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LIMITATIONS OF STOCK PRICE VALUATION BY CLASSICAL METHODS: CRITICS OF THEIR RELIABILITY AND INFLUENCE OF BEHAVIORAL FINANCE

ОБМЕЖЕННЯ ОЦІНЮВАННЯ ЦІНИ АКЦІЙ КЛАСИЧНИМИ МЕТОДАМИ: КРИТИКА ЇХ НАДІЙСНОСТІ ТА ВПЛИВ ПОВЕДІНКОВИХ ФІНАНСІВ
ОГРАНИЧЕНИЯ ОЦЕНКИ ЦЕНЫ АКЦИЙ КЛАССИЧЕСКИМИ МЕТОДАМИ: КРИТИКА ИХ НАДЕЖНОСТИ И ВЛИЯНИЕ ПОВЕДЕНЧЕСКИХ ФИНАНСОВ

When trying to figure out which valuation method to use to value a stock for the first time, most investors will quickly discover the overwhelming number of valuation techniques available to them today. There are the simple to use ones, such as the comparable method, and there are the more involved methods, such as the discounted cash flow model besides all of them have their own problems and limitations as well as impacted with behavioral finance. Companies have an intrinsic value, and that intrinsic value is based on the amount of free cash flow they can provide during their effective lifetime. Money later is worth less than money now, however, so future free cash flows have to be discounted at an appropriate rate. The theory behind most stock valuation methods is that the value of a business is equal to the sum value of all future free cash flows. All future cash flows are discounted due to the time value of money. If you objectively know all future cash flows of a company, and you have a target rate of return on your money, then you can know the exact amount of money you should pay for that company. Preparing the work, the following methods were used: Systematic analysis of the scientific literature; Comparative analysis; Systematization, comparison and summarizing of the results. Behavioral Finance in the theoretical plane based on a cumulative and develop the institutional framework and practical manifestations become increasingly important element-catalyst for the development of financial markets. Unfortunately, there is no one method that is best suited for every situation. Each stock is different, and each industry sector has unique properties that may require varying valuation approaches. In this article we structure and compare different methods, their strengths and weaknesses.

Keywords: behavioral finance, evaluation methods of shares, stocks price, disadvantages of methods of stocks valuating.

При спробі з'ясувати, який метод використовувати для оцінки акцій у перший раз, більшість інвесторів швидко виявить величезну кількість методів оцінки, доступних їм сьогодні. Існують прості у використанні, такі як метод зіставлень, є більш привабливі методи, такі як модель дисконтування грошових потоків, але всі з них, мають свої власні проблеми та обмеження, а також вплив поведінкових фінансів. Компанії мають внутрішню цінність, і внутрішня вартість базується на кількості вільного грошового потоку, який вони можуть забезпечити протягом їхнього строку служби. Гроші пізніше коштують менше, ніж гроші зараз, проте, майбутні вільні грошові потоки будуть дисконтовані за відповідною ставкою. Теорія за більшістю методів оцінки акцій полягає в тому, що вартість бізнесу дорівнює сумі вартості всіх майбутніх вільних грошових потоків. Усі майбутні грошові потоки дисконтуються через часові гроші. Якщо ви

об'єктивно знаєте всі майбутні грошові потоки компанії, і у вас є цільова норма прибутку на ваші гроші, то ви можете дізнатися точну суму грошей, яку ви повинні сплачувати за цю компанію. Під час підготовки до роботи були використані наступні методи: систематичний аналіз наукової літератури; Порівняльний аналіз; Систематизація, порівняння та підведення підсумків результатів. Поведінкові фінанси в теоретичному плані на основі сукупності та розвитку інституційної структури та практичних проявів стають все більш важливим елементом-каталізатором розвитку фінансових ринків. На жаль, немає жодного методу, який би найкраще підходив для кожної ситуації. Кожна акція різна, і кожен сектор промисловості має унікальні властивості, які можуть потребувати різних підходів до оцінки. У цій статті ми структуруємо і порівнюємо різні методи, їх сильні і слабкі сторони.

