STUDY ON
FINANCIAL AND SOCIAL DISCOUNT RATES

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INTRODUCTION

Why a study on discount rate?

Each donor uses different techniques for projects appraisal. The most known method is Cost-Benefit analysis, which is generally recognized as an important tool for decision makers as bases for financing decision. But different financiers, natural or legal persons, public or private entities have, different objectives and they are selecting methods for a project appraisal according to their goals:

- for private investors: to have a higher return;

- for banks: to secure their funds and to ensure that the money is being paid back at a specific price;

- for public or private donors using grants as an incentive in order to achieve a specific goal: to ensure the best utilization of the funds, with the maximum benefit for target groups.

If an economic or / and financial appraisal is required, all techniques use the same principles, the same mathematical tools and the same indicators. These indicators are, usually, the Internal rate of Return (IRR) and the Net Present Value (NPV).

Common principles for projects with more than one year economical life are:

I. The general rise in prices (inflation) reduces the purchasing power of money. In order to take this into account, most analysis is done at **constant prices**. This assumes that prices remain unchanged with regard to each other and that the impact of the rise in prices is identical for costs and benefits, and thus for the net balance. Occasionally, calculations are done in **current prices**. Current prices can be used retrospectively or in estimating future borrowing requirements or government expenditures.

II. The "**preference for the present**" reduces the perceived value of future resources compared to present ones. Thus, a sum (cost or benefit) due in the future is seen as less valuable than the same amount due today. **Discounting** is the computational technique that allows the analyst to take into account this preference for the present. It makes it possible to calculate the **present value** of a future sum.

III. The remunerative power of capital which creates a "loss of earning". Any project involves the use of resources which could be used elsewhere. For a given use, the benefit gained from the best alternative use measures the loss of earning, or the **opportunity cost** of using the resource. The opportunity cost of any resource thus represents the highest net income that it could earn elsewhere in the economy. The **opportunity cost of the capital** invested in the project is normally measured in form of a constant interest rate over time by:

- the average market rate of interest for financial analysis;

- the average (or marginal) rate or return on investments in the country (or in subsector) for economic analysis.

Normally, a project is "bankable" if its IRR is higher than the opportunity cost of capital and its NPV is greater than zero.

In the business framework, the opportunity cost of the capital could be used as discount rate in order to have the NPV and IRR as appraisal criteria for financing.

In the grants (institutional donors) world this approach is not suitable. But donors still need to define a specific discount rate in order to use IRR and NPV as appraisal criteria. So, *selection of a suitable discount rate is crucial in using IRR and NPV as selection criteria. Decision on this specifically discount rate is a political one, being in line with the donors' objectives. But this decision should be based on systematically studies, such as this one*.

We should mention that this study is the first one developed in Romania, but needs to be periodically revised and up-dated.

The structure of the study

The study is structured into seven chapters and annexes.

The first chapter presents the scope of the study; the second one introduces the methodology used during the preparation of the study; the third chapter introduces some theoretical issues on the discount rate, while the forth one presents a study on the use of financial and social discount rates.

Detailed information about discount rates applicable for different types of beneficiary are included in chapter 5; the same chapter explains the impact of a certain discount rate in CBA for different types of investments.

Chapter sixth presents approaches in order to determine a suitable discount rate for public and private sectors, together with proposed level of these rates and justification of the recommendations.

1. Scope of the Study

Investment projects financed by the Commission of the European Communities cover a large area of sectors, use different financial mixes (different percents for public and private funds) and, in general, are characterized by different risks. For these reasons, capital budgeting has to use complex techniques in order to become a valid instrument for avoiding the waste of financial resources. Some choices regarding the hierarchy of the different indicators or their meaning can be considered subjective, so the justification for their level has to be done cautiously. The issue is so disputable so that the European Commission (1997) recognizes: "Over the last thirty years, there have been two distinct approaches to the planning and evaluation of development projects: one has used rigorous financial and economic analysis, the other almost totally ignored such methods. Moreover economic analysis has often been perceived – and may still be perceived – as a way of justifying decisions that have already been made."[1]

This study is in line with the first point of view. It tries to explain the necessity of taking into account a rigorous level for financial and social discount rates. Moreover, it stresses that the financial and economic analysis have to be done before the investment decision. Of course, it can be argued that nobody knows what the future will bring into life. However, a less perfect plan is better than total hazard.

In order to use an appropriate tool for selection of projects under budgetary constraints, *discounting* is the most popular technique which makes different flows of money (cash flows) to be comparable. Discounting approach needs a defined *discount rate.*

Discount rate can be considered a correction factor for considering the principle of taking time into account in the appraisal of investment projects. As a result, because the project benefits and costs occur at different time intervals it is necessary to calculate the financial flows in the moment that the investment projects are analyzed, by using *the discount rate.* In cost-benefit analysis, two types of discount rates are used: **financial** and **social**.

Usually, *the financial discount rate* is considered to be roughly equal to the opportunity cost of the capital over time[2] (generally with reference to the long-term debentures issued by the Government or by the Treasury). *The financial discount rate* is used to calculate the present value of the cash flow achieved in the financial analysis, every year, to take into account the value of the money in time.

The *social discount rate* represents the opportunity cost of the public funds for the society as a whole[3]. This reflects the social point of view on how the future benefits and costs should be assessed in comparison with the current ones. The social discount rate may differ from the financial discount rate as result of different reasons (the inefficiency of the capital market, externalities, etc.). In principle, it is assumed that the social discount rate is different from the financial discount rate, from multiple reasons, such as:

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[1] European Commission, *Manual Financial and economic analysis of development projects*, Luxembourg: Office for Official Publications of the European Communities, 1997 – XXXV, p. 3.

[2] European Union, Guide to Cost-Benefit Analysis of Investment Projects, July 2008, p. 35.

[3] European Union, Guide to Cost-Benefit Analysis of Investment Projects, July 2008, p. 57.

- at social level, there is a greater concern for the welfare of future generations than at the level of the private firms;

- different companies have different preferences regarding the contemplated investment horizon (because cultural reasons and collective mentality, some human societies prefer to take a short term vision; others prefer a longer term vision).

In order to accept the necessity of estimating adequate levels for financial and social discount rates, it has to be accepted the principle of taking time into account. This principle is almost universal accepted by financial analysts (the principle of "*time value of money*"). The value of a sum of money changes in time, so the value of one Euro today is worth than the value of one Euro in the future, for at least three main reasons (European Commission, 1997, p. 20)[4]: (1) the general rise in prices (respectively, the inflation) that reduce the purchasing power of money; (2) "the preference for the present", which reduces the perceived value of future cost and benefits compared to the present ones; (3) the remunerative power of capital, which creates a "loss of earnings". Even these statements are based on some theoretical assumptions, sometimes different from person to person, they can be considered acceptable in order to quantify the preference of the community for taking time into account. The main theoretical issues regarding discounting are presented in Chapter 3 of this paper.

For the programming period 2007-2013, the EC recommended in the Working Document no. 4, a discount rate of 5% in real terms as a reference parameter for the opportunity cost of the long-term capital and a social discount rate of 5.5% for Member States benefiting from the Cohesion Policy - among them being also Romania - and 3.5% for the other EU Member States. The same levels of financial discount rate and the social discount rate are indicated in the Romanian „National Guide for the Cost Benefit Analysis of the investment projects", conducted with the assistance of JASPERS. *These levels of the discount rates, recommended by the European Commission and indicated as such in the above mentioned Guide, have not been established by considering the socio-economic realities of Romania.* The EC recommendation regarding the use of a unique value as a reference for the financial discount rate is based on the assumption that the funds come from ordinary citizens of the EU tax payers. In this context, it may be considered that, even in situations where the projects have regional character or have an impact in terms of a particular beneficiary, the estimation of the relevant opportunity should be based on an European portfolio. In addition, the financial market integration should also lead to a unique value as long as is expected to achieve on long term the convergence in terms of inflation rates and interest rates in the EU Member States. The consequence of this fact can be represented by the wrong grounding of the investment decisions from Structural Instruments associated with such projects, generating losses on medium term instead of generating the net added value.

This study responds to the concerns of the Beneficiary - Government of Romania, Authority for the Coordination of Structural Instruments - regarding the estimation of the financial and social discount rates used in capital budgeting for public investment projects. This study proposes a justification for the levels to be used for these two indicators for the particular case of Romania. As is presented in

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[4] European Commission, *Manual Financial and economic analysis of development projects*, Luxembourg: Office for Official Publications of the European Communities, 1997 – XXXV, p. 20.

Chapter 4, the performance economic indicators for Romania are still one of the poorest in European Union, so a deep concern for the use of financial resources is explainable.

Thus, it is necessary to verify the applicability of the financial discount rate of 5% (recommended in the Community's methodological to be used in financial analysis of CBA) and of the social discount rate of 5.5% (recommended in the Community's methodological framework to be used in economic analysis of CBA) to the socio-economic conditions of Romania. Thus, this study analyzes the adequacy of financial and social rates.

Despite the simplicity of the "discount" concept*, choosing a discount rate is a controversial and a difficult issue of the cost-benefit analysis. It can be mentioned that there are different points of view regarding the discount rates, and different recommendations for the relationships for calculation to be used in practice, for financial, but also for social discount rate.

The financial discount rate is a cornerstone for analysts. In the financial analysis, assuming the projects with net present value have to be accepted, a too higher level for the indicator will determine the rejection of many projects and opportunity costs (costs due to "the lost chance"). On the other hand, a too lower level for this indicator will generate the adopting of projects that are less performing than other projects, maybe rejected due to budgetary constraints. Even in the case of public projects, the importance of a rigorous estimation of the financial discount rate cannot be unappreciated. We will insist on this issue in Chapter 3.1.3.

Also, the social discount rate has a major importance in the evaluation of the public budgets. A high level of the rate will penalize the long-term projects, especially the projects whose impact extends to future generations. A low level of the rate will lead to an inefficient allocation of the resources and to the adoption of projects that are not economically viable. So a balance for the established level of the discount rate must be found.

Considering all of the above, the study seeks to provide answers to the following questions:

- *To what extent the financial discount rate of 5% in real terms and the social discount rate of 5.5% recommended by the European Commission are applicable to the socio-economic conditions from Romania*

- *What is the impact of using these discount rates over the projects financed through Structural Instruments*

- *Which is the most adequate level applicable to Romania in terms of financial and social discount rates to be used in the cost-benefit analysis*

- *What is the impact of using different discount rates (different than those recommended by the European Commission) over the projects financed through Structural Instruments*

The rest of the study is structured as follows: In the next chapter, the methodology of the study is presented. Chapter 3 presents the main theoretical issues regarding financial and social discount rates, including some considerations regarding the risks. In Chapter 4 the Romanian socio-economic framework is presented. Chapter 5 analyses the financial and social discount rates applicability on each Sectorial operational programme. Chapter 6 suggests the proposed approach for financial and social discount rates for the Romanian characteristic context. Finally, Chapter 7 concludes the study.

2. Methodology of the Financial and Social Discount Rates Study

The study has taken into account the conclusions and the recommendations of the Assessment Report made under the 1st Component of the project. In order to accomplish the study required by this task of the project, there were followed a series of steps, respectively:

- The D*ocumentation Phase:*

    - In-depth analysis of the existing methodologies in terms of discount rates;

    - In-depth analysis of the discount rates used by other EU Member States (where data is available) and verify their applicability for Romania;

    - Analysis of the macroeconomic indicators for the country level;

    - In-depth analysis of existing documents in CBA's preparation for each type of beneficiary (CBA instructions for public and private investments) - in terms of financial and economic discount rates;

    - Analysis of the relevance of the values of financial / economical indicators for projects implemented under Sectorial Operational Programs

    - Study the practical encountered issues or the results from the prior experience of the experts involved in the project;

- The *actual research phase:*

    - Collection of statistical information useful for the establishing of a level for the discount rate (see Chapter 4);

    - Collecting information regarding the measurement and the statistical analysis of the country risk of Romania (BNR) (see Chapter 4);

    - Collecting information related to Romanian socio-economic framework (see Chapter 4).

- *Analysis of the collected information and enouncing the conclusions and the recommendations;*

    - Comparative analysis of the impact of change / maintain the discount rates in already completed projects in the Sectorial Operational Programs, influence and relevance in selecting those projects

    - Propose an approach and a method of estimation (empirical) for financial and social discount rate for Romania, summarize and analyze the relevant information and actual calculation, validating or not the values proposed by the European Commission for those rates.

    - Establishing the extent to which the discount rates recommended by EC are applicable to the socio-economic conditions from Romania

    - Sustaining / Justification of the proposals for some values of these adequate rates

- Assess consequences of discount rates for each type of beneficiary;

- *Elaboration and finalization of the study based on the feed-back received from the Beneficiary and the representatives of the target groups*

Reflecting the methodology of the study conducted under this activity of the project, above described, the study regarding the financial and social discount rates also *includes:*

- An introductory part containing information with respect to the nature and the purpose of the study, to the reasons which determined the necessity of this study also retrieved from the evaluation report made under the 1st Component of the project, as well as information about relevant European methodological context (Chapter 1);

- Relevant theoretical approaches regarding the financial and social discount rates and examples of methodologies of calculation (Chapter 3);

- The impact of using the EU recommended discount rates in relation with the impact of using the discount rates appropriated to the Romanian macro-economic conditions in the assessment and selection of the investment projects financed by ERDF and FC (Chapter 5);

- Indication of the bibliographic sources.

Although the possibility of analysing and estimating the financial and social discount rate for different types of investment sectors was taken into consideration at the beginning of the study, this was dropped early on due, to the lack of necessary data and to various inconsistencies in obtained data.

For example an estimation was tried by using the profitability rates of each sector of activity. The profitability of a sector could be used as a starting point in establishing the financial discount rate as well as in indicating the threshold for IRR (the two indicators being complementary by definition). Although in the early stages of the study, data was demanded from commercial banks, companies active on the financial market and private companies, few relevant data was obtained and not enough to support a sectorial approach. Also there was the question of the quality and reality of th relevant data which could not be verified. The only reliable data (which was included in the study) came from NBR reports and it also did not support such an approach. Therefore an approach for rates of return and IRR for each type of beneficiary was chosen for the realisation of this study.

The next chapter presents in a synthetic manner the theoretical background of the project, according to the issues presented above.

3. Introduction to the discount rates

3.1 DISCOUNTED CASH-FLOW AND PROJECT PERFORMANCE INDICATORS FINANCIAL AND ECONOMIC NET PRESENT VALUES AND INTERNAL RATES OF RETURN

Basic Issues

Capital budgeting – applied also in the field of public and corporate finance – uses many financial indicators and different techniques in order to determine the feasibility of investment projects. Some of these indicators are clearly preferred in the financial literature – see Net Present Value (NPV hereafter), Internal Rate of Return (IRR hereafter), Cost / Benefit Ratio (C/B ratio), etc. Most of these indicators take the time into account, respectively the time preference.

As we already mentioned in Chapter 1, the value of a sum of money changes in time, so the value of one Euro today is worth than the value of one Euro in the future, for at least three main reasons (European Commission, 1997, p. 20)[5]: (1) the general rise in prices (respectively, the inflation) that reduce the purchasing power of money; (2) "the preference for the present", which reduces the perceived value of future cost and benefits compared to the present ones; (3) the remunerative power of capital, which creates a "loss of earnings". Even these statements are based on some theoretical assumptions, sometimes different from person to person, they can be considered acceptable in order to quantify the preference of the community for taking time into account.

Technically, if k is the discount rate and S_1 is the amount that will be paid or earned over one year, the actual value of S_1 (let's note it S_0) will be:

$$S_0 = \frac{S_1}{(1 + k)}$$

If the calculations are made on a period of more than one year (let this period be *n*), the actual sum S_0 of the sum S_n that will be earned over n years will be:

$$S_0 = \frac{S_n}{(1 + k)^n}$$

Net Present Value is considered by the major part of the theoreticians and practitioners to be the most suitable indicator in capital budgeting (see Ross, Westerfield, Jaffe, 2008, among others). According to Ross, Westerfield and Jaffe (2008), NPV, applied in corporate finance, should be preferred at least because of three main reasons. First, NPV uses cash flows and not earnings. Secondly, NPV uses all the cash flows determined by the project (beware of the approaches that neglect the cash flows beyond one particular date!). Finally, NPV discounts the cash flows properly (beware of the approaches that neglect the time value of money!). These principles can be adapted to the specific of public investment projects, taking into account the social benefits.

One important issue in this context is the time value of money. From a financial point of view, the amounts expected to be earned in the future are riskier than an equal amount earned at this moment. Moreover, if one amount is detained at this moment, it can be invested and, as result, it will determine

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[5] European Commission, *Manual Financial and economic analysis of development projects*, Luxembourg: Office for Official Publications of the European Communities, 1997 – XXXV, p. 20.

in the future a higher amount (this is an opportunity cost of capital). The preference for earlier results comparatively to later results is reflected in the necessity of discount also for the social benefits. This can bring into attention the imperative of an adequate estimation of discount rates.

NPV is a function of several variables related to the project: its cost (I_0), the cash flows generated (CF_t) (taking into account the social benefits, too, in the case of social indicator), its lifetime (n) and its residual value (RV_n), but also is a function of the discount rate (k):

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t} + \frac{RV_n}{(1+k)^n}$$

The impact of discount rate on different variables can be deduced if the relationship of NPV is analysed. Thus, an increase in the discount rate will affect the performance of the project because cash flows and residual value will be discounted at a higher rate. As result, the negative impact of discount rate (respectively, a higher level of discount rate) can compensate the positive impact of higher cash flows, social benefits and residual value).

The impact of inflation

One issue that has to be taken into account is the impact of inflation. As long as the analysis is carried out at constant prices, a real financial discount rate has to be taken into account. Also, as long as the analysis is carried out in current prices, a nominal discount rate (that includes the inflation) must be employed. The relationship between nominal and real rates (the Fisher formula) solves this problem:

$$(1 + nr) = (1 + rr)(1 + ir)$$

With: nr = nominal rate, rr = real rate; ir = inflation rate.

If the forecasts for future earnings or costs are made in current prices, it has to be used a nominal discount rate. If the forecasts for future earnings or costs are made in constant prices, it has to be used a real discount rate.

It has to be mentioned that the forecasted inflation rate can be different from year to year. In this case, the discount rates can be different from year to year, so the NPV relationship can be written as:

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{CF_t}{\prod_{i=0}^{t}(1 + k_{i,i-1})} + \frac{RV_n}{\prod_{i=0}^{n}(1 + k_{i,i-1})}$$

In this relationship, $k_{i,i-1}$ is the discount rate for the period *i-1, i*, with i = years in the lifetime of the project.

Decision process using Net Present Value

From the point of view of an investor, as long as the NPV is positive, the project can be considered for implementation, and a negative NPV implies that the project has to be rejected. For Structural Instruments, this is translated in evaluation of the return of capital (NPV/K). Because for the budgeting period 2007 – 2013, IS address only the projects needed funds (financial market failure), when it is

assessed the return on investment, NPV/C negative means the project need funds[6] Like in the case of other classical indicators used in capital budgeting, the analyst sets specific levels for each variable that determine NPV. Because the levels of those variables are fixed ex ante, their rigorous estimation can be questionable. This may lead to the adoption of unsatisfactory projects, which will cause a waste of financial resources. Thus, if some variables are estimated in a wrong manner, NPV will be an inappropriate indicator. As a result, acceptable projects can be rejected, but other projects, which would require funds, will be accepted. As the total amount of funds available for financing is limited, that would imply at least an opportunity cost, supported by the entire population.

The analysts' options can be more or less subjective. The potential bias between the "true" and the "estimated" NPV will be greater or lower depending on the considerations of the analyst regarding the variable that causes NPV. For instance, in the case of the lifetime of the investment project, of the implementation period or of the cost of investment, the estimations are carried out relatively precisely with the support of technical specialists. On the other hand, the level of subjectivism is important in the case of some other variables, the most subjective indicator, in the view of the most financial analysts being the **discount rate**. A rigorous estimation of discount rate for projects financed by public funds is obvious if agency problems and corruption are taken into account.

Any project can be analysed using the valuation indicators for investment projects – NPV, internal rate of return (IRR), payback period, etc. - no matter if we consider 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 differ between the public and private investments, the main indicators are similar from a technical point of view. However, in the case of public investment projects valuation, an adequate estimation of **social benefits** can be challenging especially if it is taken into account that the 'subjectivity' of the evaluator can be very important.

For this reason, public investment projects have to be analysed from a financial point of view (resulting a financial NPV, FNPV), but also from an economic point of view (resulting an economic NPV, ENPV). FNPV is exclusively based on monetary values, and can be used in the practice of capital budgeting for private projects and for public projects, too. ENPV takes into account the social benefits and is suitable only for public projects.

The logic implied by the analysis of the investment project is different for the financial perspective comparatively to the economical one. Practically, the decision process based on FNPV and ENPV can be summarized in Table 3 - 1.

Table 3 - 1 Decision process based on FNPV and ENPV

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[6] According to Working Document no. 4 and Reg. No. 1083

| | | Economic Efficiency (economic indicators resulting from Cost-benefit analysis) | |
		Yes ENPV>0	No ENPV<0
Financial feasibility (financial indicators)	Yes FNPV>0	Projects are financially and economically sound and they can be implemented; market forces will lead to their execution.	From and socio-economic point of view the projects would not be implemented, but the market can lead to its execution.
	No FNPV<0	**Projects are beneficial for the community and should be implemented. However, the market is not able to ensure their enforcement and special measures may be needed.**	The projects would not be implemented, and the free market will not drive to their execution.

For a project to be considered from a financial point of view (this is practically the opinion of the market), FNPV should be positive. Also, for a project to require the contribution of the Funds, the FNPV should be negative. It has to be underlined that there are projects that are neither suitable from a financial, nor from an economic point of view, and they have to be rejected. Also, an important issue – which can determine an increase interest for a suitable monitoring – is "what is beneficial for the community?". An intervention oriented for an unjustified consume of public financial resources for implementing projects with negative FNPV and apparent positive ENPV can lead, on long term, to an increase of taxes and, finally, to a degradation of the economy and society.

From a mathematical point of view, there is an inverse relationship between NPV and 'k,' respectively the higher will be the discount rate, the lower will be NPV:

$$\frac{\partial NPV}{\partial k} < 0$$

For this reason, if an (inappropriate) higher level for 'k' is fixed, suitable projects will be rejected.

According to the corresponding indicator, FNPV uses in calculation the financial discount rate, and ENPV uses a social discount rate.

3.2 ESTIMATION OF FINANCIAL DISCOUNT RATES

The discount rate used in the financial analysis should reflect the *opportunity cost of capital* to the investor. The European Commission recommends that a 5% financial discount rate *in real terms* is used as an indicative benchmark for public investment projects co-financed by the Structural Funds. Values differing from the 5% benchmark may be justified on the grounds of[7]:

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[7] European Union, Guide to Cost-Benefit Analysis of Investment Projects, July 2008, p. 35.

- the Member State's specific macroeconomic conditions;

- the nature of the investor: for instance, the discount rate can be higher for PPP projects, where the inclusion of private funds may increase the opportunity cost of capital (this is an application of the weighted average cost of capital).

- the sector concerned (e.g., transport, environment, energy, etc.).

Regarding the assessment of the **financial 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, Westerfield, Jaffe, 2008). Another recommended solution is to use as opportunity cost of capital, if it is possible, the weighted average cost of capital (*WACC*), based on the cost (k_i) of each financing source (S_i, with *n* different financial sources):

$$wacc = \sum_{i=1}^{n} \frac{S_i}{I_0} k_i ,$$

with $\sum_{i=1}^{n} S_i = I_0$.

For further details regarding WACC method see also Annex 4 "The WACC method".

For instance, the assessment of the **cost of borrowed capital** is unitary in the literature, being recommended to be used the annual equivalent interest rate (eventually corrected with tax shields) (Dragotă, 2000).

The controversies regarding the **cost of equity** are still important. There are several approaches of estimating this indicator, among which is possible to use:

(1) a return rate provided by investors explicitly. Although using such a discount rate may be convenient for the initial verification of the project, the discount rate should be, theoretically different from one project to another. This approach is in line with the EU recommendation regarding a 5% financial discount rate for all the projects as long as no justification is offered.

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

(3) market rates, such as the inverse of Price / Earning Ratio (PER). PER can be considered a proxy for the return on equity (ROE) of shares, with the value of equity equal to the market capitalization of the shares (and not to the accounting value). However, the informational relevance of the indicator is questioned. For example, the informational efficiency of Romanian capital market is doubtable (Dragotă and Mitrică, 2004; Dragotă et al, 2009), so it is possible that the prices of shares to be a biased estimator of their intrinsic value. 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) rates derived from Gordon-Shapiro model (Gordon, 1956) or its classical developments (see Bates and Molodowsky models in Dragotă V., 2006). In this case, a problem arises from the relevance of the

dividends paid by the Romanian companies – many companies do not pay dividends. 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) Capital Asset Pricing Model (CAPM), assessed in several international studies [Sharpe W., 1964; Lintner J., 1965; Mossin J., 1966; Black F., 1972 etc.]. The main recommendation of the model is that the cost of capital can be calculated as sum between risk free rate (R_f) and a risk premium (π_r):

$$k = R_f + \pi_r$$

The risk free rate is in general assumed to be equal to the return of T-Bonds. The risk premium (always positive) is a function of the risk of the asset (beta, volatility coefficient, β_i) and of market characteristics (market premium, which is calculated as difference between the expected market return, $E(R_M)$ and R_f). As result, discount rate can be written as:

$$k = R_f + \left[E(R_M) - R_f \right]$$

Although recommended by numerous practitioners, the model has some inconveniency. Hence, we can mention Roll's studies (Roll, 1977, 1978, 1979), demonstrating that the model is a tautology, but also specifically inconvenient. In applying the model for Romania, several supplementary difficulties arise, as mentioned in several studies (Căruntu, 2006; Dragotă, 2007; Dragotă, 2005). Hence, for example, for estimating the country risk premium, the time horizon is not relevant statistically (Căruntu, 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 lack of relevance of this indicator computed over a long period. The use of indicators computed for other economies (usually, Germany) is not a solution, because of the significant differences between the two economies, and corrections have to be applied.

(6) models improving CAPM (see above) by introducing more factors, such as Fama and French models (Fama, 1992, 1993, 1995, 1996), CAPM with different credit and deposit interest rates, CAPM with heterogeneous investor's expectations etc.

(7) rates assessed by the arbitrage model of Ross (Ross, 1976).

(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, both because the manner of choosing the risk factors and the quantification of the levels of sensitivities and risk premiums.

In a brief classification, there are three main approaches in order to estimate the financial discount rate:

"- the first one estimates the actual (weighted average) cost of capital. The benchmark for a public project may be the real return on Government bonds (the marginal direct cost of public funds) or the long-term real interest rate on commercial loans (if the project needs private finance) or a weighted average of the two rates. This approach is very simple, but it may be misleading: the best alternative project could earn much more than the actual interest rate on public or private loans;

- the second approach establishes a maximum limit value for the discount rate as it considers the return lost from the best investment alternative. In other words, the alternative to the project income is not the buying back of public or private debt, but it is the return on an appropriate financial portfolio;

- the third approach is to determine a cut-off rate as a planning parameter. This implies using a simple rule-of thumb approach, i.e. a specific interest rate or a rate of return from a well-established issuer of securities in a widely traded currency, and then to apply a multiplier to this minimum benchmark." (European Union, 2008, p. 207).

Also, it has to be underlined that the EU Guide supports the viewpoint of a unique reference financial discount rate, "based on the assumption that the funds are drawn from the EU median taxpayer. This means that even if the project is region- or beneficiary-specific, the relevant opportunity cost of capital should be based on a European portfolio. Moreover, the integration of financial markets should lead to a unique value as long as convergence of both inflation and interest rates across EU countries is expected in the long term. This may not, however, be true of IPA countries and, under specific circumstances, of some EU Member States." (European Union, 2008, p. 208). This level is fixed at 5% in real terms.

However, this point of view does not take into account the fact the risks are different from project to project and also, some failures in the equilibrium of financial markets (for instance, different studies put under question the efficiency of Romanian capital markets – see, for instance, Dragotă and Mitrică, 2004; Dragotă et al, 2009). Moreover, according to the Guide (European Union, 2008), values different from the 5% benchmark can be justified based on the ground of the macroeconomic specific conditions in the Member state, the nature of the investor (e.g., public - private partnership), and the sector concerned.

Moreover, "to ensure consistency amongst the discount rates used for similar projects in the same region/country, the Commission encourages the Member States to provide their own benchmark for the financial discount rate in their guidance documents and then to apply it consistently in project appraisal at national level." (European Union, 2008, p. 35).

3.3 ESTIMATION OF SOCIAL DISCOUNT RATES

In the public finance, the assessment of the **social discount** rate is even more difficult (see Dragotă, Semenescu and Pele, 2008). 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. Boardman, Greenberg, Vining and Weimer (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 investments is that public authorities should demonstrate to the citizen that the financial resources are better used in public sector than in the private one, and this assessment possibility is strongly supported by the theory of crowding-out phenomena related to public investments (Harberger, 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 other 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.

According to European Union (European Union, 2008, p. 208), "the main theoretical approaches are the following:

− a traditional view proposes that marginal public investment should have the same return as the private one, as public projects can displace private projects;

− another approach is to derive the social discount rate from the predicted long-term growth in the economy, as further explained below in the social time preference approach;

− a third, more recent approach, and one that is especially relevant in the appraisal of very long-term projects, is based on the application of variable rates over time. This approach involves decreasing marginal discount rates over time and is designed to give more weight to project impact on future generations. These decreasing rates help mitigate the so-called 'exponential effect' from the structure of discount factors, which almost cancels more distant economic flows when discounted in a standard way."

Also, the Guide (European Union, 2008, p. 208) recommends the use of social time preference rate (STPR), calculated based on the relationship:

$$STRP = e \cdot g + p,$$

where *STRP* is the real social discount rate of public funds expressed in an appropriate currency (e.g. Euro); *g* is the growth rate of public expenditure; *e* is the elasticity of marginal social welfare with respect to public expenditure, and *p* is a rate of pure time preference.

As long as g is function of GDP, which is different from country to country, STRP should be different from country to country (European Union, 2008). The estimated STRP by the Guide (European Union, 2008) differ significantly from country to country (e.g., 2.8% for Netherlands, 3.1% for Germany, 3.3% for Italy, 3.4% for France, 3.5% for Denmark, 4.1% for Austria and Sweden, 5.3% for Poland, 5.7% for Czech Republic, 7.7% for Slovakia, 8.1% for Hungary).

