Accession Capital Corp

THE MISAPPLICATION OF USING WACC IN ASSESSING PROJECT VALUE

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EXECUTIVE SUMMARY

- It is still very common for financial executives to erroneously use firm Weighted Average Cost of Capital (WACC) as a hurdle rate to assess the value of prospective projects and new assets.
- The practice fails to consider the unique risk characteristics of the project or asset being evaluated. The conclusions reached will be misleading except when the risk of the project/asset closely matches that of the firm.
- WACC is actually a composite of all the returns associated with each of the firm's uniquely identifiable net cash flows. It is possible, and quite common for the firm to be simultaneously investing in assets/projects with a wide range of risk levels.
- This paper considers a hypothetical firm that contemporaneously holds both a high-risk investment and a risk-free asset and demonstrates how the resultant WACC is not reflective of either.

INTRODUCTION

Why would any finance professional select a firm's known Weighted Average Cost of Capital (WACC) in order to assess the value of a new project (or re-assess the value of an existing project)? The short answer is that they should not – not ever. The more practical and often quoted rule of thumb[i] is that, if the project under consideration bears the same relative risk profile as all the other firm's existing activities, then using the historical WACC may provide a quick and approximately correct means of assessing the new project Net Present Value (NPV) without undertaking the effort to derive a risk-adjusted rate of return particular to that new project.

It is surprising, however, how many times even senior finance professionals will assume that the firm's existing historical WACC is automatically the correct discount rate with which to assess a new or existing project. The misguided logic here may be 'If the prospective project generates a positive NPV using the firm's WACC as a hurdle rate, then regardless of what the actual project discount rate may be, it will provide positive value to the firm.' The problem with this thinking is that, on a risk-adjusted basis, the actual project discount rate may be so much higher that the

firm's historical WACC, it will generate a negative NPV under all conditions and should rejected by *every* firm.

MISUSE OF THE ACQUIRER'S WACC TO ASSESS THE ACQUIREE PRICE

Why should this be so? Consider, for example, two firms bidding on the same target Acquiree – let's say it's a chemical plant that operates completely autonomously and is expected to continue to do so under either new potential Acquirer. Further, assume Bidder A has a WACC of 10% and Bidder B currently has a WACC of 14%. Should the target chemical plant be worth "more" to Bidder A simply because it has a lower cost of capital? If each bidder used its existing WACC to assess the current value of the target, there is little doubt that A, with the lower WACC would be paying more for the purchase of the target. There is no logical reason why this should be so, however. The chemical plant is expected to continue to operate without the intervention of either Bidder A or B after the purchase, there are no planned synergies or post-acquisition economies of scale that will accrue to either Bidder, therefore, the calculated value of the target firm should be the same to either potential buyer. The salient factors to consider in deriving the appropriate discount rate with which to assess the value of the target relate entirely to the relative risk-profile of the target chemical plant – its ability to generate net free cash flows and the risks of its specific industry. The important axiom of accepted financial theory to be remembered here is that it is always the risk-adjusted discount rate of the specific activity, project or target Acquiree that is relevant in the consideration of current value of that activity, project or Acquiree. The parent's or acquirer's cost of capital should not be a consideration – although coincidently it may turn out to be same. In the absence of post-acquisition synergies, the fair market value of any firm should not depend upon who holds the shares nor whom is bidding on them.

FIRM WACC DOES NOT EXTEND TO ALL INVESTMENTS WITHIN THE FIRM

At the risk of being redundant, another example may be helpful and to keep it simple, we will use something extreme. Imagine a very high risk all common equity firm that continuously operates with a WACC of 30%. One day the firm finds itself with some excess cash and, to be financially prudent, the firm decides to invest the excess cash in some Government perpetuities. For each $1,000 note, the federal government is promising to pay $60 at the end of each year in perpetuity. Should the firm expect to earn 30% on the government debt? Should it value the $60 perpetual cash stream at 30%: $60/0.3 = $200? Having just spent $1,000 to acquire each note[1], and then discovering that, at the 30% historical WACC would the firm necessarily require a write-down of $800 on each note - of course not. The fact is that, while the government promise to pay $60 each year may be subject to a number of risks (e.g. reinvestment risk, interest/inflation rate risk and perhaps a liquidity risk depending upon how widely these types of government notes are traded), the largest single risk factor for any type of long-term debt instrument is default risk and a government note can be considered virtually free of this critical exposure.