Keywords: поведінкові фінанси, методи оцінки акцій, ціна акцій, недоліки методів оцінки акцій.

При попытке выяснить, какой метод использовать для оценки акций в первый раз, большинство инвесторов быстро обнаружит подавляющее количество методов оценки, доступных им сегодня. Существуют простые в использовании, такие как метод сопоставлений, есть более привлекательные методы, такие как модель дисконтированных денежных потоков, но все они, имеют свои собственные проблемы и ограничения, а также влияние поведенческих финансов. Компании имеют внутреннюю ценность, и эта внутренняя ценность основана на количестве свободного денежного потока, который они могут предоставить в течение их эффективного срока службы. Однако деньги позже стоят меньше денег сейчас, поэтому будущие свободные денежные потоки должны быть дисконтировані по соответствующей ставке. Теория, лежащая в основе большинства методов оценки акций, заключается в том, что стоимость бизнеса равна сумме всех будущих свободных денежных потоков. Все будущие денежные потоки дисконтируются из-за временной стоимости денег. Если вы объективно знаете все будущие денежные потоки компании, и у вас есть целевая ставка прибыли на ваши деньги, то вы можете узнать точную сумму денег, которую вы должны заплатить за эту компанию. При подготовке работы использовались следующие методы: систематический анализ научной литературы; Сравнительный анализ; Систематизация, сравнение и обобщение результатов. Поведенческие финансы в теоретическом плане, основанные на накоплении и развитии институциональных рамок и практических проявлений, становятся все более важным элементом-катализатором развития финансовых рынков. К сожалению, нет ни одного метода, который бы лучше всего подходил для каждой ситуации. Каждая акция разная, и каждый сектор промышленности обладает уникальными свойствами, которые могут потребовать различных подходов к оценке. В этой статье мы структурируем и сравниваем различные методы, их сильные и слабые стороны.

Keywords: поведенческие финансы, методы оценки акций, цена акций, недостатки методов оценки акций.

Introduction. Financial market is an important driver for the development of the national economy, which is based on the investments in stocks and other financial instruments.

The theory behind most stock valuation methods is that the value of a business is equal to the sum value of all future free cash flows. All future cash flows are discounted due to the time value of money. But stock valuation is not that easy in practice, because we can only estimate future free cash flows.

Given the inputs, the outputs are factual. If we knew exactly how much cash flow is to be generated, and we have a target rate of return, we can know exactly what to pay for a dividend stock or any company with positive free cash flows

regardless of whether it pays a dividend or not. But the inputs themselves are only estimates, and require a degree of skill and experience to be accurate with. Hence, stock valuation is both art and science.

This research topic is very important due to the need to solve numerous problems in the field of investments and risk management, stability of financial institutions.

There are numerous works devoted to the problems of stock price valuation, behavior finance and valuation methods: Azzopardi [1], Bryzgalov[2], Cohen[3], Gladchenko[5], Graham[6], Kirsanov[7], Kovalenko E.A.[8], Vashenko T.V.[9].

Setting objectives. The aim of the research is to compare classical methods of price valuation based on their strengths and weaknesses.

The aim determines the following tasks:

- to analyze theoretical aspects of classical methods;
- to disclose critics of their reliability;
- to describe influence of behavioral finance on classical methods.

Methodology. The main method of research is the method of modeling economic processes in stock prices valuation, which determines the complex of various techniques that have become widespread in science and practice in recent years, including but not limited to cash flow analysis, discounted value approach, dividend valuation approach, earning multiple approach. Theoretical basis of the study is accumulated scientific experience in the works of domestic and foreign scientists. The information basis for the study included legal and normative documents, materials and reports of state services and scientific institutions, special literature, as well as the results of monographic and sociological studies of other researchers.

