

# “Management of enterprise’s financial sustainability and improvement of its methods”

|                     |  |
|---------------------|--|
| <b>AUTHORS</b>      | Galyna Azarenkova  <a href="https://orcid.org/0000-0003-0101-2989">https://orcid.org/0000-0003-0101-2989</a><br> <a href="http://www.researcherid.com/rid/M-5272-2015">http://www.researcherid.com/rid/M-5272-2015</a><br>Olena Golovko  <a href="https://orcid.org/0000-0001-6502-4562">https://orcid.org/0000-0001-6502-4562</a><br>Kateryna Abrosimova |
| <b>ARTICLE INFO</b> | Galyna Azarenkova, Olena Golovko and Kateryna Abrosimova (2018). Management of enterprise’s financial sustainability and improvement of its methods. <i>Accounting and Financial Control</i> , 2(1), 1-14.<br>doi: <a href="https://doi.org/10.21511/afc.02(1).2018.01">10.21511/afc.02(1).2018.01</a>   |
| <b>DOI</b>          | <a href="http://dx.doi.org/10.21511/afc.02(1).2018.01">http://dx.doi.org/10.21511/afc.02(1).2018.01</a>  |
| <b>RELEASED ON</b>  | Tuesday, 08 May 2018   |
| <b>RECEIVED ON</b>  | Friday, 19 January 2018  |
| <b>ACCEPTED ON</b>  | Friday, 20 April 2018  |
| <b>LICENSE</b>      | <br>This work is licensed under a <a href="https://creativecommons.org/licenses/by-nc/4.0/">Creative Commons Attribution-NonCommercial 4.0 International License</a>  |
| <b>JOURNAL</b>      | "Accounting and Financial Control"   |
| <b>ISSN PRINT</b>   | 2543-5485  |
| <b>ISSN ONLINE</b>  | 2544-1450  |
| <b>PUBLISHER</b>    | LLC “Consulting Publishing Company “Business Perspectives”   |
| <b>FOUNDER</b>      | Sp. z o.o. Kozmenko Science Publishing   |



NUMBER OF REFERENCES

**19**



NUMBER OF FIGURES

**1**



NUMBER OF TABLES

**12**

© The author(s) 2025. This publication is an open access article.



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"  
Hryhorii Skovoroda lane, 10, Sumy,  
40022, Ukraine

[www.businessperspectives.org](http://www.businessperspectives.org)

**Received on:** 19<sup>th</sup> of January, 2018

**Accepted on:** 20<sup>th</sup> of April, 2018

© Galyna Azarenkova, Olena Golovko, Kateryna Abrosimova, 2018

Galyna Azarenkova, Doctor of Economics, Professor, Head of the Finance Department, Kharkiv Educational and Scientific Institute of SHEI "Banking University", Ukraine.

Olena Golovko, Ph.D. in Economics, Associate Professor, Deputy Head of the Finance Department, Kharkiv Educational and Scientific Institute of SHEI "Banking University", Ukraine.

Kateryna Abrosimova, Master at Kharkiv Educational and Scientific Institute of SHEI "Banking University", Ukraine.



This is an Open Access article, distributed under the terms of the [Creative Commons Attribution-NonCommercial 4.0 International license](https://creativecommons.org/licenses/by-nc/4.0/), which permits re-use, distribution, and reproduction, provided the materials aren't used for commercial purposes and the original work is properly cited.

Galyna Azarenkova (Ukraine), Olena Golovko (Ukraine),  
Kateryna Abrosimova (Ukraine)

# MANAGEMENT OF ENTERPRISE'S FINANCIAL SUSTAINABILITY AND IMPROVEMENT OF ITS METHODS

## Abstract

The article is dedicated to the solution of the relevant issue, concerning management of enterprise's financial sustainability. Financial sustainability assessment is one of the most important principles of enterprise's activity, which provides information about financial capabilities of the company at the time of its evaluation and for the future. It is a requirement for the enterprise activity, which provides a high level of competitiveness, efficiency and intensity. Thus, the restoration and strengthening of financial sustainability is a priority task for the enterprise, a basic precondition for its effective functioning. The purpose of the research is to analyze financial sustainability and to improve the methods and approaches of its evaluation. The following methods were used in this research: financial and economic analysis, economic and mathematical modeling, analysis and synthesis, comparison.

The main results of the study are following: the theoretical and essential characteristics of enterprise financial sustainability has been determined; the financial status of PJSC "Turboatom" has been analyzed; the taxonomic index of financial sustainability has been calculated and the forecast of its significance has been made, the approaches to increase enterprise financial sustainability have been proposed.

## Keywords

financial sustainability, assessment, mathematical modeling, management, financial conditions

**JEL Classification** G30, C10

## INTRODUCTION

In market conditions the basis of survival and stable position of the enterprise is its financial stability. Functioning as a business entity, each enterprise must provide such a state of its financial resources, which will maintain the ability to continuously fulfill its financial obligations before business partners, state, owners, employees, etc. It is the financial stability that represents a certain state of the entity, which allows freely maneuvering cash and ensuring the continuity of its activities achieved by a certain ratio of own and borrowed working capital and guarantee the solvency, economic independence and investment attractiveness within the permitted level of risk.

## 1. LITERATURE REVIEW

Important contribution to the study of financial sustainability was made by well-known scholars, such as Blank I. O., Brigham E. F., Dolan E. J., Sheremet A. D., Helfert E. and others. The solution of this problem was also reflected in works of Belikova T. V., Vaschenko L. O., Zabrodsky V. A., Kizim M. O., Kolesnikova V. M., Savitskaya G. V., Tereshchenko O. O., Miroshnik O. Yu., Azarenka G. M., Golovko O. G., Guryanova L. S., etc.

The financial stability of the enterprise is influenced by many external (socio-economic and political stability in the country, the level of effective demand, tax, credit and finance, accounting, investment policy, the market situation of suppliers, industry characteristics, type of market) and internal factors (size of enterprise, the level of control system flexibility; the level of conformity of products to consumer inquiries in quality and price, material and technological base of the enterprise, technologies, state of property and financial resources, dependence on foreign creditors and investors, the effectiveness of economic and financial operations, the level of management and supply of highly qualified personnel, corporate culture, business reputation of the company, the balance of internal capacity with the influence of external threats, etc.) (Gapak & Kapteshan, 2014).

A significant number of factors that affect the financial sustainability of the enterprise cause the lack of a single approach to its definition and assessment in the economic literature (Yalovy & Bakerenko, 2011).

The traditional methods of financial sustainability assessment can be divided into three groups. The first group includes the qualitative assessment of financial stability, the second one contains the quantitative assessment of financial stability, and the third group includes the assessment of financial insolvency of enterprises.

Among methods of enterprise's financial state analysis and its' financial sustainability the following methods can be outlined: time series models, regression models, models of systems of interrelated variables, recursive systems, etc. (Zakharova, 2013).

