

# Links Between Net Present Value and Shareholder Value from a Business Economics Perspective

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## SUMMARY

*One of the oft-quoted theorems of finance is that decision making based on net present value will lead to the maximisation of shareholder value. The study analyses the reality background of this theorem within the disciplinary borders of business economics. Since finance is based directly on the bases of microeconomics, the study touches upon the presentation of the different disciplinary frames of business economics and microeconomics. The paper demonstrates that the economic content of shareholder value of a firm calculated from its business value and the project's net present value fundamentally differ from one another. With their summing up, in general cases, no index emerges with meaningful economic content. Moreover, only in exceptional cases does the ranking based on the net present value lead to the maximization of the shareholder value.*

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## INTRODUCTION

The debate over the order of preference of the application of the net present value and the internal rate of return (IRR) has been in progress for over half a century. The literature of finance expresses a very determined preference for net present value. In spite of this, when substantiating their decisions, the business professionals of developed countries apply the internal rate of return in a large proportion (see e.g. Arnold and Hope, 1990; Volkman, 1997). According to Volkman's (1997) research, the emergence of this contradiction could be attributed to the fact that finance propagates the more advantageous nature of net present value-calculation based on one of Fisher's works (Fisher, 1930) published in the first half of the past century while business economists (and business professionals) prefer the method of finding the internal rate of return based primarily on the works of Böhm-Bawerk (1889) and Keynes (1936).

Among the advantages of net present value, finance literature regularly mentions the theorem according to which the net present value indicates the project's contribution to the shareholder value (shareholder wealth). However, according to Woods and Randall (1989), this theorem remains unproven.

When transposing the theorems of finance into the corporate practice and re-interpreting them from a business economic perspective, a rather serious problem is caused by the different disciplinary frameworks. Finance, namely, is based on standard microeconomics, or as Volkman says "based on orthodox economic theory" (1997, p 75). Problems caused in part by microeconomic roots emerge in the research of Woods and Randall (1989) as well. Their article analyses the links between net present value and shareholder value on the scientific basis of finance. In the course of this, the article points out that some of the background assumptions applied by finance do not prevail in reality (for example an efficient market and full credibility). Some of the background assumptions mentioned are based on microeconomic foundations.

This study examines the links between net present value and shareholder value from the aspect of business economics by using its category system. Correct processing is made more difficult by the fact that there is a significant difference between

the theorems of finance and business economics as far as the proximity to real-life problems is concerned.

With regard to the microeconomic bases of finance, the study also casts light upon the opportunities and pitfalls of the interoperability between microeconomics and business economics. The investigation's main purpose, however, is to clarify the question to which extent the net present value is appropriate for quantifying a project's contribution to the shareholder value.

## DIFFERENT DISCIPLINARY FRAMEWORKS OF BUSINESS ECONOMICS AND MICROECONOMICS

Business economics as a scientific discipline evolved as an interaction of the general development of economy, management and sciences. Its roots can be traced back to the 16<sup>th</sup> century. At the different stages of its development, the nature of business economics changed as well. It's becoming an independent discipline can be dated to the 1920s (Du Plessis et al. 1981).

The individual disciplines have relatively independent fields of research, research objectives, research approaches and category systems. Business economics researches the operation and development of companies, taking environmental interactions into account. Considerable emphasis is put on the analysis of management operation and management-methodological relationships, on the methods of the preparation for decision making, and on the disclosure of the patterns of corporate behavior. Its level of abstraction is relatively low and a considerable part of its results – adjusted to the characteristics of the given company – may be directly used in management practice. The terminology of business economics is in accordance with the terminology of corporate management. However, it has to be mentioned that a certain kind of looseness is characteristic of the category system of business economics all over the world. (For more on this, see Illés, 2005).

Unlike the above mentioned, economics basically examines how the economy works. Schmalen (2002) describes this as follows: as far as economics is concerned, the aggregate processes, i.e. the links between the (aggregate) sectors of

“business”, “household”, “government” and the “rest-of-the-world” constitute the subject of cognizance.

Economics applies a high level of abstraction encompassing a huge field of topics. In the case of topics concerning a company, its central question is the link between rational business decision-making and economic balance. It analyses the company from a kind of external perspective and does not go into its internal structure, management-methodological questions or development tendencies. Its category system is stable and uniform world-wide. Even the notation is identical.

