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Common Methods of Valuation in Brazil

By

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Common methods of Valuation in Brazil

Introduction

I decided to do this independent research paper in order to understand how the value of companies was being estimated in Brazil. During the MBA program in the University of Michigan, we learned many different methods to perform a valuation of a company. However, some of them were relatively new and, thus, were not being largely adopted yet; other methods used concepts that were difficult to apply in countries with the limitations of having an inefficient stock market where speculation and low volume traded significantly affect prices.

Objective

The objective of this paper is to describe the main versions of the discounted cash flow (DCF) methodology and identify common methods currently used for valuation of companies in Brazil.

Methodology

Valuation methods

There are many different methods to estimate the economic value of a business. Among them: similar transactions, ratios, discounted cash flow, and Real Options. For the purpose of this paper 1 will describe the DCF methodology and its different versions, including Adjusted Present Value (APV), Weighted Average Cost of Capital (WACC) and **Cash Flow to Equity (CFE).**

Practice in Brazil

The focus of this analysis is on valuations in a Mergers & Acquisitions context. Therefore, interviews were conducted with consulting companies and investment banks because those companies have a formal and standardized approach for valuations. As an example, consulting companies and investment banks perform valuations for privatization purposes and, as a process requirement, have been producing detailed valuation reports, many times formally justifying the discount rate. These reports have helped me to understand the current valuation practices in Brazil. However, interviews were the main source of information for this paper. I conducted 18 interviews with managers/partners of companies that work actively with valuations, such as PriceWaterhouseCoopers, Booz Allen & Hamilton, Arthur Andersen, Merrill Lynch, BankBoston, Ernst & Young, Banco Pactual, Delloite and Banco Bozano Simonsen.[1]

Valuation methods

Discounted cash flow method

The definition of value of a business, according to the DCF methodology, is the value of future free cash flows, discounted by a rate that reflects the risk of those cash flows. However, a difficult question arises: How to measure risk. The financial academic community has worked on this subject for almost 50 years and the current models are still being challenged. It is not part of this research to discuss in detail how to measure risk but I will touch some aspects of it within this paper.

I will describe three different ways to measure value through the discounted cash flow method: Adjusted Present Value, Weighted Average Cost of Capital and Cash Flow to Equity.

[1] Please see note at the end of this paper.

Adjusted Present Value (APV)

The principle behind the APV is that we first value the company as if it were financed only with equity and the result is called Base NPV. Then, we add other effects that can also generate value - the most common "effect" is the interest tax shield of using debt as source of financing - and the result of adding the Base NPV and the interest tax shield (ITS) is called adjusted present value or APV. Other effects that are added to the Base NPV can also include items such as subsidized borrowing or future operating projects. APV can help managers analyze not only how much a company is worth but also where the value comes from.

$$APV = Base\ \ NPV + PV(ITS) + PV\{other\ \ effects)$$

In the APV method, each source of value is discounted by its own rate that reflects its time value and riskiness. Operating cash flows[2] are discounted by the expected return that reflects the risk of those operating cash flows, or r_a, and interest tax shield is discounted by the rate of return that reflects the risk of that tax shield, or r_T.

The question now is how we measure the discount rate. In order to discount the operating cash flows as if they were financed only with equity we should calculate the risk of the unleveraged operation, called r_a (return on operating assets).
However, the rate that can be observed in the market is the expected return on cash flows to equity, or r_e, through p_e, that is the covariance of a particular stock with the market portfolio divided by the variance of the market portfolio[3]. Thus, in order to get r_a, **we need to have a formula to convert r_e to r_a, or β_e to β_a.[4]**

[2] Definition: Operating cash flows are cash flows after taxes but before interest and before the effects of interest on taxes.
[3] S&P-500 is commonly used as a proxy for the market portfolio.
[4] The relation between r and β can be obtained through CAPM: $E(r_p) = r_f + \beta$ (Market premium).

