WACC or APV?: The Case of Emerging Markets

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Abstract

MM's seminal papers (1958, 1963) gave rise to two alternative methodologies for project and firm valuations: the Weighted Average Cost of Capital (*WACC*) and Adjusted Present Value (*APV*). Whenever a target debt ratio is set for the long term, as is often the case with larger firms in industrialized economies, *WACC* might give a good approximation. However, *APV* has certain features that make it more suitable for emerging markets, where high economic uncertainty makes the leveraging decision much more opportunistic and tax legislation tends not only to be quite complex but also to vary from country to country.

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Introduction

MM's seminal papers (1958, 1963) gave rise to two alternative methodologies for project and firm valuations: the Weighted Average Cost of Capital (*WACC*) and derived methods, and Adjusted Present Value (*APV*).

For practical purposes, whenever a target debt ratio is set for the long term, as is often the case with larger firms in industrialized economies, *WACC* and its associated methods might give an acceptable approximation.

However, the situation is different for emerging markets, where high economic uncertainty makes the leveraging decision much more opportunistic and the tax structure includes not only the traditional corporate tax, but taxes on inflationary "earnings" or asset value.

This paper asserts that *APV* has a number of features that make it more suitable than *WACC*-derived methods for emerging market projects and firms.[1]

Background

According to Miller & Modigliani (1958, 1963), hereinafter *MM*, the after tax cost of capital (*WACC*) of a firm is given by the following formula:

$$WACC = \frac{D}{V} \cdot (1 - T_C) \cdot k_D + \frac{E}{V} \cdot k_E \qquad (1)$$

The relationship below also holds according to Haley & Schall (1973):

[1] I am indebted to Simon Beninga, Maximiliano Gonzalez and Pablo Fernandez for helpful comments.

$$WACC = \left(1 - \frac{DT_C}{V}\right) \cdot r_A \tag{2}$$

Where,

r_A is the asset discount rate after taxes
D is the market value of debt
T_C is the corporate tax rate
V is the market value of the firm
k_D is the discount rate on debt
E is the market value of equity
k_E is the discount rate on equity

Reordering terms, the following expression is found for the return on equity with taxes:

$$k_E = r_A + \frac{D}{E} \cdot \left[\left(r_A - k_D\right) \cdot \left(1 - T_C\right)\right] \tag{3}$$

There is also the following equivalent formula:

$$V_L = V_U + DT_C \tag{4}$$

Where V_U is the value of the unleveraged firm after taxes.

This last formula shows that the value of the firm rises with debt by an amount equal to DT_C. This quantity is known as the tax shield.

The tax shield materializes through a cash flow increase for fund providers. Notice that *WACC* seeks to capture the impact of these incremental cash flows by diminishing the discount rate applicable to unleveraged assets.

MM's conclusions rest on the following assumptions:

a) No Transaction Costs

This supposition assumes everyone to have the same access to financial markets. For example, with transaction costs the possibility of adjusting personal portfolios to compensate for the firms' financing decisions would be costly, and might not be valid. Therefore, leverage would not be irrelevant to firm value. The lack of transaction costs also implies that costs of financial distress are inexistent.

b) Perfectly Competitive Financial Markets

With this condition nobody has advantages in the financial markets. If this were not the case, leverage preferences could differ among market participants and debt levels would not be immaterial.

c) No Agency Costs

This implies that the manager's sole objective is to maximize shareholders' wealth. Thus, the financial mix does not have any connection with the particular interests of administrators nor any impact on firm value.

d) No Personal Taxes

Individuals do not pay taxes.[2]

e) All Cash Flows are No-Growth Perpetuities and Corporate Tax Rate is Constant

[2] Miller (1977) shows how *MM*'s conclusions are affected in the presence of personal taxes.

These assumptions are made merely to simplify the formulas and are not really necessary for proving *MM*'s claims about the impact of leverage on firm value. Nonetheless, they have important implications for valuation in emerging markets, as will be pointed out later.

