Research Paper
Computational Methods for Differential Equations
http://cmde.tabrizu.ac.ir
Vol. *, No. *, *, pp. 1-18
DOI:10.22034/cmde.2024.59930.2553

Models of sensitivity of key indicators of the activity of a public company in the stock market with a neutral approach to the implementation of its dividend policy

Sergey Krylov*
Department of Financial and Tax Management, Ural Federal University, Yekaterinburg, Russian Federation.

Abstract

The purpose of this article is to study the theoretical and practical aspects of analyzing the sensitivity of key indicators of the activity of a public company on the stock market (market activity) to the main determining factors in the conditions of a neutral approach to the implementation of its dividend policy, which allows taking into account the interests of all other stakeholders interested in the activities of the public company (including potential investors) to ensure its sustainable development in the long term. The methodological basis of the study was the concept of a neutral approach to the dividend policy of a public company and the concept of sensitivity analysis, developed earlier by the author of this article. The motivation of the study is to ensure the development, justification and effective management of the dividend policy of a public company within the framework of a neutral approach to ensure the interests of its main stakeholders by constructing elasticity models of key indicators of market activity according to their main determining factors. The constructed elasticity models of the key indicators of market activity listed above can be used in predictive and analytical assessments of their changes, and also make it possible to identify the causes of these changes by calculating the impact on the specified elasticity of the determinants contained in their models, performed by the appropriate methods of factor analysis, under the conditions of a neutral approach to the implementation of the dividend policy of a public company.

Keywords. Sensitivity analysis, Elasticity, Modeling, Market activity, Neutral approach, Dividend policy, Public company.
2010 Mathematics Subject Classification. 91G50, 91G70, 91G80.

1. Introduction

In the conditions of a modern developed market economy, a rather important characteristic of the activity of a public company (public joint stock company) is its activity in the stock market (market activity), which should be understood as the choice of optimal strategies and tactics in using profit, accumulating it, increasing capital by issuing additional shares, as well as the impact on the market price of the share. Ensuring the level of market activity required by a public company, as a rule, involves the development of a set of management decisions that contribute, at least, to the non-deterioration of its position in the capital market in terms of the dynamics of market indicators (absolute - the market price of an ordinary share, earnings per ordinary share and dividend per ordinary share, as well as relative – financial coefficients of market activity).

The activity of a public company in the stock market can be considered as an essential component of its sustainable development, which implies the possibility of long-term continuation of its effective activities, which is determined by the availability and level of efficiency in the use of relevant resources and, as the author of this article believes, lies primarily in the sustainability of growth in production volumes. and sale of products (works, services), innovative and investment activity, as well as welfare of employees and shareholders of a public company.

[**?**]As an important component of the activities and market activity of a public company, one should consider its dividend policy, which is usually understood as a set of decisions related to the payment of dividends to shareholders, which is a fairly important aspect of the activities of a public company. Decisions to pay dividends are usually

Received: 04 January 2024; Accepted: 17 May 2026.
∗ Corresponding author. Email: zali6770@yandex.ru.

classified as financial decisions because dividends paid reduce a public company's reinvested earnings and thus affect its financing.

The importance of dividend policy for the activities of a public company is due to a number of reasons.

Firstly, the dividend policy influences relations with potential and actual investors in equity capital (primarily ordinary capital). The fact is that shareholders have a negative view of public companies that cut their dividends, since dividend cuts are often associated with the presence of a public company in financial difficulties. In addition, some shareholders rely on stable dividends as regular income.

Second, dividend policy influences a public company's financial strategy and capital budget. It is a fragment of long-term financial policy, which, in turn, is a tool for implementing a financial strategy. The payment of dividends implies a reduction in retained earnings, which is a potential source of financing long-term investments, and, accordingly, a reduction in the capital investment budget.

Thirdly, the payment of dividends usually involves an outflow of cash, which cannot but have a downward impact on the level of liquidity of a public company.

Fourthly, the payment of dividends, as noted earlier, leads to a decrease in retained earnings, which leads to a reduction in equity capital and a decrease in the level of financial stability of a public company.

As a rule, dividend policy is usually developed only in relation to ordinary shares, since the dividend yield of preferred shares is in most cases (but not always) fixed.

The main types (methodologies) of dividend policy usually include [7–9, 30, 32, 42, 44, 45]:

1. A policy of stable dividend per share, which involves regular payment of dividend per share in a constant amount for a long time with its subsequent increase in the event of successful development of a public company. This dividend policy is most favored by investors and helps to maximize the market value of ordinary shares, since it indicates the stability of the financial condition of a public company. In addition, many shareholders rely on stable dividends for regular income.

2. A policy of constant value of the dividend yield ratio, providing for its value to remain unchanged for a long time. This dividend policy is not favored by investors and is not conducive to maximizing the market value of the common stock as lower earnings per share leads to lower dividend per share. In addition, if a public company does not have a net profit, dividends are not paid.

3. A compromise policy (between the first two), involving the payment of a small constant dividend per share plus an increase in the most profitable years. This dividend policy is not fully accepted by investors and is not conducive to maximizing the market value of the common stock as uncertainty remains regarding the dividend per share.

4. Residual dividend policy, which provides for the payment of dividends to shareholders after all investment needs of the public company are satisfied. This dividend policy is approved by investors if there is a significant increase in the market value of the company's ordinary shares as a result of the implementation of profitable investment projects.

It should also be especially noted that the dividend policy, on the one hand, should contribute to achieving the main goal of financial management - maximizing the material well-being of shareholders, and, on the other hand, take into account the interests of all other stakeholders interested in the activities of a public company (including potential investors) to ensure its sustainable development in the long term. Fulfillment of this requirement is possible only within the framework of a neutral approach to the implementation of the dividend policy of a public company [25–27].

Obviously, the problem of sustainable development of companies cannot be solved without the formation of appropriate information support related to the development of recommendations for compiling the so-called integrated report on the sustainable development of the company, among which the GRI standards (Global Reporting Initiative), focused on the principle of "triple outcome" (Triple bottom Line): company economics, company production ecology and company social policy [17]. At the same time, indicators that characterize their activity in the securities market can be included in the list of key indicators of economic performance of public companies.

All of the above makes it appropriate to study the theoretical and practical aspects of analyzing the sensitivity of key indicators of the activity of a public company on the stock market (market activity) to the main determining factors in the conditions of a neutral approach to the implementation of its dividend policy, which allows taking into account the interests of all other stakeholders interested in the activities of the public company (including potential investors) to ensure its sustainable development in the long term.

The motivation of the study is to ensure the development, justification and effective management of the dividend policy of a public company within the framework of a neutral approach to ensure the interests of its main stakeholders by constructing elasticity models of key indicators of market activity according to their main determining factors.

2. Materials and Methods

2.1. **Previous research.** The above-mentioned indicators of market activity are quite widely discussed in numerous publications, for example, [3–6, 8–10, 13, 16, 21, 22, 24, 28, 30, 32, 37–39, 42–45].

Having generalized and systematized the points of view of the above researchers, we will single out the key financial ratios that characterize the market activity of a public company, dividing them into two interrelated groups (Table 1).

Table 1. Key financial ratios characterizing the market activity of a public company.

Name of indicator	Calculation formula	
	Numerator	Denominator
1. Indicators characterizing the investment attractiveness of common stock		
Common stock quote ratio	Market price of an ordinary share	Profit per ordinary share
Dividend yield on common stock	Dividend per ordinary share	Market price of an ordinary share
Market price to dividend ratio per common share	Market price of an ordinary share	Dividend per ordinary share
2. Indicators characterizing the dividend policy		
Dividend yield ratio (Formula 1)	Dividend per ordinary share	Profit per ordinary share
Dividend yield ratio (Formula 2)	Dividends on ordinary shares	Net profit Dividends on preferred shares
Dividend coverage ratio	Earnings per ordinary share	Dividend per ordinary share
The rate of distribution of net profit for dividends	Dividends on all types of shares	Net profit
Preferred share dividend coverage ratio	Net profit	Dividends on preferred shares
Ratio of dividends on ordinary and preferred shares	Dividends on ordinary shares	Dividends on preferred shares

The indicators of the first group (quotation ratio of an ordinary share, dividend yield of an ordinary share, ratio of the market price of an ordinary share and dividend per ordinary share) characterize, first of all, the investment attractiveness of ordinary shares of a public company for potential investors.

