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Área: Finanzas

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Febrero 2009
Nro. 392

www.cema.edu.ar/publicaciones/doc_trabajo.html
UCEMA: Av. Córdoba 374, C1054AAP Buenos Aires, Argentina
ISSN 1668-4575 (impreso), ISSN 1668-4583 (en línea)
Editor: Jorge M. Streb; asistente editorial: Valeria Dowding jae@cema.edu.ar

UNIVERSITY OF CEMA
Working Paper Series

February 2009

A TWO-TIERED APPROACH TO THE VALUATION OF INVESTMENT PROJECTS ADJUSTED FOR GOVERNANCE RISK

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Abstract

This paper sets forth a pair of distinctive contributions to the subject. In the first place, it provides a unified approach to capital investment decisions, by means of a two-tiered framework of analysis. Such approach consists in working out the net present value of the project by discounting its cash flows with a temporal structure of rates of return adjusted for country and credit risk; this procedure accounts for the first tier. It is for the second tier to bring about both the internal and external rates of return. Afterwards, we broaden the streamlined viewpoint in valuation by introducing the Corporate Governance risk rate. As a byproduct, the paper also attempts to furnish analysts as well graduate students taking core courses on Corporate Finance with a friendly and easier road to valuation.

JEL: G30, G31, G34

Key Words: investment valuation, net present value, investment projects, internal rate of return, external rate of return, governance risk, cost of capital.

Institutional Disclaim

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INTRODUCTION

Conventional wisdom widely resorts to the Discounted Cash Flows Model to assess the value of any investment project[1]. To attain such a goal the whole procedure usually comes split down into two stages:

a) Cash flows are worked out by using the incremental cash flow model, an acquisition already streamlined in most updated textbooks in Corporate Finance (see Ross et al., 2005, for instance)

b) The discount rate currently adopted is the cost of capital. As time goes by, however, such a choice turns out to be a very debatable methodology, with an increasing flock of scholars that criticizes not only the method but its underlying assumptions as well (references in Apreda, 2008).

It is our contention that valuation can be improved if we set forth a two-tiered framework that firstly makes use of the temporal structure of rates of return adjusted for risk so as to get the net present value of the project and, afterwards, it produces both internal and external rates of return, the latter carrying out the role of a constant and expected rate of return for the project. It's worth noticing that the method keeps out cost of capital rate from the calculations.

The paper is organized as follows: in section 1 we focus on the first tier, whereas the second tier will be expanded in section 2. Lastly, governance risk will be introduced in the valuation process.

1. THE FIRST TIER OF ANALYSIS

This stage of analysis consists in assessing the net present value of an investment decision by means of discount rates that come adjusted for risk. The structure of such rates comprises a Strip Rate (out of a zero-coupon bond issued by the American Treasury, for instance) plus a measure of country risk and the credit risk borne by the company facing the future investment decision.

1.1 INPUTS

We need two kinds of inputs: estimated cash flows and rates of return adjusted for risk.

Let us assume that the investment horizon spans from moment **0** to moment **n** along **n** yearly periods[2].

[1] Throughout this paper, investment projects, capital budgeting decisions, or investment decisions, will be used as interchangeable expressions.
[2] Yearly periods are most often used, but the method allows for other partitions of time, like semesters eventually.

- *First set of inputs*

It consists of a vector of estimated cash flows. That is to say,

$$\mathbf{F = [\ f(1);\ f(2);\ f(3);\ \ldots\ldots\ ;\ f(n)\ ]} \tag{1}$$

- *Second set of inputs*

It consists of a vector of rates of return adjusted for risk, also called discount rates.

$$\mathbf{R\ =\ [\ s_{adj}(0;\ 1);\ s_{adj}(0;\ 2);\ s_{adj}(0;\ 3);\ \ldots\ldots\ ;\ s_{adj}(0;\ n);\ ]}$$

1.2 THE ASSESSMENT OF INPUTS

How could we appraise both sets of inputs at moment **0**? Actually, this topic deserves some further detail.

