SOME CONSIDERATIONS
ON INVESTMENT PROJECTS VALUATION

Victor DRAGOTĂ, Prof., PhD.
Andreea SEMENESCU, Assist., PhD Student
Daniel Traian PELE, Lect., PhD.
Bucharest University of Economics, Romania

Abstract: The classical criteria for investment projects valuation, although easy to apply, have the disadvantage of not reflecting the complexity of the social and economic phenomena implied by these projects. This study emphasizes some aspects that should be carefully taken into account in the valuation process of investment projects. Hence, the assessment of the discount rate, the estimation of future earnings and the quantification of social benefits are analysed.

Knowing that direct investments have a great importance in insuring the economic growth, the correct valuation of investment projects becomes vital. Any project can be analysed using the valuation indicators for investment projects, no matter if there are classical investments (in tangible assets) or investments in an extended sense (see human resources investments, advertising investments, etc.). Although, in most of the cases the literature approaches differently the public and private investments issues, the main indicators are similar [Bellalah M., 1998; Boardman A., 2004; Copeland T., 1994; Dragotă V., 2003, Dumitrescu D., 2002, Românu I., 1997; Ross S., 1999; Stancu I., 2007 etc.]. The investment projects valuation consists in computing indicators, become classical, such as net present value, internal rate of return, duration, modified internal rate of return etc. In the case of these indicators, the analyst fixes, in a punctual manner, the level of some variables. When the level of the variables influencing the investment project performances is fixed ex-ante, their rigorous assessment may be often subjective, leading to accept some projects instead of others, more performing, and to an excessive consume of financial resources etc. The subjectivism degree differs from a determinant variable to another. Hence, the assessment of some variables such as investment project lifetime, the period of investment projects implementation, the estimated cost of the project can be made in a satisfactory manner if using the support of technical specialists, whereas the discount rate, the future cash-flows of the investment projects can only be very subjectively estimated. Furthermore, in the case of public investment projects valuation, an adequate estimation of social benefits can be a challenge, especially knowing that the subjectivism of the evaluator can be very important.

The present study is a review of some of the controversial aspects related to investment projects valuation, such as the assessment of the discount rate, the estimation of the future earnings and the quantification of the social benefits.

Regarding the assessment of discount rate, the solution accepted in the literature and also in the practice of financial management is to consider the discount rate as

being the opportunity cost of the financial resources [Ross S., 1999]. Another recommended solution is to use, if possible, the cost of capital. In spite of all, the assessment of the cost of borrowed capital is unitary in the literature, being recommended to use the annual equivalent interest rate (eventually corrected with fiscal economies) [Dragotă, 2000], but the controversies regarding the cost of own capital are still important. There are several approaches of estimating this indicator, among which:

(1) using a return rate provided by investors explicitly. An example is that of European Union recommendations, fixing a discount rate, as financial resources provider [European Union, 2006]. Hence, the real discount rate used to compute the net present value of investment projects financed by European funds is 5%, but another discount rate can be used if justified by the economic conditions in each member state, by the investor's nature (for example, public-private partnerships) or by the sector (transportation, utilities, environment). In practice a discount rate of 5,5% for the countries financed by Cohesion Fund and 3,5% for the other European Union countries is also used. Although using such a discount rate may be convenient for the initial verification of the project, the discount rate should be, theoretically different from a project to another.

(2) using a discount rate registered in the past financial exercises, based on sectorial and time series analyses. This solution is not applicable in Romania, because of a high variability of the indicators, in the context of a tremendous environment and also because most of Romanian companies are not yet mature. Therefore, the stability of sectorial economic and social indicators cannot be assumed.

(3) using market rates, such as the inverse of PER. In this case, the informational relevance of the indicator is questioned. For example, the informational efficiency of Romanian capital market is doubtable [Dragotă V. (2004). Thus, if there are doubts on the price relevance and its coincidence with the share intrinsic value, the relevance of the PER is questioned [see also Dragotă, 2005].

(4) using Gordon-Shapiro model [Gordon M.J., 1956] or its classical developments [see Bates and Molodowsky models in Dragotă V., 2006] or modern ones [Siegel J.J., 1985; Linke C. M., 1984]. In this case, a problem arises from the relevance of the dividends distributed by the Romanian companies. Hence, as long as Romanian companies do not have a stable dividend policy [see Dragotă, 2003], the estimation of the profitability rate demanded by shareholders basing on these dividends is doubtful.