A source of several misinterpretations is that the names of several basic categories of microeconomics are identical to those of business economics, although there is different economic content behind the identical names. Such categories are, among others, cost and profit. Moreover, the high level of abstraction may also become a source of misinterpretation. Microeconomic researchers would like to express general relationships (“eternal truths”) but they often do not emphasise the correct presentation or continuous awareness of the assumption system in which the disclosed patterns, relationships prevail in the business’s reality. A considerable part of the assumptions leading to high level abstractions greatly differ from the real operation conditions of real business life. Without being aware of, and then resolving, these assumptions, it is not possible to arrive at knowledge that can directly be used by the business professionals. (Unlike business economics, management-methodological counseling is not among the goals of microeconomics. This is a correct relationship between microeconomics and business life.)

Most theorems and research results of microeconomics may be employed by business economics only after proper re-interpretation and synthesis. This is a consequence partly of the different levels of abstraction and partly of the different research goals, approaches and category systems. The passage between the two different disciplines requires a great deal of care. I have demonstrated the depths of this issue through the detailed comparison of the “break-even point”, applied with an identical label but with different economic content in microeconomics and in business economics (Illés, 2011).

Despite the essential conceptual differences, we may often encounter the merging of the two disciplines in the literature, which may arise from both directions. Rather than, usually this is the crossing of disciplinary borders where the concept-system of the given discipline and the validity frames of the theorems are neglected. In order to interpret the theoretical relationships for practical examples, certain microeconomic publications often enter the area of business economics in such a way that they do not indicate the changing of the content of the categories. It causes interpretation difficulties, for example, when microeconomics applies an original corporate database but does not touches upon the fact that the costs in the database differ from the cost-concept of economics and does not correct them. Moreover, it should be emphasised that the sums in the profit column do not coincide with the sums of microeconomic profits.

Works in business economics adopt unadapted microeconomic relationships and theorems in a frequency and proportion greater than the above. (Examples are the books of Hornby et al. (2001) or Atkinson and Miller (2008), where among others the routine construction of U-shaped cost curves and furthermore the practical applicability of isoquant curves assuming the arbitrary divisibility of production factors are problematic.) Of course, these may cause significant drawbacks for the usefulness of the scientific results of business economics.

## MICROECONOMIC FOUNDATIONS OF FINANCIAL THEORY

A general characteristic of the finance literature is that its disciplinary borders are unclear. It does not become clear whether it is about a purely theoretic question of economics or about a methodological recommendation applicable by practical businessmen. In this particular case it is problematic because a business economist does not have to be concerned with the critical analysis of the theorems of economic theory. However, he or she cannot leave the recommendations of the literature touching upon management practice out of account.

Even though finance constructs its recommended methodology and its analyses related to corporate finances on microeconomic bases, it usually presents its findings embedded in a practical context. (The questions related to the project’s economic efficiency may also be counted here.) This is a very significant characteristic. At times there is a wide gap between the relationships arising according to finance models and the relationships prevailing in reality. I would like to illustrate the nature of this gap via a brief description of a real-life event. In the course of a discussion I mentioned that the average cost of drinking water per cubic meter is 280 HUF at one of the water public utility companies. Out of this amount, the marginal cost is 19 HUF. If the price of the water would be regulated according to the “price is equal to the marginal cost” principle of microeconomics, this company would soon go bankrupt. My colleague in finance reacted immediately: the reason for this is that there is no market balance. If there were market balance, no such problem would emerge. That was the point where I wound up the debate. For, based on the reality, no market balance can be imagined where approximately 93 per cent of the costs need not to be returned. Anyway, the debate would have gone on the ground of short- and long-run cost curves, and the existing chances of the arbitrary divisibility of production factors on the ground of reality.

The processing of certain theorems of finance from a business economics perspective is made more difficult by the fact that it does not become clear which assumptions and relationships originate directly from microeconomics and which come explicitly from finance theory. (Among these assumptions are, for example unlimited access to credit.)

Nowadays, there are finance studies that consider the clarification of the relationship with the practice as their goal. Clear views can also be found among them. For example “The WACC is neither a cost nor a required return: it is a weighted average of a cost and a required return. To refer to the WACC as the »cost of capital« can be misleading because it is not a cost” (Fernández, 2011, p. 9). It is a source of numerous misinterpretations that finance – just like microeconomics – calls the return requirements arising according to the opportunity cost a cost as well. In practice, however, only those items are called costs behind which there was, is or will be some expense. (Certain fields of business economics have partly adopted the cost-interpretation of microeconomics; however this does not become disturbing in a proper context.)

