

Establishing Public Sector Investment Discount Rate

CEA

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What is Discount Rate?

- The discount rate is a ratio used for every investment cost-benefit analysis
 - Measures the return on the investment, the related risks and other variables
 - Estimates the present value of the future net cash flows
- Can be used both for private and for public investments

Methods used for computing the discount rate

- There are several accepted methods used for computing the discount rate for public investments:
 - Social rate of time preference - M. Feldstein;
 - Social opportunity cost of capital - B. Officer and M. Lally
 - And the most **used is the WACC method**

WACC model

- **Weighted Average Cost of Capital** is the most commonly used method for computing the discount rate in both sectors, private and public, however in order to be used in the public sector there is a need for some adjustments:
 - Taxation rate
 - Inflation rate (the rate of inflation is the difference between the nominal WACC and the real WACC)

Formula for computing the discount rate in public sector

$$WACC_{\text{real}} = [(1 + WACC_{\text{nominal}}) / (1 + i)] - 1$$

- Where:

$WACC_{\text{real}}$ – Tax-adjusted Weighted Average Cost of Capital;

$WACC_{\text{nominal}}$ – Nominal Weighted Average Cost of Capital;

i - Inflation Rate

Two segments of the formula

- The first segment of the formula is to compute the **WACC_{nominal}** which is the crucial part in establishing the real WACC
- The **WACC_{nominal}** is computed by the formula given below:

$$\mathbf{WACC}_{\text{nominal}} = [\text{RFR} \times (1 - T_c) + (E_p \times \beta_a)] / (1 - T_e)$$

Where:

RFR – risk free rate;

E_p – equity premium

T_c – corporate tax rate

T_e – effective tax rate

β_a – Asset beta

Taxation as a major difference

- The difference between the private and public sector investments is mainly seen in the beneficiaries of the investment and the nature of the investors' capital thus the taxation is taken to be the factor that will make this difference
- Post-tax method is used because taxes are treated as a cost separate to the cost of capital for companies
- The corporate net income tax in Macedonia is 10% (T_c) and because there are no significant deduction on the tax base the same rate will be used and as a effective tax rate (T_e).

Risk free rate

- **Risk free rate** is the rate of return for a given investment when it involves a risk equal to zero. This means that the investor can reallocate their funds in these financial instruments without taking any risk. The main instruments to calculate this rate are the long term government bonds as the best alternative for risk less rate of return.
- In our case we used the Central Bank bills because the issued bonds by the Macedonian Government bonds are structured bonds issued either for compensation for property (formerly nationalized) or compensation for savings in foreign currencies (with the breaking down of the former system)
- The established Risk Free Rate (RFR) using the data from the Macedonian Central Bank Bills in period 2002-2008 is **7,86%**

Equity premium

- Equity premium represents the premium that investors expect from their investments in equity over investment in risk free financial instruments. That means that investors who will invest their money in financial instrument issued by the corporations are expecting return larger than from one secured by the long term government bonds to cover the additional undertaken risk.
- The Equity Premium is composed of two elements:
 - Market premium and
 - Risk Free Rate

Equity premium

- For computing the Equity premium in our study we used the annual average geometrical return on the MBI-10 (stock index) from the data collected from the MSE, and the already established Risk Free Rate

- Based on the above the equity premium for our study is:

Equity premium = Return on equity (Rm) – Risk Free Rate (RFR)

$$E_p = 21,69\% - 7,86 \%$$

$$E_p = 13,83 \%$$

Beta ratios

- Two Beta ratios were involved in computation of the discount rate:
 - Equity Beta – or systematic risk, refers to the relative riskiness of an investment compared to the market as a whole. It is usually calculated from a linear regression model using historic data of market returns
 - Asset Beta – measures the risk incorporated in the public investment, which is a derivative of the beta equity adjusted for the financial leverage of the private companies.

Asset Beta per sector

Average Beta Asset per Sector	
Banking	0,124
Catering	0,410
Services	0,576
Agriculture	0,614
Industry	0,659
Trade	0,737
Construction	0,953

Asset Beta

- For more precise measure we used the average four year market capitalization as a weight in calculation of the asset beta.
- The banking sector has the lowest asset beta ratio, and the construction the highest which can be expected.
- However, it should be noted that the companies which are representing the sectors have different levels of trades and returns for some of the shares and secondly some sector calculations are comprised of a higher and some of limited number of companies.

Public sector discount rate per sector

Business Sector	WACC nominal	WACC real
Construction	22,57%	13,17%
Trade	19,23%	10,09%
Industry	18,03%	8,99%
Agriculture	17,34%	8,34%
Services	16,75%	7,80%
Catering	14,19%	5,43%
Banking	9,77%	1,36%

Public sector discount rate per sector

- The difference between $WACC_{\text{nominal}}$ and $WACC_{\text{real}}$ is in the use of the rate of inflation.
- The rate of inflation in Macedonia for 2008 was 8,3%.
- As the discount rate can be expressed in real and nominal terms, the cash flows of the given investment can similarly be expressed in their real or nominal terms. The financial practitioners stress that whatever approach used is correct as long as there is consistency.

The use of the public sector discount rate

- It can be used by all public companies in their investment plans;
- By the municipalities and the Government for Private Public Partnerships;
- By the Government to present the facts to the foreign investors.

CEA CONTACT DETAILS

For information:

www.cea.org.mk

www.lsg-data.org.mk

Center for Economic Analyses-CEA

Bul. Jane Sandanski 63/3

1000 Skopje

Macedonia

Phone: +389 (70) 834 636

Fax: +389 (2) 2444 766

Marjan Nikolov President

E-mail: info@org.com.mk