## 2. METHODS

There are economic and mathematical methods, which can help to study the connections and influences between objects and phenomena, determine the homogeneous features in aggregates of objects and data, create models of behavior of individual enterprises based on the influence of various factors, determine the development trends for the forecasting.

Therefore, the use of economic and mathematical methods is the key to accurate and detailed assessment of financial sustainability of the enterprise, which provides the basis for optimizing managerial decisions and achieving the planned level of financial state.

Thus, financial sustainability of the enterprise is a key feature of its financial status, its strategic development. Timely analysis of financial sustainability creates new opportunities for the enterprise to identify reserves in order to enhance its competitive position, increase market share and fulfill other tactical and strategic goals.

## 3. RESULTS

For a deeper understanding of the mechanism of financial sustainability management using the above-mentioned methods, the Public Joint Stock Company "Turboatom" (hereinafter referred to as PJSC "Turboatom") was selected as the research base for carrying the practical calculations. It is one of the largest turbo-building enterprises in the world with a full cycle of production: design, manufacturing, supply, adjustment, firm maintenance of turbine equipment of all types of power plants.

The activity of the enterprise can be characterized by following characteristics: the degree of physical depreciation of fixed assets – 60.4%; the degree of moral deprivation – 38%; the degree of mechanization and automation of production – 66.8%; coefficient of utilization of production capacity – 64.5%.

The general indicators of economic activity of PJSC "Turboatom" for the period 2013-2015 were determined in Table 1.

The calculated results make prove that PJSC "Turboatom" is a leading domestic turbine-building enterprise competing at the world level, characterized by high quality and reliability of manufactured products, which closely cooperates with international enterprises. The analyzed period demonstrates the stability of property status of the enterprise, the tendency of increasing net profit and net income. Also the decrease in the amount

**Table 1.** General indicators of activity of the PJSC “Turboatom” in 2013–2015

| Nº | Indicator  | 2013,<br>ths. UAH | 2014,<br>ths. UAH | 2015,<br>ths. UAH | The ratio<br>2014 to 2013 | The ratio<br>2015 to 2014 |
|----|--|-------------------|-------------------|-------------------|---------------------------|---------------------------|
| 1  | Net income (revenue) from sales of products (goods, works, services) | 1741261           | 1842387           | 2694253           | 105,81                    | 146,24                    |
| 2  | Net profit   | 582944            | 637397            | 1632751           | 109,34                    | 256,16                    |
| 3  | Equity   | 2161308           | 2579448           | 3770326           | 119,35                    | 146,17                    |
| 4  | Non-current assets   | 599600            | 682189            | 605625            | 113,77                    | 88,78                     |
| 5  | Long-term liabilities  | 0                 | 161748            | 45160             | –                         | 27,92                     |
| 6  | Current liabilities  | 1559722           | 1274130           | 999674            | 81,69                     | 78,46                     |
| 7  | Receivables  | 1684306           | 454585            | 266584            | 26,99                     | 58,64                     |
| 8  | Stocks   | 1582875           | 3474634           | 3197124           | 219,51                    | 92,01                     |

of payables and receivables shows that the company is undertaking measures to optimize the structure of its capital.

Among the versatile methods of financial stability assessment of the company the analysis of absolute indicators is distinguished, which includes a generalized three-dimensional indicator of the type of financial stability (Table 2).

According to the three-dimensional index of financial stability PJSC “Turboatom” had an unstable type of financial stability in 2013. This indicates a situation where stocks and costs exceed normal sources of financing, so the company is forced to attract additional sources of funding. In this situation, there is a possibility of restoring equilibrium by replenishing sources of own funds, reducing receivables, ac-

celerating the turnover of stocks. In 2014 and 2015, the company improved its three-component rate of financial stability from an unsustainable state to absolute financial sustainability. This type of financial stability is characterized by the fact that all stocks of the company are covered by its current assets, that is, the enterprise does not depend on external creditors. Nowadays the company aims to support and fully ensure that the type of financial sustainability is maintained at the highest absolute level.

A general analysis of the financial state of the enterprise makes to conclude that the company has a satisfactory stable financial state, showing a high level of liquidity, profitability and business activity. Moreover, the PJSC “Turboatom” demonstrates a high level of efficiency and intensity of use of available property and financial resources.

**Table 2.** Three-dimensional index of financial stability of the PJSC “Turboatom”

| Indicators   | 2013,<br>ths. UAH | 2014,<br>ths. UAH | 2015,<br>ths. UAH | Relative<br>changes<br>2014/2013,<br>% | Relative<br>changes<br>2015/2014,<br>% |
|--|-------------------|-------------------|-------------------|--|--|
| Sources of own funds   | 2161308           | 2579448           | 3770326           | 16.21                                  | 31.59                                  |
| Non-current assets   | 599600            | 682189            | 605625            | 12.11                                  | –12.64                                 |
| Availability of own working capital  | 1561708           | 1897259           | 3164701           | 17.69                                  | 40.05                                  |
| Long-term loans and borrowed funds   | 0                 | 161748            | 45160             | 100.00                                 | –258.17                                |
| Availability of own and long-term loan sources for stock formation and costs                 | 1561708           | 2059007           | 3209861           | 24.15                                  | 35.85                                  |
| Short-term loans and borrowings  | 1559722           | 1274130           | 999674            | –22.41                                 | –27.45                                 |
| The total value of the main sources of stock formation and costs                             | 1582875           | 1737317           | 1598562           | 8.89                                   | –8.68                                  |
| Total inventory and cost   | 3142597           | 3011447           | 2598236           | –4.36                                  | –15.90                                 |
| Surplus (lack) of own working capital  | –21167            | 159942            | 1566139           | 113.23                                 | 89.79                                  |
| The surplus (lack) of own and long-term borrowed sources of formation of stocks and expenses | –21167            | 321690            | 1611299           | 106.58                                 | 80.04                                  |
| The surplus (lack) of the total value of the main sources of formation of stocks and costs   | 1538555           | 1595820           | 2610973           | 3.59                                   | 38.88                                  |
| Three-dimensional indicator of financial sustainability                                      | (0;0;1)           | (1;1;1)           | (1;1;1)           |  |  |

The economic and mathematical modeling is the main methods of financial sustainability analysis. Based on the conclusions of a general analysis of financial state of the PJSC “Turboatom”, a simulation of the dynamics of financial stability of the PJSC “Turboatom” was conducted.

The integral taxonomic level of development level allows assessing the average level of the attributes characterizing the phenomenon that is sufficient in a certain period or at the time of the assessment.

The first stage in the process of constructing a taxonomic index is the definition of elements of the matrix of observations.

The second stage consists of the differentiation of the characteristics of the matrix of observations. The reason for the division of signs into two groups is the effect of each of them on the level of development of the objects under study, which is the basis for constructing of so-called development standard.

The third stage is the transposition of the received matrices of coefficients with the further calculation of the distance matrices. The obtained distances serve as output values for calculating the level of use of local potentials.

