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FORECASTING FOR THE INVESTMENT PROJECT APPRAISAL

1. Introduction

Financial managers almost always act in the conditions of uncertainty. Their two essential tasks – funds allocation within the enterprise and funds raising – are both concerned with the future events. Besides, only effective allocation of company's funds primarily financed by the best (in certain conditions) available sources is a company's maximization value factor.

In order to achieve financial goals managers seek for forecasts of the relevant variables. Reliable forecasts are very useful because they alleviate the risk, and for this reason the decision-making process within the company takes the advantage of them. On the basis of forecasts financial managers may decide, plan and finally prepare company's future operations. This and other issues I have investigated in previous papers (see [Szpulak 2007; 2003]).

The goal of this article is to identify financial phenomena and variables that should be forecasted because they are the most relevant and useful for investment project evaluation. The identification of financial managers' forecasting needs will be done in section two, where I will overview all areas of their concern. Finally, in the conclusions I will discuss my further research plans concerned with financial forecasting. It is worth mentioning at this moment, that this paper creates a framework for my future research.

2. Where is a place of forecasting in capital budgeting?

First long – term decisions that usually financial managers have to face with are the investment projects' evaluations. Managers, who act in favor of the entire company and its shareholders, with common goal – maximalization of company's value, have to evaluate company investments projects in terms of positive Net Present Value. Only this positive value can enlarge company's shareholders wealth. Although

the formula for calculating NPV is very simple, the whole process of evaluation is really a challenging task. To calculate NPV, managers need expected cash flows and opportunity cost of capital.

3. Cash flows forecasting

To calculate expected cash flows, managers determine the future cash outflows and received payoffs on investments – this means they have to prepare cash flows forecasts. However, in financial literature it is usually stated that this can be done only by determining a distribution of cash flows on each future period, which is not always the case. If we can proceed past data that are available, and therefore use formal mathematical constructions like time series models, regression and econometric models or analogous models, we can get forecasts that are indeed expected values (expected cash flows). Unfortunately, it is occasionally possible to use past data

