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МОДЕЛЮВАННЯ РИЗИКІВ У СФЕРІ ОПЛАТИ ПРАЦІ

Коваль С. П.

***Предметом статті** є дослідження методів моделювання та управління ризиками, пов'язаних, зокрема, з розбіжностями офіційних і фактичних оцінок оплати праці. Оскільки існує досить велика множина методів і моделей оцінювання ризиків, вибір найбільш оптимальних серед них є актуальною науковою проблемою. У дослідженні використовувались загальнонаукові та спеціальні методи: аналізу та синтезу, аналогії та порівняння, побудови трендів та ін.*

***Результати роботи.** Отримано теоретичні моделі порівняння офіційних і фактичних оцінок оплати праці на основі лінійних та експоненційних рівнянь. Результати дослідження можуть бути використані всіма зацікавленими сторонами, у тому числі органами державної виконавчої влади при вдосконаленні механізмів реалізації соціально-економічної політики зайнятості та державного регулювання ринку праці України у сфері оплати праці.*

***Висновки.** 1. Отримані результати підтверджують актуальність розробки питань, пов'язаних з моделюванням та управлінням ризиками у сфері оплати праці. У результаті здійсненого аналізу та оцінювання ризиків за допомогою спеціальних методів отримано сценарії розвитку можливих ризикових подій, імовірність їх настання й наслідків.*

2. Перевагами моделей Блека–Шоулза–Мертон є висока прогностна спроможність, простота розрахунків, прийнятна точність прогнозу, а також відкритість інформації, доступної всім учасникам ринку праці.

3. Запропонована модель ризику дозволить оцінити ступінь впливу виділених чинників на основні джерела ризиків і на підставі отриманої оцінки більш ефективно здійснювати вибір заходів, направлених на мінімізацію ризиків.

Ключові слова: моделювання ризиків, управління ризиками, оплата праці, методи побудови трендів, офіційна інформація, фактичні дані, прогнозні оцінки.

MODELING OF RISKS IN THE SPHERE OF WAGES

Koval Svitlana

The subject of article is the study of the methods of modeling and management of risks related, in particular, with the differences of official and actual estimates of remuneration. Since there is a fairly large set of methods and models of risk assessment, the choice of the most optimal among them is an urgent scientific problem. The study used general scientific and special methods: analysis and synthesis, analogies and comparison, trend construction, etc.

The results of work. Theoretical models of comparison of official and actual estimates of remuneration based on linear and exponential equations were obtained. The results of the study can be used by all interested parties, including the bodies of state executive power in improving the mechanisms of implementation of socio-economic policy of employment and state regulation of the labor market of Ukraine in the sphere of remuneration.

The conclusions. 1. The results obtained confirm the urgency of developing issues related to modeling and management of risks in the field of remuneration. As a result of the analysis and assessment of risks using special methods, the scenarios of development of possible risky events, the likelihood of their occurrence and consequences were obtained.

2. The advantages of Black-Shoulse-Merton models are high prediction, ease of calculations, acceptable accuracy of the forecast, as well as openness of information available to all participants in the labor market.

3. The proposed risk model will assess the degree of influence of the selected factors on the main sources of risks and, on the basis of the obtained assessment, more effectively to choose measures aimed at minimizing risks.

Key words: modeling of risks, risk management, remuneration, trend construction methods, official information, factual data, forecasting estimates.

JEL Classification: D81, C10, J30, E24

Formulation of the problem. In a broad sense, risk can be considered uncertainty in the occurrence of a particular event in the future, because the risk is characterized by the presence of threats that can lead to undesirable consequences.

According to current research and observation, the risk problem is gaining increasing social importance, since the risk is perceived at the level of socio-economic factors of modern and especially future society. Risk is inherent in any area of human activity, which is related to many conditions and factors that lead to a positive or negative result of the decisions made. Historical experience convinces that the risk of failure of the intended results is especially evident in the development of commodity-money relations, the competition of participants in economic turnover, so with the emergence and development of capitalist relations there are different theories of risk, and classics of economic theory pay special attention entrepreneurial activity. If the risk is inevitable, then the problem of analysis, evaluation, choice of measurement methods and possibilities of further management becomes particularly relevant. As a result of the analysis and assessment of risks using special methods of modeling, they receive scenarios for the development of possible risky events, the likelihood of their occurrence and consequences. After comparing the obtained risks with the maximum permissible, a risk management strategy is developed, and on this basis, tools for preventing and reducing risk are offered.