- *First set of inputs: expected cash flows*

Taking advantage of the incremental cash flow model[3], each expected cash flow comes from the relationship:

$$\mathbf{f(j)\quad =\quad \Delta\ CF\ (from\ assets\ at\ date\ j)}$$

or, expanding this last expression[4],

$$\mathbf{f(j)\quad =\quad \Delta CF(operations;\ j)\ -}$$

$$\mathbf{-\ working\ capital\ provision\ (j)\ -\ non\text{-}current\ assets\ provision\ (j)}$$

whereas

$$\mathbf{\Delta\ CF\ (operations;\ j\ )\ =\ EBIT(j)\ -\ taxes(j)\ +\ depreciation(j)}^{5}$$

- *Second set of inputs: discount rates*

In order to discount the cash flow expected for date **j,** we draw up its discount rate out of the following relationship

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[3] Ross et al. (2005, chapter 2) provide a standard rendering of the model.

[4] It goes without saying that we assess cash flows for the period starting at date "**t-1**" and ends at date "**t**". In other words, **f(j)** actually means **f(j-1; j)**.

[5] Rigorously, we should add charges for amortization of intangibles, but the treatment is likewise. Both depreciations and amortizations are not outflows and they become available cash flows for the Treasury.

$$s_{adj}(0; j) = s(0; j) + \Delta\, cr\,(0; j) + \Delta\, dr\,(0; j) \tag{2}$$

where

s(0; j) = expected rate of return at date **0** from a Treasury Strip[6] with maturity at date **j**, on a yearly and nominal basis

Δ cr (0; j) = expected country risk rate at date **0** for a cash flow with maturity at date **j**, on a yearly and nominal basis

Δ dr (0; j) = expected credit risk or default risk rate at date **0** for a cash flow with maturity at date **j**, net of country risk, on a yearly and nominal basis

As we can see, the discount rate stems from a temporal structure of returns whose components are given by the risk-free rate, country risk and default risk at a distinctive maturity. Whereas in actual practice risk-free rates are easily available, it is not always feasible to have a complete temporal structure for the remaining pair of components. In such case, analysts resort to constant expected rates or they deal with a piece-wise constant structure[7] eventually.

1.3 THE VALUATION MODEL

Overwhelmingly, the most currently used valuation tool is the Discounted Cash Flow Model. To start with, the model allows for the assessment of the vector **F** at date **0** by means of the equation:

$$V(F; 0) = \sum \frac{f(j)}{[\,1 + s_{adj}(0; j)\,]^{j}} \tag{3}$$

This expression fits for yearly periods of cash flows to be reinvested. However, if we needed to take into account sub-periods of reinvestment, for instance semesters, the equation would take the following shape:

$$V(F; 0) = \sum \frac{f(j)}{[\,1 + s_{adj}(0; j) / 2\,]^{2j}}$$

[6] The Treasury Strip is a zero-coupon bond which, as such, it furnishes the investor with the return given from the difference between the asked price he paid when he made the purchase and the face value it will be paid to him at maturity date.

[7] For instance, in a project spanning ten years from the valuation date, the analyst could choose (grounded on his information set at date **t**) a constant country risk rate for the first three years, and another constant value for the seven years as from there till maturity.

For non-financial decisions, mainly those involving investment projects, **P**, the cash flow at date **0** amounts to

$$\mathbf{f(0) \;=\; -\,C(0)}$$

which currently stands for the required disbursement at the starting date of the project.

In this distinctive setting, which is the aim of our paper, the valuation model leads to the following structure:

$$\mathbf{V(P;\,0) \;=\; -\,C(0) \;+\; \sum \frac{f(j)}{[\,1 \;+\; s_{adj}(0;\,j)\;]^{\,j}}} \tag{4}$$

or, as it is usually denoted,

$$\mathbf{NPV(P;\,0) \;=\; -\,C(0) \;+\; \sum \frac{f(j)}{[\,1 \;+\; s_{adj}(0;\,j)\;]^{\,j}}} \tag{5}$$

where **NPV** reads "net present value of the project".

2. THE SECOND TIER OF ANALYSIS

Once we get the Net Present Value of the investment decision, which is the final outcome of the first tier of analysis, we must work out two constant rates of return:

- on the one hand, the internal rate of return (**IRR**);
- on the other hand, the expected rate of return for the investment, which we are going to call external (**ERR**).

In the first case, the rate stems from cash flows relevant to the project only, even the starting one, and we seek for a mathematical value that furnishes a null **NPV(P; 0).** This is the sense conveyed by the expression "internal" (endogenous) rate of return[8].