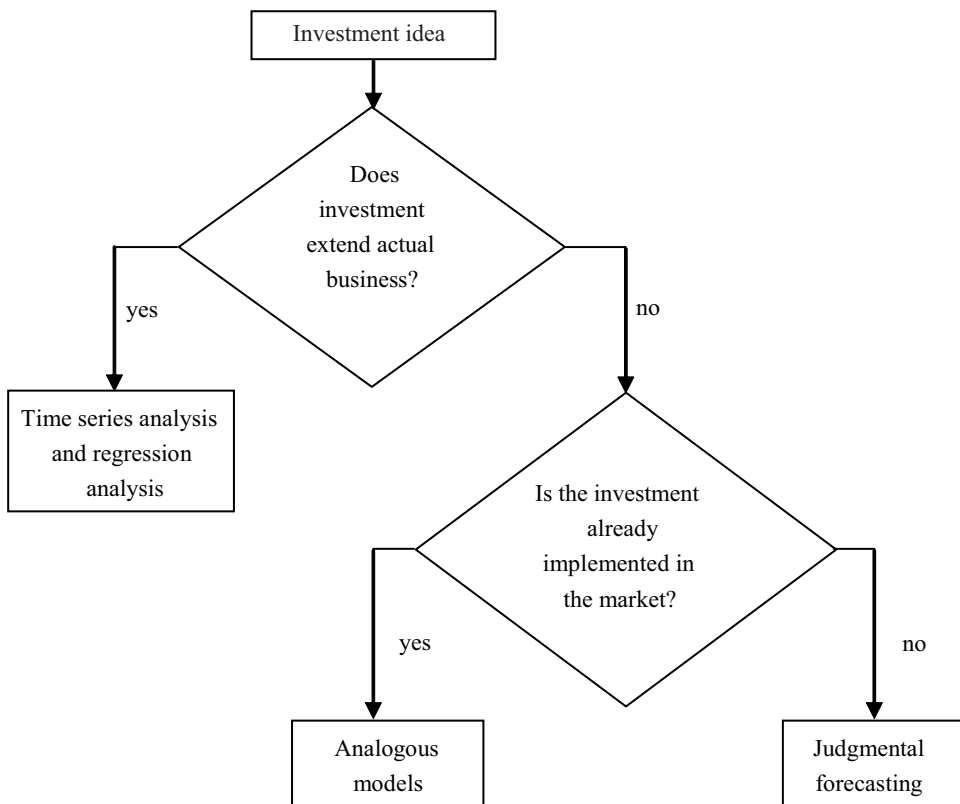


Fig. 1. Forecasting methods in cash flows forecasting

Source: own composition.

in all cases where investment projects consider new technologies, new businesses or new products for which past data are not available. In such a situation, the only way to obtain reasonable forecasts is to employ experts and predict cash flows with judgmental forecasting. In contrast to objective forecasting based on formal mathematical construction, judgmental forecasting is based on informal models created in experts' minds. Being an expert doesn't necessarily mean that this person is from the outside of the company. On the contrary, financial managers should hire experts from within of the company. Projects on new business activities require cooperation with other company's departments (R&D, Marketing and Production) from financial manager.

There is also the third possibility of cash flows forecasting, namely if investment project isn't an extension of the current business but it is still possible to find similar investments on financial or other markets one can use analogous models as a method for forecasting cash flows (see figure 1 to overview forecasting methods applied in the process of determining future cash flows).

As a result of judgmental forecasting we can obtain a distribution of cash flows – the forecasted value of cash flows and a relevant level of probability. Such distributions are constructed for each subsequent period t of investment's economic life. In terms of theory of forecasting these forecasts are variant forecasts. By multiplying each cash flow forecast at time t by the corresponding chance of appearing (level of probability) at time t one can get expected cash flows at time t (i.e. cash flows forecast).

4. Opportunity cost of capital estimations

To determine the opportunity cost of capital, managers estimate the rate of return on alternative investments. Firstly, the estimation of risk of investment at hand should be done. Secondly, it is necessary to find an investment with a similar level of risk on the financial market. Thirdly, one has to estimate the expected rate of return for pointed investment. This expected rate of return is the rate on which managers should evaluate investment projects at hand. This rate expresses incomes foregone by investing in actually evaluated investment, and that is why potential investors expect positive NPV only at this rate – only this investment has opportunity to contribute additional value to their wealth. Figure 2 outlines theoretical background on investment projects evaluation.

Again the task of evaluating an opportunity cost of capital is easy in theory but complicated in practice. As a result, scientists and practitioners have developed a series of alternative solutions but unfortunately not all can be applied to the Polish economy. Mainly, because our financial market is less efficient than those in the West and we usually can't use current stocks valuation as the benchmarks for opportunity cost of capital valuation. But let's start from the beginning.