In fact, the term DT_C in the preceding formulas is a simplification since it only takes into account the corporate tax effects on interest payments and assumes just one marginal tax rate. Strictly the actual tax rates applicable to each and every cash flow over the whole horizon should be considered. Therefore, in a more general way, the value of the tax shield (*TS*) is better expressed as *PV(TS)*.

If, in addition, the costs of financial distress are included, formula (4) must be re-written as:

$$V_L = V_U + PV\left(TS\right) - PV\left(CFD\right) \tag{5}$$

The costs of financial distress emerge through a decrease in expected cash flows for all fund providers. This results in a reduction in the value of the firm.

The value of the firm might also be affected by other variables such as subsidies that might lower the cost of debt or improve the firm's financial results, costs associated with issuing new securities, etc. If these other effects are factored in we come to the concept of Adjusted Present Value (*APV*), which in its more complete form is expressed as:

$$APV = V_U + PV\left(TS\right) + PV\left(SE\right) - PV\left(CFD\right) \tag{6}$$

Where *SE* stands for "Special Effects" encompassing the diverse factors mentioned above.

For the sake of simplicity, the impact of both the costs of financial distress and the special effects will be ignored for the rest of this

paper. Hence, the value of the leveraged firm (or its *APV*) will be given by:

$$V_L = APV = V_U + PV\left(TS\right) \tag{7}$$

MM's work gave rise to three approaches for firm and project valuation: *WACC*, Flow to Equity (*FTE*) and Adjusted Present Value (*APV*). Subsequently, Ruback (2002) proposed a fourth method: Capital Cash Flows (*CCF*).

In the following, the suitability of these methods for the particular case of emerging markets will be discussed. For the sake of simplicity the argumentation will focus on a practical example.

Valuation Methods

A base case will be established on which the different valuation approaches will be performed.

Base Case

The term "financial balance sheet" is defined as the firm's balance sheet in market value terms.

Assuming that all cash flows are no-growth perpetuities, the financial balance sheet of a leveraged firm can be expressed as:

Assets	**Liabilities**
Tangible assets	Debt
Tax shield (DT_C)	Equity
Total value	Total value

Imagine a firm with $83.34MM in tangible assets and a non-growing financial debt amounting to $50MM. The cost of the debt is 4% yearly.[3]

Tangible assets are equivalent to the present value of a $10MM non-growing perpetual annuity equivalent to the firm's unleveraged earnings after taxes.

The yearly tax rate remains constant at 50%.

The financial balance sheet of the firm will be:

Assets	**Liabilities**
Tangible assets: +$83.34MM	Debt: $50MM
Tax shield: +$50MMx0.5 = $25MM	Equity: $58.34MM
Total value: $108.34MM	Total value: $108.34MM

WACC Valuation

WACC is the most widely used method for project and firm valuation. Through this method, value is computed by discounting after tax unleveraged cash flows at the Weighted Average Cost of Capital (*WACC*) rate.

First the discount rate on equity k_E must be estimated. The most practical way to do this is to estimate the beta of the equity and then to determine k_E through the *CAPM*.

Given that in this example market information is lacking, formula (3) will be used instead:

[3] For the sake of simplicity it is assumed that the cost of serving the debt equals the discount rate of the debt k_D.

$$k_E = r_A + \frac{D}{E}\left[\left(r_A - k_D\right)\left(1 - T_C\right)\right] = 12\% + \frac{50}{58.34}\left[\left(12\% - 4\%\right)\left(1 - 0.5\right)\right] = 15.43\% \quad (8)$$

The *WACC* rate is computed through formula (1):

$$WACC = \frac{D}{V}\left(1 - T_C\right)k_D + \frac{E}{V}k_E = \frac{50}{108.34}\left(1 - 0.5\right)4\% + \frac{58.34}{108.34} = 9.23\% \quad (9)$$

Observe that the same result is obtained by using formula (2):

$$WACC = r_A \cdot \left(1 - \frac{DT_C}{V}\right) = 0.12 \cdot \left(1 - \frac{\$50MM \cdot 0.5}{\$108.34MM}\right) = 9.23\% \quad (10)$$

The value of the firm is attained by discounting $10MM at the *WACC* rate:

$$PV = \frac{\$10MM}{0.0923} = \$108.34MM \quad (11)$$

FTE Valuation

FTE is also a widely used methodology. Under *FTE*, first total value to equityholders (*E*) is computed by discounting after tax cash flows to equityholders at the equity discount rate k_E. Firm value is found by adding the value of the debt *D*.