(5) using CAPM, assessed in several international studies [Sharpe W., 1964; Lintner J., 1965; Mossin J., 1966; Black F., 1972 etc.]. Although recommended by numerous practitioners, the model has some inconvenient. Hence, we can mention Roll's studies [Roll R., 1977, 1978, 1979], demonstrating that the model is a tautology, but also specific inconvenient. Hence, the use of annual time series is recommended [Kothari S.P., 1995], as well as the volatility coefficient for portfolios and not for shares [Blume M., 1975] etc. In applying the model for Romania, several supplementary difficulties arise, as mentioned in several studies [Căruntu I.M., 2006; Dragotă V., 2007; Dragotă V., 2005]. Hence, for example, for estimating the county risk premium, the time horizon is not relevant statistically [Căruntu I.M., 2006; Dragotă, 2007]. In the case of an economy like the Romanian one, using a long reference period is practically impossible. Hence, the maturity degree of Romanian capital market imposed modifications of transaction conditions, determining the lake of relevance of this indicator computed over a long period. Unfortunately, using a beta computed on shorter periods is not a solution. Dragotă and Filip [Dragotă V., 2005], computing beta on

shorter periods emphasized important changes of the indicator from a period to another, from -0,03 to 0,38 for the same share, during an year. The use of indicators computed for other economies (usually USA) is not a solution, because of the significant differences between the two economies.

(6) using the models improving CAPM by introducing a lot of factors, such as Fama and French models [Fama E., 1992, 1993, 1995, 1996], CAPM with different credit and deposit interest rates, CAPM with heterogeneous investor's expectations etc.

(7) using the discount rate assessed by the arbitrage model elaborated by Ross [Ross S., 1976]. Conclusions on the application of the model on the Romanian capital market have been obtained by Dragotă and Dragotă [Dragotă V., 2000].

(8) using the method of computing the discount rate as risk free rate plus risk premiums. This approach, although convenient to apply, induces a high subjectivism degree in the estimation.

In the public finance, the assessment of the discount rate is even more difficult. The discount rate takes into account not only the interest rate, but it has to reflect also the preference of the community for the analysed investment project. Moreover, due to the fact that generally a financial valuation of the results of public investments is made, doubled by an economic one, choosing the discount rate becomes quite complicated. A first element influencing the discount rate is the market of the investment. Hence, if the investment is made on a perfect concurrence market, the discount rate is that of the sector, meaning that of the identical private investments. In most of the cases, it is obtained using the CAPM, if it is applicable on the national capital market of the investment. But most of the public investments are not realized on perfect concurrence markets, the discount rate having to be assessed by other criteria.

Hence, Boardman, Greenberg, Vining and Weimer [Boardman A., 2004] identify the following possibilities of assessing the discount rate for public investments:

(1) the social discount rate equals the marginal return rate of the private investments. The argument for using the discount rate of private investmentsis that public authorities should demonstrate to citizen that the financial resources are better used in public sector than in the private one, and this assessement possibility is strongly supported by the theory of crowding-out phenomena related to public investments [Harberger A., 1969]. The limits of this approach are related on one side to the fact that the risk of private investments is higher than that of public ones, and the use of the same discount rate ignores this assumption, and on the othe side to the fact that public resources can also be obtained by taxes affecting the present private consumption and not the private investments, or by external debt. Another important argument is that of the imperfect substitution between private and public investments.

(2) the social discount rate should be a marginal rate of the social time preference. Equalizing the social discount rate to the marginal time preference rate is sustained by the idea that it should be considered as a return accepted by the individuals to postpone a part of their present consumption in change of a supplementary future consumption, especially when the investment projects are financed by taxes. The critics of this procedure are related to the impossibility of determining the individual marginal time preference rates, but also to the disadvantage that the effects of the project on future generations cannot be taken into account.

(3) the social discount rate is computed as average of marginal return rate of private investments, marginal time preference rate and real interest rate for public debt, according to the part of the project financed by consumption, investment funds of the

community and debt. This method grounds in fact on a social opportunity cost. Although the method responds to conceptual requirements imposed to private discount rate, in the public sector it has the same disadvantages as the previous two methods on which it grounds.

(4) the social discount rate is equal to capital shadow-price. This method tries to correct the marginal return rate of private investments according to market distortions, but it is difficult to explain to public decision makers this criterion, and moreover, the information necessary to apply it are difficult to obtain.

(5) the social discount rate is the real consumption per capita rate. Using the real economic growth corresponds to the idea of using opportunity cost as discount rate. It considers only in part the external effects related to public investments which influence the discount rate.