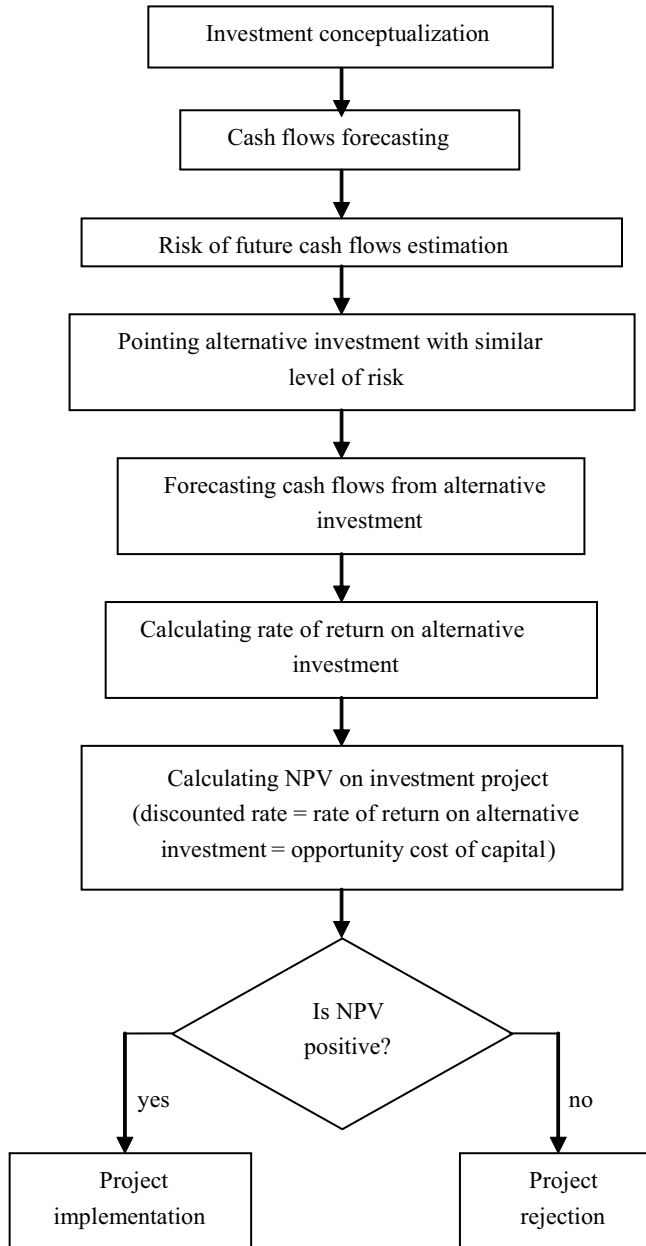


Fig. 2. Process of investment project appraisal – theoretical background

Source: based on [Brealey 1996, pp. 85-87].

After cash flows forecasting, managers have to estimate project risk (i.e. risk of obtaining cash flows as these forecasted). The solution usually comes from esti-

mations of risk of actual company assets and relies on assumption that these assets produce risky cash flows. This risk is reflected by risk of common stock. However, when a company decides to finance its assets by external sources their stocks become more risky, because shareholders bear additional risk connected with the possibility of the company's failure (financial risk). When a company doesn't have any debts the problem is not existent. In this situation, the right risk measure is a β – measure of risk of their common stock. However, because estimations involve errors (each common stock has a specific risk) it is a good practice to estimate industrial β s (for portfolio of similar companies, including no debt in financing). But when a company uses the external financing, the β of its assets is a weighted average of risks relevant for debt and common stocks. The coefficient of regression between rates of return on common stocks and market rates of return (i.e. β) will not, in such situation, reflect the risk of company's capability to produce forecasted cash flows because shareholders bear more risk (market plus financial risk). That is why the β of a portfolio of company's assets calculations require including risk of debtholders.

Nevertheless, a β of a portfolio of company's assets is a measure of company's cash flows risk and as such usually creates a starting point for further risk analysis. When managers assume that investment is much more or much less risky than risk of its present activity (than current business) they are forced to make additional adjustment on β . In process of adjusting all experts must bear in mind the main conclusion coming from CAPM model, which states that the more risky investment requires the higher opportunity cost of capital.

The first solution to the problem of opportunity cost of capital is to look at capital market and consider alternative investment as an investment in common stock. If managers know the level of risk on investment at hand they can find comparable investment in capital market. Investments in common stocks are risky and the basic measure of this risk is a standard deviation of past rates of return. Given risk, manager estimates expected cash flows from investment with equal risk and on this basis estimates expected rate of return. Finally, this rate is an opportunity cost of capital. But how one can estimate expected cash flows from investment in common stocks? There is no possibility to predict future stock prices with acceptable level of error, but there are a few theoretical models of value of common stocks based on Discounted Cash Flows formula that can be applied here. Unfortunately, it is rather impossible to apply them in order to estimate expected rate of return on stocks traded on Warsaw Stock Exchange. The first argument is a result of the Polish corporations approach to dividends. Although all models of value of common stocks are derived from the assumption that investors buy stocks to earn capital gains as well as cash dividends, all models rely almost solely on cash dividends. In the Polish reality this exact aspect of corporate policy is rather irrelevant and it would be unreasonable to assume that investors evaluate stocks on basis of dividends payments. Even the assumption that they think of expected future dividend (that could be paid in three or five year) is also unreal as the history of Warsaw Stock Exchange shows. The second argument

