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Integrating Strategic Management and Financial Analysis: The Case of Discounted Cash Flow and Optionality

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Abstract

This paper discusses recommendations for decision-making when decision-makers rely on two often-inseparable analytical techniques: discounted cash flow analysis and strategic analysis. Specifically, the paper discusses common pitfalls and recommendations for properly incorporating the discount rate into DCF analysis and the interrelationship between strategy and DCF valuation in the area of strategic options. Recognizing the strengths and shortcomings of strategic analysis and DCF analysis as analytical approaches, the paper discusses the advantages of using both DCF analysis and strategic analysis for final decision-making.

Keywords: Management Strategy, Discounted Cash Flow, Valuation, Real Option, Financial Analysis, Practitioner, Decision Making

Introduction

Complex business decisions require managers to marry multiple streams of decision-making information to analyze a situation and make recommendations. Perhaps the most frequent example of this is the need to marry financial information – often information produced by discounted cash flow analysis – and information produced by strategic analysis. Discounted cash flow analysis (DCF) and strategic analysis are often inseparably intertwined. The connections between the two techniques are subtle, but important, and are sometimes the source of consequential errors committed by business practitioners. While previous papers have addressed this interrelationship (e.g. Barwise, Marsh, & Wensley, 1989, Sussman & Grube, 2004, Yeo & Qiu, 2003), this paper is aimed at pointing out the connections and offering practitioner guidelines for marrying the two streams of decision-making information.

Discounted Cash Flow Techniques – The Basics & Issues

Discounted cash flow analysis is a technique that allows a present and future stream of cash flows to be converted into today's dollars after applying an appropriate discount rate. Seems simple enough, right? Textbook problems designed to acquaint students with technique fundamentals typically give all the information needed to arrive at a "right" answer. Unfortunately, in the real world such information is much more difficult to obtain. Because the DCF is sensitive to the choices that must be made, making the right choices can have considerable impact on the firm. As a consequence, a deeper understanding of the DCF technique and how it relates to strategic analysis is necessary.

Analysts who develop DCF models to determine the economic value of business decisions develop a feel for some important DCF relationships. For example, changing the discount rate often has large effect on the present value of future cash flows. Because the technique is sensitive to changes in discount rate, important questions should be asked. What is the "right" discount rate? How is it derived?

Changing distant cash flows in conjunction with changes in the discount rate should raise more questions. Note that as distant cash flows are increased dramatically in conjunction with a high discount rate (say, 25%) the present value of future cash

flows is changed little. In other words, cash flows that would be received in later years have little worth to the firm in decision-making. However, at lower discount rates the incremental contribution of distant cash flows is greater. Hence, discount rate and the time horizon of the analysis are interconnected.

Analysts must deal with other issues in calculating DCF. For example, real world analyses require an estimate future cash flows. Where do they come from? Is it acceptable to simply extrapolate from past cash flow data and extend past trends into the future?

Another issue to reckon with is that DCF and strategic analyses sometimes point to opposite conclusions. For example, a strategic analysis might indicate a "go for it" conclusion, but a DCF analysis might say just the opposite. Are one (or both) of the techniques conceptually flawed?

Strategic Analysis – What It Does

Strategic analysis is often directed at assessing relevant factors in the organization's external and internal environment for decision-making purposes. Most analysts rely on tools and techniques such as Porter's Five Forces Model, Strategic Group Mapping, Competitive Strength Assessment, and SWOT analysis. A common error is to use these techniques to perform a static analysis and to focus on conditions as they currently exist. The power of these techniques is increased dramatically when analytical time reference is shifted to the future to predict competitive conditions that will likely exist over the life of the contemplated project.

A properly constructed strategic analysis should provide several key pieces of information to help create a proper DCF analysis:

Future competitive rivalry – All projects under consideration should be thought of as being nestled within a future competitive landscape. Future rivalry can range from relatively benign to very harsh. A DCF analysis must consider future competitive conditions. Even first mover advantage has little value unless the firm is able to achieve sustainable competitive advantage by erecting some type of barrier to prevent competitive encroachment. In the absence of sustainability, new entrants and/or existing competitors will surely replicate any advantages offered by the project until competition reaches a natural equilibrium. Using the words of the economist, competition will intensify to the point that competitors are able to achieve only normal profits. Implied is that sales will decrease and margins will be squeezed over time. Implications for a DCF analysis: the analyst should reduce future cash flows (revenues and margins) or subsume these effects in an increase in the discount rate. The former is preferred over the latter to prevent over-aggregation of richly textured decision-making information.