Results. Many valuation metrics are readily calculated, such as the price-to-earnings ratio, or price-to-sales, or price-to-book. But these are numbers that only hold value with respect to some other form of stock valuation.

The three primary stock valuation methods for evaluating a healthy dividend stock are:

- discounted cash flow analysis;
- the dividend discount model;
- earnings multiple approach.

Discounted Cash Flow Analysis treats the company as one big free cash flow machine. We analyze the company as though we would buy the whole thing and hold it indefinitely for all of its future free cash flows. If we estimate the value of a company, we can compare it to what the market capitalization of that company currently is to determine whether it's worth buying or not, or alternatively, we can divide the total calculated value by the total number of shares, and compare this value to the current real price of the shares.

The second method, the Dividend Discount Model, is to treat an individual share as one little free cash flow machine. The dividends are the free cash flow, since that's the cash that we as investors get. In the company-wide example, a company could spend free cash flows on dividends, share repurchases, acquisitions, or just let it build up on the balance sheet, and the point is, we have little control over what management decides to do with it. The dividend, however, takes all of

this into account, because the current dividend as well as the estimated growth of that dividend takes into account the free cash flows of the company, and how management is using those free cash flows.

The third method, sometimes called an Earnings Multiple Approach, can be used whether or not the company pays a dividend. The investor estimates future earnings over a period of time, such as ten years, and then places a hypothetical earnings multiple on the final estimated EPS value. Then, cumulative dividends are taken into account, and the difference between the current stock price, and the total hypothetical value at the end of the time period, are compared in order to calculate the expected rate of return.

One of the quickest ways to check how highly valued a stock is, is to look at its price-to-earnings ratio (P/E), also known as an earnings multiple.

The earnings multiple is the stock price divided by earnings per share (EPS), and the units are expressed in years- how many years of those earnings it would take to equal that stock price.

For example, if a stock is $50, and its EPS is $2.50, then the earnings multiple is 20. The stock price is expressed in dollars, the EPS is expressed in dollars per year, so the earnings multiple of 20 is expressed in years- it would take twenty years of $2.50 each year to get $50.

Of course, the earnings multiple alone doesn't tell us much. If the company is growing its EPS each year, then in reality it will take less than that number of years for cumulative EPS to sum to the current stock price. Therefore, what constitutes a "fair" earnings multiple depends on several factors like growth and stability.

Often, earnings multiples are just used to compare two companies within the same industry, or used to compare for the same stock at two different points in time. It can also be used to check the valuation of the entire market, like with the Shiller P/E ratio.

However, using other valuation methods like the Dividend Discount Model or Discounted Cash Flow Analysis, you can determine an intrinsically fair stock price for a company, based on expected future profitability and a target rate of return. Playing around with those valuation methods, and checking the P/E ratios of those calculated fair values, provides an investor with experience about what earnings multiples are fair compared to certain amounts of growth and stability. Once an investor has that intuitive understanding, it's easy to do back-of-the-envelope calculations about stocks, easy to look at an earnings multiple, expected growth, and have a reasonable estimate of how fair is, etc.

Having an intuitive understanding of what constitutes a "fair range" of earnings multiples for a stock, relative to stability and expected growth, allows an investor to calculate some scenarios about future stock price. This method can serve as an alternative to doing Discounted Cash Flow Analysis, and can be used whether or not the company pays a dividend.

The method is to estimate EPS growth over a period of years, then place a hypothetical earnings multiple on the EPS figure at the end of that period, and compare that hypothetical stock price to the current stock price, which can allow

for quick calculation of expected rate of return over that period. There are three components to the final value:

- the final stock price at the end of the period;
- cumulative dividends received over that period;
- the impact of cumulatively reinvesting those dividends.

The Dividend Discount Model (DDM) is the key valuation technique for dividend stocks.

The most straightforward form of it is called the Gordon Growth Model.