is a condition of the Polish capital market. As it is inefficient and prices don't reflect market equilibrium we can't take current prices to estimate expected rates of return. These rates that then calculated don't reflect expected rates of return because they are biased by stock prices different from that at equilibrium. To sum it up, it is not proper to estimate opportunity cost of capital from models of value of common stocks based on DCF formula in the Polish reality. What about other possibilities?

Another suggestion to estimate opportunity cost of capital at a given level of risk is to estimate return on market portfolio (i.e. market return) [Brealey 1996, pp. 145-147]. This exact discounted rate is proper for the investments that have level of the risk similar to market risk. Firstly, this task relies on recognizing distribution of past rates of return on market portfolio and on risk free Treasury bills. Analyzed period should be as long as possible. Secondly, managers calculate the expected rate of return on both investments. The difference between expected return on market portfolio r_m and expected return on risk-free Treasury bills r_f is an estimate of average risk premium (i.e. $r_m - r_f$). Expected market return at period t is a sum of risk-free interest rate at time t and estimated average risk premium. Such estimations are true only if the future will follow the past in every term: investors will demand similar reward for risk and risk variability will stay the same. Evidence shows, however, that even with long history of trading (like NYSE) it is still not possible to make good estimations of expected rates of return as new observations change previous estimations substantially. Therefore, we can't expect that estimations of expected values and their variations based on rates of return from investments in stocks traded on Warsaw Stock Exchange will express "true" parameters of distribution of the rates of return.

It is also possible to estimate expected rate of return from investments in common stocks using Capital Asset Pricing Model (CAPM). To do this manager estimates stocks β (a measure of common stock risk in comparison to market risk). Then opportunity cost of capital r equals $r = r_f + \beta (r_m - r_f)$.

For investment that has very small level of risk or is almost risk-free the appropriate rate for discounting its cash flows is a rate of return from risk-free investments in Treasury bills. But sometimes it is possible to find in the literature that this rate is also proper for discounting all projects that consider expected cash flows (calculated as a sum of possible cash flows multiplied by corresponding level of probability) (see [Horne 1989, pp. 349-351]). Such solution is supported by opinion that calculating expected cash flows in the manner described above eliminate the problem of risk. This simply cannot be correct as we consider and apply the opportunity cost of capital concept. In this context such investment should be an alternative to risk-free investment and expected cash flows should be certain. Otherwise, if expected cash flows are uncertain the suitable discounted rate should reflect this fact and the only appropriate discounted rate in this case is the opportunity cost of capital [Brealey 1996, p. 16]. For risky investments, managers consider wherever shareholders think of this investment as just an extension of existing business. If the answer is "yes",

managers have a significant clue because now they can assume that the risk of future investment is equal to the risk of existing business and the appropriate rate for investment evaluation is a company cost of capital.

Company cost of capital is a weighted average of rates of return on portfolio of company's assets. If the company doesn't use external sources of financing and all investments are covered by issuing stocks then company cost of capital equals expected rate of return on its common stocks traded on market. Otherwise, opportunity cost of capital is an average of rates of return on debt and common stock and each rate of return has its weight according to its percentage share in company's funds. For investments that are much more or much less risky than existing business company cost of capital creates a starting point for further analysis. Managers usually adjust it in order to make it more suitable for investment risk.