Regarding the expected benefits from investments projects, the risk is mostly reflected only in assessing a higher discount rate. For example, aspects like probability distributions of the indicators, considered in valuing investments on capital markets [see Value-at-risk, Jorion P., 1997], are not taken into account in computing these indicators. Classical indicators for valuing investment projects are computed from anticipated variables, estimated by an indicator of central tendency, mostly the average of anticipated values. As result, a punctual indicator arises, with no possibility of estimating the probability distribution of valuation indicators, and implicitly of the risk of the project. As improvement of this system of indicators, some of the scientific papers in the domain recommend using modern techniques, such as sensitivity analysis, scenarios, Monte Carlo simulation, real options, decision tree etc. [Bellalah M., 1998; Boardman A., 2004; Dragotă V., 2003; Românu I., 1997; Ross S., 1999; Stancu I., 2007 etc.]. Nevertheless, for estimating the probability distributions for investment projects valuation indicators, the hypothesis of a normal distribution is maintained. Although normal distribution is very much used in practical studies, several studies [Mandelbrot B., 1963; Fama E., 1970 etc.] revealed that especially in financial modelling the normal distributions has serious inconvenient. A solution is provided by Boardman, Greenberg, Vining and Weimer [Boardman A., 2004], consisting in quantifying the social costs and benefits by computing cert equivalents. The difficulty in this case is to find an adequate utility function. An exception is modelling by using real options, although the phenomenology of the investment projects cannot always allow using this kind of models.

These considerations are valid for public, but also for private investments. Nevertheless, in public investment projects valuation there are some particularities induced by the necessity of taking into consideration the social benefits and other specific problems [European Union, 1997, 2006; Boardman A., 2004; Chandra A., 2007]. Hence, the efficiency valuation of public investment projects induces several methodological problems among which: determining the social benefit for projects the results of which cannot be quantified in monetary terms (for example: public investments in health, education, culture) [Boardman A., 2004], determining the external cost and benefit being important indicators of public investment results, determining the discount rate for this kind of projects [Boardman A., 2004], introducing correctly the risk in the valuation methodology of public investment projects, introducing the intergenerational effects and the impact of financing policies in the methodology of public investments projects valuation. A very important problem in present related to the estimation of investment projects risk is the correct valuation of their impact on the environment.

In some cases, the monetary quantification of external effects is impossible to realize or implies very high costs. Therefore, it is important to identify the optimal method of taking them into account in the efficiency analyses of public investment projects, eventually by a deliberative approach of the community [Mann S., 2008] or by monetary quantification of social costs and benefits. This quantification does not allow taking into account a great variety of aspects or permits taking them into account in a non-satisfactory way. Models based on utility functions are numerous in the literature [Fleurbaey M.,1996, Fleurbaey M., 2002 , Peacock S., 2007, Stevens K., 2007]. Other theories regard the measurement on less subjective bases of the welfare, looking for macroeconomic indicators to estimate it, such as net national product [Aronsson T., 2008]. Anyway, the mathematical modelling of the social benefit is not realized in a satisfactory way, the investment project valuation becoming difficult.

The conceptual dilemma leading to introducing the intergenerational effects bases on the perception of the beneficiary community on the time horizon on which the citizen will be able to appreciate the effects of the investment projects, but also on the stability of the preferences of the beneficiary community in time. Although the two ideas can be theoretically analysed differently, they should be considered simultaneously and in correlation in the valuation of social costs and benefits. The most used method for introducing the generational effects in the analysis of macroeconomic policies is to introduce the hypothesis of the stability of the population structure and of its preferences, hence considering a constant population with infinite lifetime like in the most of the studies related to endogenous growth models [Lucas R.E., 1984].

Although very convenient for the economic modelling, this hypothesis is usually rejected by the empirical studies on each of the two direction mentioned. For example, Longo [Longo A., 2007], determining the willingness to pay for non-polluting projects for producing electricity, shows that the population do not accord the same importance to present and future external environmental benefits, the preference being different according to the age and the characteristic of the respondents of having children or not. The same idea is revealed by Munda [Munda G., 2008] affirming the impossibility of a monetary quantification of the external effects to reflect inter and intra generational conflicts related to public investments. Regarding the variation in time of the preferences of the beneficiary community, there are several theoretical and empirical studies in the literature showing modifications of the preferences and analysing their determinants. As examples we can mention the studies of Bethencourt and Galasso [Bethencourt C., 2008], Gerlagh [Gerlagh R., 2008], and Sanz and Velazquez [Sanz I., 2007] who identifies elderly as a determinant of the modification of the community preferences.

