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FORECASTING CASH FLOWS FROM INVESTMENT

Abstract: The aim of this article was to prove hypothesis stating that the type of investment is the main factor that influences the organization of the forecasting process and character of produced cash flow forecasts. In fact the forecasting process and forecast itself are different when we consider different types of investment projects, which was described in detail in this paper.

Key words: forecasting, cash flows from investment.

1. Introduction

First long-term decisions that usually financial managers have to face are the investment projects' appraisals. Managers have to evaluate investments projects in terms of positive Net Present Value. Only this positive value can enlarge company's shareholders wealth. Even though the formula for calculating NPV is very simple, the whole process of evaluation is really a challenging task. To calculate NPV, managers need cash flows forecasts and opportunity cost of capital.

Although it is possible to find plenty of information on calculating opportunity cost of capital it is rather hard to find out something about forecasting of cash flows from investment. However, these both – cash flows forecasts and opportunity costs of capital – are equally important, and it is impossible to evaluate investment properly without cash flows forecasts as well as discounted rate. Thus the goal of this article is twofold. First, I will discuss and then review available knowledge on forecasting of cash flows from investment presented in relevant literature. On this basis I have decided to state the following hypothesis: Organization of investment's cash flows forecasting process depends on type of investment. To prove it I have presented specific features of forecasts and forecasting process that vary depending on type of investment. Second, I will formulate a research plan for further consideration of cash flows from investment, which may reduce the existing gap in the literature.

The structure of the article is as follows. Section 2 is a literature review. Section 3 discusses forecasting of cash flows which is incorporated into capital budget process. From this part managers can appoint the proper place of forecasting in capital budgeting. Section 4 contains a description of cash flows forecasting process depend-

ing on the type of investment. Fifth section consists of rules which cannot be broken when forecasting cash flows from investment. This is a specific Decalogue for those who are in charge. Finally, the conclusions include the advantages of presented ideas and research plan for future actions in the area of forecasting of cash flows from investment.

However, before going further into these considerations let us answer this simple question: What is exactly forecasted when forecasting cash flows from investment? On the one hand, we have costs that have to be paid, on the other, we have benefits that can be gained. The first calls outflows (or outputs), the second – inflows (or inputs). Both require forecasting. Next we have to consider timing of cash flows as it is important for calculating NPV. Moreover, this timing of cash flows has to be in fact considered separately – timing of inflows and timing of outflows. At the end we have to forecast salvage value – that is a value of investment at the end of its economic life. All these make 5 forecasted variables together named as *cash flows from investment forecasts*:

– magnitude of inflows,
– magnitude of outflows,
– timing of inflows,
– timing of outflows,
– salvage value.

As all forecasts, forecasts of these just mentioned variables are uncertain as well. The measure of their accuracy is mainly connected with the associate level of uncertainty.

2. Literature review

As it was mentioned in the Introduction, the literature is scarce when it comes to cash flows forecasting. A review of forecasting phenomena and variables relevant to investment projects appraisals is presented in my previous paper [Szpulak 2009]. A couple of guiding rules pointing what should and should not be included when cash flows from investment forecasting is described in book covering theory and practice of corporate finance like this written by S. Lumpy and C. Jones [Lumpy, Jones 2003] or R.A. Brealey and S.C. Myers [Brealey, Myers 2003]. In Polish literature this topic was discussed by J. Czekaj and Z. Dresler [Czekaj, Dresler 2005]. The formulas for adjusting cash flows on taxes and depreciation are presented by H. Johanson [Johanson 2005]. A detailed description of cash flow forecasting practices in context of capital budgeting procedure is made by H. Levy and M. Sarnat [Levy, Sarnat 1994]. The reports on results of survey on cash flows estimation practices addressed to large firms contain the following papers [Pohlman, Santiago, Markel 1988; Lazaridis 2006]. The usage of the Delphi technique is discussed in [Ang, Chua, Sellers 1979].

3. Capital budgeting process

Capital budgeting, considered as a systematic action taken in the company, consists of the following steps based on [Levy, Sarnat 1994, p. 30]:

1. The formulation of long-term goals.
2. The creative search for the identification of new investment opportunities.
3. Classification of investment projects.
4. The estimation and forecasting of current and future cash flows from investment.
5. Investment project appraisal.
6. A suitable administrative framework capable of transferring the required information to the decision level.
7. The controlling of expenditures and careful monitoring of crucial aspects of project execution.