Determining the fair value of a company means using Discounted Cash Flow Analysis (DCFA). DCFA, put simply, states that the present value of a company is equal to the sum value of all future cash flows that the company produces. But each future cash flow must be discounted to translate it into today's dollars. This is logical: the purpose of a business is to produce cash flows, so the value of the business is equal to the sum value of all future discounted cash flows.

By discounted, what I mean is that due to the time value of money, a payment in the future is worth less than the same payment today. For example, if you can earn a 10% rate of return on your money over time, then a payment of $10,000 one year from now would only be worth $9,091 to you today, because if you had $9,091 today, you could invest it at a 10% rate of return and turn it into $10,000 a year from now. ($9,091 multiplied by 1.10 equals $10,000) So, the discounted version of, or the net present value of, $10,000 one year from now, is equal to $9,091.

Similarly, if you were to receive $10,000 in five years, then this sum would only be worth $6,209 to you today, because you could take $6,209 and compound it by 10% annually to get $10,000. ($6,209 multiplied by 1.10 five times in a row equals $10,000). So, the discounted version of, or the net present value of, $10,000 five years from now, is equal to $6,209.

To value a business, you would take the discounted values of all future annual expected cash flows, sum them together, and that's the fair value of the business. You're trading a present sum of money (the fair value), for a future series of expected cash flows, but each cash flow has to be translated into today's value to take into account the time value of money and your target rate of return on your current money.

The inputs you need are the current free cash flow figures, the projected growth rate of those cash flows, and your target rate of return to use as the discount rate.

Obviously there's a mix of art and science involved here. If appropriate inputs (expected cash flows) are used, the output (current intrinsic value) is objective. But since the inputs are future expected cash flows, there is uncertainty in those figures and it requires reasonably accurate estimates to be useful.

You can take that same approach, and tailor it specifically for analyzing a stock that pays good dividends, and this is the Dividend Discount Model. It's also called the Dividend Growth Model, and the most straightforward form is called the Gordon Growth Model.

The DDM is based on the exact same idea, except that the share of stock represents what we're valuing, and all future dividends represent all future cash

flows of that share. The value of the stock is equal to the sum of the net present value of all future dividends.

For example, let's say you're analyzing a share of stock that pays $0.50 in dividends per quarter, or $2.00 per year. Furthermore, it's a dividend aristocrat that has raised the dividend consecutively every single year for 25 years or more. You look over its history, and find that it has increased the dividend by an average of 8% per year over the course of several decades, but that the growth is slowing down. So, you estimate that the dividend will continue to grow by an average of only 5% per year going forward.

If you desire an 11% rate of return on your money, which would represent pretty good returns, then you can use that as your discount rate. So for example, when the $2 in dividends goes up to $2.10 next year (because it grew by 5%), this $2.10 is only worth $1.89 to you today, because if you had $1.89 today, then you could turn it into $2.10 in a year if you could compound it by 11% during that period.

The following chart (see Fig.) shows the estimated value of dividend payments over the next forty years.