For this reason, a higher level for STRP can be taken into account also for Romania. One important observation is also provided by the Guide (European Union, 2008, p. 57): "Once a social discount rate is set at country level by a planning authority, it must be applied consistently to all projects belonging to the same country (the only possible exceptions being significant differences in expected growth rates at NUTS I or macro-regional level within the country)".

3.4   THE IMPACT OF RISK ON DISCOUNT RATES

From a theoretical point of view, discount rates are opportunity costs. From this point of view, they have to capture simultaneously the available (comparable) investment projects from the financial market and also the risk related to the project.

Thus, investors analyse the investment projects taking into account not only one project (the proposed project), but also the existent projects on the market. They adapt their expectations and can change their decisions based on that. There are no reasons to consider that these statements will be not applicable not only for financial discount rate, but also for social discount rate. For instance, if one investor can reach a return of 6% or 16% investing in two comparable projects, it seems logical to invest in the project that offers a higher return. This cost – also named the cost of lost chance – determine investors to choose the best option for investment – explains the concept of opportunity cost.

Typical investors take into account the risks related to the project. The higher is the risk, the higher will be the financial discount rate. Graphically, this can be depicted in graph 1. From a logical demonstration, it has to be considered that investors can invest their money in different projects, with different levels of risk. The general assumption in finance is that agents are risk adverse. As result, if all the characteristics of the projects are similar from each point of view, excepting the risk, they will have a preference for the projects with the lower risk. Consequently, the projects will be ranked function of risk as in Figure 3 - 1.

Figure 3 - 1 Relationship between risk and return based on CAPM

This is called Security Market Line (SML). The expected return based on CAPM is a function of beta (volatility coefficient) as a proxy for risk. The minimum accepted expected return is the risk-free rate (R_f).
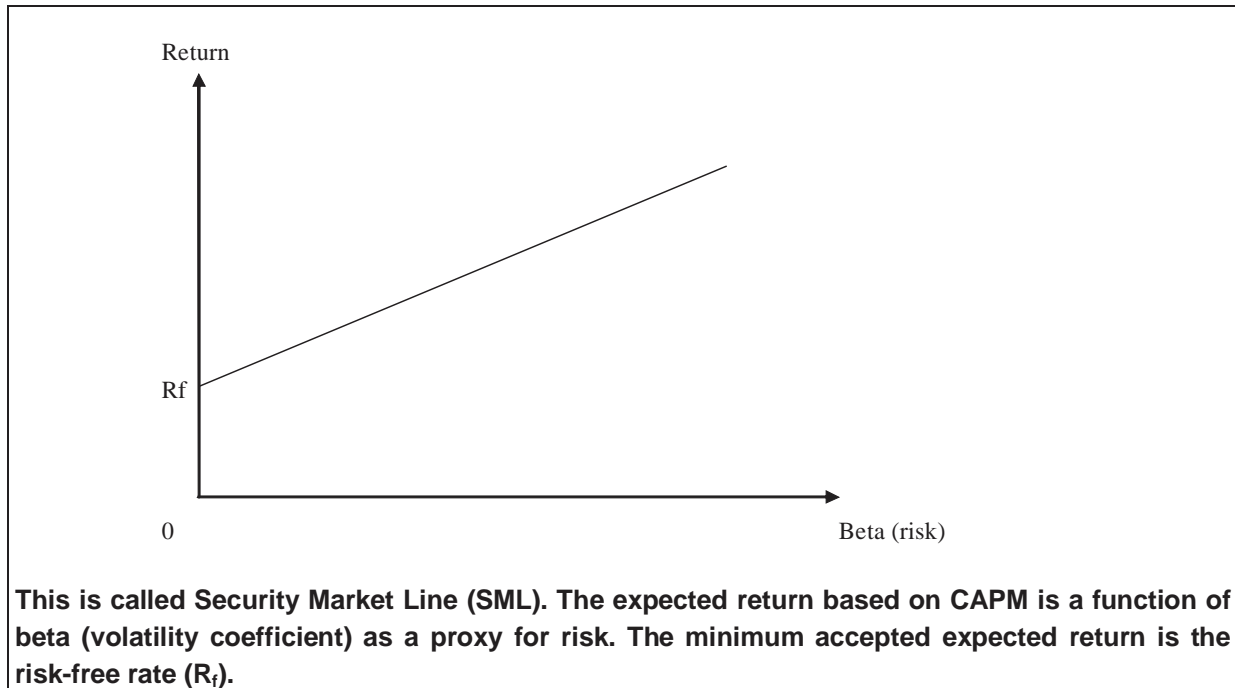
Assuming that one investor can obtain a return higher than the combination between risks and returns given by Security Market Line (SML), on a market with symmetric information, all the agents will migrate to this investment project, so SML will be moved upward in order to include this new project. On the other hand, using the same assumptions, no agents will be interested to invest their money in a project that offers a combination between risk and return positioned below SLM. That would be equivalent to accept a project that offers, for the same risk, a return lower than the one offered by SML.

It has to be underlined that not all the projects could be characterized by the same risk, so the investor should not be interested to obtain the same return no matter the risk of the project is. Otherwise, that would be equivalent that an investor should accept an equal return for projects characterized by different levels of risk. As long as investors are assumed to be risk adverse, rational investors will prefer always the projects with the lowest levels of risk, so, finally, they will invest only in projects with zero risk (and a return equal to R_f).

This assumption can be taken into account for the social discount rate. A risky project should be not preferred comparatively to a safe one, even the financial resources would be supplied by the public entities. Here it has to be considered that, even the required rate of return for a typical investor – "an average people (elector)" – can be assumed, the risk is differed from project to project.

Some researchers of Corporate Finance often consider that there are no reasons for such a distinction as long as the rational investors will require a rate of return in accordance with the assumed risk. In this context, the market equilibrium hypothesis is supposed. Thus, based on risk-return relationship, the projects shape the efficient frontier of Markowitz (1952) and the Capital Market Line. In practice, these hypotheses may be rejected, due to market inefficiency, information asymmetry, investors' feelings,

heterogeneous expectations, different investment horizons, etc.. Markets also can reach, in some circumstances, a state of disequilibrium, because of regulations that may adversely affect the investment process. For instance, if the government offers a high rate of return for its bonds, the usual risk – return relationship is reversed: higher return is offered by the securities with lower risk (theoretically, risk free rate).

Anyway, some principles have to be considered. Firstly, **any investment project has to be discounted to a financial discount rate higher than risk-free rate**. Some problems can arise if risk-free rate cannot be found in one economy (for instance, the Government does not issue T-bonds). Regarding the social discount rate, it is more difficult to establish such a minimal benchmark – common sense should be this rate has to be positive.

Secondly, **financial discount rate, but also social discount rate has to take into account some risk factors, quantified in risk premiums**. These risk premiums, even these are very subjective, seems to be logically related to the characteristics of the economy, of the sector, but also for other specific characteristics of the entity that implements the project. As result, discount rates will be determined by a relationship inspired by CAPM (see above) like:

$$k = R_f + \pi_r$$

However, the financial and economic assumptions have to be related to other issues. If discount rates can be chosen by the analysts, the risk is induced that discount rates will be manipulated according to the interest of the applicant. The applicant can be interested to apply a lower level of financial discount rate and a higher level of economic discount rate, in order to obtain public funds.

The impact of risk is different for public financial resources compared to private ones. Based on this fact, a differentiation between the cost of capital for public funds, versus the cost of capital for private financial resources in co-financing of the projects can be considered.

The estimation of discount rates has to be understood as a permanent process of recalculations and re-estimations. For public funds, the social efficiency implies that public money to be not wasted for inappropriate projects. For private investors, too low levels of return offered by public-private partnerships (which are expressed by the rate of required return for the private investors', but also as cost for the public funds), can determine lags in development and opportunity costs. As a result, once the economic conditions, the expectations of the investors and the public policies are changing, these discount rates have to be recalibrated.

Finally, it has to be mentioned that the risks can be taken into account, too, using some techniques such as sensitivity analysis, scenario analysis, etc.

These issues have been applied in order to adapt them to the socio-economic context of Romania. For this reason, in the next chapter are presented the main peculiarities of this context, which can have an influence on the estimation of economic and social discount rates.

4. Study on financial and social discount rate

As it is mentioned in the previous section, the financial discount rate is considered to be equal to the opportunity cost of the capital over time, while the social discount rate represents the opportunity cost of the public funds for the society. The opportunity cost of resources is dependent on the specific macroeconomic conditions, the nature of the investor and the sector concerned.

There is a strong relationship between risk and return (for instance, see CAPM, APT, build-up method) so, for the discount rate foundation, it has to be considered the risk involved into the project.

The build-up method consists in adding risk premium to the risk free rate:

$k=R_f+RP_m+RP_s+RP_u$

where

R_f=risk free rate

RP_m=equity risk premium for market

RP_s=risk premium for size

RP_u=risk premium for industry (unsystematic risk)

The discount rate used for evaluating the performance of an investment is influenced by a set of risk factors, among which an important and undiversified risk is coming from the socio-economic environment. The risk premiums depend on the specific condition of investment, so there has to be taken into consideration the risks that are coming from economic and social framework.

For a better understanding of the Romanian context and specific risk factors, which influences the financial and social discount rate, in this section it is presented the Romanian socio-economic framework, considering the country risk assessment (section 4.1.), social framework (section 4.2.), economic framework (section 4.3.), and analysis of the main economic sectors (section 4.4.).

4.1 COUNTRY RISK ASSESSMENT

There are different opinions about country risk concept. On the one hand, country risk might be considered as the "probability of occurrence of political events that will change the prospects for profitability of a given investment" (Haendel *et al.*, 1975). On the other hand, in a more practical light, risk is considered as a negative outcome, so that the situation of an existing risk implies a possible loss or a potential reduction of the expected return (Meldrum, 2000).

The concept of risk has different significances - as a performance variance or as the likelihood of a negative outcome that reduces the initially expected return. It is a common sense that the investors try to minimize their downside risk exposure, so that the downside risk approach is more used than the total risk perspective.

The definition proposed by Meldrum (2000) reflects the characteristics of the country risk:

"All business transactions involve some degree of risk. When business transactions occur across international borders, they carry additional risks not present in domestic transactions. These additional risks, called country risks, typically include risks arising from a variety of national differences in economic structures, policies, socio-political institutions, geography and currencies. Country risk analysis attempts to identify the potential for these risks to decrease the expected return of a cross-border investment."

Country risk analysis implies identification of the risk sources and valuation of their effects on the results. Because of the complexity of the sources of risk and their interactions, there is no clear defined theory of country risk. Most of the research in the field of country risk analysis consists in identification of the various potential sources of risks. There are two mainstreams in the literature - the first one considers the risk of the governmental or sovereign interference with business actions (Zenoff, 1967; Aliber, 1975; Baglini, 1976; Feils and Sabac, 2000); the second one considers the risk as environmental instability and its impact on business conditions (Robock, 1971; Root, 1972; Haendel *et al.*, 1975; Rummel and Heenan,1978)

Detailed information on Romania country risk assessment, methods of estimations and comparisons with other EU member states are presented in the **Annex 1 – Country risk assessment.**

4.2   SOCIAL FRAMEWORK

Population growth rate is a crucial indicator for assessing country risk. A high population growth rate implies consequences that generate pressure on the government's budget, on the country's infrastructure and on social services. On the other hand, stable or decreasing population growth rate does not improve market conditions. Demography has a lasting impact on economic and geopolitical aspects.

Detailed information on demographical issues are presented in the **Annex 2 – Demographical issues**

4.3   ECONOMIC FRAMEWORK

A comprehensive measures of country risk implies the bottom-up approach, by analysing the economic fundamentals of the country. In **Annex 3 - Overview on Romanian Economy** it is consider the evolution and comparison of the Romanian economy: Gross Domestic Product (GDP) as nominal values, per capita values, real rate of growth and the structure of it, monetary and credit indicators, capital market development, fiscal policy. This real and financial aspects influence the performance of an economy, the available financial resources, and the cost of capital, therefore the country risk and the discount rate.

MONETARY AND CREDIT POLICY

Financial and social discount rates have to consider also the monetary and credit policy aspects. In Romania total net assets for credit institution (328.893 mil RON) are mostly of private-owned institutions (93%) and of foreign-owned institutions (85%). The rate of past due and doubtful loans is increasing (the historical maximum was in September 2010) and the non-performing loans ratio is also increasing, due to the economic and social problems.

Table 4 - 1 Monetary and financial statistics - Aggregate Indicators for Credit Institutions

Date	Total net assets	Assets of private-owned institutions	Assets of foreign-owned institutions	Past due and doubtful loans	Loan-to-Deposit Ratio	Non-performing Loans Ratio

	(RON mill.)	(% in total assets)	(% in total assets)	(% in total loans)	(%)	(%)
Mar. 2011	328.839,3	93,4	85,4	2,59	114,77	12,71
Dec. 2010	341.845,5	92,6	85,1	2,22	113,46	11,85
Sep. 2010	326.000,1	93,1	85,6	2,67	116,26	11,67
Jun. 2010	330.448,5	93,4	86,1	2,17	117,46	10,20
Mar. 2010	320.016,2	93,0	85,7	1,99	113,24	9,11
Dec. 2009	330.183,5	92,7	85,3	1,45	112,80	7,89
Sep. 2009	322.468,6	93,9	86,8	1,23	117,55	6,46
Jun. 2009	328.891,8	93,2	85,9	1,03	119,23	-
Mar. 2009	332.342,3	93,7	86,6	0,66	124,69	-

Data source: National Bank of Romania
www.bnr.ro

The inflation rate is another key element for discount rates because it influences the real return of an investment, the real rate of interest and the real value of cash flows. The real returns of an investment are influenced by inflation rate. Considering the last 2 years, the present is characterized by high inflation rate.

Figure 4 - 1 - Inflation rate
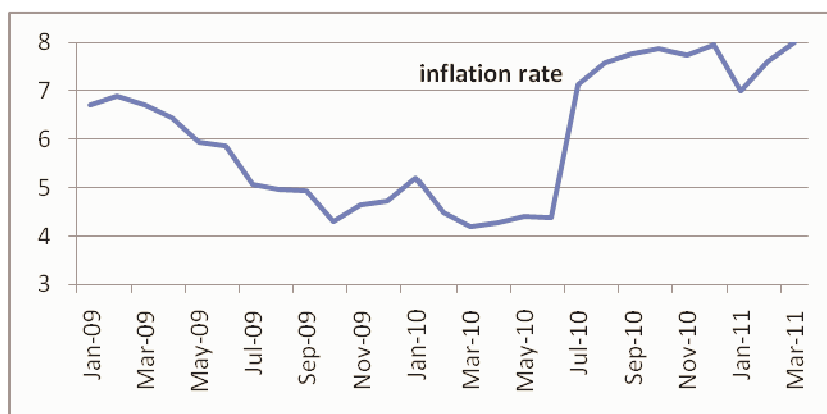
Data source: National Bank of Romania
www.bnr.ro

The exchange rate is another key element for discount rates. Considering the last 2 years, the present is characterized by high depreciation rate.

Figure 4 - 2 Exchange rate – ROL/EUR, ROL/USD
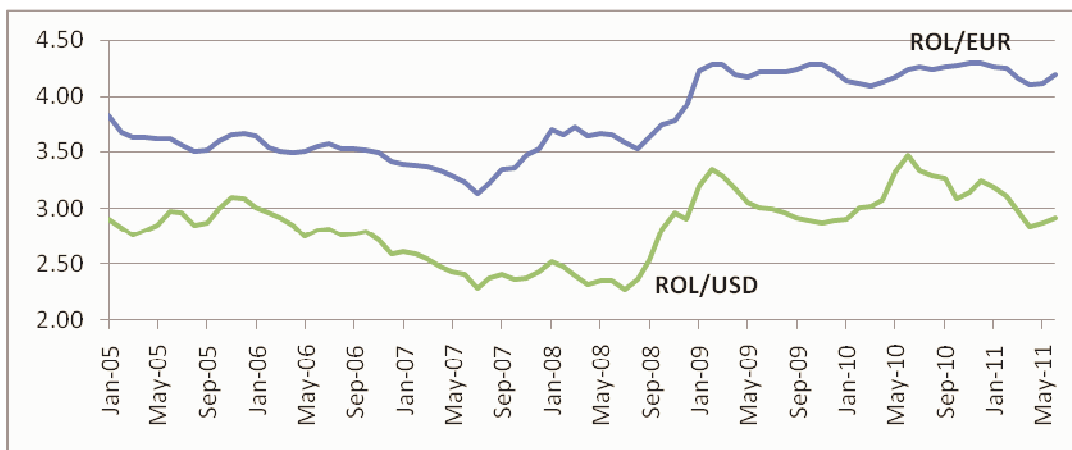
Data source: National Bank of Romania
www.bnr.ro

Figure 4 - 3 Reference interest rate
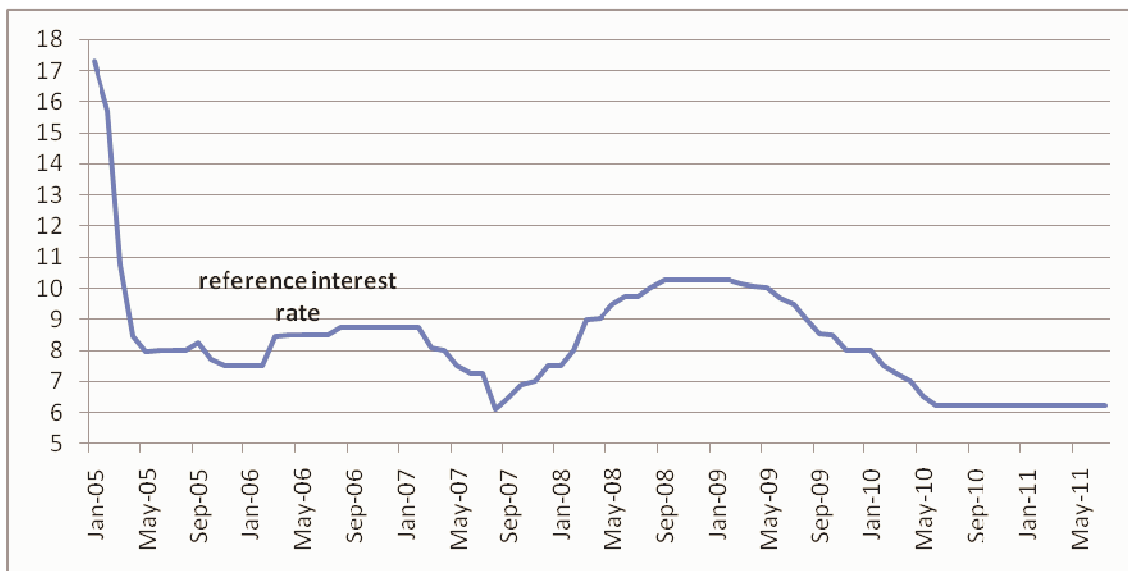
Data source: National Bank of Romania
www.bnr.ro

Another important indicator is interest rate for long-term government bonds because it represents a determinant for risk free rate and it is a consequence of how do the investors perceive the country risk. The following figure contains the values for top 10 highest interest rates.

Figure 4 - 4 Long term government bonds
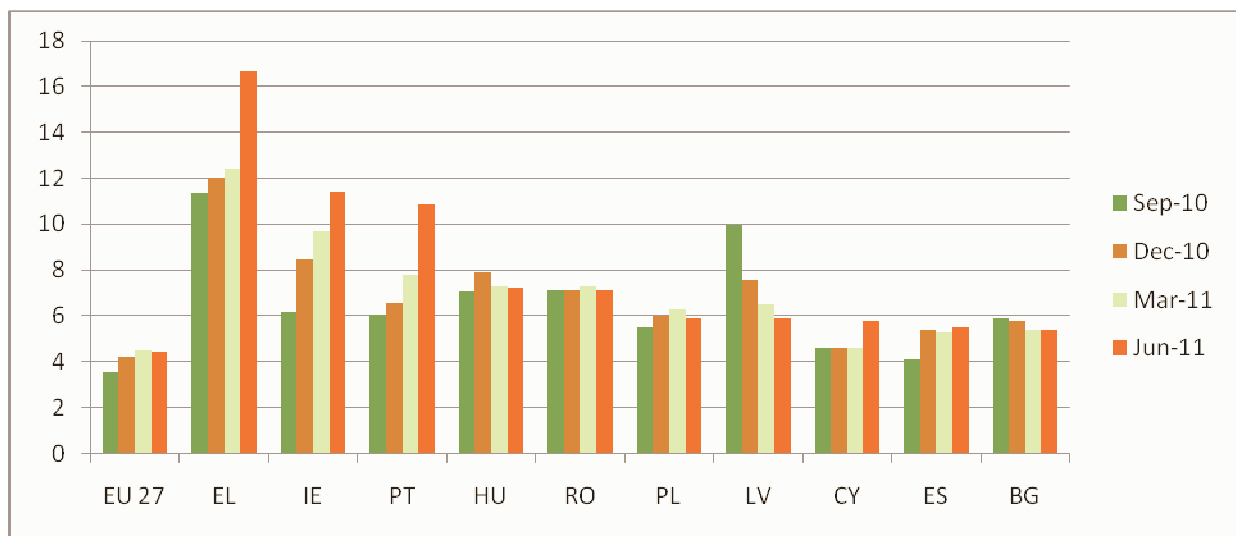
Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

This top 10 of the highest interest rate contains the following countries: Greece, Ireland, Portugal, Hungary, Romania, Poland, Latvia, Cyprus, Spain, and Bulgaria. The overall development shows a worse situation, the most dramatic evolution is in the case of Greece, Ireland, and Portugal. For Romania there is no relevant change in the interest rate for long term government bonds. This hierarchy is a reflection of the country risk perception. Top 10 the smallest interest rate contains the following countries: Sweden, Germany, Denmark, UK, Luxembourg, Netherlands, Finland, France, Austria, and Czech Republic.

CAPITAL MARKET DEVELOPMENT

The development of the capital market influences the investment rate, the savings rate, the returns of any investment project. In this section we make a brief overview of the Romanian stock market. The economic growth and the capital market are directly linked, the first one indicating the evolution of the real economy, while the second indicates the evolution of the financial sector.

Table 4 - 2 Romanian stock market – general statistics

	2000	2005	2009	2010	2011*
No. trading sessions	251	247	250	255	143
No. transactions	496.887	1.159.060	1.314.526	889.486	500.850
No. shares traded (volume-mil)	1.806,59	16.934,87	14.431,36	13.339,28	8,798,55
Turnover (mil RON)	184,29	7.809,73	5.092,69	5.600,62	6.125,57
Average daily turnover (mil. RON)	0,73	31,62	20,37	21,96	42,84
Capitalisation (mil.RON)	1.072,80	56.065,59	80.074,50	102.442,62	113.913,23
(annual change%)	87,39%	64,19%	75,21%	27,93%	14,98%
No. companies with listed shares	114	64	69	74	78
No. of new companies	1	5	3	5	4
No. delisted companies	14	1	2	0	0
Nr. Intermediaries	120	70	71	65	62

*until 25 July 2011
Data source: Bucharest Stock Exchange
http://www.bvb.ro/TradingAndStatistics/GeneralStatistics.aspx

The Bucharest Sock Exchange has an increasing capitalisation, with a positive annual change. Of course the financial crises generated a sharp decrease in values for 2009 and 2010, but there are signs of recovery.

Figure 4 - 5 Capital market – capitalisation (milliard EUR)
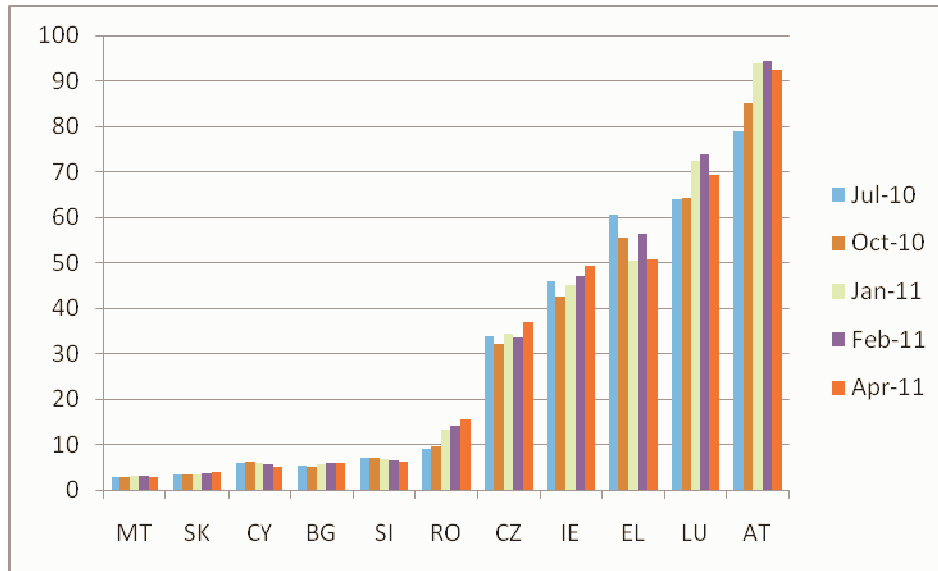
Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

The previous figure contains the capitalisation of the capital market for the first 10 countries, in a hierarchy from this point of view. The development of the Romanian capital market suggests trust and confidence of the investors for the Romanian economy and capital market.

FISCAL POLICY

Another important aspect in country risk assessment is expressed by fiscal policy. In the next tables and figures there are data about the most important fiscal indicators – deficit and public debt. The increase of public debt as a consequence of budget deficit worsens country risk especially for emerging economies.

Figure 4 - 6 Budget deficit – average values for periods 1996-2000, 2001-2005, 2006-2010
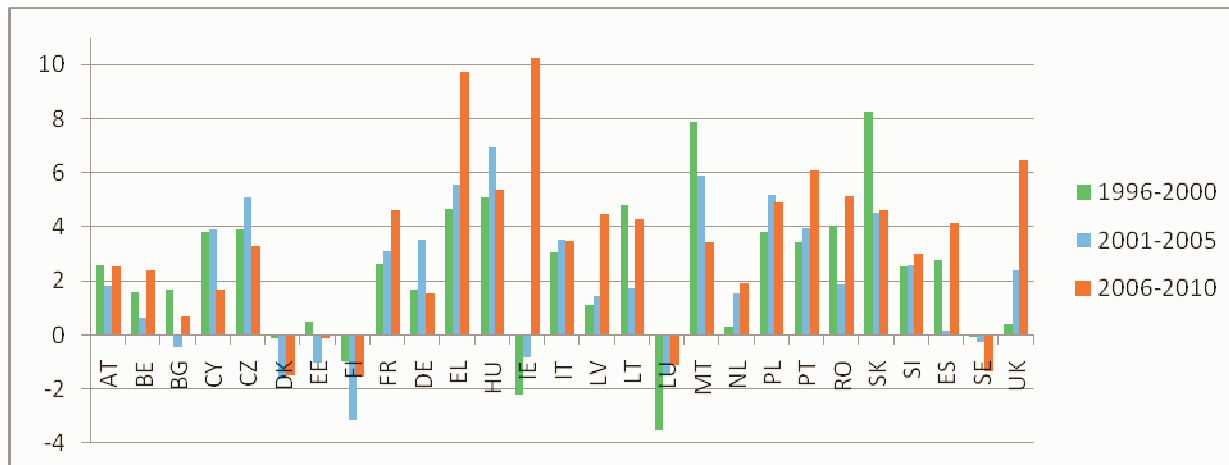
Data source: AMECO

http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

Table 4 - 3 General government consolidated gross debt (mrd EUR)

	1995	2000	2005	2008	2009	2010	2011
AT	68,27	66,52	63,94	63,75	69,63	72,26	73,85
BE	130,35	107,92	92,15	89,62	96,23	96,79	96,98
BG	:	72,53	27,48	13,69	14,64	16,22	18,00
CY	40,60	48,70	69,08	48,28	57,99	60,80	62,33
CZ	14,62	18,52	29,67	29,95	35,29	38,52	41,28
DK	72,58	52,41	37,76	34,47	41,78	43,58	45,30
EE	8,96	5,12	4,57	4,60	7,15	6,56	6,11
FI	56,62	43,82	41,74	34,13	43,81	48,37	50,57
FR	55,48	57,33	66,36	67,67	78,27	81,70	84,67
DE	55,60	59,74	67,99	66,26	73,45	83,23	82,36
EL	97,01	103,44	100,31	110,72	127,10	142,76	157,73
HU	85,36	54,90	61,82	72,31	78,38	80,20	75,20
IE	82,08	37,76	27,35	44,36	65,63	96,19	112,02
IT	121,55	109,17	105,94	106,30	116,07	119,00	120,27
LV	15,15	12,27	12,39	19,65	36,70	44,71	48,18
LT	11,47	23,70	18,42	15,59	29,48	38,17	40,73
LU	7,40	6,16	6,07	13,61	14,55	18,42	17,24
MT	35,30	55,89	69,59	61,53	67,58	68,02	67,99
NL	76,08	53,78	51,82	58,21	60,77	62,73	63,91
PL	48,99	36,79	47,09	47,11	50,91	54,98	55,41
PT	59,22	48,48	62,75	71,58	83,00	93,00	101,72
RO	6,58	22,46	15,79	13,38	23,55	30,76	33,68
SK	22,08	50,30	34,16	27,79	35,42	40,97	44,82
SI	18,71	26,44	26,72	21,93	35,18	38,00	42,75
ES	63,30	59,26	43,03	39,85	53,26	60,11	68,09
SE	72,80	53,90	50,40	38,80	42,76	39,76	36,50
UK	51,23	41,02	42,51	54,37	69,57	79,98	84,18

Data source: AMECO

http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

Figure 4 - 7 General government consolidated gross debt (%GDP) – average values for periods 1996-2000, 2001-2005, 2006-2010
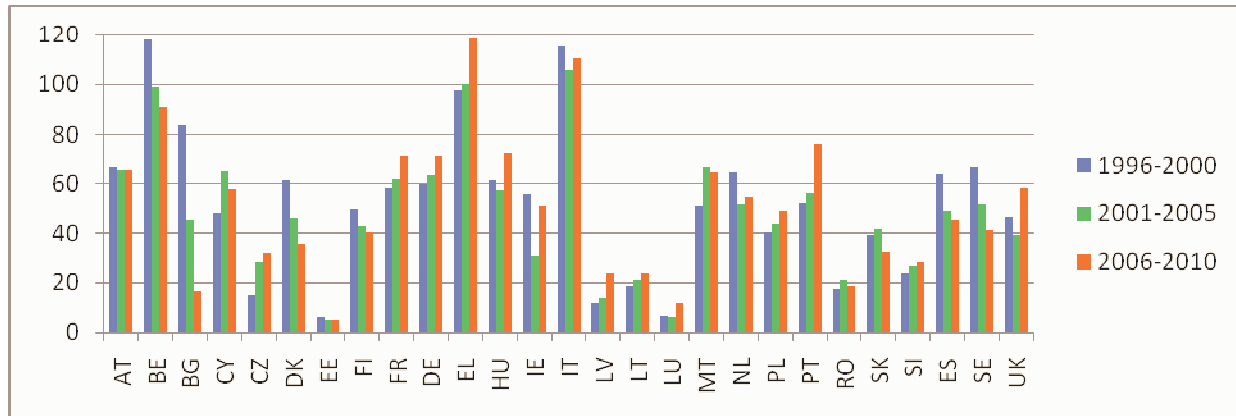
Data source: AMECO

http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

4.4   ANALYSIS OF ECONOMIC SECTORS

Economic growth, measured by GDP per capita and GDP real rate of growth, represents a key indicator in fundamental analysis for country risk. The structure of the Gross Domestic Product – consumption (final consumption expenditure of households and non-profit institutions serving households=C and final consumption expenditure of general government=G), investment (Gross fixed capital formation=I), imports of goods and services=Imp, exports of goods and services=Exp – is an expression of GDP destinations and the sustainability of economic growth. The next two figures contain the structure of GDP, average values for 2001-2005 and 2006-2010, in order to surprise the structural changes in the economies of EU countries.