To obtain the conversion formula, we can start with a theoretical balance sheet (see Fig.1), where V_a is the unleveraged value, or operating assets value. According to the APV version it is also called Base NPV. D and E are the market values of the debt and equity, respectively. T is the tax shield resulting from the interest payments on debt. The sum of V_a and T is equal to the sum of D and E, and the result of this sum is called leveraged value, or V_L. Each of these components has its specific risks that can be measured through their betas (β_a, β_d, β_e and β_T). The leveraged beta (β_L) is simply the weighted average of the β_a and β_d or β_e and β_T (see two equations beside the balance sheet).[5]

Fig.1 - Balance Sheet	
V_a (β_a)	D (β_d)
T (β_T)	E (β_e)
V_L (β_L)	V_L (β_L)

$$B_L = B_a \frac{V_a}{V_a + T} + B_T \frac{T}{V_a + T} = B_a \frac{V_a}{V_L} + B_T \frac{T}{V_L}$$

$$B_L = B_d \frac{D}{D + E} + B_e \frac{E}{D + E} = B_d \frac{D}{V_L} + B_e \frac{E}{V_L}$$

By equaling the two equations above and solving for β_a we have:

$$B_a = B_e \frac{E}{V_a} + B_d \frac{D}{V_a} - B_T \frac{T}{V_a}$$

We can simplify the above equation even further by assuming that tax shields are as risky as principal and interest payments. In this case, we can consider β_d as equal to β_T.[6] Another assumption[7], could be that debt is constant, perpetual and fairly priced (interest rate equal discount rate), in other words T = Dt[8] (t = tax rate).

[5] The rate we find through CAPM by using β_L is the weighted average cost of capital, or r_{wacc}.
[6] This is a fairly acceptable assumption, Brealey & Myers Chapter 18.
[7] This assumption is not common in practice. However, as long as a company does not have huge changes in its debt position and the forecasted horizon is long enough (say more than 20 years), the difference between using the correct formula and the perpetuity formula (PV tax shields = Tax shields divided by r_t) is relatively small.
[8] Perpetuity formula: T = present value of tax shield = $(t\, r_t\, D)/r_t = tD$.

$$(1.1) \qquad B_a = B_e \frac{E}{V_a} + B_d \frac{D}{V_a}(1-t)$$

With this formula, to calculate β_a, we only need β_e, r_d (to find β_d), the tax rate and the market value of equity and perpetual debt. Finally, with β_a, we can calculate r_a using the Capital Assets Pricing Model (CAPM)[9].

Weighted Average Cost of Capital (WACC)

This version has been accepted as the standard over the past 20 years. Today, business schools are still teaching WACC but they are also presenting other options that have fewer restrictive assumptions, such as the APV.

The WACC version is supposed to get the same results as the APV[10]. Through an adjustment in the discount rate (calculate the weighted average), the WACC version discounts the operating cash flows by r_WAcc and the result of the discounting will be V_L, the leveraged value, which already incorporates all the costs and benefits of a selected capital structure. Different from APV version that we have to add the interest tax shields benefit to obtain the leveraged value.

The formula of r_{WACC} is very similar to the r_a formula. When we compare the formulas 1.1[11] and 1.2, we can see that the only difference is that r_a considers the unleveraged value (V_a) and r_{WACC} considers the leveraged one (V_L).

$$(1.2) \qquad r_{wacc} = r_e \frac{E}{V_L} + r_d \frac{D}{V_L}(1-t)$$

[9] To find more about Capital Assets Pricing Model go to Chapter 9 of Bodie, Kane and Marcus – Investments, 1999.
[10] Actually, using the perpetuity formulas to calculate r_a, the results using the APV and WACC versions are not exactly the same. To make APV and WACC consistent we have to slightly change the formulas and use a technology called backward induction.
[11] Betas (B's) can be simply replaced by returns (r's) based on CAPM, see also notes 4 and 9.