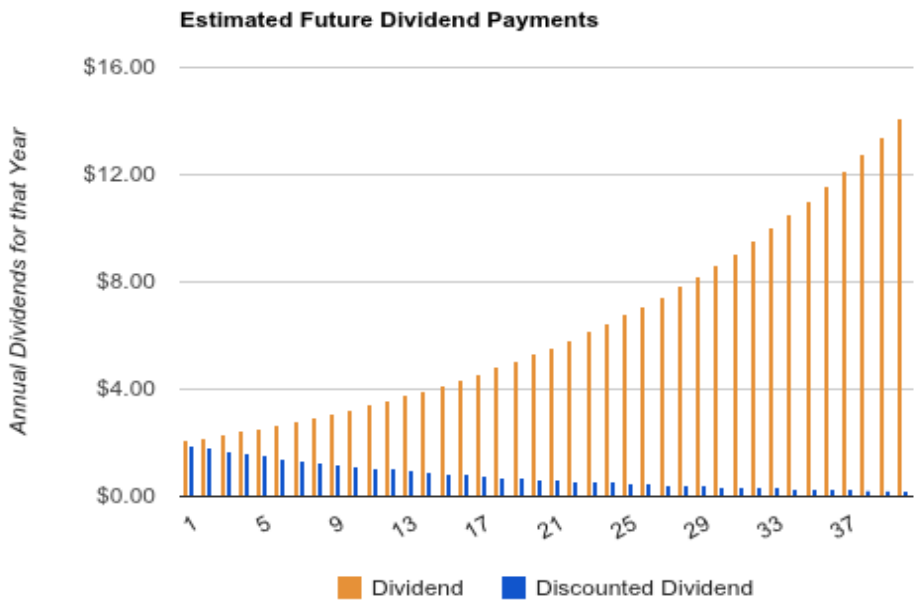

Figure - Estimated future dividend payments

The orange values are the actual dividends you expect to be paid if the dividend grows by 5% per year. The blue values are the discounted versions of those dividends; the dividends translated into today's value based on your discount rate of 11%. As can be seen, if this chart continues forever, the sum of all dividends would be infinite, but the sum of all discounted dividends is finite, because the discount rate is larger than the dividend growth rate.

To calculate the fair value of this stock, we need to sum up all of those discounted dividends. It can be done with fancy math, but after a number of mathematical cancellations, the accurate equation is extremely simple, and this is called the Gordon Growth Model:

$$P = \frac{D1}{r - g}$$

In the formula, P is the fair price of the stock. D1 is next year's expected dividend, which would be $2.10 in this case. r is the discount rate, which is 1.11, and g is the dividend growth rate, which is 1.05.

When you plug everything into the equation, you get $35. That's the fair value of this hypothetical stock, assuming that the current dividend of $2.00 really grows at that 5% per year into the future, and assuming an 11% rate of return is desirable to you. The math shows that it would be fair to trade $35 in present value for the sum value of all future dividends, because when they are discounted by 11% per year, the sum of all of them is $35. If your estimates are correct, you'll get a nice double-digit long-term rate of return.

Shortcomings. The first flaw of the Gordon Growth Model is that it assumes a constant dividend growth rate; it's a constant growth model. This may be an acceptable estimate for a fairly high-yielding mature company, but for stocks with lower dividend yields and higher dividend growth, this may not be appropriate.

To fix this, you can move towards a more general two-stage or multi-stage Dividend Discount Model. The math gets a bit more tedious at this point, but a multi-stage DDM allows you to estimate that the dividend will grow at a certain rate for a number of years, and then slow down to another growth rate after that.

The second flaw of both the Gordon Growth Model and the whole Dividend Discount Model is that it's quite sensitive to the accuracy of the inputs. Because dividend growth rates tend to be fairly high (higher than core company net income growth usually, due to share buybacks), even minor variances between the estimated dividend growth and the real dividend growth may have big impact.. This is why you should always have a margin of safety in your estimates. This also means that the DDM tends to be better for high yielding dividend stocks with lower dividend growth, rather than lower yielding stocks with higher dividend growth rates.

What if the company doesn't pay a dividend or its dividend pattern is irregular? In this case, move on to check if the company fits the criteria to use the discounted cash flow model. Instead of looking at dividends, the DCF model uses a firm's discounted future cash flows to value the business. The big advantage of this approach is that it can be used with a wide variety of firms that don't pay dividends, and even for companies that do pay dividends, such as company XYZ in the previous example.

The DCF model has several variations, but the most commonly used form is the Two-Stage DCF model. In this variation, the free cash flows are generally forecasted for five to ten years, and then a terminal value is calculated to account for all the cash flows beyond the forecast period. So, the first requirement for using this model is for the company to have predictable free cash flows, and for the free cash flows to be positive. Based on this requirement alone, you will quickly find that many small high-growth firms and non-mature firms will be excluded due to the large capital expenditures these companies generally face.