Figure 4 - 8 GDP – structure – average values for 2001-2005
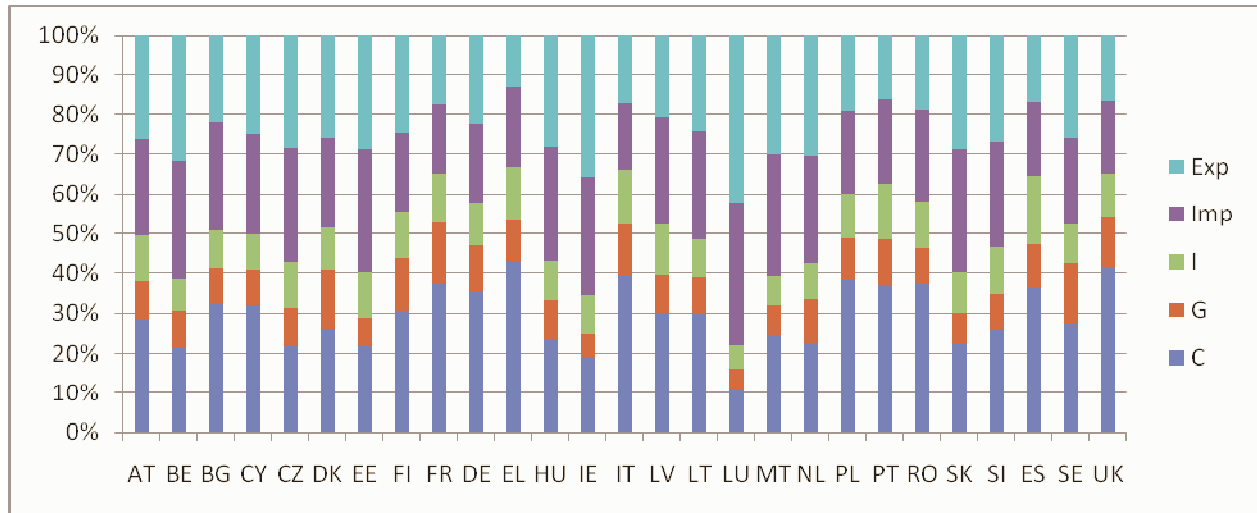
Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Figure 4 - 9 GDP – structure – average values for 2006-2010
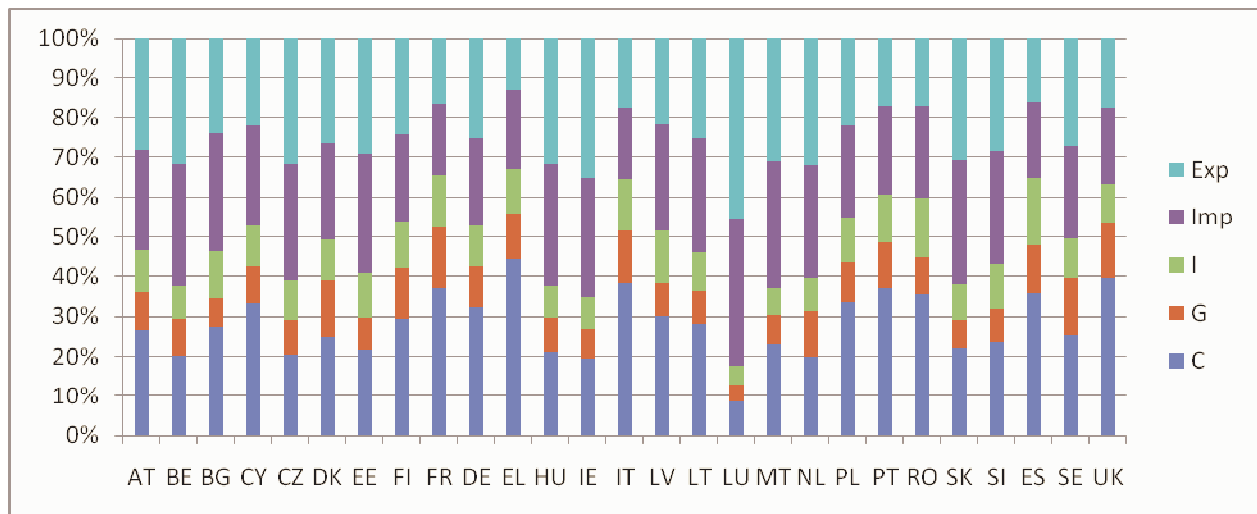
Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Comparing the average values regarding GDP structure for the periods 2001-2005 and 2006-2010, in Romania consumption decreased by 3 pp, investment increased by 6 pp, import decreased by 1 pp while export decreased by 3 pp. The most significant changes (more then 4 pp) were: in Austria import increased by 4 pp and export by 6 pp; in Belgium import increased by 6 pp and export by 4 pp; in Bulgaria consumption decreased by 4 pp, investment increased by 8 pp, import increased by 12 pp and export increased by 9 pp; in Cyprus export decreased by 6 pp; in Czech Republic import increased by 5 pp and export by 10 pp; in Denmark import increased by 7 pp and export by 5pp; in Estonia import decreased by 7pp and export by 3 pp; in Finland import increased by 7 pp; in Denmark import increased by 6 pp and export by 8 pp; in Hungary import increased by 10 pp and export by 16pp; in

Latvia import increased by 8 pp and export by 7pp; in Luxembourg consumption decreased by 6 pp, import increased by 17 pp and export by 27pp; in Malta import and export increased by 4 pp; in Nederland consumption decreased by 4 pp, import increased by 7 pp and export by 8 pp; in Poland consumption decreased by 4 pp, import increased by 7 pp and export by 8 pp; in Slovakia import increased by 9 pp and export by 8 pp; in Sweden import increased by 6 pp and export by 5 pp.

Figure 4 - 10 GDP structure in Romania
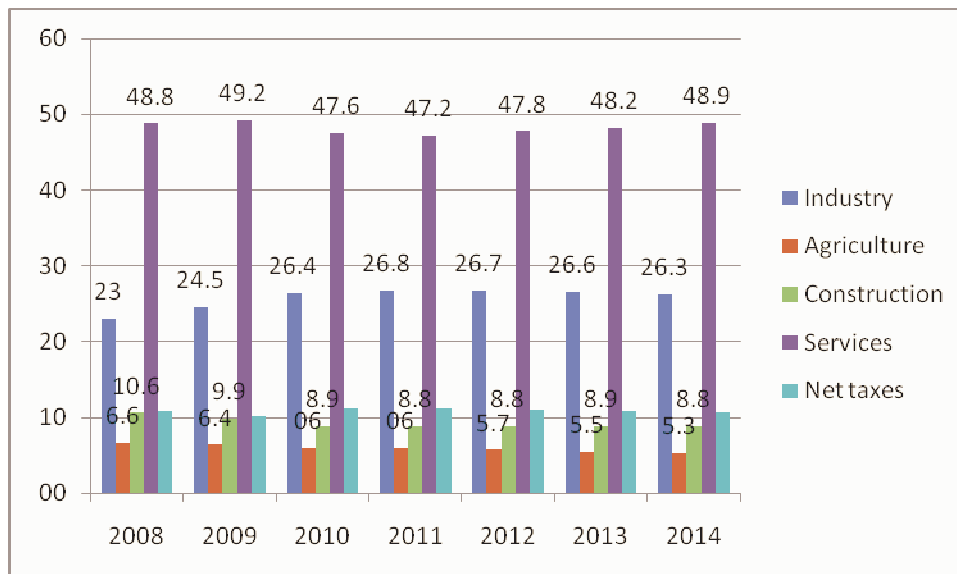
Data source: National Commission of Prognosis
http://www.cnp.ro/user/repository/prognoza_primavara_2011.pdf

The next figures explain the contribution of industry, agriculture, construction, services and net taxes to GDP real growth rate. The sharp decline in 2009 was especially due to the decline of services, agriculture and construction. The partial recovery in 2010 is sustained by industry.

Figure 4 - 11 Contribution to real GDP growth rate
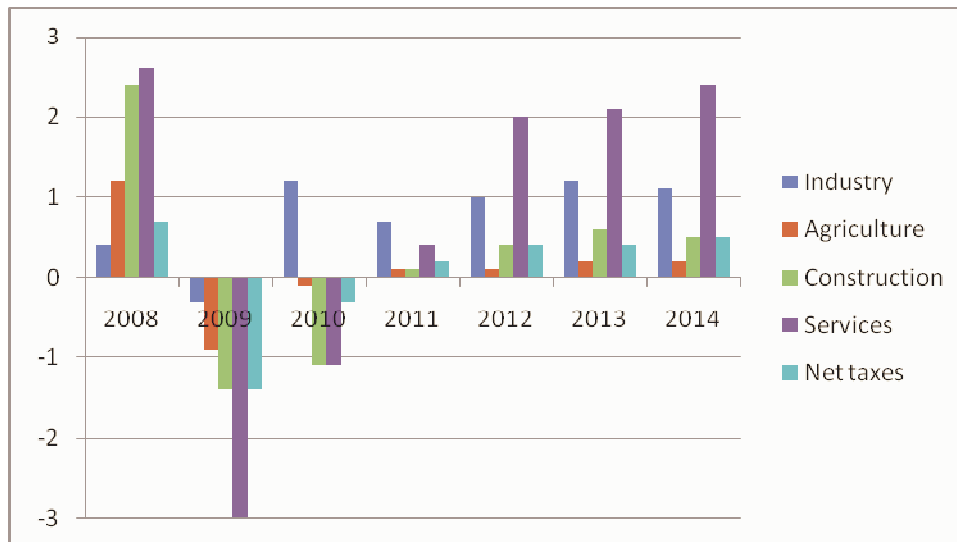
Data source: National Commission of Prognosis

http://www.cnp.ro/user/repository/prognoza_primavara_2011.pdf

For a complete fundamental analysis of the economy the previous figures contain the GDP structure by formation – services, industry, constructions, agriculture and net taxes. The following figure surprises the GDP structure: the highest component is attributed to services (almost 50%), then to industry (around 26%), constructions (9%), net taxes and agriculture (5-6%). This structure was essential in explaining the sharp decline in GDP for 2009, due to the collapse of the construction sector.

The influence of these factors is complex, and their modelling can cause some difficulties for the estimation of financial and social discount rates in Romanian context. However, Romania has some achievements regarding the estimation of these discount rates. Some considerations regarding the applicability of financial and social discount rates on each type of beneficiary (public and private) is presented in the next chapter.

5. Financial and social discount rates applicability on each type of beneficiary (public and private)

As mentioned before, in a world of finite public and private sectors, we need a standard for evaluating trade-offs, setting priorities, and finally making choices about how to allocate scarce resources among competing uses. Cost benefit analysis provides a way of doing this.

Would you rather have €1000 of income today or €1000 of income in the future (say in 3 years?). The answer is probably now, because €1000 in three years time is unlikely to buy as many goods and services as it does now (because of inflation). And also because €1000 put into a savings account today will yield interest. Discounting is a widely used technique as part of cost benefit analysis. The technique of discounting reflects the following:

The value of a cost or benefit now > the value of a cost or benefit in future years

Discounting reflects this by **reducing all future costs and benefits to express them as today's values**. The key question is: How do you choose an 'interest rate' for reducing future costs to give them a **present value** today?

Setting a general discount rate for new projects has important implications for the environment:

1. A low discount rate is often favoured by economists since they argue that investing a high proportion of current income is a good way of providing for the future

2. A high discount rate may also be favoured since it discourages investment (and by implication environmental damage) in the present

Most projects have lifetimes of 20-30 years – with many of the big costs arising early in a project e.g. from construction whereas the stream of benefits from a project occur over a much longer period of time. But for many major investment projects, some of the costs only become apparent in the long run. For instance considering the building of a new nuclear power station, environmentalists would argue that there is a long list of costs from waste management and decommissioning which stretch over 100 years into the future whereas no social benefits exist to offset these costs beyond year 30 or 40 (where the nuclear power station might reasonably be expected to be ready for closure).

The value of decommissioning costs over 100 years away is almost negligible no matter what discount rate we use. This makes discounting difficult to justify.

Methodologies for preparing and assessing projects from a coherent and homogeneous socio-economic perspective were taken into account each level of discount rates (financial and social) proposed for all type of Investment Programme available from 2000 up to present. In the following chapters we will present information in accordance with the previous and existing regulations, studies and guidelines for Cost Benefit Analysis and respectively discounted rates applied up to now.

5.1   OUTLINE OF DISCOUNT RATE APPLIED IN THE PERIOD 2007-2013 (AND BEFORE)

The guide for Cost benefit Analysis prepared for investment projects under Structural Funds, Cohesion Funds and Instrument for Pre-Accession Countries (ISPA) was issued in 2002 and includes some references related to discount rates for period 2000-2006 presented in the following part for both types of investments (public and private sectors).

Financial discount rate

The rate at which future financial values are discounted to the present is usually roughly equal to the opportunity cost of capital. It should reflect the preference for the present compared to future financial flows.

In this view it could be consistent to have different financial discount rate in different countries, reflecting different opportunity cost of capital in different financial markets. In fact the sample of projects examined shows a range of discount rates, from a minimum value of 3% to a maximum of 11%, with an average value of 5%. Nevertheless this could affect the calculation of the net present value (NPV, which is one of the most crucial performance indicators).

In order to achieve consistency there are two pathways:

- the standard practice worldwide is to take the return on Government bonds as a minimum benchmark. For investment in public sector it would be safe to use the real interest rate on public bonds of maturity equivalent to the project horizon. This solution will lead to different financial discount rate for each country, but based on the same calculation rule.

- an alternative solution would be to consider the real interest rate of a prime lender, e.g. EIB 'European Investment Bank' bond denominated in Euro, of equivalent maturity of the project horizon. In this case opportunity cost of capital is assumed to be the same in the public sector in the European Union.

The final solution was based on a mix of the two mentioned approaches. The CF Guide says: "in practice and under the current conditions this rate ranges from 6% to 8% at real prices".

In the new Guide a standard 6% has been suggested as standard financial discount rate.

Due to new macroeconomic conditions, in line with new financial disorder, and in context of instabilities on financial markets, the cost of financing will be higher than in past years.

The EURIBOR evolution is presented in the following chart and demonstrated a relevant volatility in time:

Figure 5 - 1 EURIBOR evolution

Source: http://euriborupdate.blogspot.com/
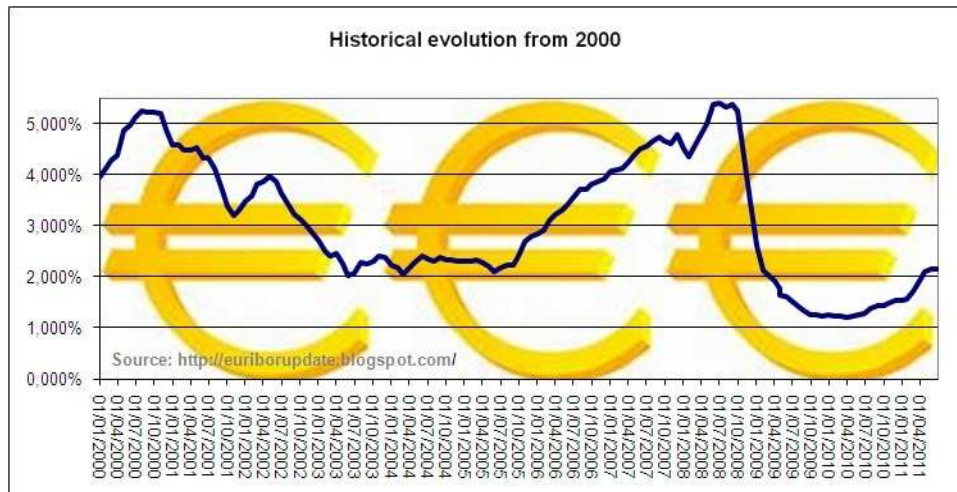
For many businesses, borrowing has the potential to be even more of a challenge in 2011 and the next years.

For many companies, however, despite the lower headline rates, the cost of capital in 2011 is going to be higher, as many will no longer be approved for lower rate traditional cash flow loans.

Regarding the evolution of the interest rates for end of 2009 and 2010, the situation could be synthesized as follows:

- The financial turmoil lead to a reorientation of the banks from quantitative targets (market share), to more qualitative oriented, credit risk analysis; The impact was a reduction of their credit offer through a rise of loans interest rates at the end of 2008 and beginning of 2009, correlated with an increased competition for new deposits

- In Q1 and Q2 2009 the banks started to adjust their interest rates to lower levels for new and existing deposits and credits, both in RON and in EUR; Thus in Dec. 2010, the average interest rate for RON new credits was 9.85% (p.a.), 9.39pp lower than its 2008 value, and for EUR new credits 5.23% compared to 7.71% in 2008

- As EUR new deposits average interest rates are concerned, in 2010 their level (2.88%) was similar to 2009 values (2.91%) due to banks financing needs, while average interest rates for RON new deposits (6.34%) are lower than their 2009 values (9.71%)

- Towards the end of 2010, average interest rates for new credits (both RON and EUR) were lower than average interest rates for existing ones, also showing banks competition to attract clients (incl. refinancing)

Nationally, bank lending levels for business in mid 2011 are down 28 percent from the beginning of 2010 (and that's not even including the worst performing sector, real estate). In the simplest terms, there is less money flowing to businesses and a lower appetite for risk among lenders. Many lenders are also handcuffed by capital adequacy requirements.

Another factor holding down traditional bank lending is that cash flow (debt-service ratio) is the most important factor when lenders are making a loan decision. The problem is that many companies had

erratic cash flow this year, which essentially ruins the likelihood that they can comply with the bank's debt-service ratios. In fact, more loans are rejected due to poor quality of cash flow than any other reason.

The banks' cost of capital is going to go up in the next years because the investors are going to have to take the risk that we, the taxpayer, have been taking. That would affect particularly the investment banking side of the operations more than the retail banking side -- there would be some increase in bank costs.

Therefore, a higher standard financial rate should be taken into consideration to be in accordance with new trends. Usually, the interest rate for a facilities expressed in EUR for private beneficiaries with projects with grant (non-reimbursable) component is among (7.12-9)% + EURIBOR according to financial rating and collaterals.

Therefore, it was strongly recommend a standard financial discount rate of 8%.

Social discount rate

Social discount rate is used for discounting in the economic analysis. It reflects the view on how future social benefits and costs should be valued when compared with present ones. For this reason theoretically a social discount rate determined country by country should better reflect this view.

As for the financial discount rate also for the social discount rate there are three alternatives:

- to use the real financial rate of return, supposing that the marginal public investment should have the same return as the private one;
- to use a formula based on the long term growth rate of the economy ;
- to use a standard conventional cut-off rate (World Bank and EBRD use a quite high real 10% required rate of return).

For social discount rate it is even more difficult to fix a standard benchmark across Europe, and this is not the place to discuss in detail this point. However a 5-6% rate, seems to be, under present circumstances, a reasonable compromise among the three approaches (taking 3-10% as extreme boundaries of a likely range). However, in specific cases, the project proposer may wish to justify a different value.

In 2008 the new guide for Cost benefit Analysis prepared for investment projects was issued and includes some changes for levels of financial discount rate (according to the new economic situation in the members of European Union).

Over the last two decades, the Structural Funds and the Cohesion Fund have co-financed through grants a very large number of projects in the Member States of the European Union. These include mainly railways, roads, ports and airports, water distribution and treatment, solid waste management, but also productive investments, science parks, museums, and many others. Other sources of infrastructure finance include grants under the Trans-European Networks in transport and energy, and loans by the European Investment Bank (EIB), or by the European Bank for Reconstruction and Development (EBRD).

In the coming years the EU institutions, national governments, regional managing authorities, public and private companies will all face challenging infrastructure needs. In 2007-2013 the EU Funds will contribute to the infrastructure plans of 27 countries, including ten new members (mostly former transition economies) and the latter candidates to accession (Romania and Bulgaria). ISPA funds will assist Croatia and other accession candidates.

The discount rate used in the financial analysis should reflect the opportunity cost of capital to the investor. This can be thought of as the foregone return on the best alternative project.

The Commission recommends that a 5% financial discount rate in real terms is used as an indicative benchmark for public investment projects co-financed by the Funds. The downwards revision compared with the 2000-2006 programming period reflects changing macroeconomic conditions in the EU.

Values differing from the 5% benchmark may, however, be justified on the grounds of:

- the Member State's specific macroeconomic conditions;
- the nature of the investor: for instance, the discount rate can be higher for PPP projects, where the inclusion of private funds may increase the opportunity cost of capital;
- the sector concerned.

The actual (weighted average) cost of capital for a given project should be considered as a lower limit. It is of utmost importance that consistency is ensured amongst the discount rates used for similar projects in the same region/country. The Commission encourages the Member States to provide their own benchmark for the discount rate in their guidance documents. This reference must then be applied consistently.

It has to be noted that when the discount rate is expressed in real terms, the analysis should be carried out at constant prices accordingly. If necessary, changes in relative prices need to be taken into account. If current prices are used instead, then a nominal discount rate must be employed. Based on long-term economic growth and pure time-preference rates, the Commission proposes the following indicative benchmarks for the social discount rate: 5,5% for the Cohesion countries and 3,5% for the others. Member States may wish to justify different values reflecting specific socio-economic conditions. For instance, the Commissariat Général du Plan, France, recently lowered its reference to 4%, while the UK Treasury consistently applies a 3,5% social discount rate for public sector investments. In Romania, the social discount rate was set at 5,5% (according to WD no 4 issued by EC) without any other adjustments. This level of discount rate was applied to all type of projects (for private and public sector). The applicability of discounting is more appropriate to project

According to WB documents (appraisal of projects) there are the following rates used for developing CBA for investment projects:

- 12% for financial appraisal for projects referring to rural roads (WB Report No: ICR0000611 June 2008);
- 12% for financial appraisal for projects referring to Romania Energy Efficiency (WB Report No: ICR0000961april 2009)

- 7% for social appraisal for project referring to project in support of the second phase of the social development fund program (WB Report No: ICR0000538 august 2007)

For investment developed under EAFRD (European Agricultural Funds for Rural Development) it is recommended to use 8% for the financial discount rate (source www.APDRP.RO) for all types of investments.

For investment developed under "SOP IEC" the level of financial discount rate is set to 9% (source www.MININD.RO).

CBA developed for investments under ROP (Regional Operational Programme) recommended the following rates (source www.inforegio.ro):

- For public beneficiaries - 5% for financial discount rate and 5.5% for social discount rate (investments in roads infrastructures, social, tourism, business environment)

- For private beneficiaries – 9% for financial discount rate and 5.5 % for social discount rate (investments in business development, tourism)

The only Cross Border Cooperation Programme which takes into account the recommendations of Working Document no. 4 is the Hungary-Romania Cross-Border Co-operation Programme 2007-2013. The only beneficiaries for this programme are from public sectors (Local Public Authorities, Researching Institutes, Public Hospitals, and Universities etc.). For all type of the investments financed under CBC the financial analyses is required using the financial discount rate of 5%.

5.2 NATIONAL GUIDELINES/STUDIES FOR IMPROVING THE CBA INCLUDING DISCOUNT RATE

In 2008, The Authority for Coordination of Structural Instruments under Finance Ministry issued a general guideline for CBA at national level.

This guideline is intended to provide relevant information and guidance on how to conduct Cost Benefit Analysis (CBA) to the large number of institutions involved in the preparation and appraisal of investment projects to be co-financed by the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) in Romania.

This includes Final Beneficiaries, Intermediate Bodies and Managing Authorities. To that extent, the goal of these Guidelines is to be accessible and understandable to a vast audience, at least when referring to the overall objectives, general methodological steps and information requirements.

These General CBA Guidelines build on the following framework:

- Romanian legislation comprising provisions related to the cost benefit – analysis (in particular, the Government Decision 28/2008 on the methodological rules for elaboration and approval of technical and economic documentation for investment projects)

- the national programming documents for the implementation of actions to be co-financed by structural instruments (ERDF and CF), namely the National Strategic Reference Framework (NSRF) and the relevant Sectorial Operational Programmes (SOPs);

- the relevant EC regulations and guidelines,

- statistics, forecasts and other documents that may provide information to be considered for the development of suitable methodological framework to carry out the CBA.

- Working Document no 4 : Guidance on the methodology for carrying out Cost Benefit Analysis

Basically, the proposed levels of discount rates are as it follows: 5% for financial and 5.5% for social. These levels do not reflect to the changing macroeconomic conditions in Romania.

Furthermore, most of the Managing Authorities (MA) for each Operational Programme developed their own guidelines in close relationship with Working Document no. 4. MA for SOP Environmental benefits technical assistance for developing CBA guidelines with Jaspers support for the following type of investments: water and wastewater projects, solid waste management and district heating projects. MA for Regional Operational Programme issued for each axis of investments (for both public and private sectors) recommendations for developing CBA (the level of rates was indicated in the previous chapter). MA for SOP Transport does not provide much information as others.

5.3   ANALYSIS ON OTHER EU COUNTRIES AND OTHER IFI'S PRACTICES REGARDING DISCOUNTING RATES

The scope of Working Documents no 4 was to present a set of working rules applicable in CBA for ERDF and Cohesion Fund application for EU countries in the 2007-2013 period. In order to ensure consistency within a Member State, each EU country developed own guidance frameworks taking into account of specific country conditions. Most of them preserved the levels recommended by Commission through existing guidelines (respectively 5% for financial rate and 5.5% for social rate), except Poland which uses the 8% for financial discount rate (in nominal term). According to the following tables the weakness of EU recommendation is clearly presented (each EU member indicates a different financial discount rate due the specific macroeconomic situations).