From (8) the equity discount rate is already known to be 15.43%.

The cash flow to equityholders will be the after tax value of the difference between yearly before tax unleveraged earnings [*10MM/(1-T_C)*] and yearly interest payments (*50MMx4%*):

$$FTE = \left[\frac{10MM}{\left(1 - 0.5\right)} - 50MM \cdot 4\%\right]\left(1 - 0.5\right) = \$9MM \quad (12)$$

The value of the firm will be:

$$PV = E + D = \frac{9MM}{0.1543} + 50MM = 58.34MM + 50MM = \$108.34MM \qquad (13)$$

Which is identical to the result obtained through *WACC*.

CCF Valuation

Capital Cash Flows (*CCF*) is a new method (Ruback 2002). The cash flow to be discounted (*CCF*) is the overall after tax cash flow received by both debtholders and equityholders.[4] The value is obtained by discounting *CCF* at the before tax *WACC* rate as follows:

The discount rate is:

$$k_{CCF} = \left(\frac{D}{V}\right) \cdot k_D + \left(\frac{E}{V}\right) \cdot k_E = \left(\frac{50MM}{108.34MM}\right) \cdot 4\% + \left(\frac{58.34MM}{108.34MM}\right).15.43\% = 10.15\% \qquad (14)$$

The cash flow to be discounted (*CCF*):

$$CCF = D \cdot k_D + E \cdot k_E = 50MM \cdot 4\% + 58.34MM \cdot 15.43\% = \$11MM \qquad (15)$$

And firm value:

$$PV = \frac{\$11MM}{0.1015} = \$108.34MM \qquad (16)$$

This is exactly the same result as those obtained through both the *WACC* and the *FTE* valuations.

However, under certain circumstances *CCF* has an advantage. It is more suitable than *WACC/FTE* when the tax structure is complex (a familiar situation in many emerging markets) since the computation of the discount rate is tax independent.

[4] *CCF* also corresponds to the unleveraged after tax cash flow plus the tax shield.

Notice that the discount rates for the previous three valuation methods require:

1) All cash flows to be no-growth perpetuities
2) A single and constant corporate tax rate
3) A constant *D/V* ratio, meaning that the level of debt evolves according to firm value over time

Since the three methods share the same restrictions it can be concluded that *FTE* and *CCF* are really *WACC*-derived valuation methods.

Strictly, the three methods should be invalidated whenever these restrictions do not hold (which happens to be the case in most real life situations). However, this drawback can be mitigated by recalculating the discount rates according to each period's capital structure. Also, an equivalent T_C reflecting the combined effect of all taxes could be estimated.

APV Valuation

After *WACC*, *APV* is the most widely used method for project and firm valuations. The value is obtained according to formula (7):

$$V_L = APV = V_U + PV\left(TS\right) = 83.34MM + 50MM \cdot 0.5 = \$108.34MM \qquad (17)$$

Once more this is the same result as obtained with the other methods.

If cash flows were not constant perpetuities and the firm wished to keep a constant debt ratio, the level of debt would have to be adjusted in each period to reflect the changing present values of both tangible assets and the tax shield.

It is important to realize that whenever cash flows are not perpetuities, *APV* has important key differences with the *WACC*-derived valuation models:

1) The discount rate is unleveraged, reflecting the expected return demanded by investors from the type of business being analyzed, independently of the way operating cash flows evolve over time. This permits valuation of cash flows that are not perpetuities.
2) The firm as a whole is valued without consideration to its leverage over time, leaving the level of debt as an independent variable with no relation whatsoever to the value of the firm. So, no fixed debt ratio is necessary.
3) The present value of the tax shield is computed by discounting actual period-by-period tax savings. Each period's taxes are computed according to the particular tax legislation applicable without having to assume a single and constant corporate tax rate.