Nowadays company's goal is clear for everybody engaged – it is a maximization of company's value. Searching for new businesses, new technologies, new equipment or just replacement of existing equipment, facilities modernization or facility expansion are examples of investments that look valuable for a company. But which of these just mentioned or other possibilities of investment is in fact valuable decides the rule of positive NPV. Only positive NPV can enlarge company's value.

In the creative and open-minded environment, where cooperation among staff exists and where is a person who is willing to listen to investment proposals, always develop new investment opportunities. Each investment project is examined in the light of its NPV and thus cash flows from each are forecasted. But before that a classification of investment projects is done. This make hard task of forecasting easier, because for some type of investment projects special clues are available. Table 1 consists of short description of forecasting procedures depending on type of investment project. The further explanation is presented in section 4 of this paper.

Once the type of investment project is recognized it is time for forecasting cash flows from planned investment. Forecasting requires completion of the relevant data from numerous departments like engineering, marketing, financial, personal and production. On this basis person in charge defines forecast horizon and indicates timing of inflows and outflows. The next task is to conclude forecasting assumptions that are followed during the whole forecasting process. A choice of forecasting method is the consequence of conclusions from previous steps. It depends on forecast horizon, forecasting assumptions, existing relationships and patterns, available data, funds, time and computer software as well. Then collected data are utilized and a forecasting model is built. This model in turn is used to state a forecast. The following step is a forecast evaluation. As a result of this activity information on forecast accuracy is being generated. Finally, forecasts of magnitude of inflows and outflows, its timing and salvage value form a stream of cash flows forecasts which next are used to calculate NPV.

It is also valuable to make preliminary cash flows estimations as the whole process is time and money consuming task. Sometimes the first simply calculations are enough to reject investment proposal. When, however, the proposal is accepted, preliminary estimates are replaced by more accurate ones (i.e. preliminary cost estimations are replaced by cost calculated by suppliers in their offer).

Administration of capital budgeting process is responsible for gathering data and transforming all relevant information among engaged departments (or persons). It administrates investment planning and implementation and controls expenditures, checks forecasts accuracy and budgets limits realizations. If all administrative work is done systematically, a uniform procedures and forms are designed and used to make capital budgeting process easygoing.

The flowchart (Figure 1) illustrates activities undertaken during capital budgeting process. Activities are divided into three phases: planning, implementation and control. Among these phases proper place of the forecasting procedure is located in planning phase. Previous to forecasting is investment formulation and latter to it is investment economic evaluation.

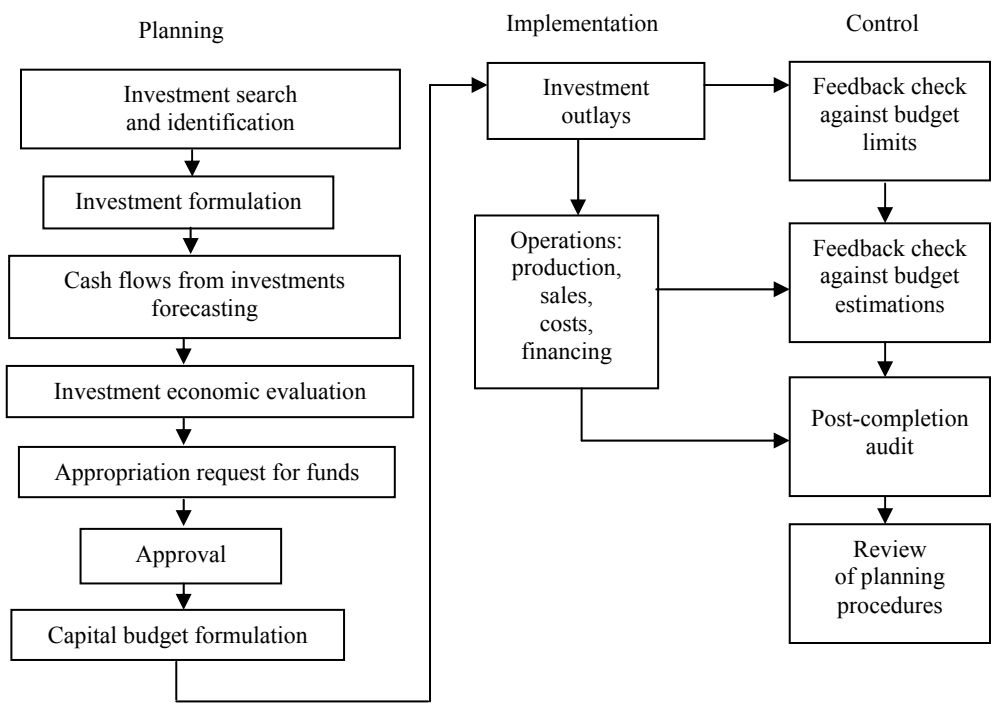

Figure 1. A flowchart for investment planning, implementation and control

Source: [Levy and Sarnat 1994, p. 29].