Environmental volatility – Environmental volatility is a term used to capture the degree of change in the external environment, frequency of change, and predictability of change. The most volatile environments are those that change radically, often, and in unpredictable ways. Volatility can stem from many sources in the competitive and macro environments. In the competitive environment, moves by competitors, supplier changes, and buyer changes are typical sources. The macro environment can induce volatility through socio-political change, legal change, changes in economic conditions, and so on. The likelihood of future environmental volatility has two implications for DCF analysis. One is that project risk is increased.

Hence, a higher discount rate is warranted. The second implication has to do with construction of a DCF analysis that produces a point estimate versus one that produces a range estimate. This second implication is discussed at greater length in later paragraphs.

The Discount Rate in DCF Analysis & Risk

It should now be clear that setting up a proper DCF analysis requires several decisions AND that those decisions are consequential to decision-making. Following are guidelines to guide the analyst through the process. The first issue to be addressed is that of the Discount Rate.

Because providers of capital require a return to compensate them for the risk they bear, the analyst must determine the firm's cost of capital (often called the firm's weighted average cost of capital, or WACC) by determining investors' required returns for each capital source. The WACC is calculated by determining the firm's cost of debt and equity and then weighting them by the market value weights present in the firm's capital structure. The market value weights are readily available for public firms, but the required returns on debt and equity must be calculated. The cost of debt is generally the yield to maturity on outstanding bonds. This is a straightforward calculation since the bond's cash flows are known with certainty (absent any default).

Determining the firm's cost of equity is more difficult because the cash flows are not known. Generally, models such as the Capital Asset Pricing Model (CAPM) or the dividend discount model (DDM) are used to estimate the cost of equity. Because the CAPM explicitly considers risk, we will focus on this approach. Mathematically, the CAPM is

$$E(R_j) = R_f + \beta_j (E(R_m) - R_f)$$

Conceptually, the discount rate represents a risk-free rate (to compensate the investor for foregone consumption) plus a risk premium on the stock. The risk premium consists of two parts: The firm's beta, representing the sensitivity of the firm's returns to the returns of the overall market, and the market risk premium ($E(R_m) - R_f$)) representing the average additional return required by investors to compensate them for bearing risk.

The risk-free rate is relatively easy to address. The normal practice is to select the interest rate for Treasury Securities as the analyst expects them to be over the life of the project. Simply checking the Wall Street Journal for today's rate might be inappropriate if today's rates are significantly higher or lower than historical trends and if the project's life is long. Unless there is a good reason to believe otherwise, the normal practice is to use historical T-Bill or T-Bond rates.

A firm's beta represents the amount of a stock's market risk. The overall market has a beta of 1, so a firm with a beta of 1.5 is 50% riskier than average. Determining a beta involves regressing a stock's returns against the returns on the overall market and measuring the slope of the regression line. Thankfully, this procedure is not necessary since betas are readily available from sources such as Value Line, Yahoo! Finance, and many others.

The market risk premium is a bit trickier. The market risk premium, which is the excess return expected on the market portfolio relative to a riskless asset, is representative of overall market risk aversion. For this reason, analysts often treat the term as a single measure rather than the difference of the individual parts $E(R_m)$ and R_f. There is actually considerable controversy associated with the actual value to use for the equity risk premium. Values used in practice by corporations in the U.S. generally range between 5% and 9% (Bruner and Eades (1998)).

As a note: While the CAPM is typically associated with finance, there are aspects that are relevant in management strategy (Naylor & Tapon, 1982).

Once the analyst has the weights and the required returns for equity and debt (along with the firm's marginal tax rate since interest costs are tax deductible) they can calculate the WACC as follows:

$$WACC = W_{debt} * K_{debt} * (1-T) + W_{equity} * K_{equity}$$

Adjusting the WACC

The firm's weighted average cost of capital (WACC) is appropriate only for discounting cash flows that are of average risk for the firm. If the project in question is more or less risky than the overall firm average then the discount rate must be changed to reflect the differential risk.

Consider these factors in evaluating Project Risk:

Projects of "Average" Risk – Fairly routine decisions made by the firm often have average risk. An example is buying a machine for a manufacturing processes. WACC (the firm's weighted average cost of capital) is probably a good proxy for the risk-free plus project risk rates (i.e., discount rate) in this instance.

Projects of "Below Average" Risk – Some projects have lower risk than the average project undertaken by the firm. For example, if a plant expansion was due to a long-term government contract to provide a large quantity of items, it could be argued that the project is less risky than average. A discount rate less than WACC might be justified in these circumstances.