## NET PRESENT VALUE AS A SURPLUS OF SHAREHOLDER VALUE IN THE LITERATURE

As mentioned in the introduction, in order to underpin the more advantageous nature of net present value, finance refers to, among others, Fisher’s theorem according to which the net

present value indicates the extent to which the project contributes to the shareholder wealth. This, with some different significance can be found in the majority of the related works in finance. The elaboration of the theorem is not typical.

Many authors explicitly bring the net present value into direct connection with the shareholder value of the firm and the shareholder wealth. Two examples:

- a) "When mutually exclusive projects rank differently because of cash-flow pattern differences, the net present value rankings should be used. In this fashion we can identify the project that adds most to shareholder wealth" (Van Horne and Vachowicz, 2008, p. 333).
- b) "If shareholder value is the aim of the company's management and directors, the project that creates greater value, not greater rates of return, is the preferred choice." And later: "The NPV is the method that is preferred in all cases. It is the method that measures the contribution of the project to shareholder value" (Crundwell, 2008, pp. 191 and 193).

From a practical point of view, the unsustainability of the statements may easily be seen. For example with identical lifespan and a given investment amount, two minor projects together result in a net present value one-and-a-half times greater than a major project. When separately analyzed, it is the major project that provides the highest net present value. However, with identical risk conditions, it is not appropriate to choose that one.

Generally, the comparability of net present values is distorted by the differences of initial investment requirements, lifespans and the rapidity of payback. These distorting effects have been known for decades (for example Keane, 1975). Despite this, the one-sided recommendation of net present value remains: "The NPV can discriminate between projects with different sizes because it measures return in absolute dollars. When such a conflict occurs, once again the NPV provides the decision consistent with the goal of maximizing shareholder wealth" (Baker and Powell, 2005, p. 257). Laux (2011) says that academics consider the NPV approach is superior and some of them so find that over time practitioners have come to agree.

There are also a considerable number of authors who interpret the net present value primarily or simultaneously as the surplus of company value. Three examples:

- a) "Those who prefer the NPV method argue that the method measures the monetary contribution which a project makes to the value of the firm, and is therefore more meaningful than a ratio of profitability" (Keane (1975, p. 13).
- b) "NPV is the better method because it is a superior indicator of how a project will affect the value of the firm." (Baker and Powell, 2005, p. 255).
- c) "A zero NPV would maintain the value of the firm; positive NPV projects would increase firm value." Laux (2011, p. 30).

This conception makes the relationships even more difficult, since the maximisation of the company's value is not the same as the maximisation of shareholder value. A project with a net present value of 0 (zero) to be realized by taking out a loan of large amount, in the first approach, increases the company's value according to the project asset's value but it does not affect the shareholder value.

## SHAREHOLDER WEALTH MAXIMISATION AS A METHODOLOGICAL QUESTION

Fisher's assumption of the maximisation of shareholder wealth in the 1930's – given the characteristic circumstances of

shareholder structure and management morale at that time – may partly be regarded as realistic. However, works in firm theory were published even in this period questioning the theorem according to which the corporate decisions, in their tendency, clearly serve the maximization of shareholder value. Berle and Means (1932) argued that the corporate person formally owns a corporate entity by the separation of corporate ownership and control. They say that in public corporations where the ownership and control is separated, the shareholders rely on the board of directors to represent their interests. Over time the boards become so dominated by the management that their supervisory role becomes ineffective and the executives get to have the final say.

Under today's circumstances of the companies' ownership structure and operation, the general theorem of the maximisation of shareholder value can be refuted, and this refutation can be found in a number of sources. Old and Shafto (1990) for example, in accordance with the professional opinion, state that the interest enforcement opportunities of the shareholders of big and free float joint-stock companies are very limited. The shareholders of such companies may encounter a number of difficulties if they want to organise the conditions required for having a relevant say in the company's issues. On one hand, the top management can informally control the appointing of new members of boards of directors so thus, it is not easy to achieve a breakthrough in this area. On the other hand, acquiring pieces of relevant information related to the company runs into a number of difficulties, as does conveying the information to thousands of shareholders. The general meeting – due to its regulated, scripted nature – is not a really appropriate platform for the enforcement of shareholder interests. By contrast, the chance for management groups with a relatively uniform situation of interests to enforce their interests is considerably better than that of the shareholders. There is a danger, and in some cases it happens, that the managers enforce their own interests at the expense of the shareholders. The corporate communication does not necessarily reflect but rather conceal the actually prevailing interest effects.

