pairs is based on application of straight line equation. The coefficient b of linear pair regression bonds x variation of factors' feature and y variation of the output feature.

The authors have chosen the number of enterprises for the conditional factor y but for independent factors all those quantitative factors which might influence the number of enterprises. The dynamics has been researched since the aggregation of the data for all these factors in Central Statistical Bureau of the Republic of Latvia – the period from 2000 to 2006.
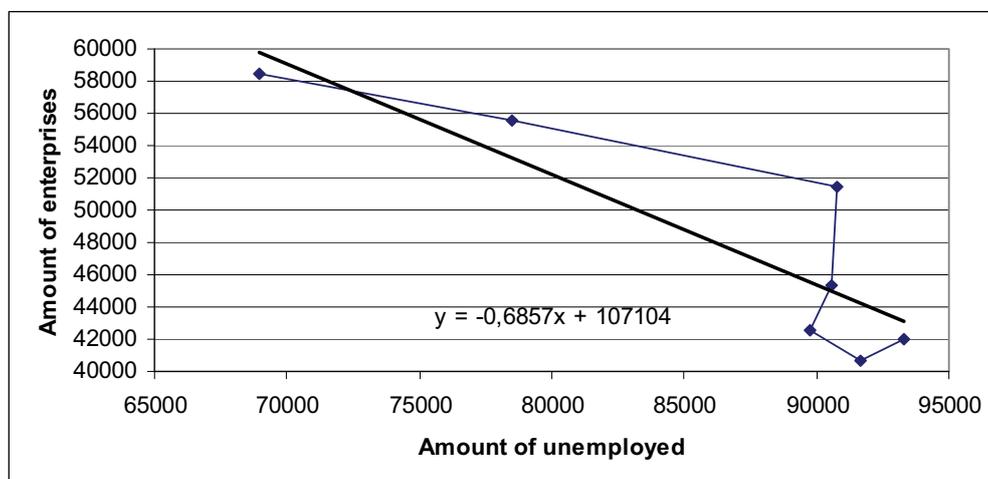

$$y = -0,6857x + 107104$$

Fig.2.

Negative tendency is observed regarding the dependence of the enterprise number on the number of unemployed – alongside with the decrease of the number of unemployed, the number of economically active enterprises increases. This gives evidence that with the increase of employment rate, especially in the regions, not only the newly established enterprises attract employees, but the unemployed persons establish their enterprises as well.

As it was mentioned before, with the increase of the number of enterprises, not only employment rate increases, but the number of economically active residents as well. This leads up to assumption that the enterprises, that initially were established as micro enterprises, have expanded their activities and operate as small and middle size enterprises. In

2005, compared to 2004, this tendency was observed in all areas. The most distinctly it was observed in area of real estate sales (190 micro enterprises with the extension of their activities moved to the small enterprises category and 41 small enterprises moved to middle size enterprise category). Similar tendencies have been observed also in trade (accordingly 116 and 43) and building construction (99 and 30) areas. In 2006, compared to 2005, the number of small (for 14) and middle size (for 6) enterprises has decreased. The reason of the decrease is expansion of supermarkets' network and inability of small and medium size enterprises to compete with them. However, both in the area of real estate sales and building construction the micro enterprises kept on extension.
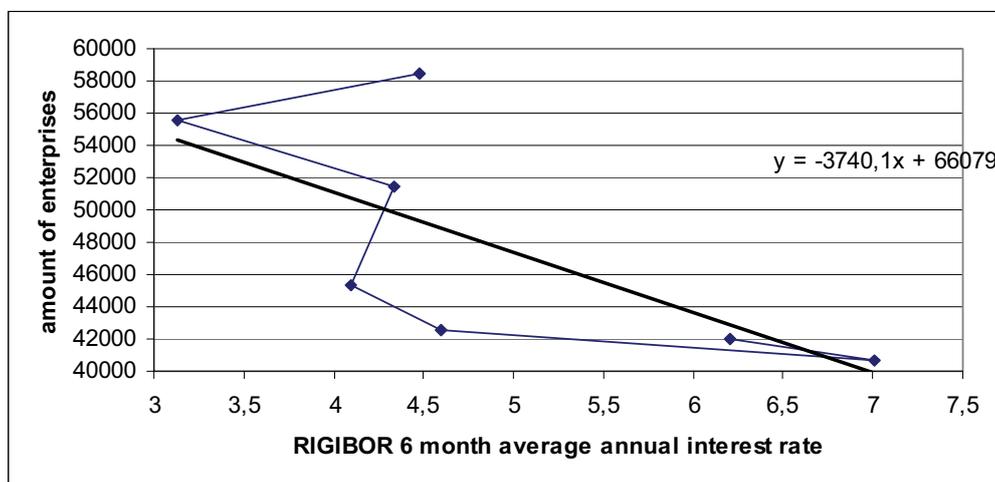