For example, take a look at the simplified cash flows of the following firm (see Table):

Table - Cash flows of the firm

	2005	2006	2007	2008	2009	2010
Operating Cash Flow	438	789	1462	890	2565	510
Capital Expenditures	785	995	1132	1256	2235	1546
Free Cash Flow	-347	-206	330	-366	330	-1036

In this snapshot, the firm has produced increasing positive operating cash flow, which is good. But you can see by the high level of capital expenditures that the company is still investing a lot of its cash back into the business in order to grow. This results in negative free cash flows for four of the six years, and would make it extremely difficult or impossible to predict the cash flows for the next five to ten years. So, in order to use the DCF model most effectively, the target company should generally have stable, positive and predictable free cash flows. Companies that have the ideal cash flows suited for the DCF model are typically the mature firms that are past the growth stages.

In practice, the two groups of factors cause a number of so-called "effects" that underlie the irrational actions of market participants in the conditions of uncertainty and risk. Depending on the targets and in different situations you can select the most important of them:

1. Effect of processing. Is a different perception of situation by economic actors, if it is written in different formulations.

2. The effect of isolation. Simplifying the choice between different perspectives, economic actors ignore common features, focusing on the differences.

3. The Illusion of control - a tendency to greater risk in a situation that creates a sense of opportunity to influence the outcome of the operation.

4. The effect of competence. Economic subjects prone to greater risk in areas where more competent, regardless of whether their knowledge and expertise in any way affect the probability of a particular outcome.

5. Information cascade effect. Exposure to economic actors influence third-party opinion.

6. The effect of the trap. Describes the situation when the economic entity has invested money, time, effort in any investment project and decides to continue its development for the sake of their initial investment, although the outlook has deteriorated seriously.

7. The effect of conservatism. Manifested in the slow change in the subjects of their beliefs under the influence of new information.

8. The effect of certainty. Individuals prefer a smaller income, but "certainly" income, then more income with less chances to get.

9. Effect of cash. Most economic subjective-ing unable to correctly assess the impact of inflation, because their perception is based on the absolute values of cash amounts.

10. The effect of predisposition. The characteristic tendency for investors to hold long in their portfolio shares, which are not profitable, and too quickly sell the shares, which give a profit.

11. The effect of reflection. Is a positive outlook that individuals tend to avoid the risk of negative and - vice versa.

12. Effect of "overreaction" - acute response to new information regardless of whether it is a bad or good.

13. The illusion of importance - the subconscious desire of the economic entity in the process of acceptance of financial decisions to allocate and use it to analyze the information that is directly or indirectly confirms the previously established his opinion of any financial instrument or entity financial relations.

14. Misperceptions their chances - in the case of recurring events that have the same outcome, if repeated many times the same outcome, then the person can choose the second outcome. However, the probability of both outcomes have not changed over time.

Knowledge of the above principles of conduct provides a significant advantage by market participants over their competitors:

1. First, it provides a basis for qualitative introspection actions, actions, thoughts;

2. Second, it helps to correctly analyze the behavior of other market participants;

3. Third, it significantly expands the analytical outlook for predicting the possible models describing the behavior of market participants in certain situations.

Here is an example of irrational behavior:

May 18, 2012 the largest social network in the world Facebook issued shares. The company has posted on the American Stock Exchange 421,200,000 shares at $ 38 each for 305 and raised $ 16 billion. At that time, the company was valued at 104 billion dollars. In two weeks the company's shares fell to 28.84 dollars in the price per unit. And in September, they reached its bottom - $ 17. Per piece. Of course, you can call a lot of reasons for this sharp fall, and one of them can be considered true effect of "overreaction." Investors too actively respond to any information that was mostly negative. As a result, the company lost in the incredible price. "This is a stunning spectacle - said senior vice president of Cuttone & Co. Keith Bliss. - Over the past 15 years I have never seen such a change of sentiment, and certainly not on the IPO».