So again, the cost of capital of the acquiring firm (the 30% in the previous example) was simply not pertinent to the asset acquisition under consideration (i.e. the government note). It was the inherent risk of the asset itself that mattered. Here, because the $60 annual payment for a $1,000 note was the market clearing price, we must concede that the market believes 6% is the appropriate discount rate for this asset … and the market is probably right[2].

It is the dramatic contrast in returns that makes the previous example so obvious. A firm with a 30% historical cost of capital should not use this WACC to assess the value of an asset that

[1] Here we are acknowledging that the market price for each note is $1,000 and that is the price to be paid regardless of how much less we might think these securities are worth. This begs the question, of course, why anyone would pay $1,000 for something they believed to be worth $200 – but the lunacy of the example serves our purpose well.
[2] At least we should be able to accept the fact that, if the market represents a large enough consensus of opinion as to the current worth of these securities, it is likely to be more correct than any other single source of opinion one might name.

clearly suits a risk-profile of 6%. The wisdom of this approach is no less logically sound, however, when the historical WACC of the acquirer is 10.0% and the target asset is 9.5%[3].

Each project operating within a firm will theoretically have its own appropriate risk-adjusted discount rate and asset beta that is specifically suitable to that stream of cash flows. Identifying and correctly quantifying each of those discount rates and cash flows is, however, not a simple task – particularly for someone without insider information. Some would say that, for a large, highly diversified firm with many different divisions and market exposures, the task becomes a practical impossibility. This is particularly true when there are many interdependencies, vertical integrations/synergies and correlations amongst the various project lines within a conglomerate. This should not, however, give anyone license to take one conveniently observable rate of return (the WACC) and indiscriminately apply that to all cash flows that accrue to the same corporate parent. To do so would only be akin to sanctioning the discounting of a 6% risk-free government bond with a 30% cost of capital rate.

THE 'OTHER' WEIGHTED-AVERAGE

Weighted Average Cost of Capital refers to the overall average rate of return investors demand from the firm's existing complement of assets. The 'weighted-average' part specifically references the capital structure of how the firm is financed. Simplistically, if the firm uses equal proportions of Common Equity, Preferred Shares and Debt, the WACC will be the sum of 1/3rd the Cost of Common Equity, 1/3rd the Cost of Preferred Equity and 1/3rd the After-Tax Cost of Debt.

If we can consider the WACC as the 'demand side' (i.e. investors expectations) of the equation, then there must be a corresponding 'supply side'. The supply side is the level of net free cash flows that the productive assets are generating in order to meet all the investors' return

[3] Generally, the predominate reason why the acquirer's WACC is used as an acceptable proxy for all new project evaluation is simply because the analyst already has knowledge of the firm's historical WACC (or can derive it with relative ease), whereas they are uncertain of the correct methodology to develop a project or single-asset cost of capital and uncomfortable with the uncertainty that this may add to their analysis.

expectations. The two sides must equal[4]. So the 'other' weighted return that must be considered is how the supply side is constituted.

Imagine a firm that has *only* two separate assets and no liabilities and has issued only common shares. The first asset is a $1 million investment in a 20 year corporate junk bond, priced to return 15% annual and the second is a $1 million dollars cash sitting idle in a non-interest bearing current account[5]. The present value of the firm is obviously $2 million. There is no debt so the WACC will equal the un-levered cost of equity (symbolized k_e) and this must equate to the expected combined returns on the firm's two assets:

$$\text{WACC} = k_e = 15\% \times (1{,}000{,}000/2{,}000{,}000) + 0\% \times (1{,}000{,}000/2{,}000{,}000) = 7.5\%^{6}$$

Intuitively the 7.5% should make sense because half of the firm's assets are invested in a risky venture generating an expected 15% return and half are parked in a virtually risk-free asset (a bank account) generating an expected 0% return.

HISTORICAL WACC CHANGES AS PROJECT RISK PROFILES CHANGE

Now consider what happens to a firm's historical WACC when it undertakes an investment with a different risk profile than all its previous investments. In the previous example we had a firm with a 7.5% WACC and it had $1 million invested in a junk bond and $1 million in cash. If the entire cash balance is now invested in a 20 year zero-coupon government security, yielding

[4] If Investors return expectations and actual returns being generated by the assets are not in equilibrium, the market price of the firm as a whole is quickly bid up or down until expectations and actual returns agree. Consider a 100% common equity financed firm where investors expect a 15% return but current press releases indicate that the most probable return that can realistically be expected is only 13%. In short order the market price of that stock is bid down until the new lower equilibrium is reached.