Sources. During the audit of payments for remuneration, such sources of information [6] are used:

- Labor legislation,
- The Labor Code,
- Legislative acts about the company and entrepreneurship,
- Estimated payment statement (Form No. P-49),
- Estimated roll (Form No. P-51),
- Payment note (Form No. 53),
- Personal account,
- Normative information for labor and wage accounting,
- initial documents,
- accounting registers,
- acts of inspections,
- orders,
- cards,
- personal affairs of employees,
- Labor contracts,
- Accounting information,
- Normative documents for paying salaries, selling and other documents on the object of research,
- Tables,
- Outfits,
- Balance,
- Home Book.

All documents involved in the process of accrual and payment of wages, information on the basis of accounting holdings both by debit and on the loan of the account «Calculations for wages» are being studied.

The purpose of the article is research of the modeling methods and management of risks related, in particular, with differences in official and actual pay estimates in Ukraine through the application of comparisons of official and actual sales assessment.

Presenting main material. According to modern research, the process of analysis and risk management in general form consists of the following stages [1]:

1. Identification of risks and determination of their potential species.
2. Risk assessment methods.
3. Formation of a system of risk management methods (development of tools, measures and technologies that allow to minimize and optimize the level of risks).

1. Identification of risks and identifying their potential species

In any risk management methodology, you must first identify the risks and identify their components. To identify risks, you must first find out their essence.

An important issue for understanding the essence of risk is what the phenomenon it is - objective or subjective. There are at least three points of view that recognize the objective, subjective and subjective-objective nature of risk [1]:

- the subjective side (nature of risk) - is manifested in the fact that people are differently perceived the same amount of risk due to the difference between psychological, moral, ideological principles and attitudes. In addition, the risk is related to the choice of certain alternatives, the calculation of the probabilities of their result;
- the objective side - it is manifested in the fact that this concept reflects real existing phenomena, processes, sides of activity, and risk, regardless of whether people are aware of or not, take into account or ignore it;
- the subjective-objective side is determined by the fact that the risk is generated by processes of both subjective nature and those that are independent of the will or consciousness of man.

That is, the essence of subjective risk interpretation is the idea that the subject should reveal the uncertainty factor and form his attitude in the case of risk. In contrast, it is believed that the risk exists regardless of the awareness of its subject and is an integral part of the choice of certain options, alternatives and approved decisions.

Risk elements are [2]:

- the object is a managed economic system, the efficiency and conditions of which are not known in advance. At the macro-level it can be a separate economic operation, type of production, technology, economic zone, etc.; at the meso-level – country, region, etc.; at the micro-level – enterprise, firm, industry, population of a certain territory, etc.;
- the subject is a person competent to make decisions about the object and is interested in the results of risk management. At risk, individuals (entrepreneur, manager) are at the micro-level, meso-level and macro-level are characterized by collective decisions;
- the source - factors (phenomena, processes, objects) that give rise to the uncertainty of the result when making decisions caused by certain reasons.

The most general and influential sources of risks in the field of remuneration include:

- accident, which is due to the probabilistic nature of socio-economic processes in this area;
- incompleteness, insufficiency, poor quality of information used in making business decisions.

Modern theory of risks consider the risk not only as an unwanted sign of uncertainty of future events, but also as a source of positive, profitable opportunities, that is, separates two types of risk: risk-negative and risk. The former should be avoided, and the second is to agree, because it is the bearer of a potential positive result. Therefore, risk is considered as a three-dimensional model: risk as a threat, risk as uncertainty and risk as a chance. In the first two cases, it requires minimization, and in the latter - optimization.

That is, in market conditions, risk is usually associated with economic results that can be both positive (in this case, the risk is a positive opportunity) and negative (risk is a negative threat). Therefore, the risk arises only if there are at least two scenarios of events and, accordingly, two or more possible results. The alternative consequences of risk implementation allow it to be determined primarily as a probability:

- 1) the emergence of negative consequences of actions;
- 2) any deviation from the planned results;
- 3) the emergence of both positive and adverse effects.