The indicators of the second group (dividend yield ratio, dividend coverage ratio, the rate of distribution of net profit for dividends, the dividend coverage ratio for preferred shares, the ratio of dividends for ordinary and preferred shares) characterize exclusively the dividend policy of a public company.

Since the investment attractiveness of ordinary shares of a public company largely depends on its dividend policy, the indicators of the second group should be considered as basic, which determines their particular importance in the analysis of market activity. At the same time, many determining factors influence both groups of indicators.

A neutral approach to the dividend policy of a public company was first formulated and justified by the author of this article in a number of his previous publications (in particular, [25–27]). This approach is based on the joint use of the theory of dividend irrelevance, the theory of materiality of dividend policy and the concept of sustainable development of the company.

It was shown that the “cornerstone” of the dividend policy, which determines its types (methods), is ultimately the ratio between dividend and earnings per ordinary share (dividends on ordinary shares and net income minus dividends

on preferred shares), which makes the dividend ratio output (or its inversely proportional indicator - the dividend coverage ratio) is the most important indicator when analyzing the dividend policy of a public company.

The results of assessing its value largely depend on the chosen approach to the implementation of the dividend policy of a public company: passive or active [44, 45].

The passive approach to dividend policy implementation, or dividend irrelevance theory, to which F. Modiliani and M. Miller [35] made a crucial contribution, arguing that for a given choice of investment decisions, the dividend yield ratio is no more than a detail of the big picture. It does not affect the welfare of shareholders. Miller and Modigliani argue that the value of a public company is determined solely by the return on its assets or its investment policy, and that the way in which net income is distributed between dividends and reinvested earnings does not affect this valuation.

In other words, the payment of dividends acts as a "passive balance" after the investment projects of the public company have been financed. The value of the dividend yield ratio will change from period to period in accordance with fluctuations in the number of investment projects acceptable from the point of view of the management of a public company. If a public company has many favorable investment opportunities, then the dividend yield ratio is likely to be zero. In contrast, if a public company does not have profitable investment opportunities, the dividend yield ratio is likely to be 1. For any situation in between, the value of the dividend yield ratio will take values from 0 to 1 [44]. At the same time, shareholders allegedly do not care what factor will increase their material well-being: dividends or an increase in the market value of ordinary shares as a result of the implementation of investment projects by a public company.

A formalized illustration of a passive approach to dividend policy is the model of James E. Walter [46], which is considered one of the first and has the advantages of relative simplicity and clarity:

$$P = \frac{D + \frac{r}{\rho} * (E - D)}{\rho}, \tag{2.1}$$

where P is the predicted market price of an ordinary share,

D – dividend per ordinary share;

E – earnings per ordinary share;

r – return on investment of a public company; ρ– market capitalization level (average market discount rate used to determine expected cash flows).

According to the active approach to the implementation of the dividend policy, or the theory of the materiality of the dividend policy, the main ideologists of which were M. Gordon [19] and J. Lintner [31], decisions on the payment of dividends play a significant, active role. The fact is that in the conditions of uncertainty, which is more or less typical for the activities of almost any public company in market conditions, shareholders do not care whether they receive their income in the form of dividends or in the form of an increase in the market value of ordinary shares. The payment of dividends gives shareholders a sense of certainty, since dividends are a type of current income, and the prospect of a return on capital can be pushed far into the future. Therefore, shareholders are not at all indifferent to what factor will increase their material well-being: dividends or an increase in the market value of ordinary shares as a result of the implementation of investment projects by a public company. In addition, if potential investors prefer early resolution of uncertainty, they will be willing, other things being equal, to pay a higher price for shares that entitle them to receive a larger current dividend [44].

A formalized argument in favor of an active approach to the implementation of dividend policy is M. Gordon's model of economic growth [18]:

$$P_0 = \frac{D_1}{k - g} = \frac{D_0 * (1 + g)}{k - g}, \tag{2.2}$$

where P_0 is the predicted current (theoretical) value of an ordinary share at the zero moment,

- D_1–expected dividend per ordinary share of the future period;
- D_0–dividend per ordinary share of the current period;
- k–acceptable discount rate (the rate of return required by investors per ordinary share of the company);

- g– dividend growth rate per ordinary share (assumed to be constant over time).

The above models (2.1) and (2.2) can be considered as formalized tools for forecasting and, accordingly, managing the dividend policy within the framework of passive and active approaches to its implementation.

At the same time, it should be borne in mind that the dividend policy of a public company, as noted earlier, should not only help maximize the material well-being of its shareholders, but also take into account the interests of all other stakeholders interested in the company's activities (suppliers, buyers, employees, the state, etc.) to ensure its long-term sustainability by contributing to the long-term value of the public company [12, 14, 15].

All this leads to the need to achieve a kind of "balance" between passive and active approaches within the framework of the so-called neutral approach to the implementation of dividend policy, which takes into account both the need to finance profitable investment projects and pay dividends to shareholders of a public company (not on a residual basis), thus leading to the maximization of the market value of its common stock.

Formalization of the idea of a neutral approach to the implementation of the dividend policy involves the construction of corresponding models of the dividend yield ratio and the dividend coverage ratio, as well as the expected price of an ordinary share.

To build models of the dividend yield ratio and the dividend coverage ratio, we equate the predicted market price of an ordinary share, calculated according to the model of D.E. Walter (formula (2.1)), to the predicted current (theoretical) value of an ordinary share at the zero moment, determined according to the M. Gordon economic growth model (formula (2.2))) based on the assumption that the current value of the flow of expected future dividends on an ordinary share corresponds to its market price ([44], which is most relevant in a highly efficient securities market:

$$P = P_0, \tag{2.3}$$

while introducing a single designation of the dividend per ordinary share as D ($D = D_0$).

As a result, we have the following equality:

$$\frac{\mathrm{D}+\frac{\mathrm{r}}{\rho}*(\mathrm{E}-\mathrm{D})}{\rho} = \frac{\mathrm{D}*(1+\mathrm{g})}{\mathrm{k}-\mathrm{g}}. \tag{2.4}$$

Through a series of transformations from formula (2.4), we obtain models of the dividend output ratio (DP) and the dividend coverage ratio (DC):

$$\mathrm{DP} = \frac{D}{E} = \frac{\frac{\mathrm{r}}{\rho}}{\frac{\rho*(1+\mathrm{g})}{\mathrm{k}-\mathrm{g}}+\frac{r}{\rho}-1}. \tag{2.5}$$

$$\mathrm{DC} = \frac{E}{D} = \frac{\rho*(1+\mathrm{g})}{\mathrm{k}-\mathrm{g}} - 1)*\frac{\rho}{r}+1. \tag{2.6}$$

Formulas (2.5) and (2.6) show that in the context of a neutral approach to the implementation of dividend policy, the following factors influence the dividend yield and dividend coverage ratios: the return on investment of a public company, the market capitalization level, the rate of return required by investors per ordinary share of the company, and the accepted constant in time rate of growth of dividend per ordinary share. The calculation of the influence of determining factors on the deviation of performance indicators in models (2.5) and (2.6) can be carried out using the appropriate methods of factor analysis.

The models of the dividend yield coefficient (formula (2.5)) and the dividend coverage ratio (formula (2.6)) built by the author of this article can be used in predictive and analytical estimates of the values of these coefficients within the framework of a neutral approach to the implementation of the dividend policy directly, as well as some other indicators , characterizing market activity (for example, the dividend yield of an ordinary share and the quote coefficient of an ordinary share), calculated on their basis.

To build a model of the market price of an ordinary share, we first express the amount of dividend per ordinary share from the D.E. Walter (formula (2.1)) and the dividend per ordinary share of the current period from the M. Gordon economic growth model (formula (2.2)) respectively as follows:

$$\mathrm{D} = \frac{\rho*\mathrm{P}-\frac{\mathrm{r}}{\rho}*\mathrm{E}}{1-\frac{r}{\rho}}, \tag{2.7}$$

$$D_0 = \frac{P_0 * (k - g)}{1 + g}. \tag{2.8}$$

Then we equate the amount of dividend per ordinary share from the D.E. Walter (formula (2.7)) to the dividend per ordinary share of the current period from the economic growth model of M. Gordon (formula (2.8)):

$$D = D_0, \tag{2.9}$$

while introducing a single designation of the expected, i.e. equilibrium in relation to the position of a particular investor and the situation on the stock market, the price of an ordinary share as P ($P = P_0$).