Projects of "Above Average" Risk – Projects of the types typically seen in MBA case studies, mergers, acquisitions, strategic alliances, new product launches, and, in general, projects that require some sort of forward-looking strategic analysis often fall in this category. High failure rates (typically in the 60-70% range) for mergers, acquisitions, and strategic alliances or anticipated environmental volatility or harsh competitive rivalry should be signals of significant risk. WACC is not an appropriate discount rate for these types of projects. Instead, perform the appropriate strategic analysis (often an analysis of the environment) to qualitatively assess project risk and make an upward adjustment to WACC. Conceptually, this practice is tantamount to establishing a discount rate that is the sum of the risk-free rate and risk associated with the project. Discount rates in the 16-25% range are not uncommon for projects residing in futures characterized by a high likelihood of new entrants, intensifying rivalry, downward pressure on price, etc.

Internal Hurdle Rates – Sometimes companies will establish an internal hurdle rate for evaluating projects. Such proscribed rates are conceptually wrong. Using the same rate to discount all project cash flows will result in an acceptance of high-risk projects and rejection of low-risk projects regardless of whether the projects add or destroy firm value. Over time, such a firm will inevitably become riskier.

Setting Up A DCF Analysis

As previously mentioned, the discount rate, the time horizon in a DCF analysis, and the expected stream of future cash flows are interdependent. Following are guidelines and tips in sorting out the interrelationships needed to construct a DCF analysis.

Time Horizons in A DCF Analysis

A high discount rate (say, 25%) has the effect of making distant cash flows (e.g. beyond years 7 or 8) relatively unimportant to the calculation of net present value. However, at low discount rates, distant cash flows (out to year 10 and beyond) continue to make a significant contribution to net present value.

A common error in DCF analyses is to arbitrarily adopt a short time horizon (say, 5 years) in a DCF analysis. Lopping off future cash flows means that the analyst has implicitly declared them to have zero worth in present value terms. The appropriate time horizon for a DCF analysis is one that doesn't implicitly declare consequential future cash flows to have zero worth in present value terms.

There are two approaches to selecting an appropriate time frame for a DCF analysis. Neither one can occur until the analyst has selected an appropriate discount rate. To implement the first approach, the analyst can make an arbitrarily large change to a distant future cash flow amount. If the net present value doesn't change significantly (i.e., enough to alter decision outcome) then the selected time horizon is adequate. The second approach is to create a final value in the DCF analysis to hold a "terminal value." The terminal value is the present value worth of all future cash flows that will occur beyond the last year in the analysis.

What to Discount?

A common error is to set up a DCF analysis using future expected profits. An analyst should never discount net profits! Net present value (NPV) calculation is done on cash flows. The analysis should add back in depreciation expense and make other adjustments to proforma income statement data to convert the data to cash flows.

Use of Extrapolation Methods to Determine Future Cash Flows

Extrapolation methods are approaches used to estimate future cash flows based on past cash flow data. Fitting a line to past data to estimate future cash flows is an example. Extrapolation methods are rooted in an assumption that the future will be an extension of the past. These methods are justifiable ONLY when the above assumption holds. If it holds, use of WACC as the discount rate or internal hurdle rates (whichever is higher) is appropriate. However, if an analysis of the environment suggests that the future will not be an extension of the past, the use of extrapolation methods is conceptually flawed and a DCF analysis can produce unreliable – even dangerous – results. Instead, the analyst should use insights gained from an

analysis of the environment and other known relationships to adjust cash flows accordingly. This might entail adjustments to revenues and/or costs if the strategic analysis points to these types of changes in the future.

Point Estimates vs. Bracketed Estimates & Sensitivity Analysis

The type of estimate that should be produced by a DCF analysis is inextricably intertwined with the amount of environmental volatility indicated by a strategic analysis. Most DCF analyses are set up to produce a single NPV (i.e., a "point estimate"). The appropriateness of such an approach diminishes as the future grows uncertain. For example, suppose an environmental analysis reveals several possible future scenarios. One scenario might be a future characterized by intensified rivalry and downward pressure on price. However, this future state might also be accompanied by a favorable or unfavorable set of macro economic conditions, such as economic recession. If the business is sensitive to changes in the general economy, the analyst should be able to see that the future can take several different forms and the form taken might be consequential to the decision to undertake the project. In conditions such as these, point estimates become too coarse grained for such important decision-making. One approach is to create scenarios to bracket the outcomes for multiple possible futures. Such an approach will generate "bracketed estimates" that reveal best case, worst case, and most likely case scenarios.