4. Crucial aspects of cash flows from investment forecasting process

From previous point we already know that forecasting process can be standardized for different types of investment. Let us discuss the basic features of forecasting activities and forecasts themselves that raise in this context. See Table 1 to get general overview.

Table 1. Types of investment versus forecasting

Feature	Type of investment	Forecasting of cash flows from investment
Size	major projects	requires unique forecasting
	regular capital expenditures	has standardized procedures of forecasting
	small projects	does not require forecasting
Cash flows time horizon	up to year	ignores timing, only total flows are important; requires short-term forecasting
	up to 3 years	requires medium-term forecasting
	over 3 years	requires long-term forecasting
Type of benefit	cost reduction	forecasts based on savings gained from investment
	expansion of sales of existing production	forecasts based on extrapolations of existing business
	expansion into new lines of business	forecasts based on analogies or judgmental forecasting
	risk reduction	forecasts based on savings gained from investment
	social overhead investments	forecasting with benchmark
Type of cash flows	conventional	cash outflows forecasts have closer time horizon than inflows forecasts
	unconventional	cash outflows and inflows have equal time horizons
The degree of dependence	mutually exclusive projects	cash flows forecasted separately for each project
	complementary projects	forecasts of cash flows of one project depend on forecasts of cash flows of the other project
	substitute projects	forecasts of cash flows of one project depend on forecasts of cash flows of the other project

Source: own elaboration.

Usually small projects and regular capital expenditures do not require special treatment. Companies typically work up standardized procedures for accepting such investments. The former just do not require forecasting of its cash flows, the latter have typical costs and benefits that are easy to estimate. It looks different,

however, when it comes to major projects that are risky, engaged large funds or a part of scarce resources (like land, key management personnel or floor space). In this case forecasting is necessary.

Recognizing next type of investment project we can concentrate on magnitude and timing of forecasts and its time horizon. Short-term investment produces cash flows in time up to one year and thus we can ignore timing, as it is not necessary to include this information in calculating NPV. When forecasting cash flows from medium- and long-term investments, that is costs and benefits, appears up to 3 years and up to 12 years, respectively, both timing and magnitude of cash flows matter. The next aspect of cash flows forecasting horizon is connected with the natural abilities to make accurate predictions about the future events. Forecasts of cash flows of short-term investment are usually accurate as it is rather easy for managers to predict in this time horizon. When it comes to medium-term investments, the forecasts errors become bigger, however, it is still possible for managers to make the accurate predictions. Finally, forecasts of cash flows from long-term investment are usually highly inaccurate. This is because it is almost impossible to predict future economic categories like prices, inflation rates, economic grow, etc. in such a time horizon. It is characteristics of all forecasts that the level of forecasts accuracy depends on time horizon. The further we look into the future, the bigger errors we made. As a consequence of such natural abilities to make accurate predictions the forecasting procedure depends on forecast horizon – it is based on different assumptions, uses different data, forecasting methods and techniques. Table 2 consists of forecasting procedure features depending on forecast horizon. This analysis considers only short- and long-term forecasts as medium forecasts are between them.

Table 2. Features of forecasts and forecasting procedure depending on forecast horizon

Feature	Forecast horizon	
	short-term	long-term
Time	up to 3 years	up to 12 years
Accuracy	usually accurate: errors are small, forecasts are unbiased (equally underestimated and overestimated)	usually highly inaccurate: errors are big and forecasts are biased (systematically underestimated or overestimated)
Attitude to the future	passive (existing trends and relationships will continue in the future; the future follows the past)	active (existing trends and relationships may change in the future, new events can appear; the future is highly independent of the past)
Methodology	hindsight and extrapolation of existing trends and relationships	foresight
Forecasting methods	time series analysis, regression analysis	judgmental forecasting, scenarios, analogy

Source: based on [Dittman et al. 2009].

Indicating types of investment by the type of benefits gained from its execution helps people responsible for forecasts preparation state questions properly and give accurate answers to them. Investments that rely on cost and risk reduction produce inflows as an amount of money saved. The best solution to forecast such inflows is to calculate a difference between outflow forecast from all business including investment and outflow forecast from all business without executing this investment. When we consider social overhead investment it turns out that possible benefits are hard to estimate. The reliable solution is to point a benchmark – a similar investment but its cash flows estimations are eased. To forecast cash flows from expansion investments it is necessary to answer the following question: Does investment extend actual business? If "yes" answer appears, it is possible to use forecasting methods that are based on existing relationships and patterns like time series analysis and regression analysis. Otherwise, we have to consider if the investment at hand was previously implemented in the market. For investment that has been already implemented we can use analogy as a method of forecasting. For completely new achievements the only one proper solution is to employ special expert's knowledge and skills for forecasting purposes. Figure 2 illustrates the way of choosing a method for forecasting cash flows from expansion investments.