As a result, we have the equality:

$$\frac{\rho * P - \frac{r}{\rho} * E}{1 - \frac{r}{\rho}} = \frac{P * (k - g)}{1 + g}, \tag{2.10}$$

from which we obtain a model of the expected price of an ordinary share:

$$P = \frac{\frac{r}{\rho} * E}{\rho - (k - g) * \frac{1 - \frac{r}{\rho}}{1 + g}}. \tag{2.11}$$

According to formula (2.11), under the conditions of a neutral approach to the implementation of the dividend policy, the expected price of an ordinary share is influenced by the following factors: the return on investment of the company, the market capitalization level, earnings per ordinary share, the rate of return required by investors per ordinary share of the company, and the rate assumed to be constant over time increase in dividend per ordinary share. The calculation of the influence of determining factors on the deviation of the effective indicator in model (2.11) can be carried out using the appropriate methods of factor analysis.

The model of the expected price of an ordinary share obtained by the author (formula (2.11)) can be used in predictive and analytical estimates of the values of this rather important indicator of the market activity of a public company within the framework of a neutral approach to the implementation of the dividend policy directly, as well as some other indicators characterizing the market activity of a public company. company (for example, the dividend yield of an ordinary share and the quote ratio of an ordinary share), calculated on its basis.

So, in the conditions of a neutral approach to the implementation of the dividend policy, based on the previously introduced symbols, a model of the dividend yield of an ordinary share (DY) can be formed:

$$DY = \frac{D * (\rho - (k - g) * \frac{1 - \frac{r}{\rho}}{1 + g})}{\frac{r}{\rho} * E}. \tag{2.12}$$

In accordance with formula (2.12), under the conditions of a neutral approach to the implementation of dividend policy, the dividend yield of an ordinary share is determined by the influence of the following factors: dividend per ordinary share, market capitalization level, the rate of return required by investors on an ordinary share of the company, the assumed constant time rate of dividend growth per ordinary share and earnings per ordinary share. The calculation of the influence of determining factors on the deviation of the effective indicator in model (2.12) can be carried out using the appropriate methods of factor analysis.

The model of dividend yield of an ordinary share formed by the author (formula (2.12)) can be used in predictive and analytical estimates of the values of this ratio within the framework of a neutral approach to the implementation of the dividend policy directly, as well as some other indicators characterizing the market activity of a public company, calculated on its basis (for example, the quotation ratio of an ordinary share).

The factor model of the quote coefficient of an ordinary share (2.13) is constructed as follows:

$$P/E = \frac{P}{E} = \frac{P}{D} * \frac{D}{E} = \frac{DP}{DY} = \frac{\frac{CD}{NP - PD}}{DY} = \frac{\frac{\frac{CD}{PD}}{\frac{NP}{PD} - 1}}{DY} = \frac{DCD}{(CPD - 1) * DY}, \tag{2.13}$$

where P/E – quote ratio of an ordinary share (Price / Earnings ratio);

DCD – ratio of dividends on ordinary and preference shares;

CPD – dividend coverage ratio for preferred shares;

DP – dividend yield ratio (Dividend payout);
DY – dividend yield of an ordinary share (Dividend Yield);
P – market price of an ordinary share;
E – earnings per ordinary share (Earnings per share);
D – dividend per ordinary share;
CD – total amount of dividends on ordinary shares;
PD – total amount of dividends on preferred shares;
NP – net profit.

In the context of a neutral approach to the implementation of the dividend policy, based on the above conventions, the model of the quotation ratio of an ordinary share (P / E) has the following form:

$$\mathrm{P/E} = \frac{\mathrm{DCD} * \frac{\mathrm{r}}{\rho} * \mathrm{E}}{(\mathrm{CPD}-1) * \mathrm{D} * (\rho - (\mathrm{k}-\mathrm{g}) * \frac{1-\frac{\mathrm{r}}{\rho}}{1+\mathrm{g}})}. \tag{2.14}$$

Based on formula (2.14), in the conditions of a neutral approach to the implementation of the dividend policy, the quote ratio of an ordinary share depends on the influence of such factors as earnings per ordinary share, the ratio of dividends on ordinary and preferred shares, the company's return on investment, market capitalization level, coverage ratio dividends on preferred shares, the rate of return required by investors per ordinary share of the company, the rate of growth of the dividend per ordinary share assumed to be constant over time, and the dividend per ordinary share. The calculation of the influence of determining factors on the deviation of the effective indicator in the model (2.14) can be carried out using the appropriate methods of factor analysis.

The model of the quote coefficient of an ordinary share built by the author (formula (2.14)) can be used in predictive and analytical assessments of the values of this rather important coefficient characterizing the market activity of a public company in the framework of a neutral approach to the implementation of its dividend policy, depending on its key indicators.

The forecast values of the above indicators of the market activity of a public company, obtained using models (2.5), (2.6), (2.11), (2.12), and (2.14), can be analyzed from the perspective of one or another stakeholder interested in the sustainable development of this company, based on the results of which they can be given a predictive assessment of the level of efficiency in managing its market activity (high, medium, low, extremely low).

It should also be noted that, as mentioned earlier, it is of particular interest to analyze the sensitivity of these indicators to changes in the main determining factors presented in their models, which leads to an increase in the effectiveness of the analysis and forecasting of the market activity of a public company in the framework of a neutral approach to its dividend policy, defining the methodological basis of this study.

To be fair, it is necessary to mention a number of other approaches to studying a company's market activity, which involve the use of mathematical methods and mathematical modeling in modern conditions.

So, Y. E. Aghdam, A. Neisy, and A. Adl, considering catastrophe bonds as one of the most effective instruments to cover the risk of catastrophic events such as earthquakes, floods, etc., which is widely used in the world, provides a model for pricing catastrophe bonds. Because catastrophic earthquake damage causes major changes in corporate assets as well as investment trends, the authors add a jump clause to the study model to indicate the severity and likelihood of damage. To obtain the time discretization, the proposed methodology uses the correct one-order expression in the first process. To obtain complete sampling at the second level, the approach of the spectral collocation method is presented, which is based on a Chebyshev basis of the second kind. Adding a jump clause causes the original model to become an integral-differential model, which is approximated using the spectral method. Also, based on the derivatives in the resulting model, we approximated the derivative operator using this type of basis. A numerical study confirms the stability and convergence of the time discretized formulation. The authors also approximated the integral sentence using an extension of the Gauss-Laguerre quadrature and presented numerical results [1].

Also H. Mesgarani, M. Bakhshandeh, Y. E. Aghdam, and J. F. Gomez-Aguilar, studying the approximate solution $u(x,t)$ of the time fractional Black–Scholes model, including the time derivative in the sense of Caputo with initial and boundary conditions, they stated that This equation plays a major role in determining the European option in financial activities. In this case, time sampling is performed by linear interpolation with time $\tau_{2-\alpha}$ order accuracy,

and Chebyshev collocation is based on orthogonal polynomials used for spatial discretization. In addition, the article discusses the analysis of the convergence and stability of these methods, as well as obtaining numerical solutions for some examples and comparing them with their analytical solutions, which demonstrate the high accuracy and feasibility of the proposed approach [34].

In addition, Y. E. Aghdam, H. Mesgarani, A. Amin, and J. F. Gomez-Aguilar propose an efficient procedure for estimating the fractional Black–Scholes model as a function of time of market prices of European options using a composition of orthogonal Gegenbauer polynomials (GB polynomials) and an approximation of the fractional derivative depending on the Caputo derivative. The authors point out that the singularity of the payoff function leads to slow convergence in time. Thus, they construct an accurate and fast numerical method based on an improved convergence rate recovery method. Derivative operational matrices for orthogonal GB polynomials were obtained by the authors of the article using Caputo-type fractional derivatives. The implementation of this algorithm is highly accurate. The advantage of the numerical method is the orthogonality of the GB polynomials and operational matrices, which reduces computation time and increases speed. Eventually The authors provide three numerical examples to illustrate the validity, and also present numerical experiments to illustrate the accuracy and efficiency of the proposed method [2].