Table 5 - 1 EU reference rates

Source http://ec.europa.eu/competition/state_aid/legislation/reference_rates.html

From	To	AT	BE	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE
01.08.2011	....	2,05	2,05	3,97	2,05	1,79	2,05	**2,07**	2,05	2,05	2,05	2,05	2,05	5,61	2,05
01.07.2011	31.07.2011	**2,05**	**2,05**	3,97	**2,05**	1,79	**2,05**	1,76	**2,05**	**2,05**	**2,05**	**2,05**	**2,05**	5,61	**2,05**
01.05.2011	30.06.2011	**1,73**	**1,73**	3,97	**1,73**	1,79	**1,73**	1,76	**1,73**	**1,73**	**1,73**	**1,73**	**1,73**	5,61	**1,73**
01.03.2011	30.04.2011	1,49	1,49	3,97	1,49	1,79	1,49	1,76	1,49	1,49	1,49	1,49	1,49	5,61	1,49
01.01.2011	28.02.2011	**1,49**	**1,49**	3,97	**1,49**	**1,79**	**1,49**	**1,76**	**1,49**	**1,49**	**1,49**	**1,49**	**1,49**	**5,61**	**1,49**

From	To	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.08.2011	....	2,05	2,56	2,05	2,2	2,05	2,05	4,26	2,05	7,18	2,65	2,05	2,05	1,48
01.07.2011	31.07.2011	**2,05**	2,56	**2,05**	2,2	**2,05**	**2,05**	4,26	**2,05**	7,18	2,65	**2,05**	**2,05**	1,48
01.05.2011	30.06.2011	**1,73**	2,56	**1,73**	2,2	**1,73**	**1,73**	4,26	**1,73**	7,18	**2,65**	**1,73**	**1,73**	1,48
01.03.2011	30.04.2011	1,49	2,56	1,49	**2,2**	1,49	1,49	4,26	1,49	7,18	**2,23**	1,49	1,49	1,48
01.01.2011	28.02.2011	**1,49**	2,56	**1,49**	**2,64**	**1,49**	**1,49**	**4,26**	**1,49**	**7,18**	**1,76**	**1,49**	**1,49**	**1,48**

From	To	AT	BE	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE
01.12.2010	31.12.2010	**1,45**	**1,45**	4,15	**1,45**	2,03	**1,45**	1,88	**1,85**	**1,45**	**1,45**	**1,45**	**1,45**	5,97	**1,45**
01.10.2010	30.11.2010	1,24	1,24	4,15	1,24	2,03	1,24	1,88	2,27	1,24	1,24	1,24	1,24	5,97	1,24
01.09.2010	30.09.2010	1,24	1,24	**4,15**	1,24	2,03	1,24	1,88	2,27	1,24	1,24	1,24	1,24	5,97	1,24
01.08.2010	31.08.2010	1,24	1,24	4,92	1,24	2,03	1,24	1,88	2,27	1,24	1,24	1,24	1,24	5,97	1,24
01.07.2010	31.07.2010	1,24	1,24	4,92	1,24	2,03	1,24	1,88	**2,27**	1,24	1,24	1,24	1,24	5,97	1,24
01.06.2010	30.06.2010	1,24	1,24	4,92	1,24	2,03	1,24	1,88	2,77	1,24	1,24	1,24	1,24	5,97	1,24
01.05.2010	31.05.2010	1,24	1,24	4,92	1,24	**2,03**	1,24	1,88	**2,77**	1,24	1,24	1,24	1,24	5,97	1,24
01.04.2010	30.04.2010	1,24	1,24	4,92	1,24	2,39	1,24	1,88	**3,47**	1,24	1,24	1,24	1,24	**5,97**	1,24
01.03.2010	31.03.2010	1,24	1,24	4,92	1,24	2,39	1,24	1,88	**4,73**	1,24	1,24	1,24	1,24	7,03	1,24
01.01.2010	28.02.2010	**1,24**	**1,24**	4,92	**1,24**	2,39	**1,24**	1,88	6,94	**1,24**	**1,24**	**1,24**	**1,24**	**7,03**	**1,24**
01.12.2009	31.12.2009	1,45	1,45	5,37	1,45	2,49	1,45	2,31	7,34	1,45	1,45	1,45	1,45	8,37	1,45
01.11.2009	30.11.2009	1,45	1,45	**5,37**	1,45	2,49	1,45	2,31	7,34	1,45	1,45	1,45	1,45	**8,37**	1,45

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01.10.2009	31.10.2009	**1,45**	**1,45**	6,41	**1,45**	**2,49**	**1,45**	**2,31**	7,34	**1,45**	**1,45**	**1,45**	**1,45**	10,01	**1,45**
01.09.2009	30.09.2009	1,77	1,77	6,41	1,77	2,96	1,77	2,78	7,34	1,77	1,77	1,77	1,77	10,01	1,77
01.08.2009	31.08.2009	1,77	1,77	6,41	1,77	2,96	1,77	**2,78**	7,34	1,77	1,77	1,77	1,77	10,01	1,77
01.07.2009	31.07.2009	**1,77**	**1,77**	6,41	**1,77**	2,96	**1,77**	3,44	7,34	**1,77**	**1,77**	**1,77**	**1,77**	10,01	**1,77**
01.06.2009	30.06.2009	2,22	2,22	**6,41**	2,22	2,96	2,22	**3,44**	7,34	2,22	2,22	2,22	2,22	10,01	2,22
01.05.2009	31.05.2009	**2,22**	**2,22**	7,63	**2,22**	2,96	**2,22**	4,57	7,34	**2,22**	**2,22**	**2,22**	**2,22**	10,01	**2,22**
01.04.2009	30.04.2009	**2,74**	**2,74**	7,63	**2,74**	2,96	**2,74**	4,57	7,34	**2,74**	**2,74**	**2,74**	**2,74**	10,01	**2,74**
01.03.2009	31.03.2009	**3,47**	**3,47**	7,63	**3,47**	3,74	**3,47**	6	7,34	**3,47**	**3,47**	**3,47**	**3,47**	10,01	**3,47**
01.02.2009	28.02.2009	4,99	4,99	7,63	4,99	4,53	4,99	6	7,34	4,99	4,99	4,99	4,99	10,01	4,99
01.01.2009	31.01.2009	**4,99**	**4,99**	**7,63**	**4,99**	**4,53**	**4,99**	6	**7,34**	**4,99**	**4,99**	**4,99**	**4,99**	**10,01**	**4,99**
01.12.2008	31.12.2008	5,36	5,36	6,7	5,36	4,2	5,36	5,55	6,43	5,36	5,36	5,36	5,36	8,58	5,36
01.11.2008	30.11.2008	5,36	5,36	6,7	5,36	4,2	5,36	5,55	6,43	5,36	5,36	5,36	5,36	8,58	5,36
01.10.2008	31.10.2008	**5,36**	**5,36**	6,7	**5,36**	4,2	**5,36**	5,55	6,43	**5,36**	**5,36**	**5,36**	**5,36**	8,58	**5,36**
01.09.2008	30.09.2008	4,59	4,59	6,7	4,59	4,2	4,59	5,55	6,43	4,59	4,59	4,59	4,59	8,58	4,59
01.07.2008	31.08.2008	**4,59**	**4,59**	6,7	**4,59**	**4,2**	**4,59**	4,81	6,43	**4,59**	**4,59**	**4,59**	**4,59**	**8,58**	**4,59**

Development of the Capacity for Cost-Benefit Analysis

From	To	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.12.2010	31.12.2010	**1,45**	2,85	**1,45**	3,16	**1,45**	**1,45**	4,49	**1,45**	7,82	1,38	**1,45**	**1,45**	1,35
01.10.2010	30.11.2010	1,24	2,85	1,24	3,99	1,24	1,24	4,49	1,24	7,82	**1,38**	1,24	1,24	1,35
01.09.2010	30.09.2010	1,24	2,85	1,24	3,99	1,24	1,24	4,49	1,24	7,82	1,18	1,24	1,24	1,35
01.08.2010	31.08.2010	1,24	2,85	1,24	3,99	1,24	1,24	4,49	1,24	7,82	**1,18**	1,24	1,24	1,35
01.07.2010	31.07.2010	1,24	**2,85**	1,24	**3,99**	1,24	1,24	4,49	1,24	7,82	1,02	1,24	1,24	**1,35**
01.06.2010	30.06.2010	1,24	**3,45**	1,24	**4,72**	1,24	1,24	4,49	1,24	7,82	1,02	1,24	1,24	1,16
01.05.2010	31.05.2010	1,24	**4,46**	1,24	**6,47**	1,24	1,24	4,49	1,24	**7,82**	1,02	1,24	1,24	1,16
01.04.2010	30.04.2010	1,24	**5,9**	1,24	**8,97**	1,24	1,24	4,49	1,24	9,92	1,02	1,24	1,24	1,16
01.03.2010	31.03.2010	1,24	**7,17**	1,24	**11,76**	1,24	1,24	4,49	1,24	9,92	1,02	1,24	1,24	1,16
01.01.2010	28.02.2010	**1,24**	8,7	**1,24**	15,11	**1,24**	**1,24**	4,49	**1,24**	9,92	**1,02**	**1,24**	**1,24**	**1,16**
01.12.2009	31.12.2009	1,45	9,53	1,45	18,77	1,45	1,45	4,53	1,45	10,75	1,16	1,45	1,45	**1,2**
01.11.2009	30.11.2009	1,45	9,53	1,45	18,77	1,45	1,45	4,53	1,45	10,75	**1,16**	1,45	1,45	1,53
01.10.2009	31.10.2009	**1,45**	9,53	**1,45**	**18,77**	**1,45**	**1,45**	4,53	**1,45**	10,75	1,49	**1,45**	**1,45**	**1,53**

Development of the Capacity for Cost-Benefit Analysis

01.09.2009	30.09.2009	1,77	9,53	1,77	15,54	1,77	1,77	4,53	1,77	**10,75**	1,49	1,77	1,77	1,85
01.08.2009	31.08.2009	1,77	9,53	1,77	**15,54**	1,77	1,77	4,53	1,77	13,2	1,49	1,77	1,77	**1,85**
01.07.2009	31.07.2009	**1,77**	9,53	**1,77**	13,2	**1,77**	**1,77**	4,53	**1,77**	**13,2**	1,49	**1,77**	**1,77**	2,2
01.06.2009	30.06.2009	2,22	9,53	2,22	13,2	2,22	2,22	**4,53**	2,22	17,29	**1,49**	2,22	2,22	**2,2**
01.05.2009	31.05.2009	**2,22**	9,53	**2,22**	13,2	**2,22**	**2,22**	5,62	**2,22**	17,29	**1,81**	**2,22**	**2,22**	2,84
01.04.2009	30.04.2009	**2,74**	9,53	**2,74**	13,2	**2,74**	**2,74**	5,62	**2,74**	17,29	**2,3**	**2,74**	**2,74**	**2,84**
01.03.2009	31.03.2009	**3,47**	**9,53**	**3,47**	13,2	**3,47**	**3,47**	6,78	**3,47**	17,29	3,31	**3,47**	**3,47**	**3,58**
01.02.2009	28.02.2009	4,99	7,81	4,99	**13,2**	4,99	4,99	6,78	4,99	17,29	**4,31**	4,99	4,99	**4,81**
01.01.2009	31.01.2009	**4,99**	7,81	**4,99**	11,05	**4,99**	**4,99**	6,78	**4,99**	**17,29**	5,18	**4,99**	**4,99**	5,7
01.12.2008	31.12.2008	5,36	**7,1**	5,36	9,44	5,36	5,36	6,42	5,36	**15,87**	5,49	5,36	5	5,66
01.11.2008	30.11.2008	5,36	6,1	5,36	9,44	5,36	5,36	6,42	5,36	11,02	5,49	5,36	**5**	5,66
01.10.2008	31.10.2008	**5,36**	6,1	**5,36**	9,44	**5,36**	**5,36**	6,42	**5,36**	11,02	5,49	**5,36**	4,34	5,66
01.09.2008	30.09.2008	4,59	6,1	4,59	9,44	4,59	4,59	6,42	4,59	11,02	**5,49**	4,59	4,34	5,66
01.07.2008	31.08.2008	**4,59**	6,1	**4,59**	9,44	**4,59**	**4,59**	6,42	**4,59**	11,02	**4,75**	**4,59**	**4,34**	**5,66**

Development of the Capacity for Cost-Benefit Analysis

FINANCIAL AND SOCIAL DISCOUNT RATES

PROJECT CO-FINANCED BY ERDF THROUGH TAOP 2007-2013

Base rates calculated in accordance with the Communication from the Commission on the revision of the method for setting the reference and discount rates (OJ C 14, 19.1.2008, p.6.). Depending on the use of the reference rate, the appropriate margins have still to be added as defined in this communication. **For the discount rate this means that a margin of 100 basis points has to be added**. The Commission regulation (EC) No 271/2008 of 30 January 2008 amending the implementing regulation (EC) No 794/2004 foresees that, unless otherwise provided for in a specific decision, the recovery rate will also be calculated by adding 100 basis points to the base rate. **Date of last update: 20.07.2011**

Changes are indicated in bold

From	To	AT	BE	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.08.2011	....	2,05	2,05	3,97	2,05	1,79	2,05	**2,07**	2,05	2,05	2,05	2,05	2,05	5,61	2,05	2,05	2,56	2,05	2,20	2,05	2,05	4,26	2,05	7,18	2,65	2,05	2,05	1,48
01.07.2011	31.07.2011	**2,05**	**2,05**	3,97	**2,05**	1,79	**2,05**	1,76	**2,05**	**2,05**	**2,05**	**2,05**	**2,05**	5,61	**2,05**	**2,05**	2,56	**2,05**	2,20	**2,05**	**2,05**	4,26	**2,05**	7,18	2,65	**2,05**	**2,05**	1,48
01.05.2011	30.06.2011	**1,73**	**1,73**	3,97	**1,73**	1,79	**1,73**	1,76	**1,73**	**1,73**	**1,73**	**1,73**	**1,73**	5,61	**1,73**	**1,73**	2,56	**1,73**	2,20	**1,73**	**1,73**	4,26	**1,73**	7,18	**2,65**	**1,73**	**1,73**	1,48
01.03.2011	30.04.2011	1,49	1,49	3,97	1,49	1,79	1,49	1,76	1,49	1,49	1,49	1,49	1,49	5,61	1,49	1,49	2,56	1,49	**2,20**	1,49	1,49	4,26	1,49	7,18	**2,23**	1,49	1,49	1,48
01.01.2011	28.02.2011	**1,4**	**1,4**	3,9	**1,4**	1,7	**1,4**	1,7	**1,4**	**1,4**	**1,4**	**1,4**	**1,4**	5,6	**1,4**	**1,4**	2,5	**1,4**	2,6	**1,4**	**1,4**	4,2	**1,4**	7,1	**1,7**	**1,4**	**1,4**	**1,4**

Development of the Capacity for Cost-Benefit Analysis

1	1	9	9	7	9	9	9	6	9	9	9	9	1	9	9	6	9	4	9	9	6	9	8	6	9	9	8

(Estonia joined the Euro zone as of 1.1.2011)

From	To	AT	BE	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.12.2010	31.12.2010	**1,45**	**1,45**	4,15	**1,45**	2,03	**1,45**	1,88	**1,85**	**1,45**	**1,45**	**1,45**	**1,45**	5,97	**1,45**	**1,45**	2,85	**1,45**	3,16	**1,45**	**1,45**	4,49	**1,45**	7,82	1,38	**1,45**	**1,45**	1,35
01.10.2010	30.11.2010	1,24	1,24	4,15	1,24	2,03	1,24	1,88	2,27	1,24	1,24	1,24	1,24	5,97	1,24	1,24	2,85	1,24	3,99	1,24	1,24	4,49	1,24	7,82	**1,38**	1,24	1,24	1,35
01.09.2010	30.09.2010	1,24	1,24	**4,15**	1,24	2,03	1,24	1,88	2,27	1,24	1,24	1,24	1,24	5,97	1,24	1,24	2,85	1,24	3,99	1,24	1,24	4,49	1,24	7,82	1,18	1,24	1,24	1,35
01.08.2010	31.08.2010	1,24	1,24	4,92	1,24	2,03	1,24	1,88	2,27	1,24	1,24	1,24	1,24	5,97	1,24	1,24	2,85	1,24	3,99	1,24	1,24	4,49	1,24	7,82	**1,18**	1,24	1,24	1,35
01.07.2010	31.07.2010	1,24	1,24	4,92	1,24	2,03	1,24	1,88	**2,27**	1,24	1,24	1,24	1,24	5,97	1,24	1,24	**2,85**	1,24	**3,99**	1,24	1,24	4,49	1,24	7,82	1,02	1,24	1,24	**1,35**
01.06.2010	30.06.2010	1,24	1,24	4,92	1,24	2,03	1,24	1,88	2,77	1,24	1,24	1,24	1,24	5,97	1,24	1,24	3,45	1,24	4,72	1,24	1,24	4,49	1,24	7,82	1,02	1,24	1,24	1,16
01.05.2010	31.05.2010	1,24	1,24	4,92	1,24	**2,03**	1,24	1,88	**2,77**	1,24	1,24	1,24	1,24	5,97	1,24	1,24	**4,46**	1,24	**6,47**	1,24	1,24	4,49	1,24	**7,82**	1,02	1,24	1,24	1,16
01.04.2010	30.04.2010	1,24	1,24	4,92	1,24	2,39	1,24	1,88	**3,47**	1,24	1,24	1,24	1,24	**5,97**	1,24	1,24	**5,90**	1,24	**8,97**	1,24	1,24	4,49	1,24	9,92	1,02	1,24	1,24	1,16

Development of the Capacity for Cost-Benefit Analysis

01.03.2010	31.03.2010	1,24	1,24	4,92	1,24	2,39	1,24	1,88	**4,73**	1,24	1,24	1,24	1,24	7,03	1,24	1,24	**7,17**	1,24	**11,76**	1,24	1,24	4,49	1,24	9,92	1,02	1,24	1,24	1,16
01.01.2010	28.02.2010	**1,24**	**1,24**	**4,92**	**1,24**	**2,39**	**1,24**	**1,88**	**6,94**	**1,24**	**1,24**	**1,24**	**1,24**	**7,03**	**1,24**	**1,24**	**8,70**	**1,24**	**15,11**	**1,24**	**1,24**	**4,49**	**1,24**	**9,92**	**1,02**	**1,24**	**1,24**	**1,16**
01.12.2009	31.12.2009	1,45	1,45	5,37	1,45	2,49	1,45	2,31	7,34	1,45	1,45	1,45	1,45	8,37	1,45	1,45	9,53	1,45	18,77	1,45	1,45	4,53	1,45	10,75	1,16	1,45	1,45	**1,20**
01.11.2009	30.11.2009	1,45	1,45	**5,37**	1,45	2,49	1,45	2,31	7,34	1,45	1,45	1,45	1,45	**8,37**	1,45	1,45	9,53	1,45	18,77	1,45	1,45	4,53	1,45	10,75	**1,16**	1,45	1,45	1,53
01.10.2009	31.10.2009	**1,45**	**1,45**	6,41	**1,45**	**2,49**	**1,45**	**2,31**	7,34	**1,45**	**1,45**	**1,45**	**1,45**	10,01	**1,45**	**1,45**	9,53	**1,45**	18,77	**1,45**	**1,45**	4,53	**1,45**	10,75	1,49	**1,45**	**1,45**	**1,53**
01.09.2009	30.09.2009	1,77	1,77	6,41	1,77	2,96	1,77	2,78	7,34	1,77	1,77	1,77	1,77	10,01	1,77	1,77	9,53	1,77	15,54	1,77	1,77	4,53	1,77	**10,75**	1,49	1,77	1,77	1,85
01.08.2009	31.08.2009	1,77	1,77	6,41	1,77	2,96	1,77	**2,78**	7,34	1,77	1,77	1,77	1,77	10,01	1,77	1,77	9,53	1,77	**15,54**	1,77	1,77	4,53	1,77	13,20	1,49	1,77	1,77	**1,85**
01.07.2009	31.07.2009	**1,77**	**1,77**	6,41	**1,77**	2,96	**1,77**	3,44	7,34	**1,77**	**1,77**	**1,77**	**1,77**	10,01	**1,77**	**1,77**	9,53	**1,77**	13,20	**1,77**	**1,77**	4,53	**1,77**	**13,20**	1,49	**1,77**	**1,77**	2,20
01.06.2009	30.06.2009	2,22	2,22	**6,41**	2,22	2,96	2,22	**3,44**	7,34	2,22	2,22	2,22	2,22	10,01	2,22	2,22	9,53	2,22	13,20	2,22	2,22	**4,53**	2,22	17,29	**1,49**	2,22	2,22	**2,20**
01.05.2009	31.05.2009	**2,22**	**2,22**	7,63	**2,22**	2,96	**2,22**	4,57	7,34	**2,22**	**2,22**	**2,22**	**2,22**	10,01	**2,22**	**2,22**	9,53	**2,22**	13,20	**2,22**	**2,22**	5,62	**2,22**	17,29	**1,81**	**2,22**	**2,22**	2,84
01.04.2009	30.04.2009	**2,74**	**2,74**	7,63	**2,74**	**2,96**	**2,74**	4,57	7,34	**2,74**	**2,74**	**2,74**	**2,74**	10,01	**2,74**	**2,74**	9,53	**2,74**	13,20	**2,74**	**2,74**	5,62	**2,74**	17,29	**2,30**	**2,74**	**2,74**	2,84
01.03.2009	31.03.2009	**3,47**	**3,47**	7,63	**3,47**	**3,74**	**3,47**	6,00	7,34	**3,47**	**3,47**	**3,47**	**3,47**	10,01	**3,47**	**3,47**	**9,53**	**3,47**	13,20	**3,47**	**3,47**	6,78	**3,47**	17,29	3,31	**3,47**	**3,47**	3,58

Development of the Capacity for Cost-Benefit Analysis

From	To	AT	BE	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.02.2009	28.02.2009	4,99	4,99	7,63	4,99	4,53	4,99	6,00	7,34	4,99	4,99	4,99	4,99	10,01	4,99	4,99	7,81	4,99	13,20	4,99	4,99	6,78	4,99	17,29	4,31	4,99	4,99	4,81
01.01.2009	31.01.2009	4,99	4,99	7,63	4,99	4,53	4,99	6,00	7,34	4,99	4,99	4,99	4,99	10,01	4,99	4,99	7,81	4,99	11,05	4,99	4,99	6,78	4,99	17,29	5,18	4,99	4,99	5,70
01.12.2008	31.12.2008	5,36	5,36	6,70	5,36	4,20	5,36	5,55	6,43	5,36	5,36	5,36	5,36	8,58	5,36	5,36	7,10	5,36	9,44	5,36	5,36	6,42	5,36	15,87	5,49	5,36	5,00	5,66
01.11.2008	30.11.2008	5,36	5,36	6,70	5,36	4,20	5,36	5,55	6,43	5,36	5,36	5,36	5,36	8,58	5,36	5,36	6,10	5,36	9,44	5,36	5,36	6,42	5,36	11,02	5,49	5,36	5,00	5,66
01.10.2008	31.10.2008	5,36	5,36	6,70	5,36	4,20	5,36	5,55	6,43	5,36	5,36	5,36	5,36	8,58	5,36	5,36	6,10	5,36	9,44	5,36	5,36	6,42	5,36	11,02	5,49	5,36	4,34	5,66
01.09.2008	30.09.2008	4,59	4,59	6,70	4,59	4,20	4,59	5,55	6,43	4,59	4,59	4,59	4,59	8,58	4,59	4,59	6,10	4,59	9,44	4,59	4,59	6,42	4,59	11,02	5,49	4,59	4,34	5,66
01.07.2008	31.08.2008	4,59	4,59	6,70	4,59	4,20	4,59	4,81	6,43	4,59	4,59	4,59	4,59	8,58	4,59	4,59	6,10	4,59	9,44	4,59	4,59	6,42	4,59	11,02	4,75	4,59	4,34	5,66

Reference/discount rates and recovery rates (since 1/1/2007, EUR27):

The rates hereafter are calculated in accordance with the previous reference/discount/recovery rate communications and include already a top-up of 75 basis points. Normally no further top-ups are necessary.

From	To	AT	BE	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.06.2008	30.06.2008	5,19	5,19	8,97	5,19	4,89	5,19	5,36	5,50	5,19	5,19	5,19	5,19	8,72	5,19	5,19	6,49	5,19	6,64	5,19	5,19	6,42	5,19	8,67	5,46	5,19	5,23	6,29
01.01.2008	31.05.2008	5,19	5,19	8,97	5,19	4,89	5,19	5,36	5,50	5,19	5,19	5,19	5,19	7,58	5,19	5,19	6,49	5,19	6,64	5,19	5,19	6,42	5,19	8,67	5,46	5,19	5,23	6,29

Development of the Capacity for Cost-Benefit Analysis

From	To	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
01.10.2007	31.12.2007	5,42	5,42	8,30	5,74	4,90	5,42	5,58	5,50	5,42	5,42	5,42	5,42	8,54	5,42	5,42	6,49	5,42	6,64	7,00	5,42	5,94	5,42	9,10	5,49	5,42	5,20	6,83
01.09.2007	30.09.2007	5,42	5,42	8,30	5,74	4,24	5,42	5,58	5,50	5,42	5,42	5,42	5,42	8,54	5,42	5,42	6,49	5,42	6,64	7,00	5,42	5,94	5,42	9,10	5,49	5,42	5,20	5,90
01.07.2007	31.08.2007	4,62	4,62	8,30	5,74	4,24	4,62	4,76	5,50	4,62	4,62	4,62	4,62	8,54	4,62	4,62	6,49	4,62	6,64	7,00	4,62	5,94	4,62	9,10	4,68	4,62	5,20	5,90
01.06.2007	30.06.2007	4,62	4,62	8,30	5,74	4,24	4,62	4,76	5,50	4,62	4,62	4,62	4,62	8,54	4,62	4,62	6,49	4,62	6,64	7,00	4,62	5,94	4,62	10,17	4,68	4,62	5,20	5,90
01.01.2007	31.05.2007	4,62	4,62	8,30	5,49	4,24	4,62	4,76	5,50	4,62	4,62	4,62	4,62	8,54	4,62	4,62	6,49	4,62	6,64	7,00	4,62	5,94	4,62	10,17	4,68	4,62	5,20	5,90

Reference/discount rates and recovery rates (since 1/5/2004, EU25):

From	To	AT	BE	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
01.12.2006	31.12.2006	4,36	4,36	5,49	4,34	4,36	4,49	5,50	4,36	4,36	4,36	4,36	8,12	4,36	4,36	6,49	4,36	6,64	7,00	4,36	5,56	4,36	4,31	4,43	5,62	5,33
01.09.2006	30.11.2006	4,36	4,36	5,20	4,34	4,36	4,49	5,50	4,36	4,36	4,36	4,36	8,12	4,36	4,36	6,49	4,36	6,64	7,00	4,36	5,56	4,36	4,31	4,43	5,62	5,33
01.06.2006	31.08.2006	4,36	4,36	5,20	3,72	4,36	4,49	5,50	4,36	4,36	4,36	4,36	7,04	4,36	4,36	6,49	4,36	6,64	7,00	4,36	5,56	4,36	4,31	4,43	3,98	5,33
01.03.2006	31.05.2006	3,70	3,70	6,34	3,72	3,70	3,74	5,50	3,70	3,70	3,70	3,70	7,04	3,70	3,70	6,49	3,70	6,64	7,00	3,70	5,56	3,70	3,74	4,43	3,98	5,33
01.01.2006	28.02.2006	3,70	3,70	6,34	3,72	3,70	3,74	5,50	3,70	3,70	3,70	3,70	7,04	3,70	3,70	6,49	3,70	6,64	7,00	3,70	5,56	3,70	3,74	5,10	3,98	5,33

Development of the Capacity for Cost-Benefit Analysis

From	To																									
01.12.2005	31.12.2005	4,08	4,08	6,34	3,40	4,08	3,54	5,50	4,08	4,08	4,08	4,08	8,59	4,08	4,08	6,49	4,08	6,64	7,00	4,08	6,24	4,08	3,96	5,10	7,55	5,81
01.09.2005	30.11.2005	4,08	4,08	7,53	3,40	4,08	3,54	5,50	4,08	4,08	4,08	4,08	8,59	4,08	4,08	6,49	4,08	6,64	7,00	4,08	6,24	4,08	3,96	5,10	7,55	5,81
01.07.2005	31.08.2005	4,08	4,08	7,53	4,05	4,08	4,23	5,50	4,08	4,08	4,08	4,08	8,59	4,08	4,08	6,49	4,08	6,64	7,00	4,08	6,24	4,08	3,96	5,10	7,55	5,81
01.06.2005	30.06.2005	4,08	4,08	7,53	4,05	4,08	4,23	5,50	4,08	4,08	4,08	4,08	8,59	4,08	4,08	6,49	4,08	6,64	7,00	4,08	6,24	4,08	4,69	5,10	7,55	5,81
01.04.2005	31.05.2005	4,08	4,08	7,88	4,05	4,08	4,08	5,50	4,08	4,08	4,08	4,08	8,59	4,08	4,08	6,49	4,08	6,64	7,00	4,08	7,62	4,08	4,69	5,10	7,55	5,81
01.01.2005	31.03.2005	4,08	4,08	7,88	4,86	4,08	4,23	5,50	4,08	4,08	4,08	4,08	8,59	4,08	4,08	6,49	4,08	6,64	7,00	4,08	7,62	4,08	4,69	5,10	7,55	5,81
01.05.2004	31.12.2004	4,43	4,43	6,33	(a)	4,43	4,58	5,50	4,43	4,43	4,43	4,43	8,59	4,43	4,43	6,49	4,43	6,64	7,00	4,43	(b)	4,43	5,30	5,10	7,55	5,68

(a)   For   the   Czech   Republic   the   reference/discount   rate   for   this   period   was   5,00%,   the   recovery   rate   was   4,86%

(b) For Poland the reference/discount rate for this period was 9,56%, the recovery rate was 7,62%

Reference/discount rates and recovery rates (prior to 1/5/2004, EU15):

From	To	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK
01.01.2004	30.04.2004	4,43	4,58	4,43	4,43	4,43	4,43	4,43	4,43	4,43	4,43	4,43	4,43	4,43	5,30	5,68
01.09.2003	31.12.2003	3,95	4,15	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	4,69	5,42

01.08.2003	31/09/2003	3,95	4,15	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	3,95	5,68	5,42
01.01.2003	31.07.2003	4,80	5,03	4,80	4,80	4,80	4,80	4,80	4,80	4,80	4,80	4,80	4,80	4,80	5,68	5,42
01.01.2002	31.12.2002	5,06	5,54	5,06	5,06	5,06	5,06	5,06	5,06	5,06	5,06	5,06	5,06	5,06	5,85	6,01
01.12.2001	31.12.2001	5,23	6,70	5,23	5,23	5,23	5,23	5,23	5,23	5,23	5,23	5,23	5,23	5,23	6,40	7,06
01.01.2001	30.11.2001	6,33	6,70	6,33	6,33	6,33	6,33	6,33	6,33	6,33	6,33	6,33	6,33	6,33	6,40	7,06
01.04.2000	31.12.2000	5,70	6,21	5,70	10,40	5,70	5,70	5,70	5,70	5,70	5,70	5,70	5,70	5,70	6,85	7,64
01.01.2000	31.03.2000	5,70	6,21	5,70	12,24	5,70	5,70	5,70	5,70	5,70	5,70	5,70	5,70	5,70	6,85	7,64
01.11.1999	31.12.1999	5,61	5,44	5,61	12,71	5,61	5,61	5,61	5,61	5,61	5,61	5,61	5,61	5,61	6,71	6,86
01.10.1999	31.10.1999	4,76	5,44	4,76	12,71	4,76	4,76	4,76	4,76	4,76	4,76	4,76	4,76	4,76	6,71	6,86
01.08.1999	30.09.1999	4,76	5,44	4,76	12,71	4,76	4,76	4,76	4,76	4,76	4,76	4,76	4,76	4,76	5,76	6,86
01.05.1999	31.07.1999	4,71	5,44	4,73	12,71	4,72	4,77	4,69	6,18	4,71	4,76	4,77	6,02	4,75	4,96	6,86
01.03.1999	30.04.1999	4,71	5,44	4,73	15,24	4,72	4,77	4,69	6,18	4,71	4,76	4,77	6,02	4,75	4,96	6,86

Development of the Capacity for Cost-Benefit Analysis

01.01.1999	28.02.1999	4,71	5,44	4,73	15,24	4,72	4,77	4,69	6,18	4,71	4,76	4,77	6,02	4,75	5,90	6,86
01.12.1998	31.12.1998	4,87	5,44	4,87	15,91	5,13	4,94	4,97	6,95	4,87	4,93	5,05	7,56	5,13	5,79	7,77
01.11.1998	30.11.1998	4,87	6,46	4,87	15,91	5,13	4,94	4,97	6,95	4,87	4,93	5,05	7,56	5,13	5,79	7,77
01.10.1998	31.10.1998	5,97	6,46	5,94	15,91	5,13	5,83	6,14	6,95	5,97	5,95	5,05	7,56	5,13	5,79	7,77
01.09.1998	30.09.1998	5,97	6,46	5,94	15,91	6,20	5,83	6,14	6,95	5,97	5,95	5,96	7,56	6,21	5,79	7,77
01.06.1998	31.08.1998	5,97	6,46	5,94	15,91	6,20	5,83	6,14	6,95	5,97	5,95	5,96	7,56	6,21	7,03	7,77
01.02.1998	31.05.1998	5,97	6,46	5,94	19,95	6,20	5,83	6,14	8,20	5,97	5,95	5,96	7,56	6,21	7,03	7,77
01.01.1998	31.01.1998	5,97	6,46	5,94	16,54	6,20	5,83	6,14	8,20	5,97	5,95	5,96	7,56	6,21	7,03	7,77
01.08.1997	31.12.1997	5,55	6,04	5,54	14,22	6,22	5,53	6,72	8,21	5,55	5,56	5,57	7,37	5,96	6,86	8,15

As it was mentioned before EU recommended for the period 2007-2013 for the new members the following discount rates: 5% for financial discount, 5.5% for social discount rate (WD no 4).