The interpretation of the taxonomic index is as follows: the closer its value to one is – the higher the level of development activity is.

The analysis of financial state of PJSC “Turboatom” for the period of 2013–2015 revealed the following objectives for increasing financial sustainability of the enterprise:

- to analyze the factors of the unstable type of financial condition of the company in 2013 in details;
- to analyze the causality between the rapid increase in the size of long-term debt capital in 2014 and its reduction in 2015;
- to offer reserves for improving maneuverability of own funds and own working capital.

The analysis of financial sustainability aims to calculate the indicators of maneuverability, autono-

my, coverage, and others. In this case, the analysis of the abovementioned indicators is not enough to formulate and confirm the assumptions about the level of financial stability of the individual entity. Financial stability of the enterprise is a broad concept; its essence is not only in ensuring the financial independence of the enterprise from borrowed funds and its solvency, but also in ensuring a sufficiently high level of profitability and turnover of available property and financial resources. That is why for constructing the integral index of financial stability the main indicators of all blocks of analysis of financial state of the enterprise (liquidity, profitability, solvency) were calculated:

- The coefficient of profitability of operational activity as a measure of financial stability characterizes the possibility of obtaining an enterprise profits to cover the cost of production and sales of products, as well as the possibility of its rational use to build assets, settlements under the obligation and development of the entire enterprise.
- The turnover rate of working capital characterizes such an aspect of financial stability of the enterprise as the ability to use all the possibilities of rapid response to changes in the market environment, the possibility of releasing additional funds for future development of the company. Also, it should be noted that the PJSC “Turboatom” has a mobile structure of assets (the share of current assets in the total value of the company’s assets at the end of 2015 was 87.4%), therefore, financial stability in terms of intensity was considered from the circulating assets.
- The coefficient of absolute liquidity characterizes the ability of the enterprise to pay off its obligations, this is one of the main aspects of financial stability of the enterprise, since the rational use of the distribution of available both borrowed and own resources will allow the company to stay at a solvent level, not to lose opportunities, to prevent and minimize the risks of bankruptcy. Today, during the economic crisis and the insolvency crisis, most domestic enterprises that not only work at a loss, losing high profitability rates, but also do not have the ability to make pay-

ments on loans, take steps to restructure debt. It is the company's liquidity that is the key to maintaining financial stability at an adequate level. According to preliminary analysis of the PJSC "Turboatom" for 2013–2015 years, it is absolutely liquid, while liquidity research in previous years is also appropriate.

- The coefficient of autonomy as an aspect of financial sustainability – is the search for opportunities to reduce dependence on borrowed capital, increasing self-financing. It is clear that in the current conditions, only enterprises that properly developed their borrowing policies and policies to rationalize the use of not only their own, but also borrowed funds, can successfully compete in the market.
- The coefficient of financial stability as a relative indicator that characterizes the company's stable sources of financing is one of the conditions for maintaining financial sustain-

ability at a sufficient level in the long run. The preliminary analysis by the PJSC "Turboatom" has shown that for the period 2013–2015 this factor did not reach the normative value. This may be due to the specifics of the industry, as well as the fact that the company uses more short-term borrowed capital than long-term.

The information base for calculations is the quarterly financial reports of the PJSC "Turboatom" for 2007–2015.

The first step in determining the integral index is the calculation of the given coefficients for the period under study. The results obtained are presented in Table 3.

The preliminary analysis of the raw data for modeling proves that the company has improved its financial state over time, which is a positive moment, while determining the causal relationship of this growth is highly expedient. For example, the

**Table 3.** Calculations of relative indicators of financial state of the PJSC "Turboatom"

| Indicator   | Profitability ratio | The turnover rate of reversible funds | Absolute liquidity ratio | Coefficient of autonomy | Stability factor |
|-------------|---------------------|---------------------------------------|--------------------------|-------------------------|------------------|
| <b>2007</b> |                     |                                       |                          |                         |                  |
| I           | 0.098975657         | 0.112258908                           | 0.83547953               | 0.82826739              | 0.83553175       |
| II          | 0.156864465         | 0.256134642                           | 0.51763347               | 0.80635153              | 0.81329131       |
| III         | 0.124011998         | 0.430820096                           | 0.36186374               | 0.79468544              | 0.80149064       |
| IV          | 0.10434103          | 0.584472436                           | 0.3198159                | 0.77736565              | 0.7835728        |
| <b>2008</b> |                     |                                       |                          |                         |                  |
| I           | 0.237951578         | 0.201464476                           | 0.39289936               | 0.80713847              | 0.81336886       |
| II          | 0.123704799         | 0.379805055                           | 0.35946848               | 0.75443554              | 0.76033829       |
| III         | 0.104285693         | 0.50470951                            | 0.2269247                | 0.65028647              | 0.65028647       |
| IV          | 0.33570401          | 0.660370511                           | 0.16153817               | 0.69915153              | 0.70241893       |
| <b>2009</b> |                     |                                       |                          |                         |                  |
| I           | 0.141376858         | 0.24507702                            | 0.28683994               | 0.69584372              | 0.7000087        |
| II          | 0.158260756         | 0.421764073                           | 0.16005703               | 0.67854677              | 0.68270436       |
| III         | 0.191072598         | 0.571723912                           | 0.19553594               | 0.68709041              | 0.69115816       |
| IV          | 0.183953852         | 0.866877867                           | 0.25919423               | 0.71479371              | 0.71850997       |
| <b>2010</b> |                     |                                       |                          |                         |                  |
| I           | 0.291195618         | 0.364982246                           | 0.30594521               | 0.76658058              | 0.77037007       |
| II          | 0.241368088         | 0.600058129                           | 0.46906504               | 0.74580579              | 0.74939917       |
| III         | 0.198877564         | 0.800921402                           | 0.53300438               | 0.7157409               | 0.71913715       |
| IV          | 0.200333429         | 1.015108197                           | 0.38615425               | 0.71078117              | 0.71408681       |
| <b>2011</b> |                     |                                       |                          |                         |                  |
| I           | 0.241227565         | 0.24093683                            | 0.49784687               | 0.66433684              | 0.66736529       |
| II          | 0.345675034         | 0.504572603                           | 0.60927083               | 0.68506035              | 0.68785361       |
| III         | 0.344214719         | 0.70311002                            | 0.71838321               | 0.66849877              | 0.67103281       |
| IV          | 0.336997276         | 0.942828026                           | 0.5122803                | 0.65564139              | 0.65757887       |