And finally, H. Mesgarani, A. Adl, Y. Esmaeelzade Aghdam in their article consider a time-fractional Black-Scholes model governing European options, in which the time derivative is centered on the Caputo fractional derivative with $0 < \beta \leq 1$. The paper argues that the approximation of financial options with respect to their hereditary characteristics can be well understood and explained due to its remarkable memory effect flowing in fractional derivatives. Forced by the stated reason. It is important to find sufficiently accurate and successful numerical methods when approaching fractional differential equations. The presented numerical scheme is derived as follows: first, a semi-discrete one is constructed in a time sense based on quadratic interpolation with an order of accuracy of $\tau_{3-\alpha}$ and secondly, the unconditional stability and order of convergence are analyzed. For the constructed fully discrete scheme, the spatial derivative terms are approximated using the collocation method based on the Legendre basis. As a result, the effectiveness of the proposed method is confirmed by numerical experiments, which show that the obtained results are acceptable and are in good agreement with earlier works in the literature [33].

Completion of a brief review of previous developments, which allows us to reveal the current state of the problem discussed in this article, allows us to move on to characterizing the methodological basis of this study.

2.2. **Methodological basis of research.** The methodological basis of the study, the results of which are presented in this article, was a neutral approach to the dividend policy of a public company and the concept of sensitivity analysis.

Since the neutral approach to the dividend policy of a public company was described in sufficient detail in the previous subsection “Previous Research”, let’s turn to the concept of sensitivity analysis.

The concept of sensitivity analysis has by now been widely used and deeply considered in many literary sources, in particular, [11, 20, 23, 29, 36, 40, 41].

Let’s take a brief look at it.

As is well known, sensitivity analysis is designed to model the impact of various factors on the bottom line in the financial model of a business or project. It can be used for the following purposes:

- identification of the most significant parameters of the model, which will require special attention when collecting data and in the course of further business;
- assessment of expected results in conditions when important characteristics of the project or business are not known exactly;
- stress testing to determine the ability of a business to withstand fluctuations in parameters, in particular, the calculation of the maximum deviations of these parameters, at which there are problems with the profitability or financial stability of the company.

It should be noted that sensitivity analysis is a rather general term, and includes many possible tasks and modeling methods that combine four main elements:

1. There is a prepared business model. This model is quite complex, and there is no way to derive a direct mathematical dependence of the result on one or another parameter in the form of a simple formula. The model for researchers is a ”black box” that can be experimented with to study the effect of parameters on the result.

2. Researchers are interested in one of the results of the model, which is expressed as a number. For example, the NPV of an investment project, or a business valuation, or the company's total capital requirement.

3. Researchers choose one or more model parameters, change them, and collect information about how the result changes. They have a great selection here. You can change the parameters evenly by trying all the values of some interval. You can choose their values randomly, taking into account the statistical distribution (this is how the Monte Carlo method works).

4. The final data on how the result is distributed with the studied parameter fluctuations is presented visually in the form of graphs or tables and used in business analysis.

Although in general statistical methods such as Monte Carlo are also sensitivity analysis, in financial models, sensitivity analysis usually means a narrower set of approaches. This is a visual display of the dependence of the final indicator on changes in one or more parameters in a given range.

In general, the sensitivity of a function is considered as the degree to which the function changes for a given absolute or relative changein the arguments. In economic and mathematical analysis, it is often necessary to determine how sensitive an economic indicator is to changes in the factors that determine it. In this case, two approaches are used – incremental and tempo. In the first case, the growth of the factor and the growth of the studied indicator are compared - the average rate of change of the function or the limiting rate of change of the function. In the second case, the growth rate of the factor and the growth rate of the studied indicator are compared, usually meaning percentage changes.

Sensitivity analysis of indicators is widely used in the practice of financial management. In the general case, it comes down to studying the dependence of some effective indicator on the variation in the values of the factors involved in its determination. In other words, this method allows you to get answers to questions like: what will happen to the resulting value if the value of some factor value changes? Hence its second name is "what if" analysis.

As a rule, such an analysis involves the following steps:

1. The relationship between the performance indicator and the factors determining it is set in the form of a mathematical equation or inequality.

2. The most probable values for the determining factors and possible ranges of their changes are determined.

3. By changing the values of the determining factors, their influence on the performance indicator is investigated.

The usual procedure for sensitivity analysis is to change one determinant while keeping the rest constant.

Sensitivity analysis is one of the simplest and most common methods of risk analysis. With its help, you can find out which factors (estimated parameters) can be attributed to the most risky.

As an indicator of the sensitivity of the object of risk regarding changes in certain factors, elasticity, or sensitivity of response, is used, which in economic theory in modern conditions is one of the fundamental values. Elasticity is a measure of the response of one variable (function) to a change in another (argument), is calculated as the limit of the ratio of the relative increment of the function to the relative increment of the argument when the increment of the argument tends to zero and is considered as an important statistical measurement tool widely used in marketing research, and economic analysis tool.

So, the elasticity of the function $y = f(x)$ with respect to the argument x is determined by the following formula:

$$E_x(y) = \left(\frac{\Delta y}{y} : \frac{\Delta x}{x}\right) = \frac{x}{y} * \frac{\mathrm{dy}}{\mathrm{dx}}. \tag{2.15}$$

It can be seen from formula (2.15) that the elasticity $E_x(y)$of the function $y = f(x)$ is directly proportional to the derivative of this function $\frac{dy}{dx}$ and expresses an approximate percentage increment of the function, which corresponds to 1% argument increments.

Sensitivity analysis is implemented in financial models using three common methods:

1) sensitivity graphs;
2) sensitivity tables;
3) tornado charts.

The sensitivity graph helps to demonstrate the dependence of a performance indicator on a change in one of its determinants. factors and shows how a change in one of the factors affects the performance indicator. As a rule, to

build a sensitivity graph, several model calculations are carried out and a graph is built using the obtained points. Most often, the dependence will be linear, so 2-3 calculations are enough to build a graph, but in order not to miss a more complex dependence, it is better to use at least 5-7 points. Here you can see one trick used in a situation where the parameter being studied is not a single number, but a whole series of numbers. Instead of absolute values, a sensitivity plot usually uses a percentage of the baseline forecast.

Sensitivity tables track the change in the effective indicator when two factors fluctuate. For sensitivity analysis in Excel, a data table service is often used, which automates multiple recalculation of models with different initial parameters. Data tables have two parameters – in terms and columns, that is, they allow you to calculate the dependence on two characteristics at once. This has led to the popularity of the tabular approach to sensitivity analysis. In the case of tabular analysis, for better visualization, conditional formatting is usually used, separating good and bad values of the effective indicator.

Tornado charts focus only on the extreme values of the deviation of the studied factors, but on the other hand, on one such chart, you can combine the analysis of several factors at once. The Tornado diagrams show the change in the effective indicator with the same fluctuations of several factors of the model. Unlike graphs or sensitivity tables, the entire range of values is not studied here, but only two values are calculated for each factor: for positive and negative deviation. Since the most influential factors are usually located at the top of the graph, it takes on a look a bit like a tornado pattern, hence the name of these charts.

Having described in a rather concise form the methodological basis of the study, the main results of which are presented in this article, the author considers it appropriate to proceed to their consideration.

3. Results

The results of the research of the author of this article are the models developed by him of elasticity of key indicators of the activity of a public company in the stock market according to the main factors determining them in the conditions of a neutral approach to the implementation of dividend policy: dividend yield ratio, dividend coverage ratio, expected price of an ordinary share, dividend yield of an ordinary share and quote ratio of an ordinary share - based on the models of the listed indicators (2.5), (2.6), (2.11), (2.12), and (2.14), using the formula (2.15) and previously introduced symbols.