5.4 IMPACT OF DISCOUNT RATES IN CBA RESULTS, BY TYPE OF INVESTMENTS

We can make a conceptual distinction between *technical* and *non-technical* changes of the discount rate. A technical change carries no information about the stance of monetary policy or the economy. It just serves to realign the discount rate with money market rates. Non-technical changes of the discount rate, in contrast, concur with a change in the policy stance, and hence those discount rate movements carry relevant information.

The discount rate that is in direct correlation with the real value of money of the project will be implemented. Therefore, assuming a non adequate level of the discount rate, and computing all project indicators accordingly (NPV, IRR, Funding gap, etc) will put a lot of pressure on the Beneficiary while implementing the project. Due to the fact that almost all beneficiaries need co-financing for a proper implementation of an investment project, the implication of banking/financial institution in the equation is required. The cost of money borrowed by commercial banks/financial institutions is correlated with the real cost of money on financial markets (influenced by ratings, international quotations for EURIBOR, LIBOR, macroeconomic conditions, volatility, etc).

Nowadays many projects are undercapitalized in order to give them a real chance to succeed. The average cost of financing for a long term facility (investment loan) for a big private beneficiary is about 8-9%. A financial discount rate lower then this will dramatically affect the cash flow of the project and will jeopardize the implementation.

In general, with higher discount rates, less value is assigned to future costs and benefits. Because benefits tend to arise later then costs, higher discount rates will typically reduce the project's apparent value proposition.

The impact of changes in the discount rate on the present value of future outcomes is illustrated in Table 5 - 2 below. The table shows the present value of $10 million worth of environmental benefits arising either 10, 30 or 50 years from now (in columns), assuming a real discount rate of 0 percent (no discounting), 3 percent, 7 percent, or 15 percent (in rows).

Table 5 - 2 Present Value of Future Environmental Benefits under Alternative Discount Rates, an Illustration Present Value of $10 million in Environmental Benefits Arising

| Discount Rate	10 Years from Now	30 Years from Now	50 Years from Now
0%	$10,000,000	$10,000,000	$10,000,000
3%	$7,440,939	$4,119,868	$2,281,071
7%	$5,083,493	$1,313,671	$339,478
15%	$2,471,847	$151,031	$9,228

Source: Own forecast of Consultant

Table 5 - 2 shows that, with an annual discount rate of 3 percent, the present value of $10 million in benefits arising in 50 years would be less than $2.3 million. With a discount rate of 15 percent, the present value would be reduced to less than $10,000! The relative impact of discounting is smaller for closer horizons.

But the choice of a discount rate not only impacts the present value of benefits and costs and the extent with which a given project (plan or action) may be deemed worthy, it also affects the ranking of projects whose costs and benefits are distributed differently over time.

To illustrate this, we consider two infrastructure investments of equal amounts ($200 million), generating comparable transportation benefits, but spread differently over a period of analysis of 20 years (20 years of operations, after project completion). Project A generates a steady annual flow of benefits, while Project B's benefits, initially low are increasing over time (Figure 5 - 2).

Figure 5 - 2 Time Profile of Costs and Benefits for Projects A and B
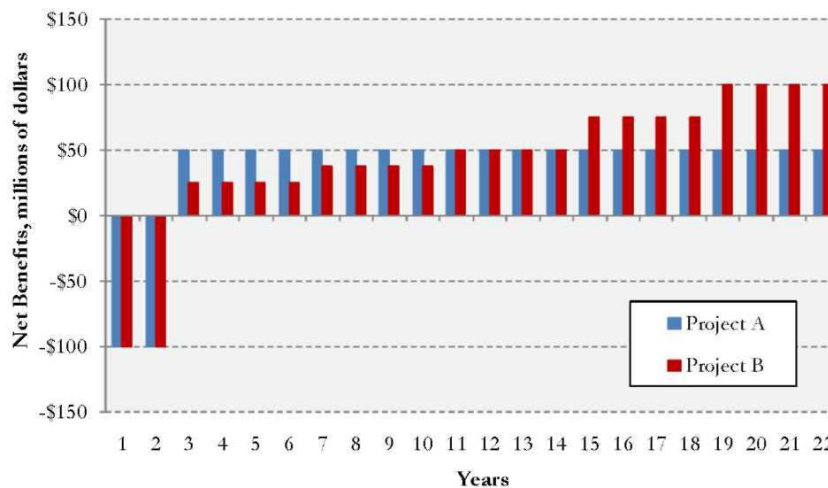
We then estimate the present value of future costs and benefits using different discount rates and calculate the Net Present Value of both projects (total discounted benefits *minus* total discounted costs). The outcomes of this analysis are shown in Figure 5 - 3.

Figure 5 - 3 Net Present Value of Projects A and B under Alternative Discount Rates
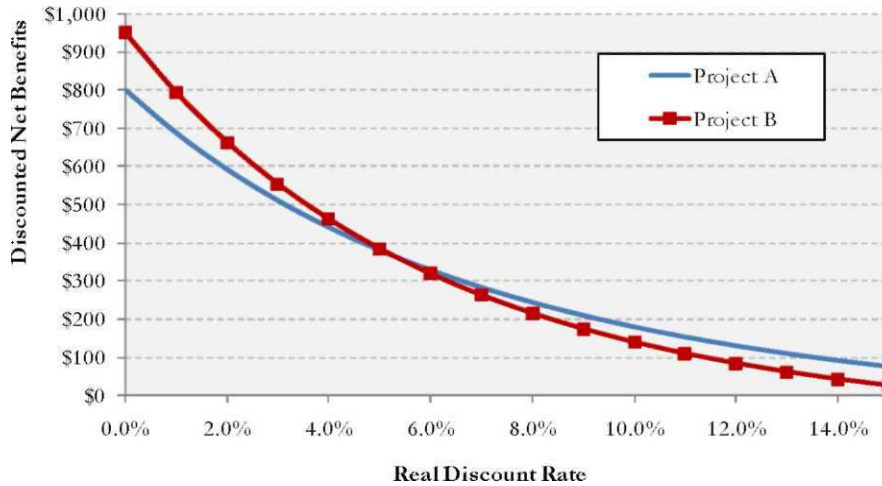
Figure 5 - 3 shows that with a low discount rate (5 percent or less), Project B would generate a higher Net Present Value than Project A and may be considered a "better" investment.

With real discount rates in excess of 5 percent, on the other hand, the Net Present Value associated with Project A would be greater, *suggesting* that Project A is a better investment. This obviously has important implications for all Managing Authorities, in particular for comparisons across modes.

The following table presents the impact of financial and economic ratio from discount rates point of view.

Table 5 - 3 Impact of financial and economic ratio

	Investment Value - EUR	Financial Discount Rate	FRR/C after Community assistance	FRR/K after Community assistance	Funding Gap	Social Discount Rate	ERR
Water/ wastewater projects							
Project 1	83.405.799	5%	-0,41%	-0,36%	91,95%	5,50%	18,30%
	83.405.799	6%	-0,24%	-0,02%	93,01%	6,00%	18,30%
Project 2	61.093.460	5%	0,83%	0,38%	92,11%	5,50%	18,30%
	61.093.460	6%	1,06%	0,73%	93,70%	6,00%	18,30%
Project 3	88.154.975	5%	0,80%	-0,54%	92,80%	5,50%	22,80%
	88.154.975	6%	0,28%	-0,17%	94,08%	6,00%	22,80%
Solid Waste Management							

Project 1	22.804.624	5%	1,80%	0,00%	90,49%	5,50%	16,10%
	22.804.624	6%	2,20%	1,00%	92,34%	6,00%	16,10%
Project 2	51.525.596	5%	2,90%	2,80%	72,60%	5,50%	15,80%
	51.525.596	6%	3,40%	3,30%	77,10%	6,00%	15,80%
Project 3	39.737.172	5%	1,70%	1,30%	93,56%	5,50%	16,50%
	39.737.172	6%	2,00%	1,60%	95,99%	6,00%	16,50%

In summary, what can we learn from these two examples?

■ A higher discount rate will reduce the present value of benefits (and costs) arising late in the planning horizon;

■ Under exponential discounting, benefits (and costs) occurring in later years may be reduced *considerably;*

■ Changes in the discount rate may alter the relative ranking of projects (plans or actions) whose effects arise differently over time; and

Other things being equal, a higher discount rate will tend to penalize projects (plans or actions) whose benefits arise relatively late.

Discount rate changes always receive considerable attention in financial markets. Two hypotheses compete to explain financial market reactions: the direct 'borrowing cost effect' and the announcement effect.

The link between the discount rate taken into consideration in projects and the reality faced by beneficiaries is that missing or distorted market prices can lead to suboptimal investment decisions in a wide range of circumstances and for a wide range of agents, local governments, and private investors.

There are two major strands of thought. If financial market participants perceive discount rate changes as signalling a switch in the future stance of monetary policy, they may alter expectations about future economic conditions and thus affect the demand for credit. An alternative view, suggested by Friedman (1959), assumes that the central bank possesses private information on the course of economic activity and may use discount rate changes to signal its predictions. For the information effect to work, markets must regard discount rate changes as conveying *new* and *useful* information. Once this line of thought is accepted, it follows that the effects of discount rate changes on market interest rates may vary considerably from announcement to announcement depending on their information content and on the degree to which they were anticipated or not.

The appropriate appraisal of public investment projects underlines the need to determine the social value of costs and benefits accruing from these investments. In developing countries in particular, social values may diverge from market prices and values. These price distortions may be caused by market imperfections as a result of both government interventions in product and factor markets,

structural disequilibria in labour markets, and thin or missing markets. As a result of these distortions, market prices can be unreliable indicators of the real net worth of goods and services (Adhikari, 1986). Official trade policy, such as the adoption of various tariff and non-tariff trade barriers, may lead to a distorted market value of foreign exchange.

The result is a distortion in the domestic price of all tradable, but also of non-tradable which use tradable in their production. In labour markets, the equilibrium wage may be higher than the market clearing wage as a result of minimum wage laws and a union bargaining presence. In capital markets, the market interest rate may diverge from the marginal productivity of capital. For environmental externalities, there may not be any prices at all, potentially creating biases against decisions that benefit the environment, and in favour of decisions that harm the environment.

Discount rates quantify the effect of time on a project's cost and benefit values, but also have to take into account the risks regarding the project.

Financial variables that have time-varying means and variances are termed *non-stationary* and have unit roots (Harris & Sollis 2005). However, non-stationary variables may have common trends, and may form stationary linear combinations (based on equilibrium long-run relationships). *Co integration* implies a long-run co-movement between trended economic time series, meaning that there is a common equilibrium relation to which the time series have a tendency to revert. Stock markets whose indices tend to follow each other are said to be co integrated. When they are, the equity markets move in tandem, and there are no long-term gains from international diversification.

Extending co integration analysis a bit further, volatility modelling may be applied to further examine equity market integration. Moreover, it is important to ascertain whether an adverse situation in one equity market actually spills over into another equity market. *Volatility* refers to the riskiness of stock prices and is an important determinant of the cost of capital for an investment project underlying the stock or portfolio of stocks in question. The models of conditional volatility commonly used in finance imply that there may be predictable patterns in stock market volatility. Such models imply that investors can predict risk, thereby assisting in investment decisions. Where an investor has forecast future prices to be volatile, they might opt to leave the market or require a much higher premium.

Ideally, project-specific parameters should be estimated for each individual project because the opportunity costs of the resources used or produced may differ from project to project, due to the specific characteristics of each project. This can be applied, for example, to aspects of urban planning. The economic value of an urban housing project for lower-income residents may be higher if it is located near environmentally beneficial features (such as parks) and public amenities (such as schools and taxi ranks), compared with one located near environmental hazards or far from public amenities. However, in the context of public finances, in many cases the necessity for the controlling of the public financial resources can become a barrier for the applicability of the theoretical issues regarding the connection between discount rates and risks (see, also, for a development, Chapter 3.4). Thus, accepting the use of different discount rates - different from project to project - can create agency problems, affecting the points of view of some analysts, which can adapt their discount rates in order to obtain public financial resources. As long discount rates are very subjective indicators (see Chapter 3), these persons can justify in an incorrect manner higher or lower levels for discount rates, which can determine an inappropriate estimation of NPV. As result, even the variability of discount rates from

project to project can be accepted from a theoretical point of view, their approval should be given cautiously. However, **it can be considered the principle that, for very important projects and with a sounded justification, can be considered an allowance for a modification of the recommended level of social and financial discount rates taking into account the risks, according to the principle "higher the risk is, higher has to be the discount rate".**

The next chapter presents a suggested approach for Romanian socio-economic context in order to estimate the financial and social discount rates.

6. Financial and social discount rates: Suggested approach

6.1   DIFFERENT APPROACH FOR PUBLIC AND PRIVATE SECTORS AS REGARDS THE DISCOUNT RATES

The discount rate is one of the crucial elements in any project appraisal procedure. The procedure of discounting reflects the opportunities that are lost because of involving resources in the planned investments. Any small change in the level of the rate affects substantially the present value of the investment and influences the decision to implement or reject the project, especially in case of very long term effects opposing immediate expenditures. The rise of the discount rate from 1% to 2% reduces the present value of 1 000 000 obtained after 100 years by almost 63% (from 369 711 to 138 033).

The question of what the exact level of discount rate should be chosen is therefore vital for the outcome of the long term project analysis. The issue is complicated additionally by various assumptions considering decision criteria that can be applied for the appraisal procedure. While in the short perspective, where all costs and benefits accrue to the investor, the effectiveness criterion is sufficient and the discount rate is a necessary measure of forgone investment opportunities, when the time span extends to other generations, the definition of the discount rate changes significantly. The rate becomes the reflection of future generation importance at the moment when the investment decision is being taken.

Whether public sector projects should be discounted at a lower rate than private sector projects is a highly contentious issue and one that has spawned an enormous literature. The purpose is to assess the appropriate private and public sector discount rates in the context of cohesion and structural funded projects. It is shown that there are powerful arguments for using a higher rate to discount private projects than public sector projects and that failure to recognise this may lead to excessive reliance on public provision. It is important to emphasise, however, that the reason for the divergence is not related to the conventional arguments of incomplete markets or taxation. Finally, we suggest that the results may have far broader implications for private and public sectors.

There are powerful arguments for using a higher rate to discount private projects than public sector projects starting with the financing costs. The standard practice of using similar discount rates for private and public provision in tests between public sector and Private/PPPs is inappropriate especially in the current economy changes and global downturns. Lower discount rates should be used for the public sector than the private sector that bears higher risks. Failure to do so will suggest that private provision is less efficient than public since the present value of private provision will be overestimated relative to public. It is important to emphasise, however, that the reason for the divergence between private sector and public sector discount rates is not related to the normal arguments in the literature. Even in a world of complete capital markets and no distortional taxation it is still appropriate to use a higher discount rate for the Private/PPP than the public sector equivalent. For example, this is a consequence of comparing the costs to the government of the two alternatives. This difference would disappear if the government would chose to assess PPP by their costs of construction and maintenance not the cost of the contract for providing services to the public sector. Clearly, there are good reasons why this does not happen but the consequences for discount rates need to be recognised.

Failure to recognise this difference between public and private sectors is likely to prejudice private provision and favour too much public sector provision.

The financial discount rate

As a general, and quite uncontroversial, definition, the financial discount rate (FDR) is the opportunity cost of capital. As described before, opportunity cost means that when we use capital in one project we sacrifice a return on another project.

Thus, we have an implicit cost when we sink capital into an investment project: the loss of income from an alternative project.

In academic literature and in practice we can find, however, differing views regarding the discount rate that should be used in the financial analysis of investment projects.

Out of the 3 approaches taken into consideration by EC in the period 2007-2013 and described in the previous sections such as:

- the first one estimates the actual (weighted average) cost of capital - WACC. The benchmark for a public project may be the real return on Government bonds (the marginal direct cost of public funds), or the long-term real interest rate on commercial loans (if the project needs private finance), or a weighted average of the two rates.
- the second approach establishes a maximum limit value for the discount rate as it considers the return lost from the best investment alternative. In other words, the alternative to the project income is not the buying back of public or private debt, but it is the return on an appropriate financial portfolio;
- the third approach is to determine a cut-off rate as a planning parameter. This implies using a simple rule-of thumb approach, i.e. a specific interest rate or a rate of return from a well-established issuer of securities in a widely traded currency, and then to apply a multiplier to this minimum benchmark. Also, World Bank and EBRD use a quite high real 10% required rate of return

We will take into account the first method at international level as the last two cannot be a reliable approach for Romania as long as the capital market is still at an early stage, having at the maximum 20 companies shortlisted on the Romanian stock exchange out of which only 10 at the maximum are analysed. Therefore, the current capital market is very volatile, not providing reliable and enough data for our analysis.

The Weighted Average Cost of Capital (WACC) approach for calculating the cost of capital is widely used and accepted. It is the method adopted by all Public Sectors historically and remains the preferred methodology of most regulators. The WACC method described detailed in chapter 3 or below in annex 4 calculates an estimate of the expected rate of return on total company assets. It can reflect the minimum return sought by investors/shareholders while in other cases investors/shareholders may set hurdle rates higher than the WACC.

We believe that the WACC approach has some weaknesses even if it is the more reliable for the case of Romania and also the simplest one, it may be misleading: the best alternative project could earn much more than the actual interest rate on public or private loans.

The WACC approach applied so far by EC is perfectly applied on both sectors when supposing that the marginal public investment should have the same return as the private one. But is not the case in Romania as the private sector bears more risks and a higher cost of capital, therefore we are proposing different discounting rates for public and private sectors.

Additionally, for the private sector we are proposing the financing cost approach respectively the borrower costs to be further detailed in the section related to discounting rates for private sector.

In fact, since 2009 various contracting authorities in Romania (as it can be seen in the previous section for the Regional Operational Programme and Sectoral Operational Programme for Competitiveness) are utilising different discounting rates such as 9% instead of 5% recommended by the EC. Unfortunately, no previous study has been made available (at the moment of this study preparation) for these changes of the financial discounting rates but based on our findings we believe these changes have been based on the reference interest rates available at that time only.

Also, as the discount rates are given at EUR level, we need to be careful when using in the project preparation the local currency that bears other risks (such as: exchange rate etc).

The social discount rate

The discount rate in the economic analysis of investment projects - the social discount rate – should reflect the social view on how future benefits and costs are to be valued against present ones. It may differ from the financial rate of return because of market failures in financial markets.

The main theoretical approaches are the following:

− a traditional view proposes that marginal public investment should have the same return as the private one, as public projects can displace private projects;

− another approach is to derive the social discount rate from the predicted long-term growth in the economy, as further explained below in the social time preference approach;

− a third, more recent approach, and one that is especially relevant in the appraisal of very long-term projects, is based on the application of variable rates over time. This approach involves decreasing marginal discount rates over time and is designed to give more weight to project impacts on future generations. These decreasing rates help mitigate the so-called 'exponential effect' from the structure of discount factors, which almost cancels more distant economic.

In the Annex 5 these approaches are presented in a more detailed manner. In practice a shortcut solution is to consider a standard cut-off benchmark rate. The aim here is to set a required rate of return that broadly reflects the social planner's objectives. Still, consensus is growing around the social time preference rate (STPR) approach. This approach is based on the long term rate of growth in the economy and considers the preference for benefits over time, taking into account the expectation of increased income, or consumption, or public expenditure. An approximate and generally used formula for estimating the social discount rate from the growth rate can be expressed as follows:

$$r = eg + p$$

where r is the real social discount rate of public funds expressed in an appropriate currency (e.g. Euro); g is the growth rate of public expenditure; e is the elasticity of marginal social welfare with respect to public expenditure, and p is a rate of pure time preference.

The pure inter-temporal preference reflects consumer's impatience or, more generally, the present value attributed to a future marginal utility. The utilitarian part measures the utility reduction of a marginal Euro caused by increases in real income. This means that in a developing economy where future consumption will be plentiful compared to the present level, individuals will require more compensation for postponing consumption. The social rate of time preference represents, in fact, the minimum return that individuals demand for giving up some of their current consumption in exchange for additional consumption in the future.

All the values in the formula are country specific, especially those of consumption growth (g) that depends directly on GDP, which is quite different across the 27 Member States as it can be seen in Annex 3 Table 2 – GDP real rate of growth (EU 27). Social and individual preferences affect the marginal, due to the fact that all the parameters used to determine social discount rate are generally applicable to both the private and public sector.

6.2   PROPOSED LEVEL AND RECOMMENDATIONS FOR DISCOUNT RATE ESTIMATION

Financial Discount Rate

Public projects – proposed financial discount rate

As previously approached by the CE for the period 2007 – 2013, Table 6 - 1 at international level shows some estimates for real rates of return on financial assets as a starting point for the choice of the financial discount rate for the public sector. We can then think that non-marginal investors and experienced professionals are able to obtain higher than average returns. Supposing project proposers are experienced investors, then a rate of return marginally higher than the mean of the values in the table will better fit our requirements.

Table 6 - 1 Indicative estimates for the long-term annual financial rate of return on securities

	Real annual return estimate %	nominal annual return estimate %
Large-cap stocks: per year	7,40%	10,10%
Mid/small-cap stocks: per year	8,70%	11,40%
International stocks: per year	7,40%	10,10%
Bonds: per year	3,60%	6,30%
Cash investments:	2,40%	5,10%

Inflation	2,70%	
Simple average*	**5,90%**	

A weighted average of these rates, according to the relative significance of the various assets in a 'typical portfolio', might be more appropriate than a simple un-weighted average. This should be estimated country by country.

Source: http://www.schwab.com/public/schwab/planning

As mentioned before, relating to the capital market, due to the lack of data at Romania level, the table above cannot be done including local data but international as reference values. Therefore, this approach is much more realistic as Romania has planned to enter euro zone starting 2015 than taking into consideration insufficient or not reliable data.

As we have learned from the recent market downturn, it is impossible to predict your investment returns with absolute certainty. However, as a guide, a 2009 study by the Schwab Centre for Financial Research estimated the expected average annual returns for long-term investments (20 years or more).

One important caveat to this data: these estimates are only expected averages—actual returns can vary widely in any given year. The greater the potential return, the greater the risk. For example, in the 10 years from 1999-2008, historical annual returns included the following highs and lows.

   Large-cap stocks: 28.7% and -37.0%

   Small-cap stocks: 47.3% and -33.8%

   International stocks: 38.6% and -43.4%

   Bonds: 11.6% and -0.8%

   Cash investments: 6.0% and 1.1%

The given inflation rate has been estimated for euro zone and taken into account for the Romanian case as well, having 2014 as streamline for entering into this zone.

Table 6 - 1 suggests that a 6% financial discount rate is marginally higher than the average value of a portfolio of different securities.

Taking into account that all the information within the table are presented at the level of 2009, having in the back the effects of the 2008 economic downturn worldwide, we are recommending a much more conservative approach for the coming period including the utilisation of a 6% discount rate for Romania (for public projects) instead of the 5% recommended one for the EU countries, Cohesion Fund beneficiaries for the current period.

During the current programming period we think that any changes to the discounting rates, either financial or social, public or private, shall be done as the allocated budgets are close to their consumption and also the programme objectives are settled having ongoing projects under preparation.

Moreover, in the case of public sector projects the financial discount rate, respectively the financial analysis, is not a relevant issue in the selection of projects but the socio-economical aspects respectively economic analysis including the social discount rate is the decision factor when financing.

Also, the cost of finance for public projects is lower than in case of private beneficiaries due the facilities offered by various commercial banks/IFIs for the co-financing part.

The most important impact of using 6% instead of 5% financial discounting rate in the case of public projects is reflected in the decrease of EU assistance which at a glance we may say is in line with allocation for the coming period 2014-2020. Of course, changing of the discount rates will affect the project cash flow and financial ratios but as previously mentioned, the financial analysis is not the one giving the green light for a project financing but it should be the socio-economic benefits.

It is important that for any decision regarding discount rates to be correlated with each contracting authority's strategy and objectives for the coming period which unfortunately were not available at the moment of the current study preparation. In fact, a suggestion to be made is that the current study shall be reviewed once the strategies for the 2014-2020 are public.

Private/PPP projects – proposed financial discount rate

In the case of projects implemented in the structure of PPP/private is possible to use higher financial value of the discount rate based on the expected profitability principle in order to reflect the higher opportunity cost capital for the private sector in consistency with the rules governing PPP/private projects.

In this case, the amount of the discount rate should be accepted by the competent institution designated in the evaluation of the project. In addition, a higher rate of the discount must be justified by the project in relation to specific project, by providing, where possible, evidence the private investor's similar project.

Consequences in the distant future—such as those from climate change—have little value today when discounted using conventional rates. This result contradicts our ''gut feeling'' about such problems and often leads to ad hoc application of lower rates for valuations over longer horizons— a step facilitated by confusion and disagreement over the correct rate even over short horizons.

Correlated changes in future rates imply that the distant future should be discounted at much lower rates than suggested by the current rate, thereby raising the value of future consequences. Uncertainty about future rates reduces the ratio of valuations based on alternate choices of the current rate.

When we consider horizons longer than a few decades, however, we run into trouble. Few markets exist for assets with maturities exceeding 30 years, making the interest rate beyond that horizon highly uncertain. This uncertainty can have important consequences for the valuation of distant benefits.

We find significant empirical evidence that historical rates are indeed uncertain and persistent.

The traditional investment criterion used in business decisions provides another way of looking at the rationale behind discounting. In reality, 7% is approximately the real return to investment in large companies in this period.

Nowadays, as we pass over (or into) a very turbulent economic and financial environment, with high pressure on financial and banking system in general, and on commercial banks in particular, which means that all available money will be theoretically placed into non-toxic assets.

Consumption rate of interest is taken as a measure of the rate at which people trade-off their spending over time. Individuals face the option of consuming today versus forgoing such consumption, investing the money, and consuming the after-tax proceeds from the investment at some future date. The consumption rate of interest is the rate at which they can perform this shift in consumption over time.

The consumption rate of interest, however, is difficult to pin down.

It is very difficult to predict the evolution of the interest rate and consequently the evolution of discounting rate. The obvious question about the potential impact of discount rate uncertainty is how much it really matters.

The interest rate is the profit over time due to financial instruments. Changes in interest rates structure depend on reasons that are both internal and external to financial markets:

1. Different types of interest rate are linked and influence each others, so that the functioning of the financial markets and their international relationships explain a good deal of interest rate fluctuations.

2. Economic performance, perspective and expectations of potential loan receivers as well as in the overall economy play an important role.

To keep things easy, we could say that interest rates are determined in **negotiations**, which are **more or less public**, binding a **larger or narrower** number of **contravenes**, more or less depending on **publicly available benchmark rate**s.

In a sentence, interest rates are set within institutional agreements.

Central bank policy is one of the most powerful factor impacting on these agreements, for example through the instrument of **direct determination of official discount rate** or the **rate for refinancing operations**.

An increase of money offered in the interbank market by the central bank is conducive to a fall in the **interbank rate**, upon which many contracts are based.
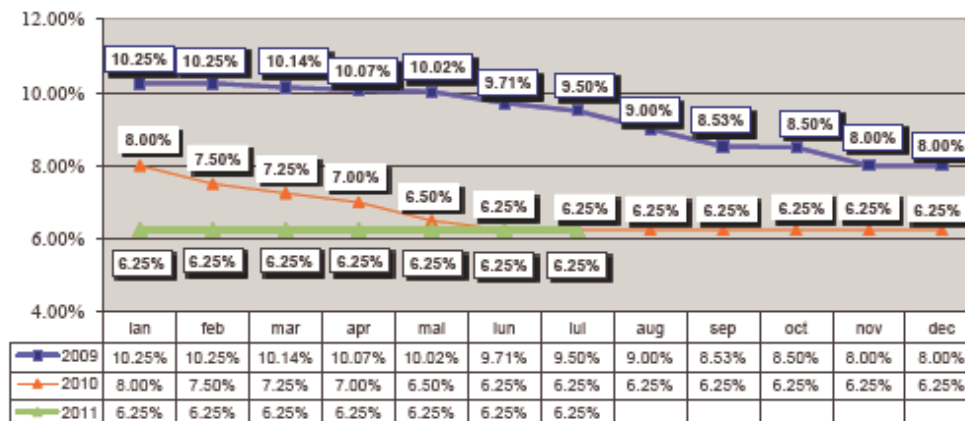
In the most recent Report issued by European Central Bank, it is emphasis that:

▪ Aggregate turnover in the euro money market increased by 15%, after three years of declines.

▪ In the unsecured market, the cash borrowing of the banks on the panel increased by 26%, while their lending contracted by 5%. Total activity (i.e. lending and borrowing combined) was concentrated in maturities of one month or less.

▪ The secured market remained the largest segment, with aggregate turnover increasing for the second year in a row (rising by 10%). This increase was driven mainly by a 24% increase in activity for the overnight maturity.

▪ The percentage of secured market transactions that were cleared by central counterparties in the second quarter of 2010 was revised upwards to 51%. This share remained broadly stable at 50% in the second quarter of 2011.

▪ All derivative segments covered by the survey showed increases in turnover in the second quarter of 2011. In percentage terms, the most significant increases were observed in cross currency swaps (where turnover increased by 68%) and overnight index swaps (where turnover increased by 42%). Turnover for foreign exchange swaps increased only slightly (rising by 1%), after being the only derivative product that did not record a decline in the second quarter of 2010 relative to previous years.

As a comment – for very short time position the interest rate is about 5%, while for medium and long term facilities banking system is not willing to support. And if willing, the price will be much higher.