**Table 3 (cont.).** Calculations of relative indicators of financial state of the PJSC “Turboatom”

| Indicator          | Profitability ratio | The turnover rate of reversible funds | Absolute liquidity ratio | Coefficient of autonomy | Stability factor |
|--------------------|---------------------|---------------------------------------|--------------------------|-------------------------|------------------|
| <b>2012</b>        |                     |                                       |                          |                         |                  |
| I                  | 0.346655103         | 0.181997472                           | 0.56513774               | 0.60508379              | 0.60674706       |
| II                 | 0.25604672          | 0.350524579                           | 1.94670407               | 0.59680905              | 0.5984962        |
| III                | 0.244530739         | 0.494397642                           | 0.45581230               | 0.57941294              | 0.58098314       |
| IV                 | 0.238145429         | 0.60169865                            | 0.46741656               | 0.50890184              | 0.50890184       |
| <b>2013</b>        |                     |                                       |                          |                         |                  |
| I                  | 0.22392005          | 0.10253821                            | 0.45326454               | 0.51863304              | 0.51975856       |
| II                 | 0.260536459         | 0.227528788                           | 0.41519977               | 0.52119408              | 0.52119408       |
| III                | 0.312253073         | 0.378328073                           | 0.38795683               | 0.56059093              | 0.56059093       |
| IV                 | 0.334782666         | 0.500516538                           | 0.50557087               | 0.58083595              | 0.58083595       |
| <b>2014</b>        |                     |                                       |                          |                         |                  |
| I                  | 0.801347837         | 0.129110597                           | 0.56563474               | 0.65705157              | 0.65705157       |
| II                 | 0.651999726         | 0.269100855                           | 0.53704870               | 0.65749572              | 0.65749572       |
| III                | 0.535581136         | 0.398126557                           | 0.64112798               | 0.69094047              | 0.69094047       |
| IV                 | 0.345962602         | 0.476293232                           | 0.7448251                | 0.64240064              | 0.6826833        |
| <b>2015</b>        |                     |                                       |                          |                         |                  |
| I                  | 1.045223085         | 0.153280747                           | 1.22037299               | 0.72050003              | 0.75726963       |
| II                 | 0.64754856          | 0.302566843                           | 1.20039607               | 0.65485643              | 0.69266132       |
| III                | 0.620190574         | 0.478183258                           | 1.76799638               | 0.73366475              | 0.7697173        |
| IV                 | 0.606012501         | 0.609956664                           | 2.26039089               | 0.78301157              | 0.79239028       |
| Average value      | 0.369474629         | 0.461861037                           | 0.68101546               | 0.65714654              | 0.66453294       |
| Standard deviation | 0.218824128         | 0.24443252                            | 0.52460427               | 0.07392303              | 0.07837372       |

situation when the currency of the balance sheet increases is not always positive, because the size of financial resources may increase due to an increase in debt and, consequently, a decrease in financial independence.

The next step was to standardize the data and differentiate the characteristics of the matrix of observation of stimulants and non-stimulants. The results of differentiation have shown that all of the parameters are stimulants. The division of indicators into stimulators and non-stimulants is the basis for constructing a development standard, representing a point with coordinates

$$P_0(z_{01}; z_{02}; \dots; z_m), \quad (1)$$

where  $z_{0s} = \max z_{rs}$ ;  $z_{rs}$  - is the standardized value of the sign  $s$  for the object  $r$ .

The distance between the individual points and the point of the standard is calculated on the basis of the Euclidean distance (Table 4).

It should be noted that the constructed taxonomic index  $D_i$  has the following interpretation: the closer the value of the indicator to one – the higher the level of financial sustainability of the enterprise is.

Thus, according to the results of taxonomic index calculations the integral indicator of financial stability of PJSC “Turboatom” for the quarters of 2007–2015 is obtained. The dynamic analysis of financial sustainability makes it possible to make the right conclusions and offer approaches to increase and maintain it at the highest level. The graphical interpretation is given in the Table 5.

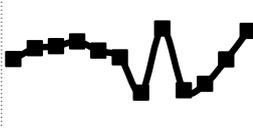
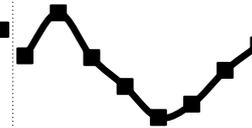
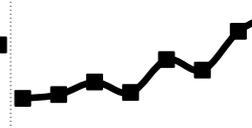
The analysis of the obtained results allows to make the following conclusions:

- the dynamics of the taxonomic indicator is not stable;
- the lowest values of the integral indicator of financial stability were observed in the following periods: 2007–2009 and 2012–2013;

**Table 4.** The process of calculating of the taxonomic index of financial stability

| Year          | Quarter | Euclidian distance | (Cio–C0)    | Taxonomic Dt |
|---------------|---------|--------------------|-------------|--------------|
| 2007          | I       | 6.56242244         | 0.134289856 | 0.217107369  |
|               | II      | 6.38539977         | 0.035884913 | 0.238226055  |
|               | III     | 6.35089083         | 0.024001506 | 0.242342949  |
|               | IV      | 6.27345488         | 0.006004429 | 0.251581006  |
| 2008          | I       | 6.4252039          | 0.052549726 | 0.233477448  |
|               | II      | 6.53788678         | 0.116909388 | 0.220034456  |
|               | III     | 7.11732879         | 0.848908222 | 0.15090741   |
|               | IV      | 6.05772574         | 0.019110545 | 0.277317349  |
| 2009          | I       | 7.08086361         | 0.783042653 | 0.155257682  |
|               | II      | 6.9714515          | 0.601376785 | 0.168310473  |
|               | III     | 6.57135237         | 0.14091445  | 0.216042034  |
|               | IV      | 6.09722835         | 0.009749248 | 0.272604714  |
| 2010          | I       | 6.12068976         | 0.005666607 | 0.269805783  |
|               | II      | 5.72593872         | 0.220926243 | 0.31689932   |
|               | III     | 5.71605149         | 0.230318544 | 0.31807886   |
|               | IV      | 5.86052821         | 0.112518933 | 0.300842883  |
| 2011          | I       | 6.77152783         | 0.33127069  | 0.192161235  |
|               | II      | 5.72939617         | 0.217687998 | 0.316486848  |
|               | III     | 5.4584547          | 0.543923847 | 0.348809985  |
|               | IV      | 5.69413565         | 0.251834332 | 0.320693404  |
| 2012          | I       | 7.04548266         | 0.721677483 | 0.159478605  |
|               | II      | 6.0960725          | 0.009978838 | 0.272742606  |
|               | III     | 7.08379033         | 0.788230912 | 0.154908526  |
|               | IV      | 7.72372258         | 2.334038221 | 0.078565035  |
| 2013          | I       | 8.41215141         | 4.911474977 | –0.003564068 |
|               | II      | 8.11303074         | 3.675134802 | 0.032120829  |
|               | III     | 7.36764119         | 1.372821264 | 0.121045307  |
|               | IV      | 6.80157161         | 0.36675739  | 0.188577031  |
| 2014          | I       | 6.03052062         | 0.027372383 | 0.280562902  |
|               | II      | 5.88189926         | 0.098638317 | 0.298293332  |
|               | III     | 5.40897838         | 0.619350506 | 0.354712477  |
|               | IV      | 5.80907247         | 0.149687095 | 0.306981519  |
| 2015          | I       | 4.55464816         | 2.693926344 | 0.456633505  |
|               | II      | 4.95522351         | 1.539443501 | 0.408845132  |
|               | III     | 3.47981311         | 7.377489968 | 0.584860611  |
|               | IV      | 2.78324877         | 11.64664318 | 0.667960273  |
| Average value |         | 6.19596663         | 1.194987614 |              |
| So            |         |                    |             | 1.09315489   |
| Co            |         |                    |             | 8.382276413  |