Models of elasticity of the dividend yield coefficient of a public company with respect to the profitability of its investments ($E_r\,(DP)$), market capitalization level ($E_\rho\,(DP)$), the rate of return required by investors per ordinary share of a public company ($E_k\,(\mathrm{DP})$) and the rate of dividend growth per ordinary share assumed to be constant over time ($E_g\,(\mathrm{DP})$) are respectively represented by formulas (3.1), (3.2), (3.3), and (3.4):

$$E_r(DP) = \frac{r}{DP} * \frac{\partial DP}{\partial r} = \frac{\frac{\rho*(1+g)}{k-g} - 1}{\frac{\rho*(1+g)}{k-g} + \frac{r}{\rho} - 1}, \tag{3.1}$$

$$E_\rho\,(DP) = \frac{\rho}{DP} * \frac{\partial DP}{\partial \rho} = \frac{1 - \frac{2*\rho*(1+g)}{k-g}}{\frac{\rho*(1+g)}{k-g} + \frac{r}{\rho} - 1}, \tag{3.2}$$

$$E_k\,(DP) = \frac{k}{DP} * \frac{\partial DP}{\partial k} = \frac{\frac{k*\rho*(1+g)}{(k-g)^2}}{\frac{\rho*(1+g)}{k-g} + \frac{r}{\rho} - 1}, \tag{3.3}$$

$$E_g\,(DP) = \frac{g}{DP} * \frac{\partial DP}{\partial g} = \frac{\frac{g*\rho*(k+1)}{(k-g)^2}}{1 - \frac{r}{\rho} - \frac{\rho*(1+g)}{k-g}}. \tag{3.4}$$

Models of elasticities of the dividend coverage ratio of a public company with respect to the profitability of its investments ($E_r\,(\mathrm{DC})$), market capitalization level ($E_\rho\,(\mathrm{DC})$), the rate of return required by investors per ordinary share of a public company ($E_k\,(\mathrm{DC})$), and the dividend growth rate per ordinary share assumed to be constant over

time ($E_g\,(\mathrm{DC})$) are respectively represented by formulas (3.5)–(3.8):

$$E_r\,(DC) = \frac{r}{DC} * \frac{\partial DC}{\partial r} = \frac{\rho - \frac{\rho^2*(1+g)}{k-g}}{\frac{\rho^2*(1+g)}{k-g} - \rho + r}, \tag{3.5}$$

$$E_\rho\,(DC) = \frac{\rho}{DC} * \frac{\partial DC}{\partial \rho} = \frac{\frac{2*\rho^2*(1+g)}{k-g} - \rho}{\frac{\rho^2*(1+g)}{k-g} - \rho + r}, \tag{3.6}$$

$$E_k\,(DC) = \frac{k}{DC} * \frac{\partial DC}{\partial k} = \frac{k*\rho^2*(1+g)}{(g-k)^2*(\frac{\rho^2*(1+g)}{k-g} - \rho + r)}, \tag{3.7}$$

$$E_g\,(DC) = \frac{g}{DC} * \frac{\partial DC}{\partial g} = \frac{g*(k+1)}{(k-g)^2*((\frac{\rho*(1+g)}{k-g} - 1)*\frac{\rho}{r} + 1)}. \tag{3.8}$$

Formulas (3.1)–(3.8) show that the elasticity of the dividend yield and dividend coverage ratios of a public company with respect to the profitability of its investments to the market capitalization level, the rate of return required by investors per ordinary share of a public company, and the dividend growth rate per ordinary share assumed to be constant over time is influenced by the following factors: the return on investment of a public company, the market capitalization level, the rate of return required by investors per ordinary share of a public company, and the rate of dividend growth per ordinary share assumed to be constant over time. The calculation of the influence of determining factors on the deviation of performance indicators in formulas (3.1)–(3.8) can be carried out using the appropriate methods of factor analysis.

Elasticity models of the expected price of an ordinary share of a public company with respect to earnings per common share ($E_E\,(P)$), the return on investment of a public company ($E_r\,(P)$), market capitalization level ($E_\rho\,(P)$), the rate of return required by investors per common share of a public company ($E_k\,(P)$), and an assumed time-constant dividend growth rate per ordinary share ($E_g\,(P)$) are represented by formulas (3.9)–(3.13), respectively:

$$E_E\,(P) = \frac{E}{P} * \frac{\partial P}{\partial E} = 1, \tag{3.9}$$

$$E_r\,(P) = \frac{r}{P} * \frac{\partial P}{\partial r} = \left(\rho - (k-g)*\frac{1-\frac{r}{\rho}}{1+g}\right)^2 + \frac{r*(g-k)}{1+g} + \frac{r*(g-k)^2*(1-\frac{r}{\rho})}{\rho*(1+g)^2}, \tag{3.10}$$

$$E_\rho\,(P) = \frac{\rho}{P} * \frac{\partial P}{\partial \rho} = \frac{\frac{r}{\rho}*\frac{k-g}{1+g} + \frac{(k-g)*(1-\frac{r}{\rho})}{1+g} - \rho}{\rho - (k-g)*\frac{1-\frac{r}{\rho}}{1+g}}, \tag{3.11}$$

$$E_k\,(P) = \frac{k}{P} * \frac{\partial P}{\partial k} = \frac{k*(1-\frac{r}{\rho})}{\rho*(1+g) - (k-g)*(1-\frac{r}{\rho})}, \tag{3.12}$$

$$E_g(P) = \frac{g}{P} * \frac{\partial P}{\partial g} = \frac{g*p*(2*g-k)*(1-\frac{r}{\rho})}{(\rho - (k-g)*\frac{1-\frac{r}{\rho}}{1+g}*(1+g)^2}. \tag{3.13}$$

According to formulas (3.10)–(3.13), the elasticity of the expected price of an ordinary share of a public company with respect to the return on investment, the market capitalization level, the rate of return required by investors per ordinary share of a public company, and the dividend growth rate assumed to be constant over time on its ordinary share is influenced by the following factors: the return on investment of a public company, the market capitalization level, the rate of return required by investors per ordinary share of a public company, and the rate of dividend growth per ordinary share assumed to be constant over time. The calculation of the influence of determining factors on the deviation of performance indicators in formulas (3.10)–(3.13) can be carried out using the appropriate methods of factor analysis.

Elasticity models for the dividend yield of a public company common stock to dividend and earnings per common share ($E_D\,(\mathrm{DY})$ *i* $E_E\,(\mathrm{DY})$ *sootvetstvenno*), public company return on investment ($E_r\,(\mathrm{DY})$), market capitalization

level ($E_\rho\,(\mathrm{DY})$), investors' required rate of return per share of a public company common share ($E_k\,(\mathrm{DY})$), and assumed time-constant growth rate dividends per its ordinary share ($E_g\,(\mathrm{DY})$) are represented by formulas (3.14)–(3.19), respectively:

$$E_D\,(\mathrm{DY}) = \frac{D}{\mathrm{DY}} * \frac{\partial DY}{\partial D} = 1, \tag{3.14}$$

$$E_E\,(\mathrm{DY}) = \frac{E}{\mathrm{DY}} * \frac{\partial DY}{\partial E} = -1, \tag{3.15}$$

$$E_r\,(\mathrm{DY}) = \frac{r}{\mathrm{DY}} * \frac{\partial DY}{\partial r} = \frac{\frac{k-g}{1+g} - \rho}{\rho - (k-g) * \frac{1-\frac{r}{\rho}}{1+g}}, \tag{3.16}$$

$$E_\rho\,(\mathrm{DY}) = \frac{\rho}{\mathrm{DY}} * \frac{\partial DY}{\partial \rho} = \frac{2 * \rho - \frac{k-g}{1+g} * (1 + \frac{2*r}{\rho})}{\rho - (k-g) * \frac{1-\frac{r}{\rho}}{1+g}}, \tag{3.17}$$

$$E_k\,(\mathrm{DY}) = \frac{k}{\mathrm{DY}} * \frac{\partial DY}{\partial k} = \frac{k * (\frac{r}{\rho} - 1)}{\rho * (1+g) - (k-g) * (1 - \frac{r}{\rho})}, \tag{3.18}$$

$$E_g\,(\mathrm{DY}) = \frac{g}{\mathrm{DY}} * \frac{\partial DY}{\partial g} = \frac{g * (1+k) * (1 - \frac{r}{\rho})}{\rho * (1+g)^2 - (k-g) * \left(1 - \frac{r}{\rho}\right) * (1+g)}. \tag{3.19}$$

In accordance with formulas (3.16)–(3.19), the elasticity of the dividend yield of an ordinary share of a public company by the return on investment of a public company, the market level of capitalization, the rate of return required by investors on an ordinary share of a public company and the assumed constant time rate of dividend growth on its ordinary share are influenced by the following factors: the return on investment of a public company, the market capitalization level, the rate of return required by investors on a common share of a public company, and the assumed rate of dividend growth per common share that is constant over time. Calculation of the influence of determining factors on the deviation of performance indicators in formulas (3.16)–(3.19) can be carried out using appropriate methods of factor analysis.