However, for the coming programming period we recommend not to exceed the level of financial discount rate specified for the public sector with more than three percentages covering additional risks borne by the private/PPP projects compare to public ones, percentages given by the difference of financing costs between a public and a private/PPP project. Therefore, we should be aware that the cost for financing a private/PPP project exceeds the one related to a public one, for example the charts bellow shows the reference interest rate (Romanian National Bank) and the interest rates for some of the most important commercial banks in Romania:

Figure 6 - 1 Reference Interest Rate Romania

	Ian	feb	mar	apr	mai	Iun	Iul	aug	sep	oct	nov	dec
2009	10.25%	10.25%	10.14%	10.07%	10.02%	9.71%	9.50%	9.00%	8.53%	8.50%	8.00%	8.00%
2010	8.00%	7.50%	7.25%	7.00%	6.50%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
2011	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%					

Source: www.bnr.ro

Table 6 - 2 Evolution of interest rates for long term loans (RON - EUR) in Romania

Year	RON	EUR
2009	9% - 12%	5.9% - 6.2%
2010	10% - 12,5%	6,5% - 7,2%
2011	11% - 14%	7,2% - 9%
2012 - 2013	12% - 15%	9% - 10%

The above table presents medium figures for interests used by Romanian commercial banks for investment long term loans. The differences between the minimum and maximum interest rate for each year represent average percentages for minimum and maximum interest rates used by commercial banks for long term loans, taking into account the reliability of the client, history of credit, offered guaranties, etc.

As it can be seen, the historical tendency for the last 2 years is the rise of interest rates for both loans in Euros and in Lei. This is the direct result of the rise of EURIBOR (which for 2011 is predicted to double from the level of 2010).

Also, for the next period (2012 - 2013), the cost of loaning is expected to rise because of the ongoing financial crisis in the European Union and the expected increase of EURIBOR. These foresights do not take into account disastrous scenarios like the collapse of the European Union or the default of important member states like Italy and Spain or the USA for example.

Figure 6 - 2 Evolution of average interest rates for long term loans in Romania
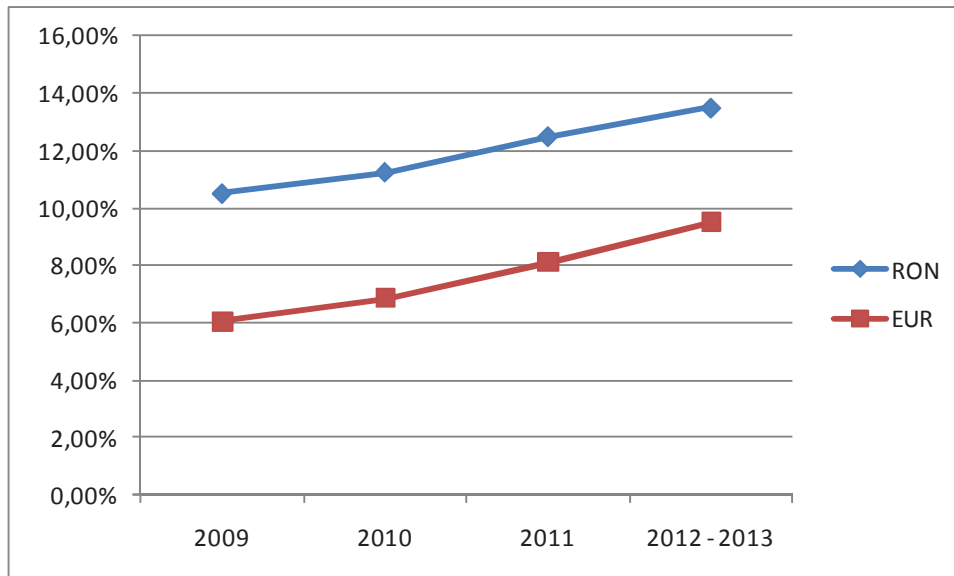
All these being said, and in a conservative manner, we are proposing for the period 2014-2020 the changing of the 5% as recommended by the CE (for the current period) into 9%, as actually used by certain contracting authorities for private projects.

Another approach for the private sector giving us the same 9% proposed bellow is setting the economic performance of companies for each type of sectors as a threshold for internal rate of financial return in investment projects under various type of financing (financial discount rate equal rate of profitability).

According to Business Survey, June 2011 National Bank of Romania, the economic performance of industrial companies will record a possible upgrading, but of low intensity, while the positive balance of opinion, although more than two times higher levels in previous month, remains moderate (8 %). In construction, the indicator will maintain its upward trajectory (short term: 35 %). It is not anticipated profitability rate variations according to 58 % of the total respondents in the industry fields and 53 % of all construction companies.

Figure 6 - 3 Profitability rate estimations
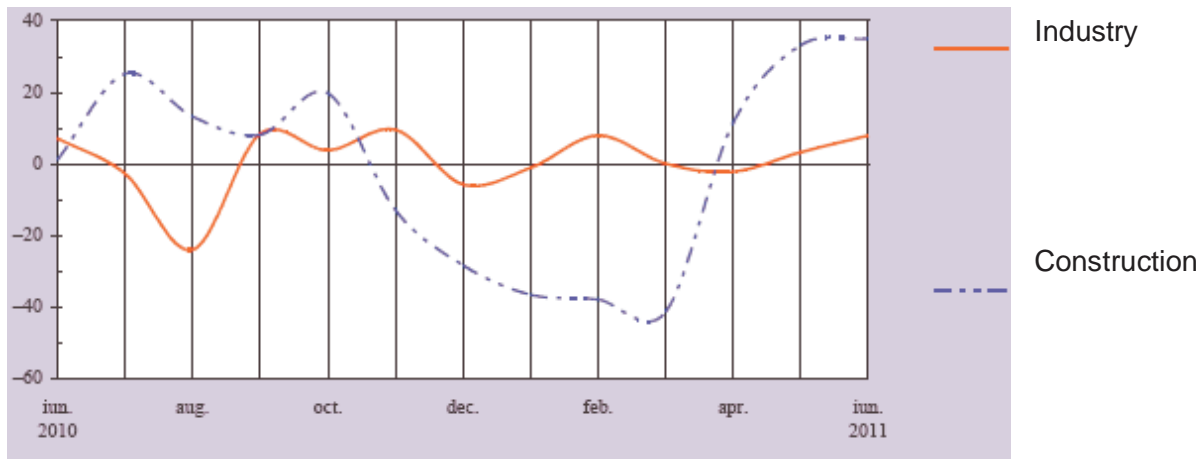
Source: BNR

A favourable trend is expected especially in the transport industry, industry construction materials and mining sector (short term balance between 47 and 62 %), the opposite hovering printing activity of reproduction of recorded media (short term: -98 %) and, to a small industry, oil processing, coking coal and nuclear fuel processing and production activity, transport and distribution of electricity and heat, gas and hot water (for the last two branches balances were -35, -25 % respectively).

Profitability rate will not change at least 78 percent of the total number of companies in the Manufacture of computers and radios, TV, wood processing industry, chemical industry, rubber and plastics processing industry and textile, garments, leather goods and footwear.

Taking into account all aspects mentioned above and the fact that most of the private companies as beneficiaries of European funds (both the Regional Operational Programme and Sectoral Operational Programme –Increase of Economic Competitiveness) we can appreciate an appropriate financial discount rate of at least 9%. However, this approach involves carrying out studies quarterly / semester on profitable companies for making a closer picture to reality in the discount rate, although the socio-economic world presents significant fluctuations in all sectors of private business environment.

The main impact of this change has been already observed by the mentioned authorities (ROP MA and CSOP MA) in the increasing of the number of applicants, a better competitiveness and the quality of projects based on an improved access to financing the own contribution through commercial loans. As we have already described above, the decision making process in the private sector/PPP projects highly relates to the financial analysis including all financial ratios and the used financial discounting rate instead of the socio-economic one.

Socio-economic discount rate – suggested approach

Since there is no consensus as to which approach is the most appropriate for the choice of a social discount rate, it is not surprising that there are significant variations in public discount rate policies in different countries around the world.

Figure 6 - 4 Variations in public discount rate policies in different countries around the world.

COUNTRY/ AGENCY	DISCOUNT RATE	THEORETICAL BASIS
Australia	1991: 8%; current: SOC rate annually reviewed	SOC approach
Canada	10%	SOC approach
People's Republic of China	8% for short and medium term projects; lower than 8% rate for long-term projects	Weighted average approach
France	Real discount rate set since 1960; set at 8% in 1985 and 4% in 2005	1985: To keep a balance between public and private sector investment 2005: SRTP approach
Germany	1999: 4% 2004: 3%	Based on federal refinancing rate, which over the late 1990s was 6% nominal; average GDP deflator (2%) was subtracted giving 4% real
India	12%	SOC approach
Italy	5%	SRTP approach
New Zealand (Treasury)	10% as a standard rate whenever there is no other agreed sector discount rate	SOC approach
Norway	1978: 7% 1998: 3.5%	Government borrowing rate in real terms
Pakistan	12%	SOC approach
Philippines	15%	SOC approach
Spain	6% for transport; 4% for water	SRTP approach
United Kingdom	1967: 8% 1969: 10% 1978: 5% 1989: 6% 2003: 3.5% Different rates lower than 3.5% for long-term projects over 30 years	SOC approach until early 1980s; thereafter SRTP approach

Source: ERD Working Paper No. 94, Theory and Practice in the Choice of Social Discount Rate for Cost -benefit Analysis: A Survey, Juzhong Zhuang, Zhihong Liang, Tun Lin, and Franklin De Guzman, May 2007

For example, the United Kingdom recommends in The Green Book2 a current SDR of 3.5%, based on the calculation of the social time preference rate. **This rate is an update of the previous rate of 6% set in 1989. This revision is justified by the UK government because of the big changes in macroeconomic conditions of the times, including the low interest rates and the need of a major orientation to the long-term in public projects appraisal[8]**, changes which are no longer applicable because of the current economic conditions.

For appraisal investment projects (both public and private), especially for long term horizon, it is recommended to apply cost-benefit analysis which imply assessment of tangible and non-tangible costs and benefits along with social discount rate. According to international literature there are two main approaches for calculating the social discount rate, depending on the type of investment (public and private), respectively: social opportunity cost rate of capital and social time   preference rate

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[8] Social Discount Rate: A Revision, Salvador Cruz Rambaud, Maria Jose Munoz Torrecillas, 2006

STPR). The social opportunity cost rate of capital is usually identified with the real rate of return on marginal projects in the private sector xxxx. The social time preference rate is the rate of fall in the social value of consumption by the public, known as the consumption rate of interest. Cost-Benefit Analysis is more suitable for projects with long term horizon, respectively for public investments with significant economic benefits. Also, the appraisal of private projects are more focused on the financial aspects of the project then social one (financial ratios are more important for a successful investment project). In this respect we proposed the same approach as it was followed for developing the Guide to Cost-Benefit Analysis of investment projects (2008), EC, respectively a shortcut solution for both public and private investments using the STPR.

In the following part we will present the methodology of social rate of return using the STPR approach. The Ramsey formula was taken into account to establish an appropriate social discount rate (SRTP) for European countries. Also the Guide to Cost Benefit Analysis of Investment Projects, EC, 2008 indicate the same approach, which is based on the long term rate of growth in the economy and considers the preference for benefits over time, taking into account the expectation of increased income, or consumption, or public expenditure.

Following this approach and the fact that the SRTP uses values in the formula which are country specific, especially those of consumption growth and elasticity in close relation to pure time preference we will use this method in determining an appropriate social discount rate. Of course it can be argued that the SRTP method is better suited for public investment projects. Be that as it may, the fact is that social benefits are largely more important in public investments then in private ones where the accent is put on profit and financial benefits.

The next hypotheses were taken into account for determining SRTP:

- Due to data related to economic growth of Romania economy for 1980-2010 (as it can be observed in the following figure) and the irregular trend we might conclude to use 4% for g (as an average of GDP for next period). This level is also proposed by the MA for developing applications under SOP Environmental where the time horizon of the projects is around 30 years.

Figure 6 - 5 Gross domestic product, constant prices
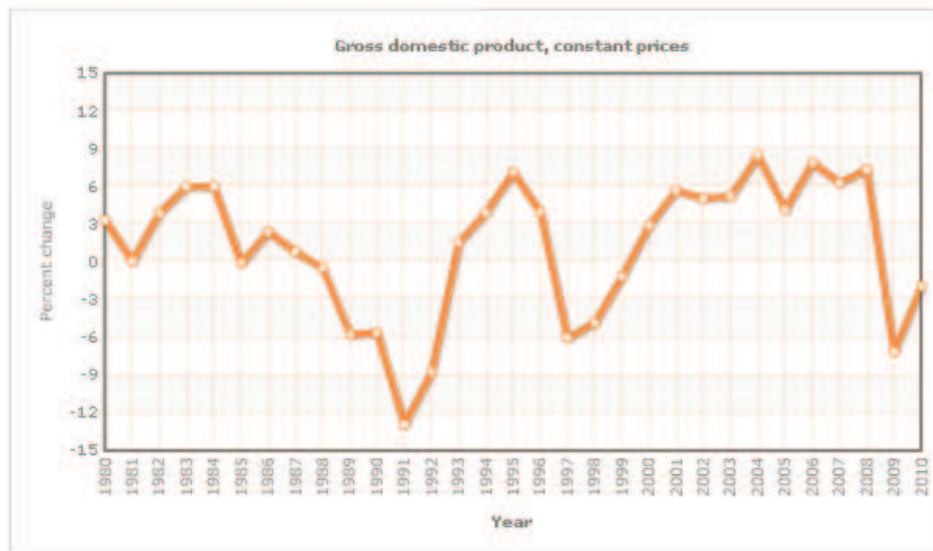
Source: *International Monetary Fund - 2010 World Economic Outlook*

- 1,25 % elasticity of marginal social welfare (the range of the marginal utility consumption over EU Members is between 1 and 2; for Romania we propose a lower level then the average due the various numbers of taxes applied on incomes)

- 1% pure time preference (according to official data the level of mortality ratio in 2010 was around 0,95%).

The results indicate about 6% for SRTP. If we reconsider annually the parameters used above we might expect at some changes of social discount rate: GDP will register a slow decrease for the next period (due the macroeconomic conditions in East - EU); the level of incomes will be preserved (due the present political decisions at national level) and level of mortality will decrease due the massive investments in public health systems. In these conditions the level of social discount rate will register a variation between 6% (as resulted in previous calculation) and 5% (if we take into account the lower values of GDP might register due the new world financial crisis which is about to occur). For social discount rate it is even more difficult to fix a standard benchmark over Romania and seems to be more appropriate for setting a range imposed by the future data. As a conclusion we propose to remain at the same level of social discount rate and update the value when the economic growth on Romania and other EU members will register a stable trend.

The next chapter presents the main conclusions of the study.

7. CONCLUSION

In conclusion, in accordance with the current situation in Romania and uncertainty for future forecasts also due to the worldwide downturn since 2008 which will affect the global economy on a longer period including the coming EC allocation 2014 – 2020 period, the lack of information at Romanian level, we believe a more conservative approach is more realistic in our case in respect with the EC recommendations relating discounting rates. Even if the requirement is that Romania shall align with the other EU member states' economy also from the discounting rates point of view, the trend being descendant (as described in the study sections), we think this can be done with small steps and in accordance with country risks and variations on certain inputs affecting these ratios.

Therefore, as it has been described since the beginning of the study starting with macroeconomic ratios and the way they are affecting these discounting rates, comparison with other EU members, defining discount rates up to the end of the study where we have proposed a different approach for public and private sectors, in the light of a better consumption of EC funds but in line with our characteristics and developments Romania may take into consideration also new financial discount rates for the coming period. Also, in our opinion, trying to modify these rates for the current period is not acceptable as long as this can modify the allocated budgets, a major part of the projects are under preparation and modifying the rules during the development process can bring important delays in the project preparations, unpredicted additional costs and later decrease of the EU funds absorption.

Regarding the economic discount rates relevant mainly in the public projects case, we think the current value shall be used for the next period as well, based on the fact that the fluctuations of the economical growth of Romania have registered values between -7% to 9%, as it was presented in the sections above. Having such fluctuations in the actual economic situation, the lack of data from the point of view of the crisis effects on the socio-economic aspects in Romania on long term, political changes and legislation it is quite difficult to fix a standard for Romania but to use the suggested one by the EC.

As the discount rates and in fact any other parameter used in the CBA shall be analysed in accordance with each developing strategy on investment sectors, we suggest that once the strategies will be made available for the coming period, these studies shall be reviewed.

As a conclusion, the present study proposed the following answers to questions presented in the Scope of Study, respectively:

- *To what extent the financial discount rate of 5% in real terms and the social discount rate of 5.5% recommended by the European Commission are applicable to the socio-economic conditions from Romania*

The levels recommended are more appropriate to socio-economic conditions to older members for EU due to different macroeconomic indicators and their variation (e.g. Negative values of GDP increase, low levels of household incomes). The present study proposes different levels of rates for next period due to Romania socio-economic context and to country risk assessment developed within.

- *What is the impact of using these discount rates over the projects financed through Structural Instruments*

The applications of investment projects through Sectoral Operational Programme require development of CBA, including the usage of different discount rates for financial and economic analysis. Also, CBA represent an important tool during appraisal and selection process. The chapter five of the study presents the impact of discount rates over the projects, respectively: a higher financial discount rate leads to a higher level of EU financial assistance; less projects approved for financing; more investment projects with economic benefits at regional levels.

- *Which is the most adequate level applicable to Romania in terms of financial and social discount rates to be used in the cost-benefit analysis*

The chapter six recommended a certain level of financial and social discount rates depending on the types of beneficiaries (public and private). The present study indicates 9% for financial discount rate at private beneficiaries' level, respectively 6% at public beneficiaries' level due to different socio-economic conditions in business environment at Romania level. Regarding social discount rate the study recommends maintaining the same level as WD no. 4 of EC indicates.

- *What is the impact of using different discount rates (different than those recommended by the European Commission) over the projects financed through Structural Instruments*

The most important issue when using different rates is increasing of EU financial assistance (especially for major projects where funding gap rate is applicable). In this respect European Commission might change the requirements for developing the applications of investment projects.

ANNEXES

ANNEX 1 – COUNTRY RISK ASSESMENT

A simple way to measure and compare country risk is given by country rating . Clei (1998) points out: "Risk specificities of ranked countries cannot be accounted for by such a uniform approach. It is thus important to consider ratings as helpful decision-making tools that must be supported by a more qualitative analysis integrating all these specificities." In the following figure there are country rating, total risk and country risk premium for EU27.

Annex 1 Figure 1 Risk premium and country rating in UE
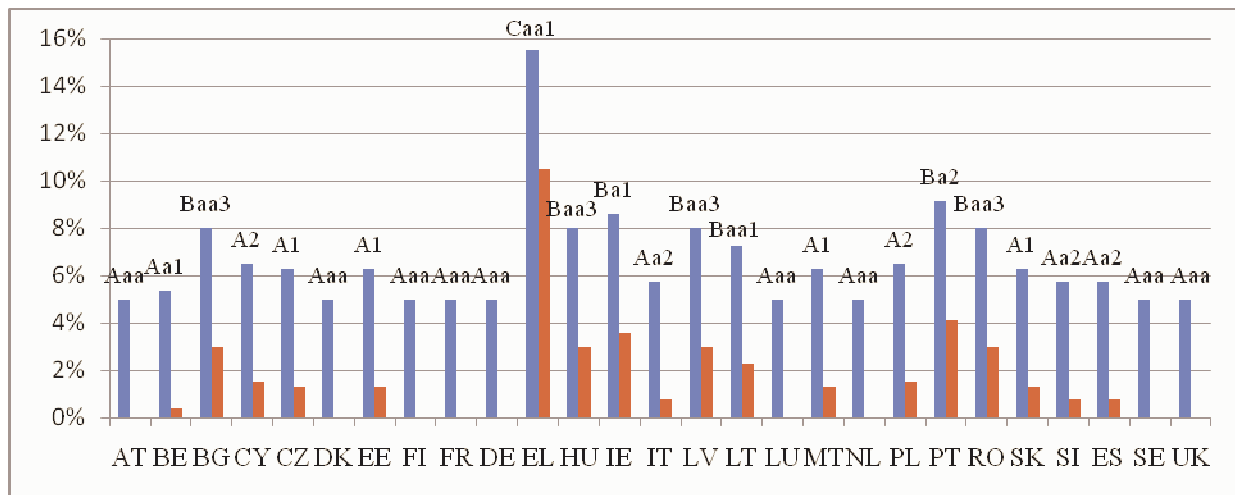
Total risk premium (blue column), country risk premium (red column)
Datasource: Damodaran (2011) "Country Default Spreads and Risk Premiums"

Romania, with a rating of Baa3 (according to Moody's rating scale, or equivalent BBB- according to Standard & Poor's and Fitch rating scale) is considered more riskier than the developed countries (AT, BE, CY, DK, FI, FR, DE, IE, IT, LU, MT, NL, PL, ES, SE, UK), even more riskier than some new member states (CZ, EE, LV, SK, SI), but less risky than EL, IE, PT (countries with serious financial problems). As a consequence of this rating, the total risk premium for Romania is 8%, and the country risk premium is 3% (the same is valid for Bulgaria, Hungary, Latvia).

These ratings provide a simple measure of country risk, but there are some inconveniences of using them as the only measure. For example, there were some debates about the "independence" of the rating agencies or, because the ratings agency focus on default risk, there might be ignored other risks that affect equity markets. A much more comprehensive measures of country risk implies the bottom-up approach, by analysing the economic fundamentals of the country.

Another approach for country risk analysis is to take into consideration the sources of risk and valuate the influence on discount rate. Considering the problem of the absence of a comprehensive theory about country risk, an exhaustive classification of the sources of risk is important. In the next table there is a sources of risks classification:

Annex 1 Table 1 Risk premium and country rating in UE

Socio-political risk			Economic risk		Natural risk
Political	Government policy	Social	Macroeconomic	Microeconomic	
Democratic or non-democratic change in the government	Change in the policy of the local authorities	Social movement intending to influence foreign business or host country policy	Any macroeconomic risk specific to the host country	Any microeconomic risk specific to the host country	Earthquake and other natural

Source: Bouchet, Clark, Groslambert (2003)" Country Risk Assessment - A Guide to Global Investment Strategy"

Country risk analysis involves examining the effects of a complex combinations of factors: macroeconomic policy, fiscal and monetary policy, capital market, structural and institutional weakness, public governance.

For emerging countries, there has to be taken into consideration the transition process, because the total risk is influenced by the country specific progress – large and small scale privatisation, restructuring of enterprises, price liberalisation and other relevant aspects of the transition. Romania, along with other former communist countries, is in the long and painful transition process. There were a lot of positive transformations, but there is still a lot of work to do. European Bank of Reconstruction and Development constructed a system of transition indicator scores in order to judge and compare country-specific progress in transition. The next table shows the evolution of transition indicators for Romania in 2000, 2005, 2009 and the values for the neighbouring countries:

Annex 1 Table 2 Transition Indicators

	Romania 2000	Romania 2005	Romania 2009	Bulgaria 2009	Moldova 2009	Ukraine 2009	Serbia 2009	Hungary 2009
Large scale privatisation	3	3,67	**3,67**	4,00	3,00	3,00	2,67	4,00
Small scale	3,67	3,67	**3,67**	4,00	4,00	4,00	3,67	4,33

privatisation								
Enterprise restructuring	2	2,33	**2,67**	2,67	2,00	2,33	2,33	3,67
Price liberalisation	4,33	4,33	**4,33**	4,33	4,00	4,00	4,00	4,33
Trade & Forex system	4,33	4,33	**4,33**	4,33	4,33	4,00	4,00	4,33
Competition Policy	2,33	2,33	**2,67**	3,00	2,33	2,33	2,00	3,33
Banking reform & interest rate liberalisation	2,67	3	**3,33**	3,67	3,00	3,00	3,00	4,00
Securities markets & non-bank financial institutions	2	2,33	**3**	3,00	2,00	2,67	2,00	4,00
Overall infrastructure reform	3	3,33	**3,33**	3,00	2,33	2,33	2,33	3,67
Telecommunications	3	3	**3,33**	3,67	3,00	2,67	2,67	4,00
Railways	4	4	**4**	3,33	2,00	2,00	2,33	3,67
Electric power	3	3,33	**3,67**	3,67	3,00	3,00	2,33	4,00
Roads	3	3	**3**	2,67	2,00	2,00	2,67	3,67
Water and waste water	3	3,33	**3,33**	3,00	2,00	2,00	1,67	4,00

Data source: European Bank for Reconstruction and Development,
http://www.ebrd.com/downloads/research/economics/macrodata/tic.xls

As the previous table shows, Romania made small steps in transition process, for most of the indicators is above Moldova, Ukraine, Serbia, Bulgaria, but below Hungary.

For 2009, Romania is characterized by the following values, and the interpretation of these transition indicators is given by EBRD:

⇨ large scale privatization: 3,67

3=More than 25 per cent of large-scale enterprise assets in private hands or in the process of being privatised (with the process having reached a stage at which the state has effectively ceded its

ownership rights), but possibly with major unresolved issues regarding corporate governance. 4=More than 50 per cent of state-owned enterprise and farm assets in private ownership and significant progress with corporate governance of these enterprises.

⇨ small-scale privatisation: 3,67

3=Comprehensive programme almost ready for implementation.
4=Complete privatisation of small companies with tradable ownership rights.

⇨ governance and enterprise restructuring: 2,67

2=Moderately tight credit and subsidy policy, but weak enforcement of bankruptcy legislation and little action taken to strengthen competition and corporate governance. 3=Significant and sustained actions to harden budget constraints and to promote corporate governance effectively (for example, privatisation combined with tight credit and subsidy policies and/or enforcement of bankruptcy legislation).

⇨ price liberalization: 4,33

4+ =Standards and performance typical of advanced industrial economies: complete price liberalisation with no price control outside housing, transport and natural monopolies.

⇨ trade and Forex system: 4,33

4+ =Standards and performance norms of advanced industrial economies: removal of most tariff barriers; membership in WTO.

⇨ competition policy: 2,67

2=Competition policy legislation and institutions set up; some reduction of entry restrictions or enforcement action on dominant firms.
3=Some enforcement actions to reduce abuse of market power and to promote a competitive environment, including break-ups of dominant conglomerates; substantial reduction of entry restrictions.

⇨ banking reform & interest rate liberalisation: 3,33

3=Substantial progress in establishment of bank solvency and of a framework for prudential supervision and regulation; full interest rate liberalisation with little preferential access to cheap refinancing; significant lending to private enterprises and significant presence of private banks. 4=Significant movement of banking laws and regulations towards BIS standards; well-functioning banking competition and effective prudential supervision; significant term lending to private enterprises; substantial financial deepening.

⇨ securities markets & non-bank financial institutions: 3

3=Substantial issuance of securities by private enterprises; establishment of independent share registries, secure clearance and settlement procedures, and some protection of minority shareholders; emergence of non-bank financial institutions (for example, investment funds, private insurance and pension funds, leasing companies) and associated regulatory framework.

⇨ telecommunications: 3,33

3=Substantial progress in commercialisation and regulation. Telecommunications and postal services fully separated; cross-subsidies reduced. Considerable liberalisation in the mobile segment and in value-added services
4=Complete commercialisation, including privatisation of the dominant operator; comprehensive regulatory and institutional reforms. Extensive liberalisation of entry.

⇨ railways: 4

4=Railways fully commercialised, with separate internal profit centres for freight and passenger services. Extensive market freedoms to set tariffs and investments.

Implementation of medium-term business plans. Ancillary industries divested. Private sector participation in freight operation, ancillary services and track maintenance.

⇨ electric power: 3,67

3=Law passed providing for full-scale restructuring of industry, including vertical unbundling through account separation and set-up of regulator. Some tariff reform and improvements in revenue collection. Some private sector involvement.

4=Separation of generation, transmission and distribution. Independent regulator set up. Rules for cost-reflective tariff-setting formulated and implemented. Substantial private sector involvement in distribution and/or generation. Some degree of liberalisation.

⇨ roads: 3

3=Fair degree of decentralisation and commercialisation. Regulation and resource allocation functions separated from road maintenance and operations. Level of vehicle and fuel taxes related to road use. Private companies able to provide and operate roads under negotiated commercial contracts. Private sector participation in road maintenance and/or through concessions to finance, operate and maintain parts of highway network. Limited public consultation/participation and accountability on road projects.

⇨ water and waste water: 3,33

3=Fair degree of decentralisation and commercialisation. Water utilities operate with managerial and accounting independence from municipalities, using international accounting standards and management information systems. Operating costs recovered through tariffs, with a minimum level of cross-subsidies. More detailed rules drawn up in contract documents, specifying tariff review formulae and performance standards. Private sector participation through the full concession of a major service in at least one city.

4=Large degree of decentralisation and commercialisation. Water utilities managerially independent, with cash flows – net of municipal budget transfers – that ensure financial viability. No cross-subsidies. Semi-autonomous regulatory agency able to advise and enforce tariffs and service quality. Substantial private sector participation through build-operator-transfer concessions, management contacts or asset sales in several cities.

In any country risk assessment, the quality of institutions represents a very important issue. Of course it is difficult to measure the real quality of the public institutions, but Kaufmann, Kraay, Mastruzzi (2004) constructed a set of indicators for six aspects of public governance, within the interval (-2,5; +2,5). These indicators are based on several hundred variables obtained from 31 different data sources, capturing governance perceptions reported by respondents - nongovernmental organizations, commercial business information providers, and public sector organizations worldwide – and these consist in:

⇨ voice and accountability - the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media

⇨ political stability and absence of violence - perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including political violence and terrorism,

⇨ government effectiveness - the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies,

⇨ regulatory quality - the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development,

⇨ rule of law - the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence,

⇨ control of corruption - the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Annex 1 Table 3 Governance Indicators

|	Romania 2000	Romania 2005	Romania 2009	Bulgaria 2009	Moldova 2009	Ukraine 2009	Serbia 2009	Hungary 2009
Voice and accountability	0,4	0,36	**0,46**	0,54	-0,31	-0,06	0,32	1,01
Political stability	0,02	0,22	**0,40**	0,47	-0,50	-0,27	-0,50	0,60
Government effectiveness	-0,39	-0,08	**-0,13**	0,14	-0,56	-0,77	-0,15	0,73
Regulatory quality	-0,1	0,19	**0,62**	0,63	-0,15	-0,54	-0,10	1,10
Rule of law	-0,14	-0,12	**0,10**	-0,05	-0,45	-0,73	-0,41	0,82
Control of corruption	-0,25	-0,16	**-0,13**	-0,12	-0,74	-0,90	-0,19	0,46

Data source: World Bank
http://info.worldbank.org/governance/wgi/sc_country.asp

Comparing situations 2009-2000, in Romania there were some good changes, but there are a lot to be done. The extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media (voice and accountability) had worsened in 2005 comparing with 2000, but the situation have been positively changed in 2009. The perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including political violence and terrorism (political stability and absence of violence) has improved in the last decade. The quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (government effectiveness) still have negative values, but the situation is better than it was in 2000. The ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (regulatory quality) had the most spectacular development, from -0,1 to 0,62. The extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence (rule of law) have been improved, the value for 2009 is positive. The extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (control of corruption) have been improved, but the values are still negative.