In the second case, the rate takes into account not only the internal cash flows attached to the investment project, but also the *external* rates of return adjusted for

[8] Sometimes the project may have either no internal rate of return or multiple ones. Those cases are beyond the scope of this paper.

risk, a set of inputs that are external or exogenous to the company and are provided by separated agencies in the market (spot rates markets, credit-risk valuation companies, commercial banks, investment banks, as well as insurance companies).

- ***Internal Rate of Return (IRR)***

This rate comes out of (5) as the root of the following polynomial equation upon the variable **x**:

$$\mathbf{0 = NPV(P;\, 0) = -C(0) + \sum \frac{f(j)}{[\,1 + x\,]^{j}}} \tag{6}$$

by ultimately making

$$\mathbf{x = IRR}$$

and solving for **IRR**.

That is to say, the **IRR** is a constant rate of return that equals the present value of all discounted disbursements with the present value of all inflows relevant to the project. In other words, if we wanted the investor to favor the project, the expected rate of return of the investment decision must be lower than the **IRR**. Otherwise, the investor gets a return that annihilates value creation.

- ***External Rate of Return (ERR)***

This rate stems from (5), the net present value found in tier one. It solves the equation

$$\mathbf{0 = -\,NPV(P;\, 0) - C(0) + \sum \frac{f(j)}{[\,1 + y\,]^{j}}}$$

by ultimately making

$$\mathbf{y = ERR}$$

or, equivalently, by solving

$$\mathbf{0 = -\,[\,NPV(P;\, 0) + C(0)\,] + \sum \frac{f(j)}{[\,1 + ERR\,]^{j}}} \tag{7}$$

2.1 Contrasting the external rate with the cost of capital rate

When we follow the conventional method of discounting the cash flows by means of a constant cost of capital rate, the ensuing **NPV** does not equal the one we got in (5). This can be seen through the following string of relationships:

$$\mathbf{NPV(P;\,0;\,cost\ of\ capital\ rate)} = -\mathbf{C(0)} + \sum \frac{\mathbf{f(j)}}{[\,1 + \text{cost of capital rate}\,]^{j}} \neq$$

$$\neq \; -\mathbf{C(0)} + \sum \frac{\mathbf{f(j)}}{[\,1 + s_{adj}(0;j)\,]^{j}} = \mathbf{NPV(P;\,0;\,temporal\ structure\ of\ returns)}$$

If we now face how the second tier evolves with the conventional approach, we have to single out two qualifications.

a) The **IRR** is the same, irrespective of which approach we are using. In point of fact, it holds that

$$0 = \mathbf{NPV(P;\,0;\,cost\ of\ capital\ rate)} = -\mathbf{C(0)} + \sum \frac{\mathbf{f(j)}}{[1 + \text{cost of capital rate}\,]^{j}} =$$

$$= -\mathbf{C(0)} + \sum \frac{\mathbf{f(j)}}{[\,1 + IRR\,]^{j}} = \mathbf{NPV(P;\,0;\,temporal\ structure\ of\ returns)} = 0$$

b) In contradistinction to a),

$$\mathbf{ERR \neq \text{cost of capital rate}}$$

since they solve different equations, namely:

$$0 = -\,\mathbf{NPV(P;\,0;\,cost\ of\ capital\ rate)} - \mathbf{C(0)} + \sum \frac{\mathbf{f(j)}}{[1 + \text{cost of capital rate}\,]^{j}}$$

$$0 = -\,\mathbf{NPV(P;\,0;\,temporal\ structure\ of\ returns)} - \mathbf{C(0)} + \sum \frac{\mathbf{f(j)}}{[\,1 + ERR\,]^{j}}$$

Next exhibit provides intuition to these remarks.