Method Comparison for Developed and Emerging Markets

It was seen above that the shortcomings associated with the *WACC*-derived methods can be mitigated if the discount rates are recalculated according to the capital structure of each period and an equivalent T_C is adapted to reflect the combined effect of all corporate taxes. In this manner, the *WACC/FTE/CCF* results will tend to resemble those achieved through *APV*.

It was also stated that if cash flows are not constant perpetuities and the firm wishes to keep a constant debt ratio, *APV* will yield results akin to those of *WACC/FTE/CCF* as long as the level of debt is adjusted over time in line with the changing present values of both tangible assets and the tax shield. In this way, the *APV* results will tend to be like those attained through *WACC/FTE/CCF*.

Observe that a time frame (be it a month, a semester or a year) must always be defined to make either of these adjustments. The shorter the period the closer the results will be between the *WACC*-derived methods and *APV*. Nonetheless, the periods being discrete, the outcomes of the two approaches will always differ.

At this point it can be stated that:

1) Whenever the level of debt can be anticipated over the whole horizon, *APV* will be the friendlier method: The present value of the tax shield is added to the firm's unleveraged value and, tax savings being directly associated with the systematic risk of the debt, they will be discounted at the discount rate of the debt k_D.

2) When the firm seeks to maintain a stable debt ratio, the level of debt evolves with the value of the firm. Hence, tax savings depend on both the changing value of the firm and the discount rate of the debt. In this instance, the appropriate discount rate is not clear cut, although it has been proved that *WACC* automatically solves this problem (Inselbag & Kaufold 1997). Hence, *WACC* will be the preferable method.

It is obvious that neither of these two extreme cases faithfully reflects the day-to-day reality of most corporations, be they in the developed or the developing world.

Having said that, case 2, in which a target debt ratio is set for the long term, might give an acceptable approximation for many larger corporations in advanced and stable countries. Thus, it is not surprising that most corporate finance textbooks (which originate from industrialized countries) recommend *WACC*, and its related methods *FTE* and *CCF*, as the more appropriate valuation tools.

On the other hand, case 1, in which the level of debt is independent of firm value, is closer to reality in emerging markets, where high

economic uncertainty requires firms to build in considerable financial flexibility and be prepared to quickly adjust the amount and profile of their debts in reaction to political and macroeconomic developments.

On the Practical Impact of the Tax Shield

Before we continue, some comments are necessary about the final impact of the tax shield.

The tax shield is relevant only to the extent that corporate profits materialize. However, corporate profits not only arise from day-to-day operational results but are also affected by so called non-debt tax shields (NDTS). NDTS stem from items such as depreciation and amortization, and research and development expenditures that are regularly subtracted from taxable income. The larger these deductions, the lower the taxable income and the less significant the debt tax shield will be. This means less sizeable tax benefits of debt for capital intensive and research dependent firms with considerable NDTS (Grinblatt & Titman 1998).

Volatility also plays a role. Whenever significant NDTS are present the likelihood of obtaining a positive taxable income and a positive tax shield from debt will decrease in inverse relation to the volatility of the economic environment, which is often high in emerging markets.

In many emerging markets, the fact that corporate taxes do not depend only on profits also makes the tax benefits of leverage less predictable. The inflation adjustment tax existing in some Latin American countries offers an extreme example in which it is possible for the debt tax shield to decrease (instead of increase) with leverage (Sabal 2002).

In practical terms, the widespread custom in emerging markets (at least for the larger firms) is to adopt a mixed debt policy. A minimum (low) debt ratio is established that should remain constant for the long term and at the same time a management determined second tier to be modified opportunistically is acknowledged. Hence, debt is partially dependent on firm value and partially management determined.