[5] For simplicity we are considering investments in bonds and cash – but the examples would be just as pertinent if we were considering a diverse range of investments in chemical plants and, say, precious metals.

[6] The more theoretically sound method of identifying the cost of equity here, since the maturity of the junk bond is known, would be assess the known current value of the firm against the expected cash returns (20 annual instances of 150K, then the return of the $1M junk bond principal and return of the $1M cash in the bank account as:
$\$2{,}000{,}000 = \$2{,}000{,}000/(1+r)^{20} + ?^{n=20} \$150{,}000/(1+r)^{n}$
Through some iteration it will be discovered that "r" equates to 7.5%

6.0%, the overall WACC of the firm will change. Let us say that a risk-free government security can be had where no annual cash stipends are paid, the only cash return occurs 20 years hence at an amount (per $1 million principal invested) is $1,000,000 x 1.06^{20} = $3,207,135.

So now, in order to find the new WACC:

$$\$2{,}000{,}000 = (\$1{,}000{,}000 + \$3{,}207{,}135)/(1+ r)^{20} + ?^{n=20} \$150{,}000/(1 + r)^{n}$$

Again, some iterative trial and error testing for "r" eventually tells us that, the new "r" or WACC is 9.53%. (If your expectation was that the WACC would turn out to be 50% of 15% + 50% of 6% = 7.5% + 3% = 10.5%, this will not work. Except for two specific instances, geometric mean rates of return are not proportionately additive.)

Where the historical WACC was 7.5%, switching out the investment in cash for an investment in a zero coupon long-term government note has increased the overall WACC to 9.53%. Consider that, had the historical 7.5% WACC been used to assess firm value once the government security had been purchased, the erroneous conclusion would have been:

$$\$2{,}519{,}589 = (\$1{,}000{,}000 + \$3{,}207{,}135) / (1+ 0.075)^{20} + ?^{n=20} \$150{,}000/(1 + 0.075)^{n}$$

Clearly such a conclusion would defy any rationale explanation, given that it was known with certainty that the Junk Bond and the Government Zero Coupon Bond each had a market value of $1,000,000 just prior to the consolidation of the two.

ONE OF THE MOST IMPORTANT REASONS WHY THE HISTORICAL WACC SHOULD NOT BE USED TO ASSESS THE NPV OF NEW PROJECTS IS BECAUSE THE NEW INVESTMENT CAN GENERALLY BE EXPECTED TO CHANGE THE FIRM'S OVERALL GEOMETRIC WACC. This can be true EVEN WHEN the firm's historical WACC and the appropriate risk-adjusted rate for the new investment are precisely the same geometric return, but the timing of the cash flows are significantly different (see footnote seven).

CONCLUSIONS

The following comments ignore the consideration of the debt within the firm's capital structure. In that case the sum total of the individual project/asset returns will differ from the WACC rate by the amount of tax shield created from the presence of debt.

- A firm's existing WACC is a compilation of the various project or asset risk-adjusted returns.
- Each project or asset operating within a firm could, coincidentally have the same internal rate of return as the firm-wide WACC, but this is unlikely. It is more probable that each project or asset will have different risk profiles.
- If a firm has only ONE Asset or Project generating cash flows, then that return WILL represent the overall firm WACC (excepting the presence of debt in the capital structure)
- Except in the case where a prospective project has virtually the same risk characteristics as the overall firm, using the firm-wide WACC as a discount rate to assess project value will yield misleading results.
- Where there are two or more projects or assets generating cash flows within a firm the resultant firm-wide WACC is not necessarily the proportionate sum of the individual project/asset returns[7].

[i] Brealey et al refer to this concept of assessing all new capital budgeting decisions as the 'company cost of capital rule'. They sum up the argument against this practice in "the company cost of capital rule can also get a firm into trouble if the new projects are more or less risky than its existing business. Each project should be evaluated at its *own* opportunity cost of capital. This is a clear implication of the value-additivity principle introduced in Chapter 7. For a firm composed of assets A and B, firm value is:

Firm Value = PV(AB) = PV(A) + PV(B) = sum of separate asset values" From Brealey, Myers et al Principles of Corporate Finance, 2nd Canadian Edition, (pg. 199), McGraw Hill Ryerson Ltd.

[7] This paper has not focused on this point, however, it can be shown that the firm-wide WACC will be the proportionate sum of the project and/or asset rates of return only when: i) all the constituent cash flows are annuities (i.e. the cash flows are level in each year) or, ii) one or more of the rates of return is zero (as was demonstrated above when one of the investments was held in cash)