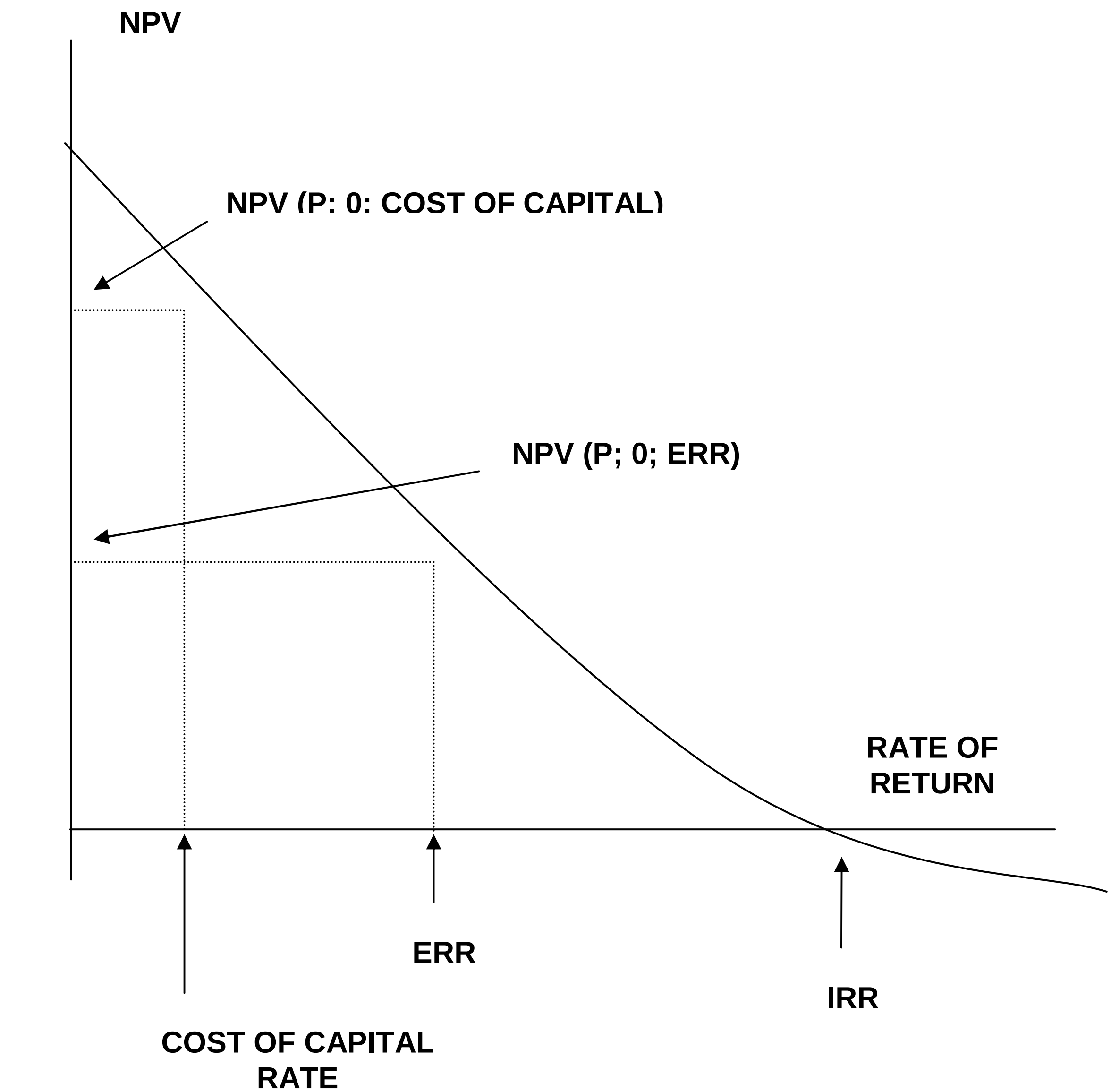

EXHIBIT 1

To all intents and purposes, the cost of capital rate lends credence and weight to project valuation when it is used as a hurdle rate (see Exhibit 1). In fact, this is the less debatable application of cost of capital[9], and refers to the seminal paper by Ezra Solomon (1955), which attempted to measure any company's cost of capital:

[9] On different viewpoints regarding cost of capital, see Apreda (2008).

Its function is to provide a correct and objective criterion by which management can determine whether it should or should not accept available proposals involving the expenditure of capital. Because of this function, this concept has also been called the "minimun required rate of earnings" or the "cut-off" rate for capital expenditure.

On this line of analysis, Ross et al. (2005) argued that being the cost of capital the minimum required return on a new investment, it can be translated like "*the opportunity cost associated with the firm's capital investment."*

Therefore, cost of capital becomes a "hurdle rate" in the following sense:

i) for an investment project in the firm's line of business such a rate would grant that the basic business risk of the new asset will be the same as the one of already existing assets;

ii) valuation of an investment project from a different risk class would demand a cost of capital metrics that takes into account the proper line of business."