This brings us to conclude that *APV* looks better suited for emerging market situations than the *WACC*-derived methods. However, at first glance the practical application of *APV* is hampered by the fact that the discount rate for the tax shield is not clearly defined.[5] Fortunately, a recent paper (Fernandez 2004) offers a solution to the tax shield problem. Fernandez asserts that:

> *"…a consistent way to estimate the value of the tax savings is not by thinking of them as the present value of a set of cash flows, but as the difference between the present values of two different sets of cash flows: flows to the unlevered firm and flows to the levered firm".*

Therefore, the problem stemming from the correct discount rate applicable to the tax savings seems to be resolved: The present value of the tax shield is computed by subtracting the present value of two cash flow streams both tied to shareholder returns. The first stream corresponds to the taxes that the firm would have paid if it had lacked any leverage. As these taxes are directly related to the firms' unleveraged profits, the applicable discount rate must be the unlevered discount rate r_A, which in this instance is equivalent to the equity discount rate k_E.

The second stream corresponds to the taxes paid by the leveraged firm. These taxes are tied to period-by-period leveraged profits and

[5] There has been a long academic dispute as to the right discount rate for tax savings since it has not been at all clear what risk is associated with this cash stream (Myers 1974, Harris & Pringle 1985).

therefore their discount rate is the period-by-period equity discount rate k_E. This rate must be computed in line with the firm's leverage at each point in time. The present value of the tax shield is reached by subtracting the second from the first stream.

Thus, the way is cleared for *APV* as the proper valuation method in emerging markets. The valuation is decomposed as follows: First, the value of the unleveraged firm must be calculated. Second, the present value of the tax shield (as the difference between the two cash streams) is computed. Third, the impact of special effects (including the costs of financial distress, if applicable) must be factored in.

Finally, the fact that *APV* does not rely on a simple corporate tax rate T_C and assesses the impact of taxes in a more realistic way offers an additional advantage to this method in emerging markets, where complex corporate tax structures are found.

Before we conclude, a word must be said about the terminal value.

In many valuations (be they in developed or emerging markets) it is customary to assume a constant debt ratio perpetuity at the end of the horizon. It was explained above why *WACC* (and its derived methods) are the most suitable for this kind of situation. Therefore, there is no doubt that *WACC* is the most recommendable method for finding the present value of the perpetuity.

To summarize, in emerging markets it is recommendable to use *APV* within the horizon when leverage is unstable and *WACC*-related methods for the perpetuity when the debt ratio is fixed.

Conclusions

MM's seminal papers (1958, 1963) gave rise to two alternative methodologies for project and firm valuations: on the one hand the

WACC-derived methods, including *WACC* proper, Flow to Equity (*FTE*) and Capital Cash Flows (*CCF*); and on the other hand Adjusted Present Value (*APV*).

The two methodologies yield the same results as long as cash flows are no-growth perpetuities, there is a single and constant corporate tax rate, and leverage as a proportion of the market value of the firm remains constant. When these conditions are not met the two methodologies can be adjusted to yield approximately analogous outcomes.

For practical purposes, whenever a target debt ratio is set for the long term, *WACC* and its associated methods might give an acceptable approximation. This is often the case with larger corporations in advanced and stable countries. Thus, it is not surprising to find that many corporate finance textbooks emanating from industrialized countries recommend the *WACC*-derived methods as the more appropriate valuation tools.

However, the situation is different for emerging markets, where: a) high economic uncertainty presses firms to build in considerable financial flexibility and be prepared to quickly adjust the amount and profile of their debts in reaction to political and macroeconomic developments and; b) legislation often includes taxes such as those on inflationary "earnings" or asset value, to the extent that the common corporate tax rate might not necessarily be the most significant levy.

APV has a number of features that make it more suitable than *WACC*-derived methods for emerging market projects and firms. In particular:

1) No fixed debt ratio is necessary. The firm as a whole is valued without consideration to its leverage over time, leaving the level of debt as an independent variable with no relation whatsoever to the value of the firm.

2) The present value of the tax shield is obtained by discounting actual period-by-period tax savings. Each period's taxes are computed according to the particular tax legislation applicable without having to assume a single and constant corporate tax rate.

However, *WACC* still remains the more appropriate procedure for discounting the perpetuity that is usually assumed at the end of the horizon, the reason being that *WACC* automatically corrects for the discount rate applicable to the tax shield.

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