Considering the UE 27 countries, Romania is on the last position regarding voice and accountability, government effectiveness, regulatory quality, control of corruption, on the penultimate position regarding rule of law (before Bulgaria), and on the 23th place regarding political stability (before after Cyprus, United Kingdom, Greece, Spain).

Annex 1 Figure 2 Governance Indicators for UE - 2009
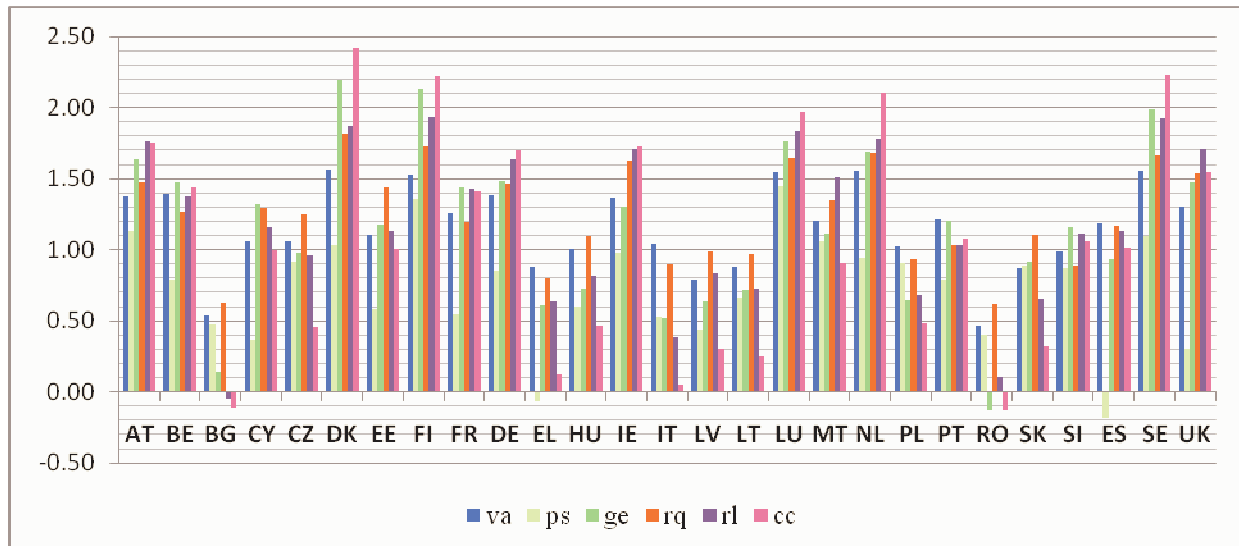
Data source: World Bank
http://info.worldbank.org/governance/wgi/sc_country.asp

The ranking for EU27 shows that the first five places are taken by
- ⇨ for voice and accountability (va): DK, SE, NL, LU, FI
- ⇨ political stability and absence of violence (ps): LU, FI, AT, SE, MT
- ⇨ government effectiveness (ge): DK, FI, SE, LU, NL
- ⇨ regulatory quality (rq): DK, FI, NL, SE, LU
- ⇨ rule of law (rl): FI, SE, DK, LU, NL
- ⇨ control of corruption (cc): DK, SE, FI, NL, LU

The ranking for EU27 shows that the last five places are taken by
- ⇨ for voice and accountability (va): LT, SK, LV, BG, RO
- ⇨ political stability and absence of violence (ps): RO, CY, UK, EL, ES
- ⇨ government effectiveness (ge): LV, EL, IT, BG, RO
- ⇨ regulatory quality (rq): IT, SI, EL, BG, RO
- ⇨ rule of law (rl): SK, EL, IT, RO, BG
- ⇨ control of corruption (cc): LT, EL, IT, BG, RO

Another important aspect that has to be considered in a country risk assessment is the corruption. This aspect is impossible to measure, but the perception of it could be surprised by a specific survey. Since 1995, Transparency International has published each year the corruption perception index (CPI), ranking countries on a scale from 0 (perceived to be highly corrupt) to 10 (perceived to have low levels of corruption). The CPI plays a critical role in branding the issue of corruption on the world's conscience, because it is seen as a powerful message and national governments have been forced to take notice and act in response.

This aspect of governance's quality places Romania on the lowest place comparing with the UE27 countries.

Annex 1 Table 4 Corruption perception Index – Romania comparing with 10 NMS and the rank in the UE27

	2000	2005	2009	2010	rank 2000	rank 2005	rank 2009	rank 2010
Bulgaria	3,5	4	3,8	3,6	22	25	25	26
Czech Republic	4,3	4,3	4,9	4,6	19	21	20	21
Estonia	5,7	6	6,6	6,5	14	16	12	12
Hungary	5,2	5	5,1	4,7	16	18	18	20
Latvia	3,4	4,2	4,5	4,3	24	24	22	22
Lithuania	4,1	4,8	4,9	5	20	20	20	19
Poland	4,1	3,4	5	5,3	20	26	19	18
Romania	2,9	3	3,8	3,7	25	27	25	25
Slovakia	3,5	4,3	4,5	4,3	22	21	22	22
Slovenia	5,5	6,1	6,6	6,4	15	15	12	13

Data source: Transparency International
http://www.transparency.org/policy_research/surveys_indices/cpi/

ANNEX 2 – DEMOGRAPHICAL ISSUES AND LABOR FORCE EVOLUTION

The total population of Romania is around 21,3 millions of persons, which places our country on the 7th place in a top 27UE, after Denmark, France, United Kingdom, Italy, Spain and Poland. There is a problem regarding the growth rate, which is negative from 1991 so far, with an average value of -0,3% for the period 1991-2000 and -0,5% for the period 2001-2010. Regarding the growth rate of the population, Romania takes the 24th place in a top 27UE, before Latvia, Lithuania, Bulgaria.

**Annex 2 Figure 1 Population annual growth rate -- average (%) UE**

Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Regarding the unemployment rate comparison for UE27 countries, Romania has an average value of 6% for the period 1991-2000 and around 7% for the period 2001-2010, and takes the 12th place in a top 27, before Portugal, Hungary, Italy, Belgium, Finland, Germany, France, Estonia, Greece, Lithuania, Latvia, Bulgaria, Spain, Poland, Slovakia. The unemployment average rate is bigger than in the previous decade, but comparing with other countries, unemployment rate doesn't represent a problem.

Annex 2 Figure 2 Unemployment rate (average annual values for the period 1991/2000, 2001/2010 and the annual values for 2008, 2010) – UE
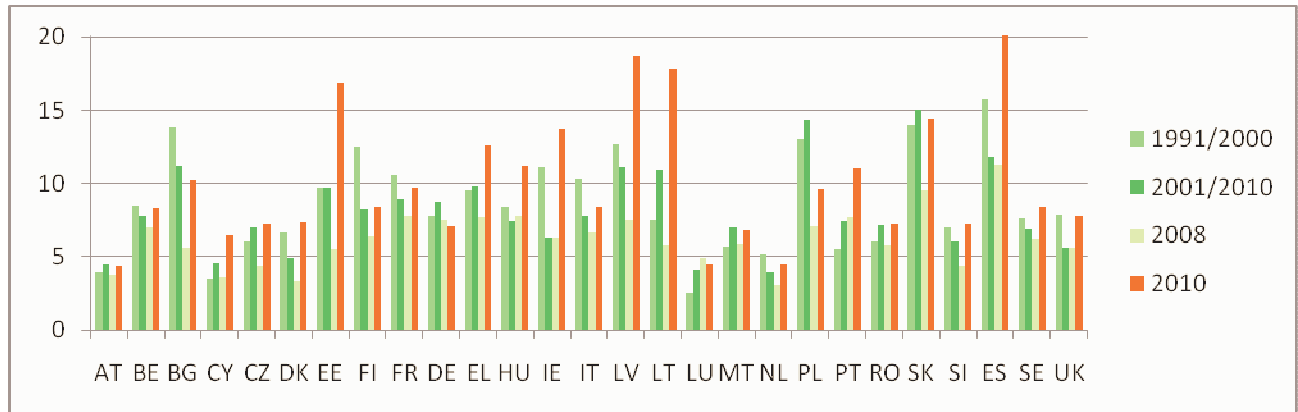
Data source: AMECO

http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

HDI

The Human Development Index (HDI) is an important indicator for country risk assessment, given that it expresses the measure of life expectancy, literacy, education and standards of living for countries worldwide. The ranking for 2010 contains for the first 5 positions IE, NL, DE, SE, FR and for the last 5 positions PT, LT, LV, RO, BG.

The problem for Romania is coming from the age structure of the population – the population of 65 years and over increased for the last 10 years, while the population of 15-64 years and above 14 years decreased.

Annex 2 Table 1 Evolution of the main indicators of labour force

	2008	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*
Active population (ths)	9.150,4	9.120,1	9038	9078	9168	9.290	9415
activity rate (%)	42,6	42,5	42,2	42,4	42,9	43,6	44,3
growth rate (%)	0,6	-0,3	-0,9	0,4	01	1,3	1,3
Occupied population (ths)	8.747,0	8.410,7	8.411	8.578	8.708	8.845	8.995
occupied rate (%)	40,7	39,2	39,2	40,1	40,8	41,5	42,3
growth rate (%)	0,2	-3,8	00	02	1,5	1,6	1,7
Employees (ths)	5.232,7	4.879,5	4.776	4.825	4.880	4.940	5.010
growth rate (%)	1,4	-6,8	-2,1	01	1,1	1,2	1,4
Unemplyed persons (ths)	403,4	709,4	627	500	460	445	420
- with compensations (ths)	143,5	435,5	330	219	207	202	192

- unemployment rate %	4,4	7,8	6,9	5,5	05	4,8	4,5
The activity rate of population above 15 years	54,5	54,4	54,5	54,6	54,9	55,3	55,7
The activity rate of working age population (15- 64 years)	62,9	63,1	63,7	64,2	64,5	65,1	65,7
Employment rate of population above 15 years	51,4	50,7	50,5	51,1	51,6	52	52,5
Employment rate of population in working age (15-64 years)	59	58,6	58,8	59,9	60,4	61	61,7
Unemployment rate	5,8	6,9	7,3	6,4	6,2	6	5,8
real salary rate of growth (%)	16,5	-1,5	-3,5	-0,4	1,1	1,7	1,8

Data source: National Commision of Prognosis
http://www.cnp.ro/user/repository/prognoza_primavara_2011.pdf

Another important aspect is the quality of life, but, as any qualitative measure, is hard to commensurate. United Nations created an index of human development, used to rank countries by level of "human development" and separate "very high human development", "high human development", "medium human development", and "low human development" countries. The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education and standards of living for countries worldwide. It represents a standard means of measuring well-being. It is used to distinguish whether the country is a developed, a developing or an under-developed country, and also to measure the impact of economic policies on quality of life.

Romania occupied the final position in UE27 classification in 2000, but for the present takes the 26th place. This aspect confirms the fact that in Romania there are no long term policies for sustaining and improving life expectancy, literacy, education standard of living.

Annex 2 Figure 3 Human Development Index –EU 27

Data source: United Nations Development Programme
http://hdrstats.undp.org/en/tables/default.html

This weakness might be overcome by public financed programs for education and health and for improving the standard of living. HDI shows a standard means of measuring well-being. Used as a measure for the impact of economic policies on quality of life, it shows an improvement during the period 2000-2010.

ANNEX 3 - OVERVIEW ON ROMANIAN ECONOMY

GROSS DOMESTIC PRODUCT

Annex 3 Table 1 Nominal GDP (mil.euro) - Romania comparing with 10 NMS

	2000	2005	2009	2010	2011	2012
BG	13704,3	21882,3	34932,8	36033,5		
CZ	61495,2	100190,1	137161,5	145937,8	157590,6	165700,8
EE	6159,8	11181,7	13860,8	14500,9	15537	16441,6
LV	8495,6	13012,2	18538,7	17970,8	18809,3	19765,7
LT	12377,3	20870,1	26507,7	27410,2	28677,4	30336,8
HU	51320,2	88645,8	92941,6	98445,8	105552	111426,6
PL	185713,8	244420,1	310485,5	353664,6	384344,9	411532,6
RO	40651,3	79801,9	117457,4	121941,2	128432,3	140195

| SI | 21434,8 | 28758,2 | 35384,4 | 36061 | 37199,6 | 38767 |
| SK | 22029 | 38462,4 | 63050,7 | 65905,5 | 69742,9 | 74306,5 |

Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

The total nominal Gross Domestic Product for the period 2000-2010 increases by 200%, with an average of 11% per year, but this is difficult to interpret as long as it is in current prices. The nominal growth rate of GDP in Romania has the minimum value in 2009 (-15,96%) and the maximum value in 2005 (30,69%), which shows the effects of the business cycle. A more realistic comparison between countries is done by considering the GDP per capita values.

Annex 3 Figure 1 GDP per capita (ths. euro) - Romania comparing with EU27
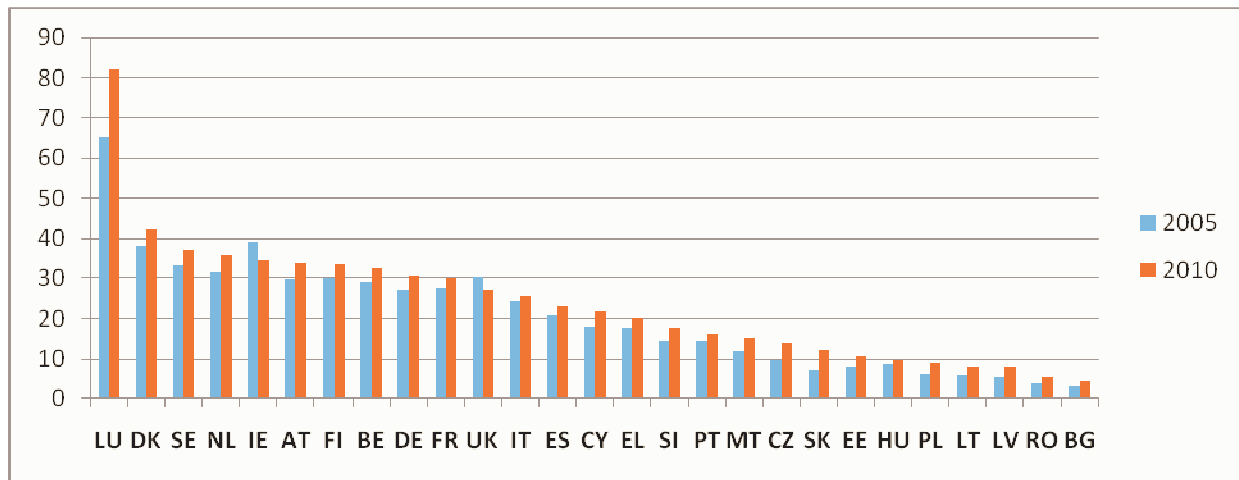
Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

GDP per capita indicates the weak position of Romania comparing with the 10 NMS: the final 7 places in the 2010 hierarchy are occupied by Estonia, Hungary, Poland, Lithuania, Latvia, Romania, Bulgaria, and the value for Romania represents 53% from the value for Estonia. The catching up process implies strong effort to increase GDP per capita, but the lags between countries remain substantial.

**Annex 3 Table 2 GDP real rate of growth (%) - – UE27**

	2000	2005	2009	2010	2011	2012
SE	4.5	3.2	-5.3	5.5	3.3	2.3
SK	1.4	6.7	-4.8	4	3	3.9
PL	4.3	3.6	1.7	3.8	3.9	4.2
MT	.	4.7	-3.4	3.7	2	2.2
DE	3.2	0.8	-4.7	3.6	2.2	2
LU	8.4	5.4	-3.6	3.5	2.8	3.2
EE	10	9.4	-13.9	3.1	4.4	3.5
FI	5.3	2.9	-8.2	3.1	2.9	2.3
CZ	3.6	6.3	-4.1	2.4	2.3	3.1
BE	3.7	1.7	-2.8	2.1	1.8	2
DK	3.5	2.4	-5.2	2.1	1.9	1.8
AT	3.7	2.5	-3.9	2	1.7	2.1
NL	3.9	2	-3.9	1.8	1.5	1.7
FR	3.9	1.9	-2.6	1.6	1.6	1.8
IT	3.7	0.7	-5.2	1.3	1.1	1.4
LT	3.3	7.8	-14.7	1.3	2.8	3.2
PT	3.9	0.8	-2.5	1.3	-1	0.8
UK	3.9	2.2	-4.9	1.3	2.2	2.5
HU	4.9	3.2	-6.7	1.2	2.8	3.2
SI	4.4	4.5	-8.1	1.2	1.9	2.6
CY	5	3.9	-1.7	1	1.5	2.2
BG	5.7	6.4	-5.5	0.2	2.6	3.8
ES	5	3.6	-3.7	-0.1	0.7	1.7
LV	6.9	10.6	-18	-0.3	3.3	4
IE	9.7	6	-7.6	-1	0.9	1.9
RO	2.4	4.2	-7.1	-1.3	1.5	3.8
EL	4,5	2,3	-2	-4,5	-3	1,1

Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

The GDP growth rate is a better measure of the economy's development because it doesn't contain the inflation effects. All of the 10NMS except Poland, obtained negative real growth rate in 2009, which shows the economies' vulnerabilities in the context of financial and economic crisis. 2010 demonstrates again that Romania has real economic problems and the recovery plan has negative and serious consequences – the value of real GDP growth rate (-1,3%) puts Romania on final positions in a EU27 ranking, before Greece (-4,5%), but after Ireland (-1%), Latvia (-0,3%), Spain (-0,1%), Bulgaria (0,2%).

**Annex 3 Figure 2 Evolution of GDP in Romania – GDP per capita (ths EUR) and real growth rate of GDP (%)**
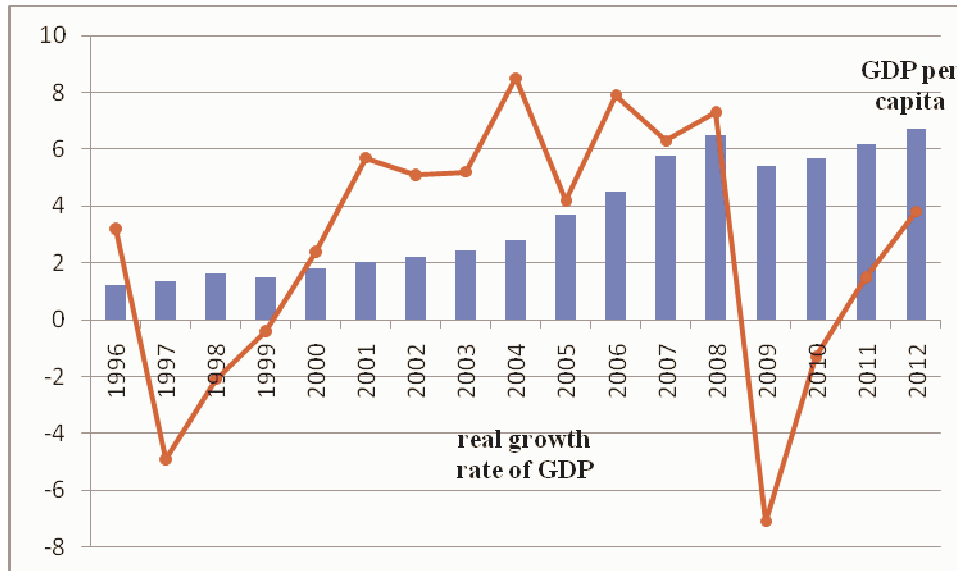
Data source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

The structure of GDP reveals the real problems and solutions of the economy. The sharp decline in 2009 was the consequence of the strong decrease of constructions, agriculture and services. On the other hand, in 2010 the real GDP growth rate was „saved" by industry, constructions remaining a sector with negative growth rate. For the next years, there is the prognosis of NCP which consists in positive real growth rate for GDP, the recovery process being sustained by constructions, industry and services.

Final consumption registered a strong decrease in 2009, based on sharp decrease of household consumption, the adjustment for public administration consumption was delayed by one year lag. Also gross fixed capital formation was sharply decreasing in 2009 and 2010, with negative and strong consequences on future economic development. The shocks for GDP growth rate were also coming from trade balance – exports were decreasing in 2009, the same being valid for imports, due to the final consumption decline.

Annex 3 Figure 3 GDP structure
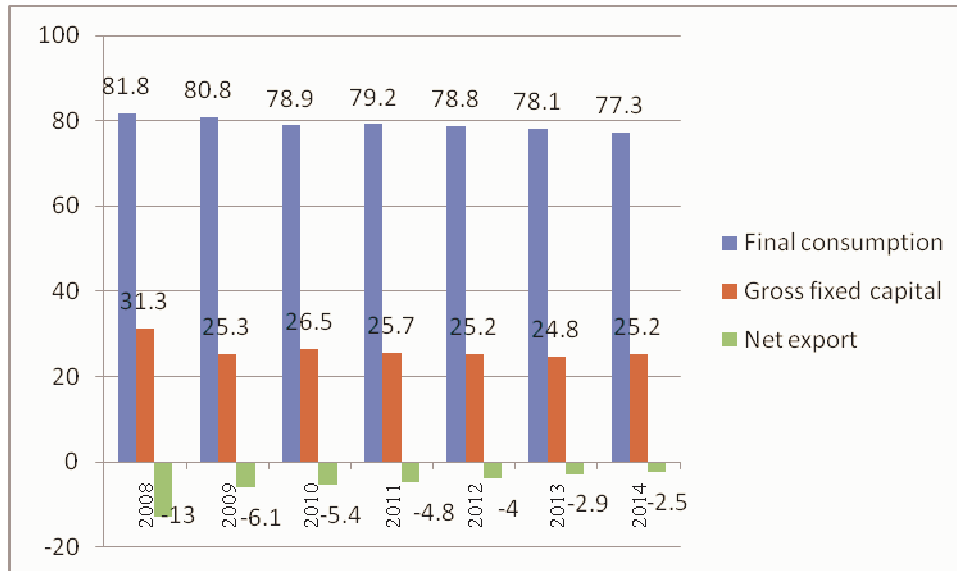
Data source: National Commision of Prognosis
http://www.cnp.ro/user/repository/prognoza_primavara_2011.pdf

ANNEX 4 THE WACC METHOD

The WACC method estimates the corporation's cost of capital by combining the return on debt and equity of a Public Sector Companies, weighting these returns by the total value of debt and equity held. The formulation of the WACC outlined below has been chosen to incorporate the effects of taxation and the regime of dividend imputation.

The preferred method for calculating WACC is as follows:

Post-tax WACC = Rd*(1-T)*(D/V) + Re*[(1-T)/(1-T(1-γ))] * E/V

Where:

Rd = Cost of Debt

Re = Return on equity

D = Debt based on target capital structure

E = Equity based on target capital structure

V = Total capital employed

γ = Gamma - Proportion of imputation credits that can be used by shareholders

T = Tax collected at the company level

The post-tax WACC is to be applied to modelled nominal income before interest expense and depreciation, but after income taxation equivalents (excluding interest). Where it is not practical to

model taxation cash flows, it is acceptable to apply the post-tax WACC to nominal income before interest expense less taxation equivalents (excluding interest) applied at the statutory rate.

A WACC should be calculated for each key business activity, with different risk profile, within the Group.

The return on equity is the annual rate of return an investor expects to earn on their investment in a corporation for the risk to which it is exposed.

It is recommended the Capital Asset Pricing Model (CAPM) be adopted for use by Public Sector Companies for the purpose of deriving the WACC. The CAPM is one of the most widely used and simplest methods for estimating the expected return on equity.

CAPM

The CAPM states that a firm's cost of equity capital is equal to the risk free rate of return on the market, plus a premium above the risk free rate, to reflect the relative riskiness of the investment.

The CAPM can be expressed as:

$Re = Rf + \beta (Rm - Rf)$

Where:

Re = Return on equity

Rf = Risk free rate of return

Rm = Market rate of return

βe = Equity beta measures the correlation between the asset's risk and the overall market

The CAPM provides an estimation only of the rate of return an investor expects. It is not an actual measure. Preferred values/methodologies to be adopted in the calculation of the CAPM parameters are outlined below.

The market risk free rate of return is the return an investor could reasonably expect if they invested their money in a riskless investment. As the market rarely offers a riskless investment, a proxy for the risk free rate is applied. Most commonly, the return that investors can receive on government bonds is used as a proxy.

When a WACC measure is calculated to assess an investment proposal, the term to maturity associated with the risk free rate should reflect the project life or the useful life of the assets. Many of these timeframes however, are considerably longer than the terms to maturity available in the bond market. Accordingly, the most frequently traded (i.e. most liquid) government bond with the longest possible term to maturity should be used to determine the risk free rate.

The majority of Public Sector Companies might use the 10 year Government Bond rate as the risk free rate. Some of them use the rate at a specific point in time while others take the average rate over varying time periods.

The market risk premium is the rate of return earned on a well-diversified portfolio of assets over the risk free rate. The market risk premium is scaled (using CAPM) measuring the risk of the asset relative to a market index.

The scaling factor Beta (β) to be applied to the risk premium, measures the volatility of the security under examination, relative to other market securities. If the security is more volatile than the market average, then the beta to be applied is greater than one. The beta for a company is calculated using regression analysis. For Public Sector Companies however, as they do not trade on the market, a comparative measure must be derived. Typically a beta is used which reflects betas of listed companies similar to the unlisted entity.

The beta value is the key sensitivity in the CAPM calculation, see also sample table bellow for Beta Risks calculation. Therefore, identifying a company or group of companies for comparative purposes, especially in the case of a Public Sector Company, can be challenging. Ideally, the chosen comparative companies should be listed companies whose financial structure and industry environment reflect that of the Public Sector. Given the changing nature of the market environment it may be necessary to make comparisons with international companies, although caution should be used as market volatility and performance can vary substantially to Romania.

The equity beta (βe) is the beta which is observed in the market place. When using comparative companies the difference in leverage of the companies has to be considered. It is necessary to remove these differences in financial risk (gearing/leverage) by 'de-levering' the betas of the comparable companies to obtain their business risk. The beta with financial risk removed is referred to as the asset beta (βa).

To 'de-lever' an equity beta into an asset beta, it is preferred that Public Sector Companies use the formula outlined below:

âa = âe /(1+(1-T)*(D/E))

where

D = the market value of debt of the comparable companies

E = the market value of equity of the comparable companies

T = the effective tax rate

To 're-lever' the asset beta to calculate the equity beta for the GOC, the following formula should be used:

âe = âa * (1+(1-T)*(D/E))

where

D = is the value or proportion of debt of the GOC based on the target capital structure

E = is the value of proportion of equity of the GOC based on the target capital structure. The cost of debt is most commonly estimated by applying an appropriate debt margin over the risk free rate. Often, an average of industry debt risk premiums is used.

The value chosen for dividend imputation (gamma) has a significant impact on the WACC. There are conflicting views on the magnitude of gamma, with no real consensus.

When assessing investment proposals, independent commercial advice provided to Public Sector is that a value of zero should be used for dividend imputation as dividend imputation is not generally taken into account by the private sector and Public Companies competitors when determining a WACC.

Accordingly, for non-regulated assets and assets not subject to monopoly prices oversight, it is proposed all Public Companies to adopt a value of zero for gamma in calculating WACC. To the extent future academic research provides strong support for changes to this value for gamma, Public Companies will review its position.

When using the WACC formula outlined above, dividend imputation should not be reflected in the cash flows of the investment proposal evaluation.