**Table 5.** Conditional distribution by periods of integral index of financial stability of the PJSC “Turboatom”

| Years   | 2007–2009   | 2010–2011   | 2012–2013  | 2014–2015   |
|---------|---|---|--|---|
| Diagram |  |  |  |  |
| Result  | Unstable nature   | A sharp decline in one of the quarters  | Unstable dynamics, lowest results  | Tendency to increase  |

- it is possible to distinguish four periods of development of the enterprise according to the level of financial stability:
  - 2007–2009 – the pre-crisis and crisis period, financial stability becomes an average of 0.22, which is an important sign for the enterprise to take measures for optimizing the structure of capital, reviewing borrowing policy and others;
  - 2010–2011 – the period of introduction of measures by the enterprise to increase financial stability, the average level of taxonomic index of financial stability is 0.297;
  - 2012–2013 – the period with the lowest indicators of financial sustainability in all its dimensions, according to a preliminary analysis of the financial condition of the company it was determined that during this period the enterprise had an unstable type of financial stability, the average level of the integral indicator is 0.125;
  - 2014–2015 – the period of increasing financial stability, the average level of the integral indicator is 0.42. The graphic illustration of conditional division is indicated in table 2.13;
- during the analyzed period, the financial stability of the enterprise gradually increased, reaching the level of 0.67 in 2015;
- conclusions on the stable financial status of PJSC “Turboatom” in 2015 are confirmed by the value of the taxonomic indicator for the quarters of 2015, while the company, in any case, has reserves to increase the level of financial stability in the future.

Based on the integral taxonomic index, it was decided to construct a forecast using a trend model. A software package for Statistica was chosen for this purpose. The taxonomic index for 36 periods (quarters of 2007–2015) was the starting point, and a variable  $t$  was introduced, which is defined as the serial number of the quarter. As an independent variable  $t$  was taken, the dependent variable is the taxonomic index  $Dt$ . The analysis of the dependence between the variables gives rise to the choice of the following options: the exponential function  $D = a_0 \cdot a_1^t$ , the second degree polynomial  $D = a_0 + a_1 \cdot t + a_2 \cdot t^2$  and the index function  $D = a_0 \cdot t^{a_1}$ .

The trend equation was constructed separately for each model. To estimate model parameters, the Nonlinear Estimation module was used, the type of estimation was the user-defined regression with the least squares method error, and the Leuenberg-Marquardt method.

According to the most mathematically grounded model, it was decided to build a forecast for the next 4 quarters. The model was evaluated using the following values: final value of loss function – the sum of the squared errors of the model, proportion of variance accounted for,  $R$  (Correlation ratio). The obtained model parity was estimated by statistical significance.

Results of the construction of the exponential model  $D = a_0 \cdot a_1^t$ : the percentage of the explained dispersion is 17.67%, the correlation ratio is 42.04%. We see that this model does not explain all the changes in the taxonomic index, therefore, according to preliminary conclusions, the forecast

**Table 6.** Results of constructing an exponential trend model

Model is:  $D = a_0 \cdot a_1^t$

|                | Estimate | Standard | t-value                        | p-level  | Lo. conf | Up. conf |
|----------------|----------|----------|--------------------------------|----------|----------|----------|
| a0             | 0.164127 | 0.032446 | 5.0585                         | 0.000014 | 0.098189 | 0.230065 |
| a1             | 1.023420 | 0.008019 | 127.6313                       | 0.000000 | 1.007125 | 1.039716 |
| Trend equation |          |          | $D = 0.164127 \cdot 1.02342^t$ |          |          |          |

based on it will not be correct. The parameters of this model are determined in Table 6, the obtained coefficients are statistically significant, since the value of Student's criterion for the  $p$ -index for each parameter is less than or equal to 0.05 ( $p \leq 0.05$ ).

Trend models for adequacy are also estimated by the theoretical values of the dependent variable and the model error. The exponential function of theoretical values and errors confirms the conclusion that the model is not suitable for further prediction; therefore the following option for constructing a trend model has become an indicator function.

Results of the construction of the indicator function  $D = a_0 \cdot t^{a1}$ : the percentage of the explained dispersion is 7.4%, the correlation ratio is 27.2%. We see that this model does not explain all the changes in the taxonomic index, therefore, according to preliminary conclusions, the forecast based on it will not be correct. The indicator function model shows less adapted results than the ex-

ponential function. Table 7 defines the parameters of this model, the coefficient a0 is statistically significant, since the value of Student's criterion for the  $p$ -index for this parameter is less than or equal to 0.05 ( $p \leq 0.05$ ), the coefficient a1 is insignificant.

Such results give grounds for concluding that the model is not suitable for forecasting. Therefore, the next step of simulation was the construction and analysis of the model of the second-order polynomial.

The results of constructing the function of the polynomial of the second degree  $D = a_0 + a_1 \cdot t + a_2 \cdot t^2$ : the percentage of the explained dispersion is 34.51%, the correlation ratio is 58.75%. So, this model explains the bigger value of all changes in the taxonomic index than the previous variants of the trend models. Table 8 defines the parameters of this model, the coefficient a0 and a1 are statistically significant, since the value of Student's criterion for the  $p$ -index for each parameter is less than or equal to 0.05 ( $p \leq 0.05$ ).

**Table 7.** Results of construction of the indicator function of the trend

Model is:  $D = a_0 \cdot t^{a1}$

|                | Estimate | Standard | t-value                           | p-level  | Lo. conf  | Up. conf |
|----------------|----------|----------|-----------------------------------|----------|-----------|----------|
| a0             | 0.151630 | 0.053982 | 2.808870                          | 0.008181 | 0.041924  | 0.261335 |
| a1             | 0.198132 | 0.119883 | 1.652705                          | 0.107597 | -0.045501 | 0.441764 |
| Trend equation |          |          | $D = 0.151630 \cdot t^{0.198132}$ |          |           |          |

**Table 8.** Results of trend building on the basis of the second grade polynomial

Model is:  $D = a_0 + a_1 \cdot t + a_2 \cdot t^2$

|                | Estimate  | Standard | t-value  | p-level  | Lo. conf  | Up. conf  |
|----------------|-----------|----------|--|----------|-----------|-----------|
| a0             | 0.317730  | 0.058324 | 5.44763  | 0.000005 | 0.199068  | 0.436392  |
| a1             | -0.017997 | 0.007269 | -2.47587   | 0.018595 | -0.032785 | -0.003208 |
| a2             | 0.000613  | 0.000191 | 3.21792  | 0.002893 | 0.000226  | 0.001001  |
| Trend equation |           |          | $D = 0.317730 - 0.017997 \cdot t + 0.000613 \cdot t^2$ |          |           |           |