The alternative solutions offered by the literature in order to reflect the intergenerational effects focus in most of the cases on modifying the discount models – the use of hyperbolic discount models [Cairns J., 2000], the use of different discount rates, arising problems related to their correct assessment etc. All these solutions can be applied if social costs and benefits are quantified in monetary units. On the other side, in many cases, important direct or external effects cannot be quantified in monetary terms without inducing a high estimation risk. This is why it is still necessary to modify the present methods or to find new methods to introduce the intergenerational effects in the valuation of public investments. These methods vary according to several conditions among which:
- the age and education structure of the population and the number of the

individuals having children,

- the economic development of the beneficiary region,
- the nature of the effects determined by the project and of the indicators suitable for their measurement,
- the stock of public capital of the same kind to that produced by the investment project and the exploitation of this capital.

Hence, an aged population will prefer projects with important benefits on a short run to projects with greater impact on a long run. A study for OECD countries [Sanz I., 2007] shows that an aged population will prefer public expenses for health, defence and social assistance to education expenditures. However, the modification of public expenses structure will be only for a short period, on a long run the modification of the preferences of other categories of population determines the increase of the education expenses. The education degree of the community and the percent of the individuals having children are also determinants of the preferences of the community, especially regarding expenses for education and environment.

The economic development of the region during the realization and exploitation of the project can lead to variations of the preferences (for example, by increasing the interest of the community for investments in environment, R&D etc. once the region develops [Wen J., 2008]).

In order to determine the variations of the community preferences in future an interdisciplinary study should be conducted, using statistical, psychological and sociological techniques, as well as economic ones. As an alternative, indirect indicators can be used to measure these modifications such as the percentage of the community members having voted for a certain set of political objectives, if this indicator is relevant. In other cases, the analyses in media res or ex post of similar investment projects can provide important information for establishing the future preferences of the community, if the two populations are similar.

For certain non-monetary effects, the preferences can intensify during the realization of the project (for example, in the case of a street rehabilitation, the external negative effects generated by the noise for the persons living on the street intensify in time). For other effects, their importance decrease in the preference set with the persistence of the effect due to a process of adaptation of the community to the new conditions determined by the investment, and for others there is no change in the intensity of the effect.

The financing of public investment project is another aspect which can influence the social costs of the projects. The existence of several alternatives of financing with different impact on the cost and benefits of the project can affect the selection decision and imposes an analysis of the financing effect. If for private investments, the impact of the financing decision was reflected in fiscal savings generated by borrowing resources and in the level of the cost of capital, the public investment financing raises more complex issues, difficult to consider in the process of efficiency valuation of the public investment projects. In the analysis of the financing effect the discounting procedures can be used due to the monetary expression of this effect. However, the classical discounting model in not always the most suitable because of the possible manifestation of intergenerational effects.

A first issue is related to the public authority which should support the financing of the public investment project. The requirements regarding the equity principle and the efficiency of the investment project, as well as the major implications of the agency

theory in the decisional process related to public investments suggest that the project should be financed by the beneficiary community. In the case of great interregional or international externalities and if they can be internalized, the financing should have a component reflecting these effects. The situation when the mentioned effects cannot be internalized is special and should be very carefully analysed by the public decision makers in order to determine, generally by negotiation, the optimal financing alternative. A second problem very important is related to choosing the financing instruments. The decision should take into account the particularities of each financing instrument and of the project. The main financing instruments of public investments are: fiscal resources obtained by introducing a new tax or increasing an existing one, external or internal debt, grants or transfers from other public authorities or mixed financing from private and public funds. Depending on the specific of each project some of these instruments may not be available, and of course, any combination is allowed. A third issue to be taken into account is the phase of the public investment process that is to be financed. Most of the studies regarding the financing of public investments analyse the realization phase, but the requirements of the sustainability of the project during its exploitation impose the extension of the financing effect analysis on the exploitation phase too, being able to induce modifications in the valuation process of the efficiency of public investments.

In the last years, numerous studies analyse direct investments in the context of the globalisation [Patro D.K., 2005; Chua C.T., 2007], some of them studying the particularities of this process for emergent economies [see Ho S.S.M., 2004, for Hong Kong; Park S.H., 2006,for China]. Classical agent problems started to be connected with the valuation and selection of investment projects domain [see, Davies J.R., 2005; Aggarwal R.K., 2006; Almeida H., 2006; Burns N., 2006]. Knowing that Romania is characterized, according to international studies, by a high level of corruption, taking into account these aspects is very important for the investment projects.

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