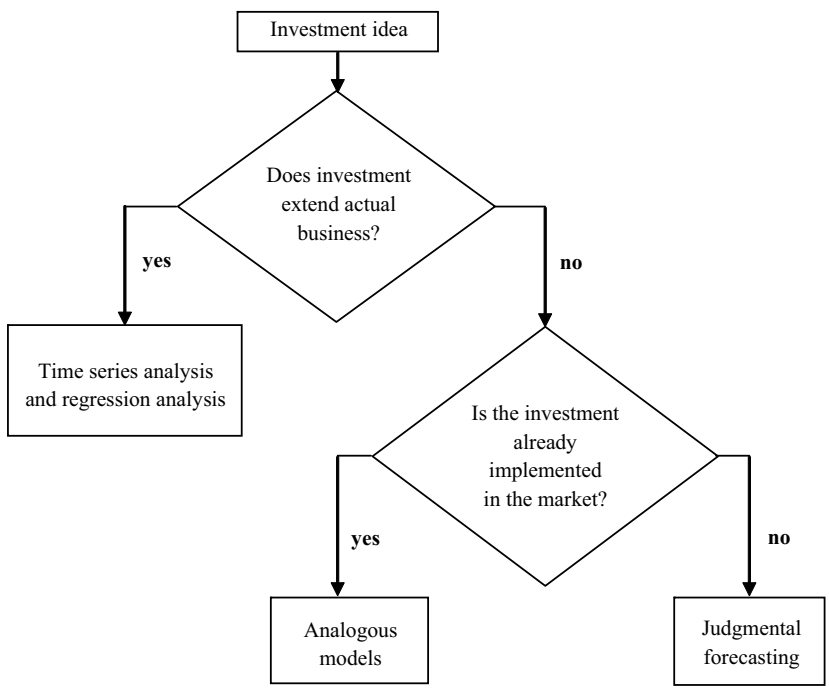

Figure 2. A choice of method of forecasting cash flows from expansion investment

Source: own elaboration.

While forecasting conventional cash flows – such that negative cash flows appear at the beginning of the investment execution and positive raise after – managers forecast outflows and inflows but the former have closer time horizon than the latter. Thus the outflows forecasts can be more formally generated and may occur more accurately in the relevant literature about forecasts we say accurate not accurately than the inflows forecasts. To the contrary, forecasting unconventional cash flows – such that negative cash flows may occur at any time during investment economic life – have similar level of difficulty for both outflows and inflows. The risk of generating inaccurate forecasts is similar as well. In general, forecasting unconventional cash flows is much harder than forecasting the conventional ones.

The process of forecasting the cash flows from projects that are distinguished on the basis of the degree of dependence takes characteristics from the existing relationship between projects. If mutually exclusive projects are such that only one of them can be executed, the forecasting process is run separately for each project. If complementary projects are such that taking one project increases the cash flow of other project and substitute projects are such that taking one project decreases the cash flow of other project, these facts have to be included in forecasting model and cash flows from such investments considered together in one forecasting process.

5. Basic rules of cash flows from investment forecasting

Forecasting process usually starts with forecasting task formulation. In this area a forecaster is obliged to define, among others, the aim of forecast preparation. This aim is a consequence of the decision that is made on the basis of stated forecast. In capital budgeting process on the basis of cash flows forecasts managers decide whether to take investment or not. They evaluate investment because they wish to take only valuable ones. This forces managers to think wide about possible costs and benefits that are generated through its whole economic life.

A couple of cash flows forecasting rules have been worked out in practice. They draw attention to different types of costs and benefits that should be included or ignored. The general rule is that only inflows and outflows from operational activity of the company are being analyzed. Investment and financial activity are ignored in these forecasts. Of course this rule and the following 10 rules have to be used in light of investment and requires considering of all circumstances that associate it. These rules are:

1. Ignore all costs generated prior to investment appraisal. It is normal that some costs appear before the formulation of investment project; these costs are all expenditures for first trial made by R&D department, marketing research on demand and market. In general these costs are generated by transformation of investment idea into investment projects. There are costs of cash flows preliminary estimates in this group as well. Anyway, no matter how big they were, these costs are “sunk costs” and it is impossible to get many back, so these many should not influence the decision concerning investment appraisal.