In today's modern market economies, the dominance of interests prevailing within the companies of different size, different organisation and different ownership structure shows very significant differences. Independent of this particular fact, a model and its calculation background whose the purpose is profit-maximisation and the maximisation of shareholder wealth can be analysed.

So thus, the main question in this case is not whether the pursuit for the maximisation of shareholder value does prevail in reality. Independent of this, the methodological relationship of whether the sum of net present value is able to measure the project's impact on shareholder wealth can be analysed.

## NET PRESENT VALUE AND THE SHAREHOLDER VALUE OF A PROJECT

### *The Main Task and Content of Net Present Value*

The net present value is one of the means of judging the project's economic efficiency. With its help, it may be determined whether the given project meets the return requirement. The literature is not concerned with the clarification of its economic content. According to my research, the economic content of the net present value is clear only in case of investment projects with orthodox cash flow patterns. In this case the net present value is the sum of the surplus yield above the required one (or lack of that), discounted for present value. This is proved mathematically (Illés, 2012).

The net present value (NPV) calculation applied to orthodox cash flow pattern projects is as follows:

$$NPV = -E_0 + \sum_{t=1}^n H_t \frac{1}{(1+i)^t}, \quad (1)$$

where

$E_0$  = Initial investment. The investment sum occurring in the zero point of time, and investment amounts occurring earlier added up with required rate of return.

$t$  = Serial number of years ( $t > 0$ ).

$H_t$  = Difference between cash inflows and cash outflows in year  $t$ , where  $H_t > 0$  for orthodox cash flow pattern projects.

$n$  = Duration of the project, where the time of investment realization does not constitute part of the duration.

$i$  = Required rate of return.

The economic efficiency of a project and the project value are two concepts essentially different from one another. In the case of projects with a measurable return on investment, the question analysed while examining the economic efficiency is whether the return requirement is met. The project value, however, indicates the maximum amount that, at the time of the analysis, could be paid by a competent businessman when buying the project in question. So one question is whether the total expenditure and the yield requirement of the investment according to the required rate of return will be returned. The other question is how much the project is worth. The basic function of net present value is to answer the question of economic efficiency. The way of giving the answer is another issue. This answer simultaneously indicates the discounted sum of the surplus yield (or its lack) generated above the yield requirement. The discounted yield surplus, however, does not refer to the project's value. A zero net present value, for example, means that the required yield is just met. However, in such cases the project value is not zero. Based on all these reasons, it can be stated that, in a general case, the firm value and the net present value of the project can theoretically not be summed up.

It may happen that, due to an unexpected market impact, an investment project becomes uneconomic after the start. In this situation its net present value would be a negative sum. As long as the negative sum of net present value does not exceed the net replacement value of the project's assets, the project can be sold for some amount of money. It has a value, in spite of the negative net present value. It may be seen from this side as well that the project's value cannot be identified or substituted with the net present value.

### *Project Value and Firm Value*

The value of a project is the maximum amount the organisation's leaders are willing to pay to get a project afloat. The value of an orthodox cash flow pattern project is calculated as the sum of discounted future cash flows. This can be regarded as a commonly known relationship, though it may happen that it does not yet have a scientific rank. The calculation formula is as follows:

$$V_P = \sum_{t=1}^n H_t \frac{1}{(1+i)^t}, \quad (2)$$

where  $V_P$  = value of the project.

Summing up the value of the project and the firm value seems possible in the first approach, provided the firm value is estimated on a DCF (discounted cash-flow) basis. The two values, however, in theory cannot be summed up, for the periods taken into account are different. The calculation of the firm value encompasses a long period, i.e. an infinite lifespan. When calculating the project value it is usually a period significantly shorter than that (according to the real lifespan) taken as a basis.

The problem of summing up does not emerge in the case of assets. The price of a building to be purchased today with a lifespan of 100 years and the price of the technological system operating within with a lifespan of 10 years can be summed up without any problem. The sum indicates how much the two assets are worth together today, independent of the fact that one will remain to function for 100 years, the other for 10 years. The difference in the lifespans does not disturb their summing up.