One of the common consequences of risk implementation is the fallacy of the decisions made, which leads to losses. Losses can be:

- material (in the form of unforeseen costs for the maintenance of equipment, purchase of raw materials, payment of energy, etc.);
- labor (measured by loss of working time as a result of unforeseen circumstances);
- financial (evaluated by monetary damage related to the payment of unforeseen payments, taxes, as well as invented income);
- time loss (determined by hours, days, months of detention of the required result);
- moral and social loss (for example, moral-loss of reputation, social-loss of confidence by consumers, etc.).

In determining the criteria for choosing an alternative, the risk of a solution may have a certain objective or subjective assessment of each of the states of the system, that is, the likelihood of their occurrence. Since the solutions are evaluated, first of all, by the results obtained, it is by consideration that it is logical to start the choice process. These

results are the criteria of the solution, and they are the basis of the actual choice. Criteria have different meanings. Yes, some criteria are mandatory restrictions while others simply fix the desired characteristics. In other words, a decision-making criterion is a function that expresses the benefits of a particular decision and defines the rule by which an acceptable or optimal solution is chosen. Any decision in the context of incomplete information is made with taking into account the quantitative characteristics of the situation. Criteria are possible use in turn, and after calculating their values among several options have to arbitrarily highlight some final decision. This allows, firstly, it is better to penetrate all internal ligaments decision-making problems and, secondly, weaken the impact of subjective factor.

Since the risks often occur in the conditions of uncertainty or lack of information, then, if you consider the risk as an opportunity to occur or lack a particular event or situation, it can be considered the probability of a particular event or an event that may occur with a certain probability. And, therefore, it is advisable to use elements of probability theory to study and analyze it.

Fundamental concepts in risks theory and in their statistical analysis is the concept of probability and random variable (variable). Under the term A random value in probability theory is understood not every variable the value that accepts accidental, in advance unknown values. A random variable is called a variable that is influenced by random multiple factors can take certain values with some many numbers.

A random value is a variable that even at fixed circumstances cannot be given a certain fixed value but can assign several values that it accepts with certain probabilities. The likelihood of a certain event (for example, an event, which is that a random variable has accepted a certain value) is usually understood as the share of numbers and consequences favorable to this event in the total number of possible equal results (consequences).

Mathematical expectation (hope) is the value of an economic indicator caused by the uncertainty of the situation, calculated as average weighted by the likelihood of all possible values where the probability of each value is used as a specific gravity or statistical frequency. The scope of the expected values is characterized by variability of possible results, that is, the degree of deviation of possible results from their expected value. The greater difference (positive or negative) between the possible result and the expected, signals the greater risk.

2. Methods of risk assessment

In order to effectively manage risks, it is necessary to be able to exactly measure them. There is a fairly large set of methods and models of risk assessment. Thus, there are currently many models of risk assessment based on market indicators, namely: Black-Shoulse-Merton models [2].

The advantages of such models are the high predictability, ease of calculations, acceptable accuracy of the forecast, as well as the openness of information available to all market participants. The disadvantages are that the information is only appropriate if the market is efficient, and a large array of data is required; It is difficult to determine the frequency of economic cycles and to estimate the likelihood of risk; not always the data provided are reliable; official reporting shows the results of the postfactum, that is, there is insufficient forecast of future prospects; the rating revaluation has a time lag and more. These methods were implemented in practice in the form of Credit Monitor software. The peculiarities of such approaches are that they take into account the cyclicity of the economy, make it possible to obtain a long-term assessment, to carry out an analysis of the trend of development [3].

The trend is the main direction of development of the process being investigated. Any dynamic series within the period with more or less stable conditions of development reveals a certain pattern of change of levels-a general trend. One row has a tendency to grow, the other to reduce levels. The growth or decrease in the levels of the dynamic series, in turn, occurs differently: evenly, accelerated or slowed. Often, the series of dynamics due to fluctuations in levels do not reveal a pronounced tendency [4, p. 97].