The expected return on equity, or r_e, which is determined by r_a, has a positive correlation with debt ratio; in other words, r_e increases when debt ratio is growing, as long as r_a is greater than r_d (usually true) and r_d is constant. As we mentioned, r_d tends to be flat based on the assumption that increases in debt ratio do not change the risk of the debt. However, as from an "optimum level", debt will become riskier and debt-holders will demand a higher return on debt; as a result, r_d will increase sharply. Increases in r_d will transfer business risk from stockholders to bondholders and, thus, r_e will go down. The combined effect of increases in debt ratio and increases in r_d will be that r_e will continue to become higher as soon as the increases in r_d are smaller than the increases in the debt ratio. When r_d is growing more than the debt ratio, then r_e will go down. The formula below can help to understand what determines changes in expected return on equity. This is simply the equation 1.1 solved for p_e and with expected returns replacing betas (CAPM).

$$r_e = r_a + (r_a - r_d)\frac{D}{E}(1-t)$$

The rate r_{wacc} goes down as debt ratio increases. A common mistake in trying to explain why this happens is to say that r_{wacc} decreases because of the bigger weight on r_d, which is usually lower than r_e. This is not correct because r_e increases, too. In fact, if there were no taxes, the increase in r_e would perfectly offset the increase in the proportion of R_d and r_{wacc} would remain unchanged. This result was the conclusion of the important Miller & Modigliani's paper called Proposition II (see Brealey and Myers, chapter 17).

The only reason for the decline in r_{wacc} is the tax shields. We can prove that using algebra by showing that r_{wacc} only depends on r_a, tax rate and the debt ratio[12] (using the

[12] When we substitute r_e in the r_{wacc} equation for an expression that is function of r_a and r_d, r_d cancels out and the result is: $r_{wacc} = r_a$ (1-debt ratio) + r_a (debt ratio) (1-t)

We can also find r_{WACC} through β_L by using CAPM and to find β_L we can use the formula presented beside Fig. 1.

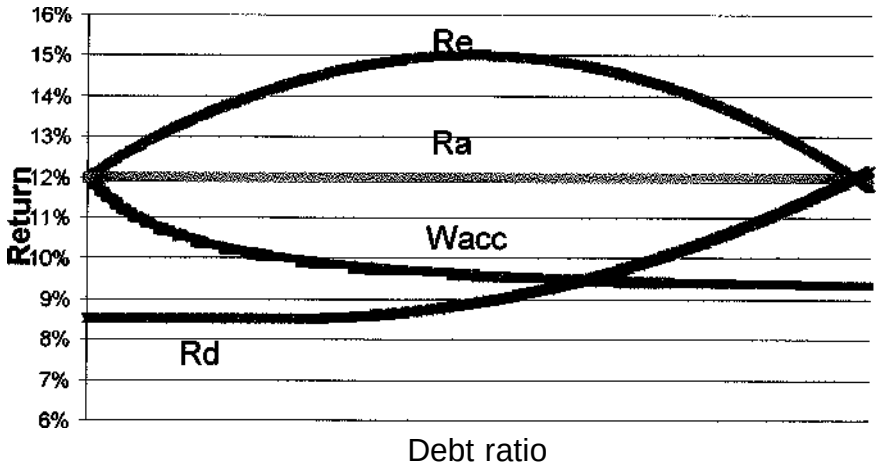
Cash flow to equity (CFE)

The third version of the discounted cash flow is the cash flow to equity. Here, again, we obtain consistent results when compared to WACC or APV. The basic idea is to consider the cash flows to equity, in other words, the cash flows after the payment of debt related activities, such as principal and interest, and discount them by a rate that reflects the risk of equity, in this case r_e. The resulting present value is the equity's value, not the value of the company as a whole. To obtain the total value, we have to add the market value of the debt. This method uses r_e that is calculated through B_{Si} which is the information available in the market.