In case of the project's value  $e$  and the firm value, this analogy is not valid. In this case, a shorter lifespan means faster capital payback. With the faster payback, the capital may be re-invested earlier and it can be applied for gaining further surplus yields. Within the time horizon applied in estimating the firm's value, the project with a shorter lifespan or faster payback provides a chance for a further increase of the firm's value by a greater amount. The summing up of the project's value and the firm's value leaves this opportunity out of account. The summation would be undistorted only by the assumption that the yield rates of the re-investment opportunity emerging related to the project are identical with the required rate of return. There is no such a relationship in reality.

### *Shareholder Value of a Project*

The difference between the firm's value and the sum of debts gives the shareholder value of the firm. Since it was proven that there is no direct logical relationship between the firm's value and net present value, it can be stated that there is no direct economic-logical link between net present value and shareholder value, either.

Theoretically, the project's shareholder value can also be analysed. This can be done according to the analogy of the method applied in the estimation of the shareholder value of the firm. Black et al. (1998) define of shareholder value of a firm as follows:

$$\text{Shareholder value} = \text{Firm value} - \text{Debt}$$

According to this, the shareholder value of a project may be estimated as the difference between the project's value and the debt related to the initial investment of the project. The formula is as follows:

$$V_{PS} = V_P - E_D,$$

where

$V_{PS}$  = shareholder value of the project,

$E_D$  = the sum of debt in the project's initial investment.

This formula can be made more detailed.

$$V_{PS} = \sum_{t=1}^n H_t \frac{1}{(1+i)^t} - E_D \quad (3)$$

In general terms the shareholder value of a project and the shareholder value of the firm (calculated totally by the DCF) cannot be summarised, primarily because of the different lifetimes.

### Comparison of Net Present Value and Shareholder Value of a Project

By the collation of Equations (1) and (3) it can be seen that the net present value and shareholder value of a project in general case cannot be compared. However, the two values coincide if the total initial investment of project is realised entirely from debts [Equation (4)].

$$-E_0 + \sum_{t=1}^n H_t \frac{I}{(1+i)^t} = \sum_{t=1}^n H_t \frac{1}{(1+i)^t} - E_D \quad | \quad E_0 = E_D \quad (4)$$

According to one of finance's previously quoted assumption, the firms' access to capital sources is not limited (i.e. the capital stock may arbitrarily be increased through loans). In the sense of this assumption, beyond a certain boundary the marginal capital may only originate from credit. If in addition there is another assumption according to which reinvestment happens on the level of required rate of return, then and only then could the theorem according to which the net present value quantifies the project's contribution to the shareholder value be proven.

With the assumption of unlimited investment opportunities and the assumption that reinvestments yields equal to the required return, there are no comparison distortions in net present value. From the aspects of ranking the initial investment, the duration and the rapidity of capital payback become unattractive. In this theoretical case, the net present value – in addition to showing the project's contribution to the shareholder value – is indeed suitable for ranking and maximising shareholder value. (That is the project with the highest positive net present value out of mutually exclusive projects is acceptable.) With the assumptions mentioned above, but only than the statements that net present value measures the contribution of the project to shareholder value can be justified. Those statements, however, according to which the net present value indicates the increment in a firm's value, are incorrect and misleading even under these assumptions. Namely, the value of the company will be increased not only by the net present value, but also by the amount of debt (by appropriate investment cost).

In reality, the access to capital is limited from several aspects; moreover, the limiting assumption related to the profitability of reinvestment cannot be regarded as realistic. Based on all this, the theorem of finance according to which the analysis of net present values according to the conditions of existing reality may lead to the maximisation of shareholder value provides for what in practice is misleading information. For this maximisation purpose another methodological solutions are suitable.

Above, the DCF-based firm valuation method was applied as the background assumption theoretically best matching the structure of the net present value. However, there are several methods for estimating the value of a firm. Damodaran (2006), among others, provides a summarising overview of these methods. The practical applicability of DCF models, according to some of the literary sources, is dubious. The main problem is that a part of future cash-flows develop depending on future investment opportunities. One issue is how many years we can forecast as far as future investment opportunities are concerned. A relatively recent, brief summary of the debate over the method may be found in Laux's (2011) work.