To identify and characterize the main trend, different ways of smoothing and analytical alignment of dynamic series are used. The essence of smoothing is to consolidate the intervals of time and replace the primary row by a series of average at intervals. In average, the fluctuations in the levels of the primary series are made, resulting in the trend of development is more clearly.

In analytical alignment of the dynamic series, the actual values of y_t are replaced by a certain function $Y = f(t)$, which is called a trendy equation (t - time variable, Y - theoretical level of the row).

The choice of type of function is based on a theoretical analysis of the nature of the phenomenon being studied and the nature of its dynamics. Usually, the preference is given to functions whose parameters have clear economic content and measure absolute or relative development rate. A significant help in choosing functions is the analysis of the chain characteristics of the intensity of dynamics. If chain absolute growths are relatively stable, they do not have a clear tendency to grow or decrease, alignment of a row is performed on the basis of a linear function: $Y_t = a + bt$. If the relatively stable growth rates are relatively stable, then the most adequate to such a nature of dynamics is the exponent: $Y_t = abt$. In these functions t - the serial number of the period (date), a - the level of the row at $t = 0$. Parameter b characterizes the speed of dynamics: the average absolute in the linear function and the average relative – in the exponent.

In this case, the dynamics of the average salary for 1996-2021 (26 time intervals), which allows to determine the main trend of development in the form of exponential function (Figure 1).

As we can see, after the smoothing procedure, a typical exponential function $y = 79,32e^{0,1979x}$ (Figure 1) was obtained.

The actual levels of dynamic series under the influence of various factors vary, deviating from the main trend of development. In some rows of fluctuations have a systematic, natural character, repeated at certain intervals of time, in others – do not have such nature and are therefore called random (risk).

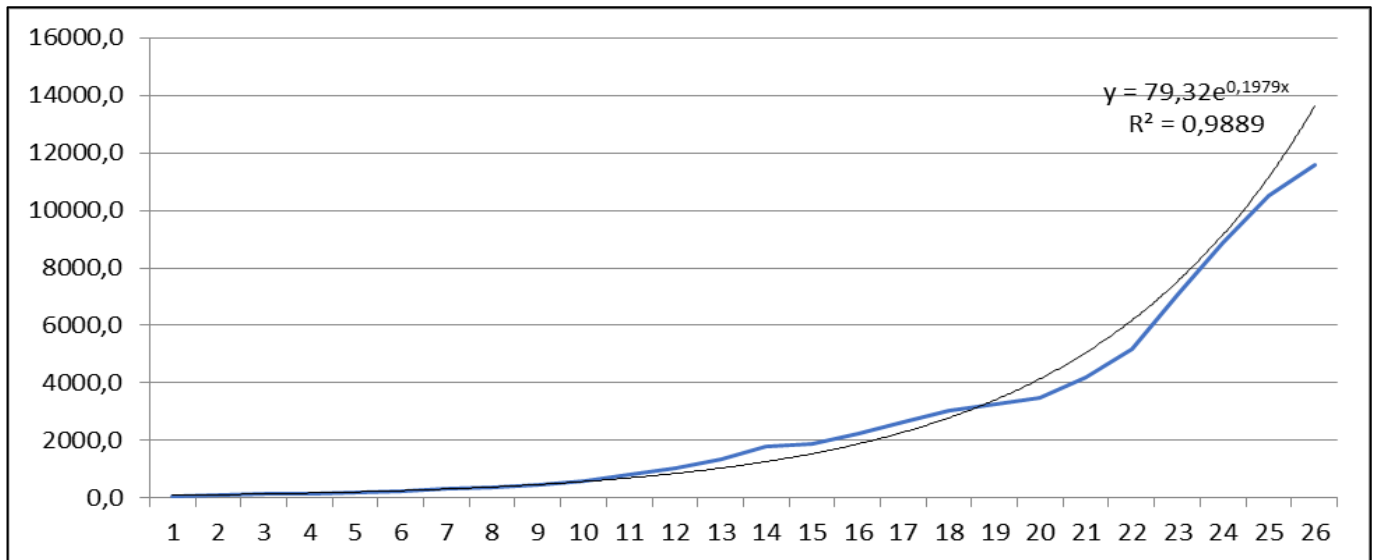


Figure 1. Actual and smoothed levels of a number of dynamics of average wage for 1996-2021.