Elasticity models for the quoted ratio of a public company's ordinary share in terms of dividend and earnings per ordinary share ($E_D\,(P/E)$ *i* $E_E\,(P/E)$ *sootvetstvenno*), the ratio of dividends on ordinary and preferred shares of a public company ($E_{\mathrm{DCD}}\,(P/E)$), its dividend coverage ratio on preferred shares ($E_{\mathrm{CPD}}\,(P/E)$), the return on investment of a public company ($E_r\,(P/E)$), market the level of capitalization ($E_\rho\,(P/E)$), the rate of return required by investors per ordinary share of a public company ($E_k\,(P/E)$) and the dividend growth rate assumed to be constant in time per its ordinary share ($E_g\,(P/E)$) are respectively represented by formulas (3.20)–(3.27):

$$E_D\,(P/E) = \frac{D}{(P/E)} * \frac{\partial\left(\frac{P}{E}\right)}{\partial D} = \frac{\rho}{(k-g) * \frac{1-\frac{r}{\rho}}{1+g} - \rho}, \tag{3.20}$$

$$E_E\,(P/E) = \frac{E}{(P/E)} * \frac{\partial(P/E)}{\partial E} = 1, \tag{3.21}$$

$$E_{DCD}\,(P/E) = \frac{\mathrm{DCD}}{(P/E)} * \frac{\partial(P/E)}{\partial DCD} = 1, \tag{3.22}$$

$$E_{CPD}\,(P/E) = \frac{\mathrm{CPD}}{(P/E)} * \frac{\partial(P/E)}{\partial CPD} = \frac{CPD}{1 - CPD}, \tag{3.23}$$

$$E_r\,(P/E) = \frac{r}{(P/E)} * \frac{\partial(P/E)}{\partial r} = \frac{\rho - \frac{k-g}{1+g} * (1 - \frac{2*r}{\rho})}{\rho - (k-g) * \frac{1-\frac{r}{\rho}}{1+g}}, \tag{3.24}$$

$$E_\rho\,(P/E) = \frac{\rho}{(P/E)} * \frac{\partial(P/E)}{\partial \rho} = \frac{\frac{k-g}{1+g} - 2 * \rho}{\rho - (k-g) * \frac{1-\frac{r}{\rho}}{1+g}}, \tag{3.25}$$

TABLE 2. Values of some indicators of the public company "Gamma" at the end of the reporting year.

Index	Meaning
Return on investment of a public company (r), %	23.9
Market capitalization level (ρ), %	15.3
Rate of return required by investors for an ordinary share of a public company (k), %	12
Dividend growth rate per ordinary share (assumed to be constant over time) (g), %	5
Earnings per ordinary share (E), rubles	157.48
Dividend per ordinary share (D), rubles	86.14
Dividend ratio for common and preferred shares (DCD)	23
Preferred Dividend Coverage Ratio (CPD)	60
Expected market price of an ordinary share (P), rubles	1294.73
Dividend yield ratio (DP), %	54.7
Dividend Cover Ratio (DC)	1.829
Dividend yield per share (DY), %	5.4
Common share price ratio (P/E)	7.256

$$E_k\,(P/E) = \frac{k}{(P/E)} * \frac{\partial (P/E)}{\partial k} = \frac{k * (1 - \frac{r}{\rho})}{(1+g) * (\rho - (k-g) * \frac{1-\frac{r}{\rho}}{1+g})}, \tag{3.26}$$

$$E_g\,(P/E) = \frac{g}{(P/E)} * \frac{\partial (P/E)}{\partial g} = \frac{g * (k+1) * (\frac{r}{\rho} - 1)}{(1+g)^2 * (\rho - (k-g) * \frac{1-\frac{r}{\rho}}{1+g})}. \tag{3.27}$$

Based on formulas (3.20) and (3.23)–(3.27), on the elasticity of the quoted ratio of an ordinary share of a public company on dividend per ordinary share, the dividend coverage ratio of a public company on preferred shares, the profitability of its investment, the market capitalization level, the rate of return required by investors on ordinary share of a public company and its assumed constant rate of dividend growth over time, its ordinary share is influenced by the following factors: dividend coverage ratio on preferred shares of a public company, return on investment of a public company, market capitalization level, the rate of return required by investors on ordinary share of a public company and the rate of dividend growth per ordinary share assumed to be constant over time. The calculation of the influence of determining factors on the deviation of effective indicators in formulas (3.20) and (3.23)–(3.27) can be carried out by the appropriate methods of factor analysis.

The sufficient complexity of the elasticity models developed by the author for key indicators of the activity of a public company in the stock market according to the main factors determining them in the context of a neutral approach to the implementation of dividend policy makes it difficult to determine the direction of the influence of these factors on the corresponding performance indicators without considering an example of the practical use of these models on a specific digital material.

Let us apply the elasticity models developed by the author of key indicators of the activity of a public company in the stock market in terms of the main factors determining them in the conditions of a neutral approach to the implementation of dividend policy (3.1)–(3.27) to the corresponding data of the public company Gamma (the real name has been changed), based on the assumption that it focuses on a neutral approach to dividend policy.

The values of some indicators of the public company "Gamma" at the end of the reporting year are presented in Table 2.

Based on contained in the Table 2 data were calculated according to the models (3.1)–(3.27) of the elasticities of the key indicators of the activity of the public company "Gamma" in the stock market (expected market price of an ordinary share (P), dividend output ratio (DP), dividend coverage ratio (DC), dividend common stock return (DY), common stock quote ratio (P/E)) by their main determinants (return on investment of a public company (r), market capitalization level (ρ), rate of return required by investors per ordinary share of a public company (k), assumed to be a time-constant growth rate of dividend per ordinary share (g), dividend per ordinary share (D), earnings per ordinary

TABLE 3. Values of elasticity of key indicators of the activity of the public company "Gamma" in the stock market by the main factors determining them.

Index	Determining Factors							
	r	ρ	k	g	D	E	DCD	CPD
P	0.016	-0.453	-0.335	0.00041	–	1	–	–
DP	0.453	-1.257	1.337	-0.615	–	–	–	–
DC	-0.453	1.256	1.401	6.249	–	–	–	–
DY	-0.453	0.163	0.335	-0.148	1	-1	–	–
P/E	1.552	-1.258	-0.335	0.148	-0.805	1	1	-1.017

TABLE 4. Percentage changes in the values of key indicators of the activity of the public company "Gamma" in the stock market in the event of an increase / decrease in the value of each of the main factors determining them separately (with the values of all other factors unchanged) by 10%.

Index	Determining Factors							
	r	ρ	k	g	D	E	DCD	CPD
P	$\frac{+0.16}{-0.16}$	$\frac{-4.53}{+4.53}$	$\frac{-3.35}{+3.35}$	$\frac{+0.0041}{-0.0041}$	–	$\frac{+10}{-10}$	–	–
DP	$\frac{+4.53}{-4.53}$	$\frac{-12.57}{+12.57}$	$\frac{+13.37}{-13.37}$	$\frac{-6.12}{+6.12}$	–	–	–	–
DC	$\frac{-4.53}{+4.53}$	$\frac{+12.56}{-12.56}$	$\frac{+14.01}{-14.01}$	$\frac{+62.49}{-62.49}$	–	–	–	–
DY	$\frac{-4.53}{+4.53}$	$\frac{+1.63}{-1.63}$	$\frac{+3.35}{-3.35}$	$\frac{-1.48}{+1.48}$	$\frac{+10}{-10}$	$\frac{-10}{+10}$	–	–
P/E	$\frac{+15.52}{-15.52}$	$\frac{-12.58}{+12.58}$	$\frac{-3.35}{+3.35}$	$\frac{+1.48}{-1.48}$	$\frac{-8.05}{+8.05}$	$\frac{+10}{-10}$	$\frac{+10}{-10}$	$\frac{-10.17}{+10.17}$

share (E), dividend ratio for ordinary and preferred shares (DCD), dividend coverage ratio for preferred shares (CPD)) presented in Table 3.

Contained in the Table 3 values of elasticities of the key indicators of the activity of the public company "Gamma" in the stock market according to the main factors determining them approximately show by what percentage upward ("+") or decrease ("-") the value of one or another key indicator will change depending on 1% increments the value of one or another factor determining it.