In finance, the Beta (β) of a stock or portfolio is a number describing the relation of its returns with those of the financial market as a whole. An asset has a Beta of zero if its returns change independently of changes in the market's returns. A positive beta means that the asset's returns generally follow the market's returns, in the sense that they both tend to be above their respective averages together, or both tend to be below their respective averages together. A negative beta means that the asset's returns generally move opposite the market's returns: one will tend to be above its average when the other is below its average

Annex 4 Table 1 Beta risks

Industry Name	Number of Firms	Unlevered Beta corrected for cash	Correlation with market	Total Beta (Unlevered)
Advertising	28	1,55	36,96%	4,18
Aerospace/Defense	63	1,07	50,42%	2,13
Air Transport	40	0,95	46,24%	2,05
Apparel	48	1,32	43,32%	3,05
Auto Parts	47	1,58	44,26%	3,56
Automotive	19	0,93	57,22%	1,62
Bank	418	0,47	40,71%	1,15
Bank (Canadian)	7	0,84	73,68%	1,14
Bank (Midwest)	40	0,68	55,27%	1,23

Beverage	34	0,86	41,52%	2,07
Biotechnology	120	1,20	32,06%	3,76
Building Materials	47	0,88	44,51%	1,97
Cable TV	24	0,97	51,17%	1,89
Canadian Energy	10	0,94	75,19%	1,25
Chemical (Basic)	17	1,19	62,23%	1,91
Chemical (Diversified)	31	1,39	56,93%	2,44
Chemical (Specialty)	83	1,20	46,38%	2,58
Coal	25	1,45	65,72%	2,20
Computer Software/Svcs	247	1,12	43,66%	2,57
Computers/Peripherals	101	1,31	35,27%	3,72
Diversified Co.	111	0,76	51,88%	1,46
Drug	301	1,08	33,30%	3,24
E-Commerce	52	1,19	46,99%	2,54
Educational Services	37	0,84	34,56%	2,43
Electric Util. (Central)	23	0,46	71,97%	0,64
Electric Utility (East)	25	0,49	70,83%	0,69
Electric Utility (West)	14	0,49	72,71%	0,67
Electrical Equipment	79	1,29	47,75%	2,71
Electronics	158	1,13	36,58%	3,09
Engineering & Const	17	1,85	59,21%	3,13
Entertainment	75	1,38	38,21%	3,61
Entertainment Tech	31	1,55	41,07%	3,78
Environmental	69	0,64	34,21%	1,86
Financial Svcs. (Div.)	230	0,75	44,97%	1,67

Food Processing	109	0,74	46,71%	1,58
Foreign Electronics	9	1,23	62,91%	1,95
Funeral Services	5	0,94	57,80%	1,62
Furn/Home Furnishings	30	1,49	39,84%	3,75
Healthcare Information	26	0,96	39,64%	2,43
Heavy Truck/Equip Makers	8	1,55	47,85%	3,25
Homebuilding	24	1,05	52,10%	2,01
Hotel/Gaming	52	1,33	45,58%	2,91
Household Products	22	1,05	55,05%	1,91
Human Resources	24	1,57	47,43%	3,32
Industrial Services	137	0,86	42,03%	2,05
Information Services	26	0,98	55,53%	1,77
Insurance (Life)	31	1,44	53,89%	2,67
Insurance (Prop/Cas.)	67	0,94	60,40%	1,56
Internet	180	1,21	31,75%	3,80
Machinery	114	1,05	52,80%	1,99
Maritime	53	0,64	61,42%	1,04
Medical Services	139	0,80	38,57%	2,06
Medical Supplies	231	1,01	40,00%	2,51
Metal Fabricating	30	1,44	52,78%	2,74
Metals & Mining (Div.)	69	1,25	42,17%	2,96
Natural Gas (Div.)	32	0,99	62,82%	1,57
Natural Gas Utility	27	0,45	69,86%	0,64
Newspaper	13	1,34	43,82%	3,06
Office Equip/Supplies	24	1,19	46,26%	2,58

Oil/Gas Distribution	12	0,61	57,01%	1,07
Oilfield Svcs/Equip.	95	1,34	60,15%	2,23
Packaging & Container	27	0,85	56,67%	1,49
Paper/Forest Products	37	1,01	44,64%	2,27
Petroleum (Integrated)	23	1,12	68,00%	1,65
Petroleum (Producing)	163	1,17	45,52%	2,56
Pharmacy Services	19	0,87	51,25%	1,70
Pipeline MLPs	11	0,61	74,84%	0,81
Power	68	0,78	43,29%	1,80
Precious Metals	74	1,15	40,63%	2,84
Precision Instrument	83	1,31	42,45%	3,09
Property Management	27	0,58	50,77%	1,14
Public/Private Equity	8	1,20	53,80%	2,24
Publishing	23	0,96	45,44%	2,12
R.E.I.T.	6	1,07	53,25%	2,01
Railroad	14	1,10	70,32%	1,56
Recreation	52	1,21	42,81%	2,82
Reinsurance	8	1,09	71,04%	1,54
Restaurant	60	1,21	48,41%	2,50
Retail (Special Lines)	143	1,48	40,71%	3,64
Retail Automotive	15	1,25	61,35%	2,03
Retail Building Supply	8	0,85	60,65%	1,41
Retail Store	38	1,19	49,96%	2,37
Retail/Wholesale Food	29	0,63	52,28%	1,21
Securities Brokerage	25	0,75	61,62%	1,21

Semiconductor	115	1,68	45,34%	3,70
Semiconductor Equip	14	1,97	55,97%	3,52
Shoe	18	1,48	51,38%	2,89
Steel (General)	19	1,43	65,17%	2,20
Steel (Integrated)	13	1,43	49,36%	2,90
Telecom. Equipment	104	1,22	39,48%	3,08
Telecom. Services	85	0,84	43,67%	1,93
Telecom. Utility	28	0,66	48,97%	1,35
Thrift	181	0,74	42,64%	1,73
Tobacco	13	0,66	44,64%	1,47
Toiletries/Cosmetics	15	1,19	46,29%	2,56
Trucking	33	0,97	54,08%	1,79
Utility (Foreign)	5	0,70	69,63%	1,01
Water Utility	12	0,47	76,79%	0,61
Wireless Networking	48	1,15	46,74%	2,45
Total Market	**5928**	**0,96**	**45,08%**	**2,13**

Source: http://pages.stern.nyu.edu/~adamodar/

ANNEX 5 METHODOLOGIES FOR CALCULATING THE SOCIAL DISCOUNT RATE

Development of the Capacity for Cost-Benefit Analysis

A. Approaches to Discounting Future Benefits and Costs from economic point of view

A public investment project typically incurs costs and generates benefits at different points in time. A common practice in cost–benefit analysis, called discounting, is to express all costs and benefits in terms of their present value by assigning smaller weights to those that occur further away in the future than to those occurring more recently. Discounting, a critical step in determining whether or not a public project is socially desirable, makes costs and benefits with different time paths comparable.

There are two arguments why costs and benefits with different time profiles may not be

comparable if not properly discounted. The first is that consumers (or savers) prefer to receive the same amount of goods and services sooner rather than later. There are two standard textbook explanations for this time preference (Dasgupta and Pearce 1972). The first is that individuals expect their level of consumption to increase in the future, hence, marginal utility of consumption will diminish. With this expectation, individuals would have to be paid more than one unit in the future to compensate for sacrificing (saving) one unit of consumption now. The second explanation, which has been a subject of great controversy, is that individuals have a positive pure time preference, that is, even if levels of future consumption are not expected to change, they would still discount the future. Two reasons are often quoted in explaining the pure time preference. One is that consumers are generally "impatient" or "myopic." The other is the risk of not being alive in the future. According to these lines of reasoning, the rate to discount future benefits and costs should be the marginal social rate of time preference (SRTP), that is, the rate at which society is willing to postpone a marginal unit of current consumption in exchange for more future consumption.

The second argument for discounting future costs and benefits takes the perspective of a producer (or an investor). According to this, capital is productive and resources acquired for a particular project can be invested elsewhere, generate returns, and so have an opportunity cost. Therefore, to persuade an investor to invest in a project, the expected return from the investment should be at least as high as the opportunity cost of funding, which is the expected return from the next best investment alternative. Following this logic, the rate the investor should use in discounting benefits and costs of a project is the marginal rate of return on investment in the private sector. In the absence of market distortions, this is equivalent to the marginal social rate of return on private investment, also termed marginal social opportunity cost of capital (SOC).

In a perfectly competitive economy without distortions, prices of inputs and outputs would reflect their economic or social values. The supply and demand prices of investible funds are given by SRTP and SOC, respectively. The capital market clears at an interest rate that equates the supply of and demand for investible funds. Both SRTP and SOC are equal to the market interest rate. The market interest rate reflects marginal social opportunity cost of investible funds, which is then the appropriate social discount rate to achieve an efficient allocation of resources in the economy.

In reality, the market is often distorted due to various imperfections. A typical example of imperfection is the taxes imposed on corporate incomes and individuals' interest earnings. Other examples are risks, information asymmetry, and externalities. These imperfections create a wedge between SRTP

and SOC (with the former generally lower than the latter), and make both deviate from the market interest rate. Under such circumstances, the market interest rate will not reflect the marginal social opportunity cost of public funds, and the latter will vary depending on whether it is measured in terms of SRTP or SOC. What rate then should be used to discount future benefits and costs in cost–benefit analysis? The debate on this has been ongoing for many decades. Four alternative approaches have been put forward: (i) SRTP, (ii) SOC, (iii) weighted average approach, and (iv) shadow price of capital (SPC) approach. However, there has been no consensus on which is the most appropriate (Boardman et al. 2001). In essence, these different approaches reflect differing views on how public projects affect domestic consumption, private investment, and cost of international borrowing.

Earlier discussions on public sector discounting coincided with the rise of cost–benefit analysis in the 1960s and 1970s. In the 1990s, the choice of the social discount rate was brought up again in the context of finding a rate to discount the long-term environmental benefits and costs, such as those related to addressing climate changes and global warming. Here, the problem of choosing an appropriate discount rate is further complicated by the consideration of intergenerational equity. In the following subsections, we review in some detail how the social discount rate can be estimated under each of the four approaches, and the latest debate on how to choose a discount rate for very long-lived environmental projects.

B. Social Rate of Time Preference

The social rate of time preference is the rate at which a society is willing to postpone a unit of current consumption in exchange for more future consumption. The use of SRTP as the social discount rate, supported by Sen (1961), Marglin (1963a and b), Diamond (1968), and Kay (1972), is based on the argument that public projects displace current consumption, and streams of costs and benefits to be discounted are essentially streams of consumption goods either postponed or gained. Two alternative methods have been suggested for empirical estimation of SRTP. One is to approximate it by the after-tax rate of return on government bonds or other low-risk marketable securities. Although this is straightforward, a major concern is that individuals may not express all their preferences concerning the future in the marketplace and, even if they do, their preferences expressed as individuals may not be the same as their preferences expressed when they see themselves as part of a society. Society as a whole would have a lower rate of discount in its collective attitude than the observed market rates, which could reflect individuals' myopia (Dasgupta and Pearce 1972).

The other method is to use a formula named after the renowned British economist Frank P. Ramsey. According to Ramsey's formula derived from a growth model, SRTP is the sum of two terms: the first is a utility discount rate reflecting the pure time preference and the second is the product of two parameters—the elasticity of the marginal utility of consumption and the annual rate of growth of per capita real consumption (Ramsey 1928). The second term of the formula reflects the fact that, when consumption is expected to grow in the future, people will be less willing to save in the current period to obtain more in the future, because of diminishing marginal utility of consumption. Using the Ramsey formula to empirically estimate SRTP requires information on the utility discount rate (ρ), elasticity of marginal utility of consumption (θ), and annual rate of per capita real consumption growth (g). The choice of g is relatively straightforward while the choice of ρ and θ is more difficult, as it involves normative value judgments, and has been a subject of intense debate.

The utility discount rate, ρ, is conceptually considered as consisting of two components, one related to individuals' impatience or myopia and the other related to the risk of death or human race extinction. Many empirical studies set the first component to zero often on the ethical ground (see, for example, Kula 1984, 1987, and 2004; Cline 1992; Stern 2006). It has also been argued that considering myopia in estimating SRTP implies introducing irrationality into the decision-making process, which is inconsistent with the principle of cost–benefit analysis, i.e., to bring rationality into investment decisions (Kula 1984). The difficulty in empirically estimating this first component of pure time preference could also be a reason why many studies have ignored it. On the other hand, setting this to zero does lead to some paradoxical results. Among empirical studies that consider this to be positive, the suggested range is 0–0.5% (OXERA 2002). Scott (1977 and 1989) argues that the long-run savings behaviour in the United Kingdom (UK) is consistent with a value of 0.3–0.5% for this component of ρ. Figure 6 - 2 provides a survey of some of the empirical studies on the utility discount rate including both of its two components. The suggested range is 1–3 percent.

For the component of the utility discount rate related to the risk of not being alive in the future, the controversy is not on whether it should be considered; rather, it is on how to measure this risk. Some attempt to estimate individuals' survival probability and risk of death using death rate statistics (Kula 1984, 1987, 2004). Others argue that individuals' risk of death is not relevant to the derivation of the social time preference; what is relevant is the changing life chance for whole generations (Pearce and Ulph 1999).

The Debate on Pure Time Preference

Many argue that the positive pure time preference, which implies valuing utility of future generations less than the present generation, is ethically indefensible (Ramsey 1928, Pigou 1932, Harrod 1948, Solow 1974). Others, while admitting that ethically all generations should be treated alike, point out that a zero rate of pure time preference implies a savings rate excessively higher than what we normally observe and contradicts real world savings behaviour, leading also to other paradoxical results (Arrow 1995). There are also those who argue that the risk of death, or mortality, is a rational enough reason for positive pure time preference (Eckstein 1961). This argument, although more amenable to empirical investigation and less prone to fundamental disputes about value judgments, is also subject

to disagreement about what precise risks are being discussed (Pearce and Ulph 1999). Dasgupta and Pearce (1972) highlight the problem of considering risk-of-death time preference in calculating the social discount rate, because the social time preference relates to society, and not to an aggregate of individuals; although individuals are mortal and society is not. Among more recent empirical studies, some authors look at the increasing risk of death, or changing survival probability, for an individual as one gets older (Kula 1985, 1987, 2004; Evans and Sezer 2004). Pearce and Ulph (1999) highlight problems of this approach, and argue that when dealing with very long-lived projects, the appropriate risks are not so much the increasing probability of death of a single individual, but what is happening to the life chances of whole generations. Newbery (1992) attempts to measure this risk by estimating the perceived risk of the end of mankind in 100 years. The Green Book of the UK HM Treasury refers to this as a catastrophe risk, that is, the likelihood that there will be some events so devastating that all returns from policies, programs, or projects are eliminated, or at least radically and unpredictably altered (HM Treasury 2003). The Stern Review defines this as the risk of extinction of the human race

and argues that such risks could arise from possible shocks such as a meteorite, a nuclear war, or a devastating outbreak of some diseases.

Empirical estimates of the elasticity of marginal utility of consumption (θ) also vary from one study to another. Three different approaches have been used: direct survey methods; indirect behavioural evidence; and revealed social values (see a recent review by Evans 2005). The survey methods focus on measuring risk and inequality aversion from responses to specially designed survey questions. The indirect behavioural evidence is based on observed consumption behaviours from empirically estimated consumer demand models. The third approach in estimating θ involves inference from government behaviour revealed through spending and tax policies. A survey of empirical estimates of θ based on the three approaches indicates that its values mostly fall within the range from 1 to 2%, except for a few outliers (Figure 6 - 3). The differences suggest that the results are sensitive to model specification, level of aggregation in the data, choice of estimators, sample size, and the length of sample periods.

Annex 5 Figure 1 Empirical estimates of the utility discount rates

EMPIRICAL ESTIMATES OF THE UTILITY DISCOUNT RATE

SOURCE	EMPIRICAL ESTIMATES	THEORETICAL BASIS
Scott (1977)	1.5%	Component reflecting myopia is 0.5%, and that reflecting the changing life chance due to the risk of total destruction of a society is 1.0%
Kula (1985)	2.2%	Reflecting average annual survival probability in the UK during 1900–1975
Kula (1987)	1.2%	Reflecting average annual probability of death in the UK in 1975
Scott (1989)	1.3%	Component reflecting myopia is 0.3%, and that reflecting the changing life chance due to the risk of total destruction of a society is 1.0%
Newbery (1992)	1.0%	Perceived risk of the end of mankind in 100 years
Dynamic Integrated Model of Climate and the Economy (DICE) model (Nordhaus 1993)	3% per year	Utility discount rate reflecting pure social time preference, determined by calibrating the DICE model to match actual data
Pearce and Ulph (1995)	1.1%	Reflecting the average annual probability of death in the UK in 1991
Arrow (1995)	1%	Utility discount rate reflecting pure social time preference, and matching the observed savings behavior
OXERA (2002)	Myopia = 0–0.5% Risk of death = 1.1% with a projected change in the near future to 1.0%.	Based on previous studies and projected and recent average annual death rates in the UK
Evans and Sezer (2004)	1.0–1.5%	1% for EU countries and 1.5% for non-EU countries, reflecting catastrophe risks
Kula (2004)	1.3%	Reflecting the average annual death rate in India during 1965–1995
Evans (2006)	1%	Based on the approximate average annual death rate in 2002–2004 in 15 countries of the European Union
Stern Review (2006)	0.1%	Probability of human race extinction per year

Sources: Compiled by authors.

Source: ERD Working Paper No. 94, Theory and Practice in the Choice of Social Discount Rate for Cost -benefit Analysis: A Survey, Juzhong Zhuang, Zhihong Liang, Tun Lin, and Franklin De Guzman, May 2007

Annex 5 Figure 2 Empirical estimates of the elasticity of marginal utility of consumption

EMPIRICAL ESTIMATES OF THE ELASTICITY OF MARGINAL UTILITY OF CONSUMPTION

SOURCE	EMPIRICAL ESTIMATES	DATES
A. Survey Method		
Barsky et al. (1995)	Approximately 4.0	Reflecting risk aversion of the US middle-aged who were surveyed
Amiel et al. (1999)	0.2–0.8	Reflecting inequality aversion of US students who were surveyed
B. Indirect Behavioral Evidence		
Constant elasticity demand models		
Kula (1984)	1.56	Canada: 1954–1976 data
Kula (1984)	1.89	US: 1954–1976 data
Evans and Sezer (2002)	1.64	UK: 1967–1997 data
Evans (2004a)	1.6	UK: 1965–2001 data
Kula (2004)	1.64	India: 1965–1995 data
Evans et al. (2005)	1.6	UK: 1963–2002 data
Percoco (2006)	1.28	Italy: 1980–2004 data
Almost ideal demand system		
Blundell (1988)	1.97	UK: 1970–1984 data
Evans (2004b)	1.33	France: 1970–2001 data
Lifetime consumption model		
Blundell et al. (1994)	1.2–1.4	UK: 1970–1986 data
Quadratic almost ideal demand system		UK: 1970–1984 data
Blundell et al. (1993)	1.06	Aggregate model
	1.06–1.37	Micro models
Banks et al. (1997)	1.07	UK: 1970-1986 data
C. Revealed Social Values		
Cowell and Gardiner (1999)	1.28-1.41	UK: 1999–2000 data
Evans and Sezer (2004)	1.5	UK: 2001–2002 data
Evans (2005)	1.25-1.45	Five major OECD countries (France, Germany, Japan, UK, US): 2002–2003 data

Sources: Evans (2005); compiled by authors.

Source: ERD Working Paper No. 94, Theory and Practice in the Choice of Social Discount Rate for Cost -benefit Analysis: A Survey, Juzhong Zhuang, Zhihong Liang, Tun Lin, and Franklin De Guzman, May 2007

With estimates of ρ, θ, and g, SRTP can be calculated using the Ramsey formula. Figure 6 - 4 provides an illustration.

Annex 5 Figure 3 Estimating SRTP using the Ramsey formula

ESTIMATING SRTP USING THE RAMSEY FORMULA

Consider the following Ramsey growth model where the representative agent maximizes its life-time welfare subject to intertemporal constraints (Ramsey 1928):

$$\text{Maximize} \int_0^\infty U(c_t)\, e^{-\rho t}\, dt \tag{1}$$

$$\text{subject to } \dot{k}_t = f(k_t) - c_t \tag{2}$$

where $U(.)$ represents a time-invariant utility function with properties of $U'(.)>0$ (the marginal utility of consumption is positive) and $U''(.)<0$ (the marginal utility of consumption diminishes); ρ is a utility discount rate reflecting pure time preference; c_t is consumption at time t; $f(.)$ represents a production function; and $\dot{k}_t$ is net investment at time t.

Maximization requires

$$U'(c_t)\,f'(k_t) + U''(c_t)\,\dot{c}_t - \rho\, U'(c_t) = 0 \tag{3}$$

where $\dot{c}_t$ is change in consumption at time t. Equation (3) can be simplified to

$$r = f'(k_t) = \rho + \theta g \tag{4}$$

where r is the rate of return to savings; $\theta = -\frac{U''}{U'}c$ is the elasticity of marginal utility of consumption representing preference and is also known as the coefficient of relative risk aversion; and $g = \dot{c}_t / c_t$ is the growth rate of per capita consumption. Equation (4) is the familiar Ramsey formula, which states that households choose consumption so as to equate the rate of return to savings to the rate of pure time preference plus the rate of decrease of the marginal utility of consumption due to growing per capita consumption.

Following Evans and Sezer (2004), the rate of pure time preference ρ is assumed to be 1.5%, elasticity of marginal utility of consumption θ is assumed to be 1.3, and the average growth rate of per capita real consumption g is the average annual growth rate of per capita real GDP from 1970 to 2004 (Penn World Tables 6.1). The Ramsey formula yields the following estimates of SRTP for four selected Asian countries (see box table).

BOX TABLE
EMPIRICAL ESTIMATES OF SRTP FOR SELECTED ASIAN COUNTRIES

	ρ (%)	g (%)	θ	SRTP (%)
Indonesia	1.5	3.55	1.3	6.1
Malaysia	1.5	4.88	1.3	7.8
Singapore	1.5	4.48	1.3	7.3
Japan	1.5	2.34	1.3	4.5

Source: ERD Working Paper No. 94, Theory and Practice in the Choice of Social Discount Rate for Cost -benefit Analysis: A Survey, Juzhong Zhuang, Zhihong Liang, Tun Lin, and Franklin De Guzman, May 2007

A major criticism on using SRTP as the social discount rate is that it is purely a measure of the social opportunity cost in terms of foregone consumption and ignores the fact that public projects could displace or crowd out private sector investment if they cause the market interest rate to rise (Baumol 1968 and Harberger 1972). If additional public investment is made at the cost of displacing private investment, its marginal social opportunity cost should also reflect what the displaced private investment would otherwise bring to the society, which can be measured by the marginal social rate of

return on private sector investment (SOC). Since SRTP is generally lower than SOC because of the wedge created by market distortions such as taxes, this raises the possibility that too many low-return investments in the public sector would be undertaken when SRTP is used as the social discount rate.

C. Marginal Social Opportunity Cost of Capital

The proposal for using the marginal social opportunity cost of capital (SOC) as the social discount rate, advocated by Mishan (1967), Baumol (1968), and Diamond and Mirrlees (1971a and b), among others, is based on the argument that resources in any economy are scarce; that government and private sector compete for the same pool of funds; that public investment displaces private investment dollar by dollar; and those devoted to public sector projects could be invested in the private sector. Therefore, public investment should yield at least the same return as private investment. If not, total social welfare can be increased by reallocating resources to the private sector, which yields higher returns.

It has been suggested that SOC could be approximated by the marginal pretax rate of return on riskless private investments. A good proxy for this is the real pretax rate on top-rated corporate bonds (Moore et al. 2004). First, in theory, the marginal pretax rate of return, rather than the average rate, should be used in estimating SOC. The marginal rate of return will be lower than the average rate as rational businessmen will make their best deal first. Second, the rate of return on private investment includes premiums to compensate investors for risks that are generally higher than those for public sector investment. Third, returns on private investment as social opportunity cost of capital may also be contaminated by market distortions such as externalities and monopolistic pricing.

Estimating SOC from Yields on Corporate Bonds

Based on the method used by Boardman et al. (2001), the average annual yield on Moody's AAA long-term corporate bonds was estimated at 6.81% from January 1947 to December 2005 in the United States (US). Applying the 2004 corporate tax rate of 40% (KPMG 2004), the nominal pre-tax return on bonds was calculated at [0.0681 / (1- 0.38)] = 11.35 percent. A proxy for the expected rate of inflation is the average annual inflation rate, which was 3.78% between 1947 and 2005 in the United States.

Therefore, the real pretax rate of return on top-rated corporate bonds in the US is [(0.1135 – 0.0378) / (1+0.0378)] = 7.29%, which approximates SOC.

Dasgupta, Marglin, and Sen (1972), on the other hand, note that the argument for using SOC as the social discount rate is only justified in the context of a two-period model where the total amount of capital available for investment is fixed independently of project choice in the public sector. In this case, the public investment displaces (or crowds out) private investment dollar for dollar, and the marginal rate of return on private investment (inclusive of taxes) provides an adequate measure of SOC. But when either assumption (two-period model or fixed amount of capital) is dropped, the argument would not hold anymore. If capital needed for financing public projects is partially satisfied by consumers postponing their current consumption, the return required by consumers usually is less than the marginal rate of return on private investment; hence, the social discount rate should be lower than SOC.

D. Weighted Average Approach

Previous discussions suggest that using SRTP to discount future costs and benefits is problematic since it does not take into account impacts of public projects on funds available for private investment. Using SOC as the social discount rate, on the other hand, assumes that public investment only displaces private investment and not private consumption, which is also not always true in reality. The weighted average approach, associated with contributions by, among others, Harberger (1972), Sandmo and Drèze (1971), and Burgess (1988), attempts to reconcile the SRTP approach with that of SOC.

Proponents of the weighted average approach recognize that sources of funds available to public projects may come from displacing private investment, inducing consumers to postpone current consumption, and, in the case of an open economy, borrowing from international capital markets.

The social opportunity costs of funds from these various sources are different because of market distortions such as taxes. Thus, the social discount rate should be the weighted average of SOC, SRTP, and the cost of foreign borrowing, with weights reflecting proportions of funds obtained from their respective sources. Harberger (1972) argues that SOC may differ from one productive sector to another and SRTP could also vary among different groups of savers (reflecting, for instance, different tax brackets); therefore, SOC and SRTP themselves should be the weighted average of those of various productive sectors or saver groups. Burgess (1988) suggests that the weights depend also on the degree of complementarily or substitutability between public and private investment, but points out that the positive externalities of public investment due to its complementarily can be considered as part of benefit streams and, in that case, no adjustments to the weights are necessary.

For a closed economy, if the supply of funds is perfectly inelastic, a public sector project will displace only private investment, so the weight for SRTP will be zero and the social discount rate will be equal to SOC. If, on the other hand, the demand for funds is perfectly inelastic, a public project will only displace current consumption, the weight for SOC will be zero, and the social discount rate will be equal to SRTP. In general, it is believed that both the supply and demand of investible funds respond to changes in the market interest rate, so the social discount rate will lie somewhere between the two extremes. Harberger (1972), however, argues that the accumulated econometric evidence on investment functions clearly shows that many categories of investment are quite sensitive to changes in the interest rate, while evidence that savings are responsive to interest rate changes is only scanty. Hence, there is a reasonable presumption that the relevant weighted average will be reasonably close, if not precisely equal, to SOC.

For an open economy where capital is mobile across countries, it is expected that the domestic interest rate will be related in some way to the interest rate at which the country can borrow in the world capital market (Sandmo and Drèze 1971, Edwards 1986, Lind 1990). In the extreme case of a small open economy with perfect capital mobility, risk neutrality, pegged exchange rate (with zero expected devaluation), and an infinitely elastic supply of foreign capital, public projects will displace neither domestic consumption nor private investment. The weights for SOC and SRTP will, therefore, both be zero and the social discount rate will be equal to the international borrowing rate. However, Edwards (1986) argues that even a small economy with perfect capital mobility will face an upward-sloping supply curve of foreign capital. One justification is that a higher level of foreign indebtedness could be

related to a higher probability of default as perceived by lenders, and to a higher cost at which this particular country can borrow from the international capital market.

In this case, a public project that is (partially) financed with additional foreign debt will result in a higher rate charged on foreign loans, and perhaps, higher domestic interest rates as well since the two are linked. Therefore, a public project will be financed partially by an increase in foreign debt, and partially by an increase in private savings and a reduction in private investment. Then, in the presence of country risk premiums, the social discount rate will be a weighted average of SOC, SRTP, and the international borrowing rate inclusive of risk premiums. In another extreme, if a country faces credit rationing from abroad, the new demand for public funds will be met fully by additional domestic private savings and displaced private investment. Then, the social discount rate will be a weighted average of only SOC and SRTP.

A key challenge in the empirical estimation of the social discount rate using the weighted average approach is to determine the weights attached to SRTP, SOC, and the international borrowing rate, as well as weights for SRTPs of various saver groups and for SOCs of various productive sectors.

Harberger (1972) provides a formula for calculating the social discount rate using the weighted average approach in the case of a closed economy, where the weights are estimated from interest derivatives (the responses of private investment and savings to changes in market interest rates), which can also be expressed in terms of elasticities. Sandmo and Drèze (1971) expands the formula to an open economy context by incorporating the international borrowing rate, with weights being estimated from the interest derivatives of the domestic and foreign supplies of funds. Based on Harberger and Jenkins (2002), the next paragraph provides an example using the weighted average approach to estimate the social discount rate, assuming varying SRTP among saver groups, varying SOC among productive sectors, taxation on interest earnings (including withholding tax for foreign savers) and on investment returns, and an upward-sloping supply curve of foreign capital.

A major criticism on the weighted average approach is that, while it recognizes that costs of public investment can displace private investment, it assumes that benefits will be consumed immediately and ignores the fact that they could also be reinvested in the private sector, generate future consumption, and bring more social value than if they were consumed immediately. Recognizing higher social cost of displaced private investment than displaced consumption, while ignoring the higher social value of project benefits that are reinvested than immediately consumed, leads to over discounting of project benefits. This over discounting will be higher the farther in the future the benefits occur. Therefore, compared to SRTP, the weighted average approach could be biased against long-term projects (Zerbe and Dively 1994).

Estimating the Social Discount Rate Using the Weighted Average Approach

According to the weighted average approach, also known as Harberger approach, the social discount rate can be expressed as

$$\delta \alpha = SOC + (1 - \alpha - \beta) i f + \beta \ SRTP$$

where δ denotes the social discount rate, if is the government's real long-term foreign borrowing rate, α is the proportion of funds for public investment obtained at the expense of private investment, β is the proportion of funds obtained at the expense of current consumption, and $(1 - \alpha - \beta)$ is the proportion of

funds from foreign borrowing. SRTP and SOC are measured, respectively, by the rate of real return on savings exclusive of ($\hat{\imath}$) and investments inclusive of ($\hat{r}$). Expressing the weights attached to different funding sources in terms of elasticities of demand and supply of funds with respect to changes in interest rates, equation (1) becomes:

$$\delta = \frac{\sum_i \varepsilon_i (S_i/S_t)\hat{\imath}_i + \varepsilon_f (S_f/S_t)\hat{\imath}_f - \sum_j \varepsilon_j (I_j/I_t) r_j}{\sum_i \varepsilon_i (S_i/S_t) + \varepsilon_f (S_f/S_t) - \sum_j \varepsilon_j (I_j/I_t)}$$

where εi, εf, εj are respectively elasticities of savings, supply of foreign capital, and private investment with respect to the interest rate. *Si /St and Sf /St are the shares to the total savings by various groups of domestic savers and foreign savers. Ij /It* is the investment share of various business sectors. Using Equation (2) and 1988–1989 data for Papua New Guinea, Harberger and Jenkins (2002) present an example of calculating the social discount rate, which they call economic opportunity cost of capital. The example assumes that there are four savers groups: households, business, government, and foreign. For each saver group, the real rate of return on savings was calculated from the nominal market interest rate by taking out the respective taxes and inflation. In estimating the real marginal cost of foreign borrowing, further adjustment was made by taking into consideration the effects of new borrowing on the country's foreign borrowing rate. In the case of investors or demanders of funds, they were classified into the following sectors: housing, agriculture, manufacturing, government, and mining. The nominal pre-tax rate of return on investment for each sector was again calculated from the normal market interest rate by adding respective tax rates. These rates, together with the estimated saving shares and elasticities of various saver and investor groups, yield an estimated economic cost of capital, or the social discount rate, of 11.76 percent. Detailed calculations are in the Appendix. Source: Harberger and Jenkins (2002).

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