There are methods for the estimation of corporate value where the firm's value (estimated independent of the analysed project) is increased by the net present value of the analysed project (regardless of the necessary amount of credit). Such a method may be, for example, when the company's value is estimated via the summing up of the net replacement value of

the assets and the discounted value of free cash-flows arising in the future. Provided the amount of equity capital required to start the project is incorporated into the net replacement value of assets then it would appear that the project indeed increases the shareholder value by its net present value. However, the difference of time horizons taken into account in this case is still a problem. Therefore the net present value of future cash flows should include the yields of all reinvestments as well.

### THE QUESTION OF MAXIMISING

The paragraphs above were primarily concerned with the analysis of the possibility of summing up the net present value and the shareholder value, as well as with taking the net present value as shareholder value into account. The assumption related to the maximisation of the shareholder value was only briefly mentioned. As for the latter, we have to touch upon that peculiarity in the literature that the goal is often expressed as the maximisation of the shareholder wealth. The definition of shareholder wealth, however, runs into several difficulties. With regard to this, in this paper I handle the shareholder wealth (in accordance with many of the sources) as a concept analogous to shareholder value. This solution can also be found in the statements quoted at the beginning of the paper.

With the assumption of unlimited investment opportunities and the assumption that yield rate of reinvestments equal the required rate of return, there are no comparison distortions in net present value. In this case the shareholder value will be maximised when the company implements all positive net present value projects, and the case of mutually exclusive projects implements the variant of highest positive net present value.

In reality credit is not unlimited for the firms. Taking this condition into account, the profit will be the greatest if – with a given risk level – the average internal rate of return (the factual profitability rate) is the highest, and if the difference between the required and factual average profitability rates of the selected projects is the greatest considering the available yields of reinvestments as well.

Based on net present values, it is not possible to directly come to this criterion, for the net present values of the individual projects cannot be compared; furthermore, the summation of these does not lead to a clear economic result.

The distortion factors mentioned above are the initial investment, the duration and the rapidity of capital payback. These factors are often mentioned in the literature of finance as well. By systematically eliminating these distortions in the case of orthodox cash flow pattern projects the net present value transforms into a special kind of rate, namely, the modified difference between the factual and the required rate of return. Ranking the projects to be realised according to these differences, we come to the ranking according to the internal rate of return (with identical risk levels). It is a very significant relationship that with identical project risks the ranking according to the net present values cleansed of distortions is identical with the ranking according to the internal rate of return. From this point of view, the order of preference of the two methods disappears, but only if the removal of distorting effects is done. If the respective risk levels are different, the ranking by the rate differences between the factual and required rate of return may be the relevant one. The expectable profitability differences of re-investment opportunities may justify further analyses as well (Illés, 2012). In the case of projects with unorthodox cash flow pattern, adapting calculation related to the specific features makes it possible to obtain sufficient information (Illés, 2007).

It is an almost commonplace basic truth of economics that, in the competitive market, the capital goes where the highest return on investment can be achieved for a given risk. The ranking on the basis of net present values is not in accordance with this process. The net present value is known to be a difficult way to see the true profitability of an investment opportunity. For example, for an individual who is fixing 300,000 euro in a bank for one year, it is more meaningful to do so at an interest rate of 4.5% than to be told that he will get 3% interest on his deposit plus 4,500 euro more. This is more difficult to clarify for bank deposits with a long-term commitment.

## CONCLUSIONS

The direct relationship of net present value (NPV) and shareholder wealth – according to the research of Woods and Randall – has never been proven. “One of the most widely accepted tenets of financial theory is that the objective of

financial management should be to maximize shareholder wealth. This precept and the implication that shareholder wealth is measured by NPV is generally cited capital budgeting. However the links between NPV and shareholder wealth are not made explicit in the literature. Textbooks merely state the equivalence as a general premise without rigorous proof” (Woods and Randall, 1989, p 85).

In this paper I have examined this relationship from the business economics aspect. Based on a content analysis of the categories and the comparison of calculation models, I have come to the conclusion that in general cases existing in reality there is no direct link between net present value and the shareholder value of the firm. In other words, no index emerges that has meaningful economic content. Moreover, decision making based on net present value and the ranking based on this will not necessarily lead to the maximisation of shareholder value. Except for random cases, this occurs only with the unlimited credibility of companies and with the required rate profitability of the reinvestment amounts. However, these conditions are never met in reality.

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