$y = -3740,1x + 66079$

Fig.3.

Considering the regression coefficient, RIGIBOR 6 month interest rate is one of the factors having the most essential influence over the number of economically active enterprises. However, this is not true, as the figure reveals that at interest rate 4-4,6% the number of economically active enterprises is essentially different. For instance, in 2005, compared to 2004, the average rate of this index was 27,9% , and the number of enterprises increased for 8,1%, however in 2006, compared to 2005, RIGIBOR rate increased for 43,1%, but the number of enterprises increased only for 5%. This gives evidence that the model of linear regression in this situation not sufficiently well approximates the real data.

The establishment of new enterprises is directly connected with economic growth, which ensures the growth of GDP, as it is observed in the next figure.

Alongside with the increase of the number of enterprises, the number of work places also increases, which consequently increases the total demand for labour force, which, in its turn, facilitates the increase

in wages. However, due to inflation, excise tax and other factors, minimal wage regularly drops behind the subsistence minimum, which does not facilitate the filling of vacancies and registration of self-employed persons. The increase of minimal wage defined in the country facilitates the increase of productivity. The vacant labour force often is motivated to start entrepreneurship, which explains the value of the regression coefficient. Alongside with the increase of number of economically active enterprises there is increase both in GDP growth and GDP per capita.

The average annual inflation growth promotes not only consumption but also investment in entrepreneurship, which directly affects the establishment and development of enterprises.

As new enterprises are founded, goods and services are produced, which promotes consumption of the output. Therefore the goods' consumption basket not only increases but also extends.
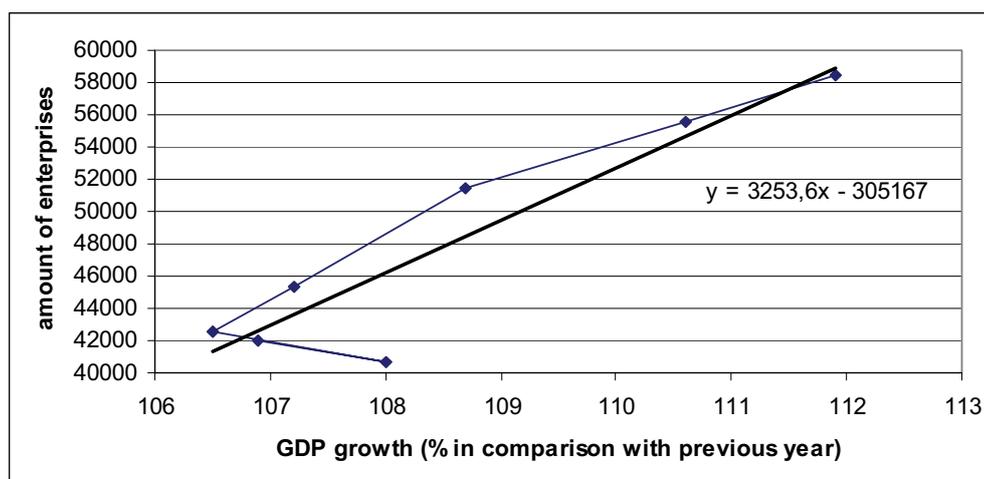
The same as the dynamics of the enterprise

Fig.4.

number in connection with RIGIBOR 6 month interest rate value, also the number of studious has little influence over the increase of number of economically active enterprises, despite regression coefficient. This gives evidence that enterprises are mostly established after the graduation of university or the managers of already existing enterprises start up their studies.

Since Latvia has joined the European Union, the number of foreign tourists' border crossings has rapidly increased. Consequently, the demand for services associated with tourism has increased, and, therefore, it is natural to have increasing tendency of enterprises in small and medium size enterprises group, which has more flexible reaction to this demand.