3. INTRODUCING GOVERNANCE RISK IN THE VALUATION PROCESS

In a lately paper[10], we addressed the problem of adjusting the cost of capital for governance risk. Now we are interested in carrying out such adjustment for investment projects in the context of the two-tiered approach. To properly handle this issue, we split down the oncoming discussion into the following stages:

a) to start with, the first tier must produce a net present value adjusted by governance risk;

b) next, the second tier will deliver internal and external rates of return which had already been adjusted for governance risk in the former step;

3.1 Adjusting Net Present Value for Governance Risk

We derived in a former paper the rate of governance risk as coming out of the rate of change in a weighted average governance risk, **G(k; t)**, for a company **k**, at date **t**, as follows:

firstly, the rate of governance performance along the horizon **H** = **[t; T]** is defined from

$$\mathbf{1 + r_k(governance) = G(k; T) / G(k; t)}$$

which lead to next arbitrage relationship

[10] Apreda (2008).

$$< 1 + r_k (\text{governance}) > . < 1 - \Delta \text{ govrisk}_k > = 1$$

and, lastly, we get the governance risk rate

$$\Delta \text{ govrisk}_k = \frac{r_k (\text{governance})}{< 1 + r_k (\text{governance}) >}$$

Now, we move on to net present value, as depicted by relationship (5)

$$NPV(P; 0) = - C(0) + \sum \frac{f(j)}{[1 + s_{adj}(0; j)]^j}$$

and reshaping the equation (2), for company k, as it follows:

$$s_{adj}(0; j) = s(0; j) + \Delta \text{ cr } (j) + \Delta \text{ dr } (j) - \Delta \text{ govrisk } (j)$$

When the additive approximation becomes rough and non-reliable, we can proceed to using a multiplicative model that will come close to the one recently furnished by Apreda (2007, 2008).

$$[1 + s_{adj}(0; j)] = [1 + s(0; j)] . [1 + \Delta \text{ cr } (j)] .$$

$$. [1 + \Delta \text{ dr } (j)] . [1 - \Delta \text{ govrisk } (j)]$$

It goes without saying that the second tier, which works out the **IRR** and the **ERR**, it provides both rates adjusted for governance risk.

3.2 Contrasting with the cost of capital adjusted for risk of governance

If we wanted to contrast the cost of capital rate with the **ERR** adjusted for risk of governance, we would need in advance to adjust the cost of capital for governance risk, as we did in 2.1. This can be accomplished, following Apreda (2008), by means of either an additive model or a multiplicative one.

The adjustment for governance risk has two alternative courses of action: either we embed it into the linear approximation or we deal with the multiplicative model outright.

Conventional approach

In keeping with the linear expression for the cost of capital, the approximation would be given by[11]

$$\mathbf{k_{+gov} = x_D R_D + y_S R_S + z_{FH} R_{FH} - \Delta\, govrisk}$$

Unconventional approach

In contrast with the former approach, the framing of governance risk into the multiplicative model proceeds from

$$\mathbf{1 + K_{+gov} = < 1 + x_D R_D > . < 1 + y_S R_S > .}$$

$$\mathbf{. < 1 + z_{FH} R_{FH} > . < 1 - \Delta\, govrisk >}$$

Bear in mind that if

$$\mathbf{\Delta\, govrisk < 0}$$

then $\mathbf{K_{+gov}}$ becomes larger since governance worsens, adding up to the overall risk premium in cost of capital.

CONCLUSIONS

This paper brings forth a methodology for valuing investment decisions by means of a two-tiered procedure that exhibits the following features.

- Firstly, cash flows are discounted by a temporal structure of rates adjusted for risk that are external to the investment decision, and grounded in the dynamics of real markets.
- Afterwards, the internal and external rates of return are produced, the latter performing as an implicit and constant rate of return expected from the project.
- Last of all, the procedure is enhanced by embedding the governance risk rate in the temporal structure of discounted rates adjusted for risk.

[11] When adjusting for governance risk we denote cost of capital as $\mathbf{K_{+gov}}$ and $\mathbf{k_{+gov}}$**,** the former referring to a multiplicative model and the latter to an additive model. R_D, R_S, R_{FH}, denote return from debt, stock, and financial hybrids, respectively. On the other hand, x_D stands for the proportion of debt against the whole of debt, stock and financial hybrids. (x_S and x_{FH} are defined likewise).

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