Table 1. Opportunity cost of capital according to the level of investment's risk

Level of risk	Opportunity cost of capital	
	measure	calculations
Similar to risk of current business	company cost of capital	as a weighted average of rates of return on debt and stocks
Similar to market risk	rate of return on market portfolio	as a sum of risk-free rate and risk premium
Similar to alternative investment in common stocks	rate of return on common stocks	from CAMP model
		from model of value of common stocks (based on DCF formula)
Very small or almost risk-free	rate of return on risk-free investments	as a rate of return on Treasury bills

Source: [Brealey 1996, pp. 73-74, 143-147, 179-182, 206-216; Copeland 1988, pp. 406-411].

Table 1 consists of methods of evaluating opportunity cost of capital at different risk assumptions.

5. Conclusions

In previous part we have seen that there are two main areas of forecasting in investment project evaluation process. The first is connected with the future cash flows received from investment and the second is connected with the future cash flows received from alternative investment at comparable level of risk.

Forecasting in the first context is similar to the forecasting of economic variable – as it is elaborated in specialist forecasting literature. There are all steps of forecasting task: problem definition, forecasting assumptions formulation, data collection and adjustment, model building and evaluating and finally setting a forecast. Forecasting model doesn't necessarily have to be designed as a formal mathematical construc-

tion, it can be informal model created in experts' mind. Although, in financial literature dominates opinion that cash flows forecasts are only expected cash flows in meaning of distribution of future cash flows, I have shown in this article that cash flows forecasts can also be derived from mathematical models such as time series models, regression and analogous models and it is not necessary to present them as distribution of future cash flows. But by changing forecasting assumptions we can obtain variant forecast and a corresponding level of probability. There is wide range of methods of achieving forecast by utilizing judgmental forecast that is not outlined in financial literature. This gap requires fulfillment.

Forecasting in the second context is theoretically similar to previous, but because of impossibility of achieving enough accuracy of cash flows forecasts from alternative investments, practitioners and theoreticians have developed a series of alternative solutions. Although these solutions, presented in the article, are supported by thorough theoretical background, it is ineffective to apply them in the Polish economy or it is just impossible or unreal to fulfill their assumptions. In particular, unreal is omnipresent assumption concerned with the passive attitude to the future, meaning that the future will follow the past.

I think that the point of investment project evaluation is not the accuracy of cash flows forecasts but a necessity of running economic analysis of investments projects in order to choose only valuable ones. This is only possible if managers use opportunity cost of capital derived from capital markets, because in this way they can evaluate investment from both points of view – one connected with profitability and second connected with valuation made by potential investors. It is important because both – managers' and shareholders' evaluation should be coherent. That is why this special solutions demand further studies and adjustment to the Polish economy.

Literature

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ROLA PROGNOZOWANIA W OCENIE PROJEKTÓW INWESTYCYJNYCH

Streszczenie

Celem artykułu była identyfikacja zjawisk i zmiennych, które wymagają prognozowania przy dokonywaniu oceny projektów inwestycyjnych. Cel osiągnięto na podstawie analizy działań podejmowanych przez menedżerów na poszczególnych etapach procesu oceny projektów inwestycyjnych, a następnie przez analizę narzędzi i teoretycznych modeli prognostycznych stosowanych w tym procesie. Na podstawie analizy stwierdzono, że w literaturze finansowej podaje się niewiele wskazówek użytecznych dla menedżerów przy prognozowaniu przepływów gotówkowych z inwestycji oraz przy dostosowywaniu poziomu ryzyka aktywów przedsiębiorstwa do poziomu ryzyka ocenianej inwestycji. Natomiast wiele z takich wskazówek i modeli można znaleźć w literaturze z dziedziny prognozowania. Ponadto zauważono, że najlepsze w sensie teoretycznym sposoby szacowania alternatywnego kosztu inwestycji, tj. metody oparte na szacowaniu przepływów gotówkowych z alternatywnych inwestycji, wymagają dostosowania przed ich zastosowaniem w polskich warunkach.