The authors are interested to elicit those factors which have the most significant influence over the number of enterprises. Therefore multi-factor analysis will be applied and multi-factor regression model will be created.

Everything associated with plural number (multi grade) regression, conceptually is identical with pair regression, except the fact that more than one variable is applied.

Multifactor multi grade regression equation looks as follows:

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + ...b_mx_m,$

Where y – conditional or predictable variable;
x_i – independent variable;
a – free part of equation;
b_i – conditionally – clear regression coefficient;
i = 1,..., m;
m – the number of independent variables (features of factors).

The term "conditionally – clear regression coefficient" means that each of the quantities (values) b measures (reflects) the average trend (aggregated) of the conditional variable (outcome feature) in case

if there is deviation of the conditional variable (factor) x from its average quantity against one unit of measurement on the condition that all other factors included in the regression equation are consolidated in average quantities (values), they do not change and do not vary.

Thus, unlike pair regression coefficient, the conditionally-clear regression coefficient measures the influence of a factor remaining abstracted from the variations of this factor with the variation of other factors. If it was possible to include all factors influencing the variation of the outcome feature in the regression equation, then quantities could be regarded as factors' direct influence measures. But since it is unreal to include all the factors in the equation, then coefficients b are not free from the addition of those factors not included in the equation.

The authors have created the model of multifactor linear regression to define the dependence of the number of economically active enterprises y on all 16 before mentioned factors.

The best model of multifactor linear regression for the particular problem (model with the least error) is:

$Y = 42154,36939 - 173,5283 * X3 + 14,80952 * X5 + 0,000585 * X6 + 256,5339 * X7 + 4,203993 * X8 + 2,454507 * X10 - 30,11979 * X11 - 0,145606 * X13 - 0,29498 * X14 + 11,36112 * X15$

From this model it results that X7 (inflation) has the largest influence on the number of economically active enterprises – the coefficient 256,5 after processing, indicates that the higher inflation rate is, the higher is economical activity, which facilitates the establishment of new enterprises.

The coefficient (-173,5) of RIGIBOR index (X3) is sufficiently large, which indicates that alongside with the increase of interest rate, the number of economically active enterprises decreases and vice

verse – at low credit interest rates the economic activity in the country increases.

The third most significant factor is X11 (the number of divorced marriages), which has negative rationed coefficient (-30,1). The next most significant is X5 (GDP per capita) with the coefficient 14,8. With the increase of the number of enterprises, the total demand increases, which results in GDP growth and welfare of the population, which creates favourable conditions for the creation of new families (the significance of factor X10 is 2,5) and increase of birth-rate (the coefficient of factor X8 is 4,2). As big part of Latvia micro enterprises consists of family enterprises, divorced marriages have negative influence on the number of economically active enterprises.

The normative acts of the state, regarding the amount of minimal wage per month, and the number of students have negative influence on the number of enterprises. This could be explained with the fact that significant part of economically active residents invests their time and money in education.

Unfortunately the number of enterprises is little influenced by foreign investment (the significance coefficient of X6 is only 0,0006), however the situation could possibly change in the future.

Since Latvia regained its independence, the number of foreign tourists' boarder crossings has increased which points to the dynamic development of the tourism industry. This indicator not only improves the macroeconomic indicators (especially GDP), but leaves positive impact also on the increase of the number of enterprises (the influence of the factor X15 is 11,4).

In order to check how accurate this model is, it is necessary to calculate the standard error S_e of the equation applying the formula:

$$S_e = \sqrt{\frac{\sum\limits_{i=1}^{n}\left(y_i - \widehat{y}_i\right)^2}{n-1}}$$

Where $\widehat{y}$ - the empiric values of the outcome features;

- the calculated values of the outcome features after regression equation;

n – the number of observations;

If the calculated S_e value is compared with the average value of the outcome feature $\widehat{y}$, using the formula $\dfrac{S_e}{\overline{y}}*100$, then it is possible to find out if the value of the standard error is large or small.

The value of the standard error in the model, created by the authors, is small ($S_e = 11,8$) un

$$\frac{S_e}{\overline{y}}*100 = 0,025.$$

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