For greater clarity, Table 4 shows the expected percentage changes in the values of key indicators of the activity of the public company "Gamma" in the stock market in the event of an increase / decrease in the value of each of the main factors determining them separately (with the values of all other factors unchanged) by 10%.

Then the predicted values of the key indicators of the activity of the public company "Gamma" in the stock market in the event of an increase / decrease in the value of each of the main factors determining them separately (with the values of all other factors unchanged) by 10% can be summarized in Table 5.

Concluding the consideration of the above example, it should be noted that in the context of a neutral approach to the implementation of the dividend policy of a public company, it allows not only to determine for a particular public company the degree of sensitivity of the values of key indicators of its activity in the stock market to changes in the values of the main factors determining them, but also the direction the impact of these factors on the key indicators of the dividend policy in the direction of increasing or decreasing their values. All this makes it possible to predict the values of key indicators of the activity of a particular public company in the stock market in the event of an increase / decrease in the value of each of the main factors determining them separately (with the values of all other factors unchanged) by a given percentage, if this public company adheres to a neutral approach to implementation dividend policy.

In addition, the models of elasticities of key indicators of the activity of a public company in the stock market built by the author of this article according to the main factors determining them (3.1)–(3.27) can be used as tools for managing the values of these elasticities by adjusting the values of the factors that determine them in a neutral approach to the implementation of the dividend policies of this public company.

TABLE 5. Forecast values of key indicators of the activity of the public company "Gamma" in the stock market in the event of an increase / decrease in the value of each of the main factors determining them separately (with the values of all other factors unchanged) by 10%.

Index	Determining Factors							
	r	ρ	k	g	D	E	DCD	CPD
P, rubles	$\frac{1296.80}{1292.66}$	$\frac{1236.08}{1353.38}$	$\frac{1251.36}{1338.10}$	$\frac{1294.78}{1294.66}$	–	$\frac{1424.20}{1165.26}$	–	–
DP, %	$\frac{57.2}{57.2}$	$\frac{47.8}{61.6}$	$\frac{62.0}{47.4}$	$\frac{51.3}{58.0}$	–	–	–	–
DC	$\frac{1.746}{1.912}$	$\frac{2.059}{1.599}$	$\frac{2.085}{1.573}$	$\frac{2.972}{0.686}$	–	–	–	–
DY, %	$\frac{5.155}{5.645}$	$\frac{5.489}{5.312}$	$\frac{5.581}{5.219}$	$\frac{5.320}{5.480}$	$\frac{5.940}{4.860}$	$\frac{4.86}{5.94}$	–	–
P/E	$\frac{8.383}{6.130}$	$\frac{6.343}{8.169}$	$\frac{7.013}{7.499}$	$\frac{7.363}{7.149}$	$\frac{6.672}{15.306}$	$\frac{7.982}{6.530}$	$\frac{7.982}{6.530}$	$\frac{6.518}{7.994}$

4. Discussion

The scientific results considered in this article, obtained by its author and related to the development of models of elasticity of key indicators of the activity of a public company in the stock market according to the main factors determining them (**??**) in the context of a neutral approach to the implementation of the dividend policy of this public company, can be characterized as fundamentally new, unparalleled developments on this issue.

The fundamental novelty of the author's developments is determined by the fact that a neutral approach to the dividend policy of a public company was formulated, and the underlying models (2.5), (2.6), (2.11), (2.12), and (2.14) were again developed by the author of this article (in particular, [25–27].

Since analogues for comparison with the scientific results obtained by the author were not found in the relevant scientific literature, it seems appropriate to focus on the merits of the above models of elasticity of key indicators of the activity of a public company in the stock market in terms of the main factors determining them in the context of a neutral approach to the implementation of its dividend policy. manifested in the fact that these models:

- focused on maintaining a balance of interests of all stakeholders of a public company, contributing to its sustainable development;
- are based on a repeatedly tested and proven methodology;
- characterized by objectivity and rationality;
- make it possible to calculate the influence of determining factors on the deviation of the effective indicators determined by them by the appropriate methods of factor analysis;
- are effective tools for analyzing and forecasting the values of key indicators of the market activity of a public company, which makes it possible to rationalize and improve the process of managing it.

At the same time, since the elasticity models obtained by the author for key indicators of the activity of a public company on the stock market according to the main factors determining them in the conditions of a neutral approach to the implementation of its dividend policy are deterministic (functional) factor models, the accuracy of calculating the performance indicators depends solely on the adequacy of the reality of the indicators that determine them factors.

Also, the elasticity models of key indicators of the activity of a public company on the stock market according to the main factors determining them in the conditions of a neutral approach to the implementation of its dividend policy differ from existing models characterizing the position of a public company on the stock market and traditionally considered in the literature on financial analysis, financial management and corporate finance [8–10, 20, 22, 24, 30, 32, 37, 42, 44, 45], according to the author, greater simplicity and clarity.

The computational complexity of the algorithm, according to the author, is not high enough, since the resulting models of elasticity of key indicators of the activity of a public company on the stock market according to the main factors determining them in the conditions of a neutral approach to the implementation of its dividend policy are

based on arithmetic operations: addition, subtraction, multiplication and division. This allows computerization of these models using spreadsheets, for example, MS Excel.

As is well known, the main advantages and differences of spreadsheets lie precisely in the ease of use of data processing tools. And although data processing tools can be compared to databases in their capabilities, working with them does not require the user to have special programming training.

At the same time, it should be noted that there are certain limitations inherent in the elasticity models developed by the author of key indicators of the activity of a public company in the stock market in terms of the main factors determining them in the context of a neutral approach to the implementation of its dividend policy.

First, in accordance with these models, the change in the value of each of the main factors that determine the key indicators of the activity of a public company in the stock market is taken into account separately (isolated), that is, with the values of all other factors unchanged.

Secondly, these models are focused on the constant growth rate of dividends per ordinary share of a public company.

Thirdly, they proceed from a sufficiently high efficiency of the securities market.

Overcoming these limitations will be the subject of further research.

5. Conclusions

Summing up the consideration of models of elasticity of key indicators of the activity of a public company in the stock market according to the main factors determining them in the conditions of a neutral approach to the implementation of its dividend policy, which are the results of the research and development of the author of this article, it is advisable to formulate the following conclusions:

- the key indicators of the activity of a public company in the stock market in the context of a neutral approach to the implementation of its dividend policy should include dividend yield ratio, dividend coverage ratio, expected price of a common share, dividend yield of a common share, and quote ratio of a common share;
- models of elasticity of key indicators of the activity of a public company in the stock market in terms of the main factors determining them in the conditions of a neutral approach to the implementation of its dividend policy are built on the basis of models of these indicators developed earlier by the author;
- the construction of these models involved the use of the well-known and repeatedly tested mathematical apparatus of sensitivity analysis, associated with the calculation of the elasticities of performance indicators by the factors that determine them;
- the main factors that determine the key indicators of the activity of a public company in the stock market in the context of a neutral approach to the implementation of its dividend policy include the return on investment of a public company, the market level of capitalization, the rate of return required by investors per ordinary share of a public company, and the dividend growth rate assumed to be constant over time per ordinary share, dividend per ordinary share, earnings per ordinary share, ratio of dividends on ordinary and preferred shares, as well as the dividend coverage ratio on preferred shares;
- the constructed models make it possible to determine the elasticities of the key indicators of the activity of a public company in the stock market according to the main factors determining them in the context of a neutral approach to the implementation of its dividend policy and approximately show by how many percent the value of one or another key indicator will change upward or downward depending on an increment of **1% the value** of one or another factor determining it;
- these models can be used as sufficiently effective tools for analysis and forecasting, and, consequently, for managing the market activity of a public company in the context of a neutral approach to the implementation of its dividend policy.

6. Directions for further research

The above conceptual foundations for analyzing the sensitivity of key indicators of the activity of a public company in the stock market (market activity) to the main determining factors in the context of a neutral approach to the implementation of its dividend policy largely determine only some of its general outlines as a new direction of scientific research and practice. They are a kind of theoretical basis for further development of modeling the elasticity of key

indicators of the activity of a public company in the stock market in terms of the main factors determining them in the context of a neutral approach to the implementation of its dividend policy.