**Table 9.** Results of calculation of theoretical values and errors on the function of the polynomial

Model is:  $D = a_0 + a_1 \cdot t + a_2 \cdot t^2$

|    | Observed  | Predicted | Residuals |
|----|-----------|-----------|-----------|
| 1  | 0.217107  | 0.300347  | -0.083239 |
| 2  | 0.238226  | 0.284189  | -0.045963 |
| 3  | 0.242343  | 0.269259  | -0.026916 |
| 4  | 0.251581  | 0.255554  | -0.003973 |
| 5  | 0.233477  | 0.243076  | -0.009599 |
| 6  | 0.220034  | 0.231825  | -0.011790 |
| 7  | 0.150907  | 0.221799  | -0.070892 |
| 8  | 0.277317  | 0.213000  | 0.064317  |
| 9  | 0.155258  | 0.205428  | -0.050170 |
| 10 | 0.168310  | 0.199082  | -0.030771 |
| 11 | 0.216042  | 0.193962  | 0.022080  |
| 12 | 0.272605  | 0.190068  | 0.082537  |
| 13 | 0.269806  | 0.187401  | 0.082405  |
| 14 | 0.316899  | 0.185960  | 0.130939  |
| 15 | 0.318079  | 0.185746  | 0.132333  |
| 16 | 0.300843  | 0.186758  | 0.114085  |
| 17 | 0.192161  | 0.188996  | 0.003165  |
| 18 | 0.316487  | 0.192461  | 0.124026  |
| 19 | 0.348810  | 0.197152  | 0.151658  |
| 20 | 0.320693  | 0.203069  | 0.117624  |
| 21 | 0.159479  | 0.210213  | -0.050734 |
| 22 | 0.272743  | 0.218583  | 0.054160  |
| 23 | 0.154909  | 0.228179  | -0.073271 |
| 24 | 0.078565  | 0.239002  | -0.160437 |
| 25 | -0.003564 | 0.251051  | -0.254615 |
| 26 | 0.032121  | 0.264327  | -0.232206 |
| 27 | 0.121045  | 0.278829  | -0.157784 |
| 28 | 0.188577  | 0.294557  | -0.105980 |
| 29 | 0.280563  | 0.311512  | -0.030949 |
| 30 | 0.298293  | 0.329693  | -0.031399 |
| 31 | 0.354712  | 0.349100  | 0.005612  |
| 32 | 0.306982  | 0.369734  | -0.062752 |
| 33 | 0.456634  | 0.391594  | 0.065040  |
| 34 | 0.408845  | 0.414680  | -0.005835 |
| 35 | 0.584861  | 0.438993  | 0.145868  |
| 36 | 0.667960  | 0.464532  | 0.203428  |

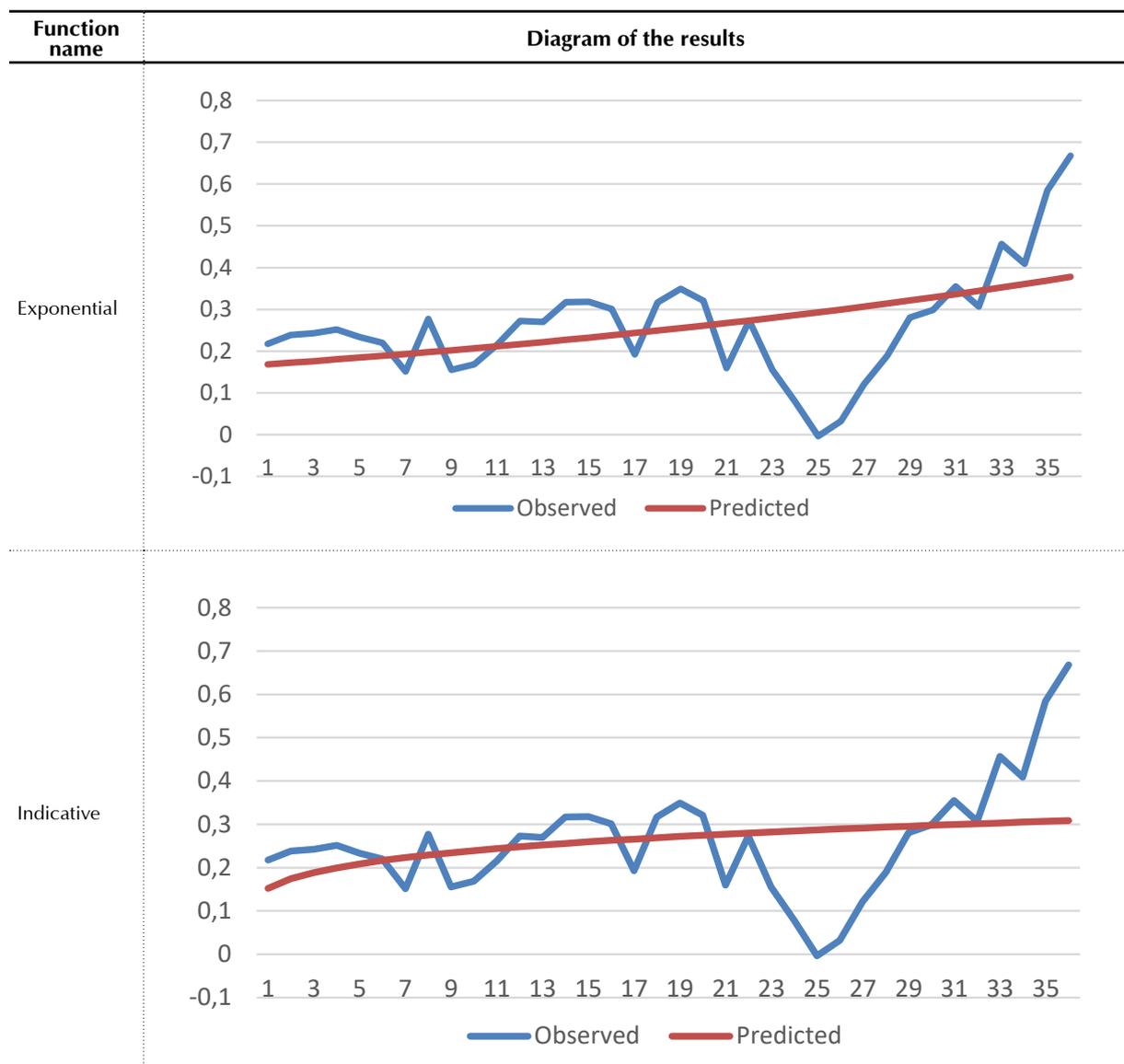
Also, the calculations of theoretical values of the dependent variable and model errors based on the function of the second degree polynomial are presented in Table 9.

In order to determine which of the calculated functions is most suitable, the main characteristics should be given to the investigated functions and the obtained results (Table 10).