Sensitivity analysis is another way to assess the degree of forecasting risk. The technique is designed to allow the analyst to identify variable(s) in the analysis that exert significant effects on the outcome of NPV calculations. This is a worthwhile exercise. Once they have determined a consequential variable the analyst should think about two issues. One is to make a subjective assessment of the likelihood that the values assigned to this variable will vary significantly over the time horizon of the analysis. If the likelihood is great, creating scenarios (best case, worst case) is appropriate. Hence, the analyst will construct the DCF analysis to produce "bracketed estimates" as discussed above. The second issue requires a probe of the overall quality of the estimate for this variable. Sometimes identifying a consequential variable will prioritize the investigation efforts. The analyst will want to make the estimate for the consequential variable(s) be the very best they can possibly achieve.

Conflicts Between Financial & Strategic Analyses

It isn't unusual to see a project that has negative NPV, but a strategic analysis reveals many compelling reasons for going forward with the project. A decision maker might wonder how this can be. The source of the conflict sometimes lies in information not "priced" in the DCF analysis. In Finance parlance, NPV, as strong as it is, systematically undervalues projects because it ignores things contributing to managerial flexibility (called "real options")(Copeland & Antikarov, 2001, Kulatilaka & Marks, 1988). Real options, such as the option to expand, the option to abandon, the option to add complementary products, the option to enter other lines of business down the road if we enter this one now, etc. are almost always present, and they add value to a project. They can never decrease the value of a project (that is why they are called "options"). It is possible to place a value on these options, but doing so is fairly difficult and is considered an advanced Finance topic. Regardless, it is important to recognize "optionality" in a project, and recognize that options add value.

In strategic analysis, options frequently take the form of sources of future competitive advantage by lowering cost (especially if that advantage is sustainable), synergies across products or businesses, or opportunities to enhance differentiation advantage for the company or the company's product offerings (Bowman & Hurry, 1993). For example, it can be argued that the ability to capture synergies between the firm and the project, if undertaken, either effectively lowers acquisition price of the project or favorably affects future cash flows by increasing revenues and/or lowering cost relative to revenues or costs associated with the stand-alone project.

Often, the most important decisions made by the firm are those concerning actions that will play out in a highly uncertain marketplace. Indicators of environmental volatility and the presence of intense future competitive rivalry only serve to increase the likelihood that DCF and strategic analyses will reach different conclusions. Such decision-making also serves to vividly underscore the limitations of each analytical technique. While DCF analysis offers the advantage of boiling the worth of a complex decision down to a single number (i.e., NPV) for evaluation purposes, qualitative richness – especially the richness associated with the value of options – is often obscured. Strategic analysis is designed to reveal the value of options, but the analyst is left with only a qualitative assessment of their worth.

So, what is the decision-maker to do? Two approaches are acceptable. One is to apply advanced Finance techniques to assign values to options associated with the project. Doing so should bring agreement between the outcomes of a DCF analysis and a strategic analysis. However, the technique is complex and runs the risk of over-aggregation of important decision-making data. The recommended approach allows the differences in information produced by the two analytical approaches to stand side by side. The perspective of the decision maker must shift to acknowledging the shortcomings of each analytical technique and embracing the complementarity of the two techniques in combination. DCF analysis is capable of providing either a point or range estimate of the present value of a contemplated project – sans options. Strategic analysis provides a large amount of useful information – an indication of project risk, likely future competitive conditions, guidance for preparing estimates of future cash flows (revenue and margin streams), and indications of the worth of options – but, unfortunately, such information will always be qualitative in nature. Keeping the two streams of information separate, but marrying them during final decision-making enhances the likelihood of better decisions.

Summary & Conclusions

The focus of this paper has been to provide practical guidelines for decision-making, in which decision-makers rely on two often-inseparable analytical techniques: DCF analysis and strategic analysis. The recommended approach has been to use strategic analysis as a guide to properly construct a DCF analysis. Recognizing the shortcomings of each analytical approach, it is further recommended that decision makers use both DCF analysis and strategic analysis for final decision-making. The hoped for result is better decision making that allows the best of both techniques to play an important role.

Unfortunately, today's trends of increasing environmental volatility and intensifying rivalry have increased the frequency that top executives must make decisions that defy the usual practices of DCF analysis. Such decisions demand a forward-looking strategic analysis that places a contemplated project in an uncertain future. Many times these decisions put the future health of the firm at risk and one only needs to look to the popular press to notice the speed at which the bone yards are filling with executives who made bad choices. Admittedly, such an approach might create a sense of discomfort among some decision makers. If so, it would be appropriate to consider the alternatives. Failure to consider the worth of options inherent in a project can result in the firm missing opportunities to create future sustainable competitive advantage. In the same vein, a total reliance on qualitative information derived from strategic analysis exposes the firm to excessive risk of not considering the hard-nosed financial realities that can be revealed only through the DCF technique. Properly blending the two techniques offers the greatest hope for avoiding these two pitfalls and producing the higher quality decisions.

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