The following can be considered as the main directions for further development of modeling the elasticity of key indicators of the activity of a public company in the stock market (market activity) according to the main determining factors in the context of a neutral approach to the implementation of its dividend policy:

- development of such models with a changing growth rate of dividends per ordinary share of a public company;
- building models of elasticity of key indicators of the activity of a public company in the stock market according to several main factors that determine them, acting jointly, interconnectedly and simultaneously, in the conditions of a neutral approach to the implementation of dividend policy: dividend yield ratio, dividend coverage ratio, expected price of an ordinary share, dividend yield of an ordinary share and quote ratio of an ordinary share - based on the models of the listed indicators (2.5), (2.6), (2.11), (2.12), and (2.14);
- derivation of calculation formulas that make it possible to determine the impact on the elasticity deviation of key indicators of a public company's activity in the stock market for each factor that determines them, acting in isolation, and for several main factors that determine them, acting jointly and simultaneously, in the conditions of a neutral approach to the implementation of dividend policy: the dividend yield ratio, the dividend coverage ratio, the expected price of an ordinary share, the dividend yield of an ordinary share and the quote ratio of an ordinary share, based on the relevant models;
- computerization of the elasticity models formed by the author of key indicators of the activity of a public company in the stock market according to the main factors determining them in the conditions of a neutral approach to the implementation of dividend policy in order to more effectively use these models in practice in the process of managing the market activity of a public company.

References

[1] Y. E. Aghdam, A. Neisy, and A. Adl, *Simulating and pricing cat bonds using the spectral method based on Chebyshev basis*, Computational Economics, *63* (2024), 423–435.

[2] Y. E. Aghdam, H. Mesgarani, and A. Amin, *An efficient numerical scheme to approach the time fractional Black–Scholes model using orthogonal Gegenbauer polynomials*, Computational Economics, (2023).

[3] A. Akhigbe and J. Madura, *Dividend policy and corporate performance*, Journal of Business Finance and Accounting, *23* (1996), 1267–1289.

[4] J.S. Ang, R. A. Cole, and J. W. Lin, *Agency costs and ownership structure*, Journal of Finance, *55*(1) (2000), 81-106.

[5] L. A. Bernstein, J. Wild, and K. R. Subramanyam, *Financial statement analysis*, McGraw-Hill Higher Education, New York, 2001.

[6] F. Black, *The dividend puzzle*, Journal of Portfolio Management, *2*(2) (1976), 5–8.

[7] S. B. Block, G. A. Hirt, and B. Danielsen, *Foundations of financial management*, McGraw-Hill Education, New York, 2011.

[8] R.A. Brealey, S. C. Mayers, and F. Allien, *Principles of corporate finance*, McGraw-Hill Education, New York, 2017.

[9] E. F. Brigham and J. F. Houston, *Fundamentals of financial management: Concise*, Cengage Learning, Boston, 2015.

[10] R. M. Brooks, *Changes in asymmetric information at earnings and dividend announcements*, Journal of Business Finance & Accounting, *23*(3) (1996), 359–370.

[11] D. G. Cacuci, *Sensitivity and uncertainty analysis – theory*, Chapman and Hall/CRC, New York, 2003.

[12] D. D. Dunphy, A. Griffiths, and B. Suzanne, *Organizational change for corporate sustainability: A guide for leaders and change agents of the future*, Rountledge, London, 2007.

[13] E. F. Fama and K. R. French, *Business conditions and expected returns on stocks and bonds*, Journal of Financial Economics, *25* (1989), 23–49.

[14] R. E. Freeman, *Strategic management: A stakeholder approach*, Cambridge University Press, New York, 2010.

[15] R. E. Friedman and S. Miles, *Stakeholders: Theory and practice*, Oxford University Press, New York, 2006.

[16] W. N. Goetzmann and P. Jorion, *A longer look at dividend yields*, Journal of Business, *68*(4) (1995), 483–508.
[17] Global Reporting Initiative (GRI), *G4 sustainability reporting guidelines*, EYGM Limited, New York, 2013.
[18] M. J. Gordon, *Dividends, earnings and stock prices*, Review of Economics and Statistics, *41*(2) (1959), 99–105.
[19] M. J. Gordon, *Optimal investment and financial policy*, Journal of Finance, *18*(2) (1963), 264–272.
[20] A. Griewank, *Evaluating derivatives, principles and techniques of algorithmic differentiation*, SIAM, Philadelphia, 2000.
[21] R. Hauser, *Did dividend policy change during the financial crisis?*, Managerial Finance, *39*(6) (2013), 584–606.
[22] E. A. Helfert, *Financial analysis: Tools and techniques. A guide for managers*, McGraw-Hill, New York, 2001.
[23] J. C. Helton, J. D. Johnson, C. J. Salaberry, and C. B. Storlie, *Survey of sampling based methods for uncertainty and sensitivity analysis*, Reliability Engineering and SystemSafety, *91*(10-11) (2006), 1175–1209.
[24] R. C. Higgins, J. Koski, and T. Mitton, *Analysis for financial management*, McGraw-Hill Education, New York, 2016.
[25] S. Krylov, *Dividend policy scores models: Neutral approach*, SBS Journal of Applied Business Research, *8* (2020), 23–33.
[26] S. Krylov, *Dividend policy: Scores modeling within neutral implementation approach conditions*, Academy of Accounting and Financial Studies Journal, *25*(1) (2021), 1–10.
[27] S. Krylov, *Neutral approach at dividend policy modeling*, In M. Khosrow-Pour, D. B. A. (Ed.), Encyclopedia of Information Science and Technology, Sixth Edition, Advance online publication, 2025.
[28] B. M. Lambrecht and S. C. Myers, *A Lintner model of payout and managerial rents*, Journal of Finance, *67* (2012), 1761–1810.
[29] E. E. Leamer, *Sensitivity analyses would help*, American Economic Review, *75*(3) (1985), 308–313.
[30] C. F. Lee and J. E. Finnerty, *Corporate finance: Theory, method, and applications*, Harcourt Brace & Company, New York, 1990.
[31] J. Lintner, *Dividend, earnings, leverage, stock prices and the supply of capital to corporations*, The Review of Economics and Statistics, *44*(3) (1962), 243–269.
[32] E. J. McLaney, *Business finance for decision makers*, Pitman Publishing, London, 1992.
[33] H. Mesgarani, A. Adl, and Y. Esmaeelzade Aghdam, *Approximate price of the option under discretization by applying quadratic interpolation and Legendre polynomials*, Mathematical Sciences, *17* (2023), 51–58.
[34] H. Mesgarani, M. Bakhshandeh, Y. E. Aghdam, *The convergence analysis of the numerical calculation to price the time-fractional Black–Scholes model*, Computational Economics, *62* (2023), 1845–1856.
[35] M. H. Miller and F. Modiliani, *Dividend policy, growth and the valuation of share*, Journal of Business, *34*(4) (1961), 411–433.
[36] D. J. Pannell, *Sensitivity analysis of normative economic models: theoretical framework and practical strategies*, Agricultural Economics, *16*(2) (1997), 139–152.
[37] S. Penman, *Financial statement analysis and security valuation*, Irwin, New York, 2004.
[38] R. R. Petit, *Dividend announcement, security performance and capital market efficiency*, Journal of Finance, *27* (1972), 993–1007.
[39] M. S. Rozeff, *Growth, beta, and agency cost as determinants of dividend payout ratios*, Journal of Financial Research, *5*(3) (1982), 461–488.
[40] A. Saltelli, *Sensitivity analysis for importance assessment*, Risk Analysis, *22*(3) (2002), 1–12.
[41] A. Saltelli, K. Chan, and M. Scott, *Sensitivity analysis*, John Wiley and Sons, New York, 2000.
[42] J. K. Shim and J. G. Siegel, *Financial statement analysis*, Barron's Educational Series, Inc. , New York, 2008.
[43] K. R. Subramanyam, *Financial management*, McGraw-Hill Education, New York, 2014.
[44] J. C. Van Horne, *Fundamentals of financial management*, Prentice-Hall, Englewood Cliffs, 1989.
[45] J. C. Van Horne and J. M. Wachowicz, *Fundamentals of financial management*, Pearson Education Limited, Harlow, 2009.
[46] J. E. Walter, *Dividend policies and common stock prices*, Journal of Finance, *11*(1) (1956), 29–41.