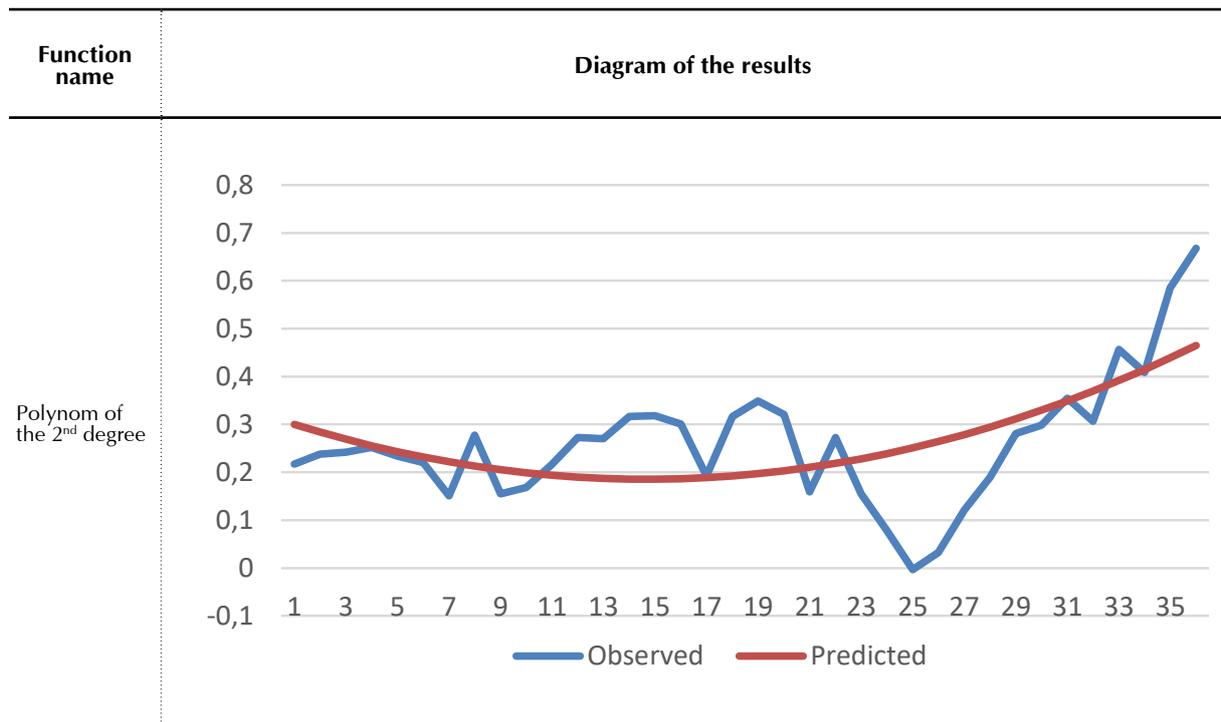
**Table 10.** Characteristics of used trend models

| Characteristic                  | Exponential  | Indicative  | Polynomial 2nd degree   |
|---------------------------------|--|---|---|
| Brief description               | Expresses the tendency of accelerated and still more accelerated growth of levels. With growth in the exponential the absolute growth is proportional to the achieved level. | Sufficiently widely used in economic analysis. often in situations when analyzing the variable Y with a steady growth rate over time. | Allows to confirm the existence of a spatial trend in data and to determine the general features of its distribution. |
| General formula                 | $D = a_0 \cdot a_1^t$  | $D = a_0 \cdot t^{a_1}$   | $D = a_0 + a_1 \cdot t + a_2 \cdot t^2$   |
| <b>Research results</b>         |  |   |   |
| Trend equation                  | $D = 0.164127 \cdot 1.023420^t$  | $D = 0.151630 \cdot t^{0.198132}$   | $D = 0.317730 - 0.017997 \cdot t + 0.000613 \cdot t^2$  |
| Percent of explained dispersion | 17.674592  | 7.408784  | 34.512427   |
| Correlation proportion          | 42.04116   | 27.219082   | 58.75   |

And also, in Table 11 the received graphs are presented for illustration of the received results.

**Table 11.** Graphs of the Forecast of Financial Stability for Different Trend Models

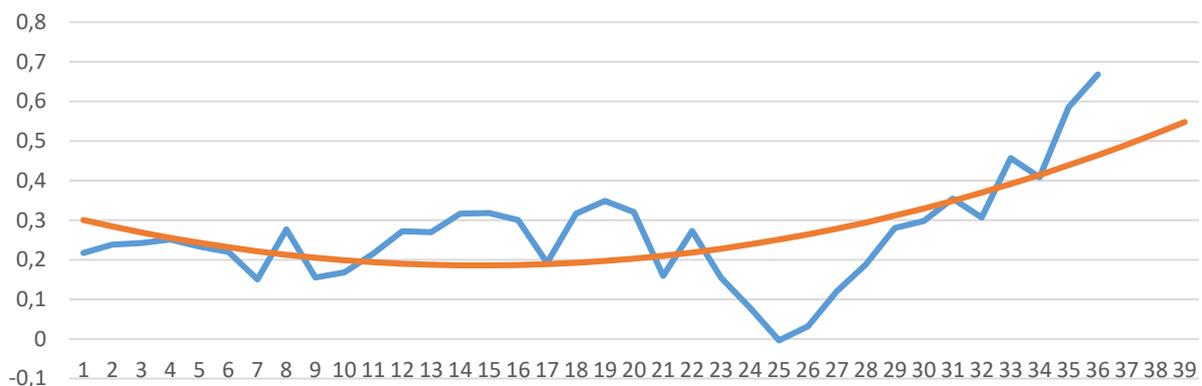
**Table 11 (cont.).** Graphs of the Forecast of Financial Stability for Different Trend Models



Thus, the function of the second grade polynomial is more adequate and statistically significant for constructing a taxonomic forecast for the next 4 quarters. For this matter the point forecast in the software package Statistica was used. The obtained results are presented in Table 12.

According to the forecast, it is possible to follow the dynamics of the adjusted taxonomic index by the function of the polynomial of the second degree. This adjusted indicator of the forecast shows a positive dynamic, that is, the financial stability of the PJSC “Turboatom” will be strengthened in the coming periods. In practice, this increase in financial sustainability can be achieved by reducing payables, optimizing the structure of accounts receivable and other measures to improve the efficiency and intensity of activities.

A graphical interpretation of the results obtained for a more in-depth analysis of dynamics is demonstrated in Figure 1.