Source: built by the author according to the data of State Statistics Service of Ukraine [5]

Comparison of theoretical and actual levels of the row allowed to distinguish a random component of risk, which can be described using a linear model

$y = -0,0076x + 12,435$ (Figure 2).

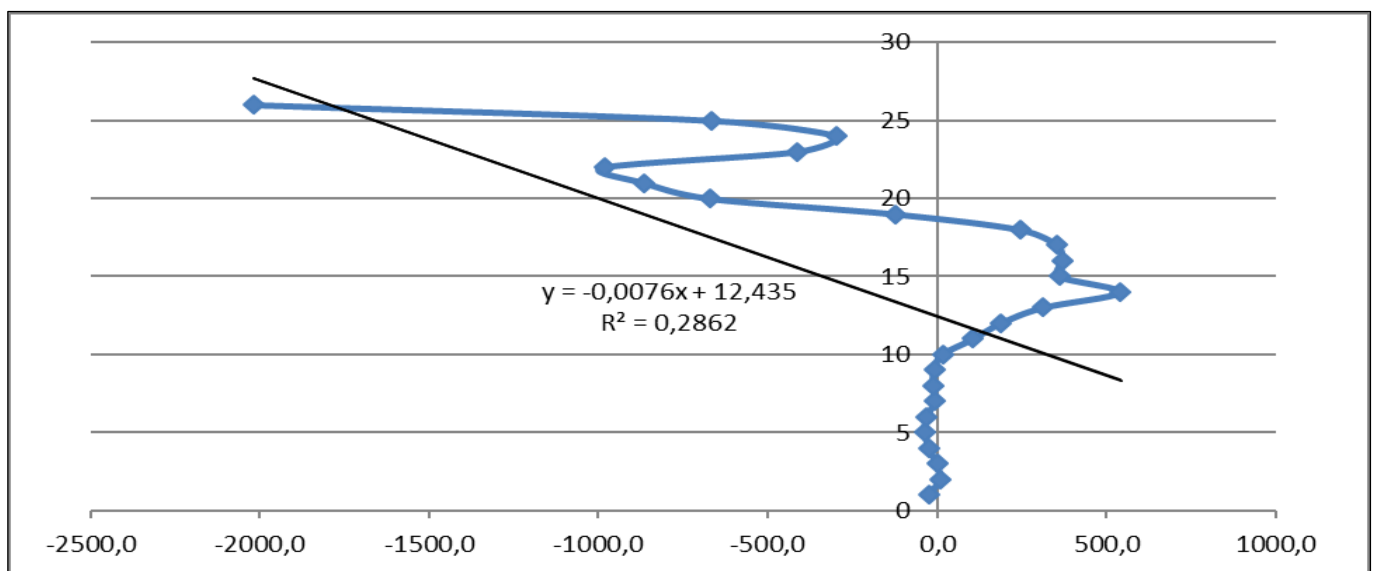


Figure 2. Random component (risk) of changes in the average wage for 1996-2021.

Source: built by the author according to the data of State Statistics Service of Ukraine [5]

The main component of the income of the general population in Ukraine is known to be official wages. However, in practice, it is often found that official data on the amount of wages are not true [6].

Thus, the use of this method proved that its advantages are high predictability, ease of calculations, acceptable accuracy of the forecast, as well as openness of information available to all market participants.

3. Risk management methods in the sphere of remuneration

Adequate information support is most important for effective risk management. It includes a wide range of different types of information: statistical, economic, commercial, financial, legal, technical, etc. The presence of reliable and up-to-date information allows you to quickly make management decisions that have an impact on risk reduction. Proper information support and its effective use in risky operations minimize the likelihood of risks [7].

The conclusions. Thus, the above states the relevance of developing issues related to modeling and management of risks in the field of remuneration. As a result of the analysis and assessment of risks using special methods, the scenarios of development of possible risky events, the likelihood of their occurrence and consequences were obtained.

The advantages of Black-Scholes-Merton models are high predictability, ease of calculations, acceptable precision, as well as openness of information available to all market participants.