2. Ignore depreciation as it is non-cash flow cost.

3. Ignore all financing costs. During investment execution there arise financing costs of funds that finance outlays like interests paid for credits or dividends for shareholders. It is not necessary to include these costs in cash outflows forecasts as they are outflows from financial activity, not operational.

4. Include only incremental cash flows. Incremental cash flows are strictly connected with appraised investment and can be defined as cash flows that could not arise without investment execution. Sometimes its magnitude and timing is obvious, other time it is really hard to decide on this issue. In such situation a solution that can be applied has been already mentioned in previous part of this paper. This possibility is to forecast all business cash flows with and without investment execution.

5. Exclude non-incremental costs and benefits. In addition to previous point some costs and benefits are not connected with investment execution and can be defined as cash flows that arise whether the investment is executed or not. A typical example are fixed overhead costs that are often included in cash flows forecasts but in fact they are not generated by investment itself; they are non-incremental cash flows.

6. Include opportunity costs of assets or funds the company possesses and can utilize during investment execution. Imagine that a company has already unnecessary assets that can be utilized during investment execution. On the other hand they can be used for different purpose and finally give different streams of cash flows; they can be sold for example. Money earned on this transaction are opportunity costs and should be calculated as cash outflow in cash flows forecast. In general, possible benefits and costs forgone with investment have to be included but with different sign to that original. However, it is improper to include opportunity costs from opportunity investment that cannot be taken, like for example including possible benefits gained from land that cannot be sold for given price or cannot be sold at all.

7. Include costs of stocks replacement. In addition to previous point, sometimes a situation appears in which a company has assets that can be used while investment executing as they are currently disposable. But these stocks have to be rebuilt after and thus it is necessary to include future costs generated by purchases.

8. Include benefits gained from using stocks. Contrary to previous point, when a company has assets that can be utilized during investment execution and do not require to be rebuilt after the inflow arise in form of money saved. Similarly, money saved on maintaining it generates cash inflows that should not be forgotten when investment evaluating.

9. Include profits foregone with investment. Some investments take over a part of existing profits – new product competes for consumers with the old one, new business competes for managers and other personnel with the old one, new technology competes for scarce resources with the old one – these all are examples of profits forgone with new investment. Such foregone profits must be taken into account as cash outflows when cash flows from investment forecasting.

10. Include working capital changes. Investment that relies on extension of current business or investment in new business always requires growth in working capital. Working capital fund requirements are in part met with liabilities that company generates when buying on credit but the rest needs to be collected in form of cash. This is a typical cash outflow from investment.

Besides these 10 rules which consider specific types of benefits and cost that can arise during investment execution, there also exist two more that regard to inflation and taxes.

Cash flows can be measured in nominal or real terms. The former include trends in prices, the latter are deflated. These matters for discounting as the numerator and denominator in NPV formula have to be comparable. So it is proper to discount nominal cash flows at nominal rate and real cash flows at real rate.

Cash flows – inflows and outflows as well – should be adjusted on taxes. On the one hand, income tax is a part of benefit that is unavailable for shareholders and reduces it. On the other, some taxes, like ZUS, are additional costs and should be included. Investors often complain that investments projects are rejected due to too high labour costs in Poland.

6. Conclusions

Forecasting cash flows from investment is as important for investment project appraisal as determining a discounted rate and moreover by practitioners it is usually reported as the most difficult task during investment evaluation. However, this special topic is rather seldom discussed in the relevant literature. Existing considerations are reduced to formulation of some guiding rules as these mentioned in section 5.

Cash flow from investment forecasting process takes part in more general process of capital budgeting which consists of planning, implementation and control phases. Forecasting is positioned between investment formulation which is former to it and investment evaluation which is latter activity.

Next step of research on forecasting of cash flow from investment will be devoted to identification and thorough description of forecasting methods relevant for cash flow in the context of type of investment.

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PROGNOZOWANIE PRZEPŁYWÓW PIENIĘŻNYCH Z INWESTYCJI

Streszczenie: celem artykułu było zweryfikowanie tezy, że rodzaj inwestycji jest głównym czynnikiem determinującym organizację procesu prognostycznego i cechy postawionych prognoz przepływów pieniężnych z inwestycji. Faktycznie proces prognostyczny i cechy prognoz różnią się w kontekście omawianych rodzajów projektów inwestycyjnych, co zostało w szczegółach opisane w tym artykule.