**Figure 1.** The actual and predictive values of taxonomic index of financial stability of the PJSC “Turboatom”

**Table 12.** Predictive values of taxonomic index of financial stability of the PJSC “Turboatom”

| N <sup>o</sup> | t  | D              | D predict |
|----------------|----|----------------|-----------|
| 1              | 1  | 0.217107369    | 0.300346  |
| 2              | 2  | 0.238226055    | 0.284188  |
| 3              | 3  | 0.242342949    | 0.269256  |
| 4              | 4  | 0.251581006    | 0.25555   |
| 5              | 5  | 0.233477448    | 0.24307   |
| 6              | 6  | 0.220034456    | 0.231816  |
| 7              | 7  | 0.15090741     | 0.221788  |
| 8              | 8  | 0.277317349    | 0.212986  |
| 9              | 9  | 0.155257682    | 0.20541   |
| 10             | 10 | 0.168310473    | 0.19906   |
| 11             | 11 | 0.216042034    | 0.193936  |
| 12             | 12 | 0.272604714    | 0.190038  |
| 13             | 13 | 0.269805783    | 0.187366  |
| 14             | 14 | 0.31689932     | 0.18592   |
| 15             | 15 | 0.31807886     | 0.1857    |
| 16             | 16 | 0.300842883    | 0.186706  |
| 17             | 17 | 0.192161235    | 0.188938  |
| 18             | 18 | 0.316486848    | 0.192396  |
| 19             | 19 | 0.348809985    | 0.19708   |
| 20             | 20 | 0.320693404    | 0.20299   |
| 21             | 21 | 0.159478605    | 0.210126  |
| 22             | 22 | 0.272742606    | 0.218488  |
| 23             | 23 | 0.154908526    | 0.228076  |
| 24             | 24 | 0.0785650347   | 0.23889   |
| 25             | 25 | -0.00356406754 | 0.25093   |
| 26             | 26 | 0.0321208294   | 0.264196  |
| 27             | 27 | 0.121045307    | 0.278688  |
| 28             | 28 | 0.188577031    | 0.294406  |
| 29             | 29 | 0.280562902    | 0.31135   |
| 30             | 30 | 0.298293332    | 0.32952   |
| 31             | 31 | 0.354712477    | 0.348916  |
| 32             | 32 | 0.306981519    | 0.369538  |
| 33             | 33 | 0.456633505    | 0.391386  |
| 34             | 34 | 0.408845132    | 0.41446   |
| 35             | 35 | 0.584860611    | 0.43876   |
| 36             | 36 | 0.667960273    | 0.464286  |
| 37             | 37 | Predict        | 0.491038  |
| 38             | 38 | Predict        | 0.519016  |
| 39             | 39 | Predict        | 0.54822   |

## CONCLUSION

Thus, financial stability is a financial state in which the financial independence of the enterprise from external sources of financing is achieved, its solvency and long-term prospects of development are ensured. This general characteristic of financial and economic state of the enterprise is influenced by internal and external factors. The level of their complex impact on the financial stability of the enterprise depends on the stage of the company's life cycle, the chosen strategy of operation and management, the financial management of the enterprise, as well as the overall level of economic development of the country, the choice of domestic and foreign policy and other socio-political and economic factors.

The main directions of financial stability strengthening of the PJSC “Turboatom” were determined, such as:

- replacement and modernization of fixed assets in order to reduce the high level of physical and moral depreciation;
- identifying of weak and strong points of the company with the help of SWOT-analysis to determine the further prospects for its development and increase of competitiveness of the enterprise.

The introduction of such recommendations will give the company a competitive advantage, increase profitability and enable to revise and minimize the negative impact of external and internal factors on the company’s activities.

## REFERENCES

1. Agency for the development of the stock market infrastructure of Ukraine (ARIFRA). Retrieved from <http://smida.gov.ua/db>
2. Dovbenko, V. I. (2013). Conditions for Forming the Potential of Increasing the Competitiveness of Domestic Enterprises. *Lviv Polytechnic National University Institutional Repository*, 778, 152-159.
3. Gapak, N. M., & Kapteshan, S. A. (2014). Features of Determining the Financial Sustainability of the Enterprise. *Scientific herald of Uzhgorod University*, 1, 191-196.
4. Gluhoded, G. S., & Golovko, O. G. (2013). Features of Financial Services for Diagnosis. *Financial and credit activity: problems of theory and practice*, 14, 97-102.
5. Golovko, O., & Shakhova, O. (2013). The Role and Importance of Financial Planning in Market Conditions. *Financial and credit activity: problems of theory and practice*, 2, 193-196.
6. Golovko, O. G., Fiodorova, A. M., & Petruk, O. Ya. (2015). Implementation of Modern Budgeting System, *Problems and Prospects of Entrepreneurship Development: a Collection of Scientific Works*, 4, 117-121.
7. Kovalchuk, N. O., & Rusnak, T. V. (2016). Financial Stability of Domestic Enterprises as a Prerequisite for Their Stable Functioning. *Economy and Management of Enterprises*, 11, 368-371.
8. Krivitskaya, O. P. (2005). Planning of the Profit of the Enterprise in Determining the Development Strategy, *Finance of Ukraine*, 3, 138-143.
9. Levchenko, L. O., & Belova, L. O. (2013). An Overview of the Methods of Forecasting the Financial Condition of the Enterprise on the Basis of Econometric Models. *Informational Technologies in Economics*, 14, 164-169.
10. Miroshnik, O. Yu. (2015). Features of Estimation of Financial stability of the Enterprise with the Absolute Indices. *Economics. Series Accounting and Finance*, 12(45), 134-142.
11. Miroshnik, O. Yu. (2016). Some Aspects of Assessing Financial Sustainability of the Enterprise. *Financial and credit activity: problems of theory and practice: Materials of the III International Scientific Conference*, 15-21.
12. Official site of PJSC “Turboatom”. Retrieved from <http://www.turboatom.com.ua>
13. Sergienko, O. A., Gaponenko, O. Ye., & Tatar, M. (2015). Dynamic Imitation Models of Scenarios for the Formation of Competitiveness of Mechanical Engineering Enterprises. *European Journal of Economics and Management*, 1, 49-60.
14. Shtembulyak, D. O. (2010). Financial Stability of Enterprises in the Conditions of Market Turbulence. *Economy and Management*, 1, 119-123.
15. Solomenko, O. E., & Vinogradov, O. A. (2011). Benchmarking as a Marketing Tool for Improving Business Processes. *Bulletin of the Economy of Transport and Industry*, 230-234.
16. Tsarenko, O. V. (2014). Due Diligence as a Preventive Action to Reduce Risks in Optimizing Business Processes in Regions. *Actual Problems of the Region's Economy Development*, 9, 212-216.
17. Yalovy, G. K., & Bakerenko, N. P. (2011). Conceptual Approaches to Definition of Financial Stability of Enterprise. *Economic Bulletin of NTUU “KPI”*, 8, 23-28.
18. Zakharova, N. Yu. (2013). Methodological Approaches to Assessing the Financial Condition of an Enterprise. *Collection of scientific works of the Tavria State Agrotechnological University (economic sciences)*, 2(3), 128-133.
19. Zosimova, G. S. (2013). Measures to Implement the Anti-crisis Strategy in an Unstable Environment. *Business Inform*, 9, 325-329.