The proposed risk assessment model will assess the degree of impact of the selected factors on the main sources of risks and, on the basis of the obtained assessment, more effectively to choose measures aimed at minimizing risks.

Список використаних джерел

1. Калініченко Л. Л. Управління кадровим ризиком на основі застосування когнітивного моделювання. *Ефективна економіка*, 2012. № 7. URL: <http://www.economy.nayka.com.ua/op=1&z=1275> (дата звернення 11.09.2022)
2. Васильєва Т. А., Леонов С. В., Кривич Я. М. та ін. *Економічний ризик: методи оцінки та управління : навч. посібник*. Під заг. ред. д-ра екон. наук, проф. Т. А. Васильєвої, канд. екон. наук Я. М. Кривич. Суми: ДВНЗ «УАБС НБУ», 2015. 208 с. URL: https://essuir.sumdu.edu.ua/bitstream-download/123456789/50229/5/Ekonomichnyi_ryzyk%20.pdf;jsessionid=0E2D7629FB779AB87F8C1C0D8CC4CE9E (дата звернення 12.09.2022)
3. Данилов В. Я., Жиров О. Л., Бідюк П. І. Оцінювання кредитних ризиків методами інтелектуального аналізу даних. *Системні дослідження та інформаційні технології*, 2017. №1. С. 33-48.
4. Коваль С. П. *Статистика: навчально-методичний посібник*. Переяслав-Хмельницький, 2017. 266 с.
5. Офіційний сайт Державної служби статистики України. URL: <http://www.ukrstat.gov.ua/> (дата звернення 12.09.2022)
6. Самофалова М. О. Заробітна плата як один із чинників впливу на ризик плинності кадрів. *Ефективна економіка*, 2014. № 9. URL: <http://www.economy.nayka.com.ua/?op=1&z=3349> (дата звернення 12.09.2022)
7. Koval Svitlana. Risk management in the sphere of wages. *University Economic Bulletin: Collection of scientific articles of scientists and post-graduate students*. I. 51. Pereyaslav, 2021. P. 66-73. DOI: <https://doi.org/10.31470/2306-546X-2021-51-66-73>

References

1. Kalinichenko L. L. (2012). *Upravlinnia kadrovym ryzykom na osnovi zastosuvannia kohnityvnoho modeliuvannia [Personnel risk management based on the use of cognitive simulation]*. *Efektivna ekonomika – Effective economy*, 7. URL: <http://www.economy.nayka.com.ua/op=1&z=1275>
2. Vasyliieva T. A., Leonov S. V., Kryvykh Ya. M. ta in. (2015). *Ekonomichnyi ryzyk: metody otsinky ta upravlinnia : navch. posibnyk [Economic risk: Methods of evaluation and management: teach. guide]*. Pid zah. red. d-ra ekon. nauk, prof. T. A. Vasylievoi, kand. ekon. nauk Ya. M. Kryvykh. Sumy: DVNZ «UABS NBU». URL: https://essuir.sumdu.edu.ua/bitstream-download/123456789/50229/5/Ekonomichnyi_ryzyk%20.pdf;jsessionid=0E2D7629FB779AB87F8C1C0D8CC4CE9E
3. Danylov V. Ya., Zhyrov O. L., Bidiuk P. I. (2017). *Otsiniuvannia kredytnykh ryzykiv metodamy intelektualnoho analizu danykh [Assessment of credit risks by intelligent data analysis]*. *Systemni doslidzhennia ta informatsiini tekhnolohii - System Research and Information Technology*, 1. 33-48.
4. Koval S. P. (2017). *Statystyka: navchalno-metodychnyi posibnyk [Statistics: Educational manual]*. Pereiaslav-Khmelnytskyi.
5. Ofitsiyni sait Derzhavnoi sluzhby statystyky Ukrainy [Official site of the State Statistics Service of Ukraine]. URL: <http://www.ukrstat.gov.ua/>
6. Samofalova M. O. (2014). *Zarobitna plata yak odyin iz chynnykiv vplyvu na ryzyk plynnosti kadriv [Salaries as one of the factors influencing the risk of frames]*. *Efektivna ekonomika – Effective economy*, 9. URL: <http://www.economy.nayka.com.ua/?op=1&z=3349>

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