Feature of the theory of behavioral finance is that it focuses on the reasons “why” the specific actions in the past acquired. Prediction of possible events - an extremely difficult task, since psychology is fundamentally unable to provide information with a high degree of accuracy. Therefore, the theory of "behavioral finance":

1. The instability of the market. Emotions, feelings, stereotypes, the extra information of low quality and more influence on the choice of market participants. Fear of losing the money invested or, conversely, the desire to get rich can not think rationally. We should not forget about the fact that people also feel calmer, acting in the crowd. Therefore, any mood, hearing, the idea is very contagious and extremely dangerous. All this can be as a "mount up to heaven" and "destroy" the

same day. That's what working stock exchanges and other financial institutions similar structure.

2. The unpredictability of financial market development. The reasons are the same. Every moment, millions of people treated with vast amounts of information, which has a direct impact on their selection. A key role here, of course, plays insider information.

Conclusions. No one valuation method is perfect for every situation, and it`s crucial to know his straight and weakness in order to apply in in right situation. That`s why it`s mandatory to continue studying current and future methods of valuation in order to provide relevant critics. By knowing the characteristics of the company, investor can select a valuation method that best suits the situation. In addition, investors are not limited to just using one method. Often, investors will perform several valuations to create a range of possible values or average all of the valuations into one.

Behavioral Finance in the theoretical plane based on a cumulative and develop the institutional framework and practical manifestations become increasingly important element-catalyst for the development of financial markets.

In the context of the shadow economy investment is largely produced outside the boundaries of organized markets. On the other hand, individual and group follow a more or less clear trend of investment conditions observed quite clearly. Establish standards of financial behavior is not always acceptable, even for professional investors - financial institutions. Investment preferences, non-professional market participants, choice of financial instruments to meet them - are based not so much on knowledge, but for the most part are stochastic Therefore, the formalization of rules of behavior of all market participants need both a means and the post-crisis management. Not only purely economic but also psychological, religious, ethical, cultural and other factors play a role increasingly important driver of refusal or consent to the proposed use of community financial services, and search and display of precise determination of socio-cultural and economic components of financial innovations based on mutual trust is crucial for their distribution.

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ECONOMIC-MATHEMATICAL MODELING OF THE EFFICIENCY GROWTH OF THE AGRARIAN SECTOR OF THE UKRAINIAN ECONOMY

ЕКОНОМІКО-МАТЕМАТИЧНЕ МОДЕЛЮВАННЯ ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ АГРАРНОГО СЕКТОРУ ЕКОНОМІКИ УКРАЇНИ

The article analyzes all stages of production of both raw materials and finished agricultural products common for the modern agricultural production in Ukraine. Both the external and internal factors influencing the primary and secondary production of agricultural products were studied. The markets for agricultural raw materials and finished products, namely, the national and international markets for agricultural products, were also considered.

Based on the results of analysis, the economic-mathematical model of production and processing of agricultural products as a single economic system has been constructed . The model was built taking into account the most vital requirements of each of the selected stages,. Each of the five stages of production, that were distinguished, was described using mathematical formulas. For some of the steps, the Cobb-Douglas multiplicative production function, modernized for the specifics of agricultural production, was used. The function used includes the influence of the areal factor on the gross agricultural production, as well as classic labor and capital factors. The problem of increasing the efficiency of the agricultural sector of Ukraine's economy was formulated and solved

Using this economic-mathematical model of production in the development of agricultural policy and macroeconomic planning will allow to consider changes in the economy of the agricultural and processing industry, to assess the possible consequences of new activities in state economic policy, implementation and monitoring of the long-term negative and positive trends of production and processing of agricultural products. Moreover, due to this model, it could be possible to increase the volume of earnings inforeign currency, which, in turn, can be used as investment not only in agricultural but also in other sectors of the national economy.

Keywords: agriculture, agricultural production, mathematical modeling, economy of Ukraine.