Relations between r_a, r_B, r_i and r_{WACC} (see Graph 1)

We have covered that r_a is the expected return on operating assets, as if the firm were only financed with equity. Thus, r_a does not change when the debt ratio varies. Similarly, r_d tends to be flat while the debt ratio is reasonable; however, with very high debt ratios, r_d increases substantially (high yield). Now, I will discuss in more detail what happens with r_e and r_{WACC} when we increase the debt ratio.

Graph-1

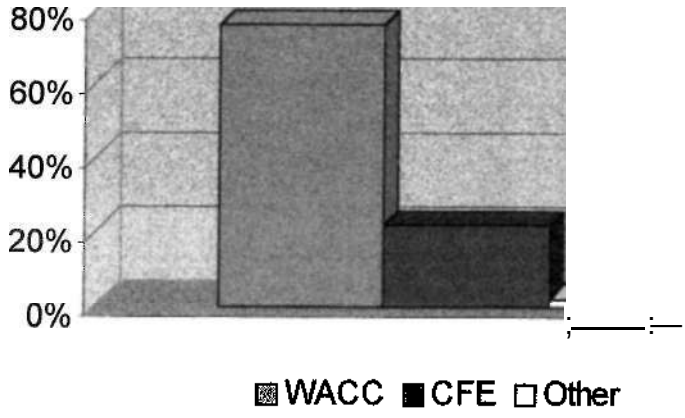


privatization activity in these sectors frequently leads to associations between operators, financial investors, large local groups and technology providers. Some sectors, such as auto-parts, food and beverages and high-technology have for some years been adapting to this new competitive environment. Currently there has been an intense concentration activity in the financial sector. Transactions in the financial sector grew by 31 % in 1997, reflecting the strong presence of foreign companies in banking and insurance and the privatization of state-owned banks or banks under government intervention.

Valuation methods

According to the interviews, the most common method for valuation is the discounted cash flow methodology, and the version most widely used is the weighted average cost of capital. In general, professionals were not totally familiar with the APV method. The graph below shows a summary of the results.

Valuation methods in Brazil



The main reasons for the use of WACC version are described below:

* Standard method for Valuation. The way international investors are looking to local companies.

- **WACC version is simple. While the cash flow to equity version (CFE) requires forecasts of future interest payments, WACC version is based on operating profits before the payment of interest expenses. APV requires several discounting calculations and WACC requires only one.**

The main reasons why some companies prefer cash flow to equity instead of WACC are described below. According to them:

- **The cost of equity capital r_e does not require the estimation of debt ratio based on market values that r_{WACC} requires. Thus, it avoids the circular calculation.**
- **Flexibility to change debt ratio. Aiong the forecasted horizon, we may find significant changes in debt ratio and also different r_d. When using the WACC version we have to use just one debt ratio and one r_d**
- **Frequent changes in the tax rate. It is common to have changes in the tax rate especially because of accumulated losses that reduce taxes in future periods. The WACC version does not have the flexibility to use different tax rates for different years.**

One problem the WACC version presents is that it assumes the same debt ratio and r_d for the whole projected horizon. The alternative for this problem would be to have one r_{WACC} for each year, but it would result in complex calculations and it would not be very informative.

The majority of companies estimate the cost of capital based on CAPM, but given the limitations of using CAPM in Brazil, they also rely on their experience on previous **valuations and in a comprehensive strategic analysis to understand the key success factors and risks for the business. The main reasons given by the interviewees for**

assuming that CAPM does not hold well in Brazil were the lack of local information about betas and market value of stocks to calculate debt ratio, and the complications in adapting foreign data for local reality. To calculate country risk based on the difference between a T-bill in USA and a T-bill in Brazil is not totally correct, because this difference would include essentially credit risk that is not necessarily the same as the additional risk to be operating in a different country that is what we would like to measure. In Brazil, the number of closely held companies is high and for those companies the available information is very limited.

Valuation based on ratios is not largely used because, in the opinion of the professionals, the stock prices in Brazil do not necessary reflect the market value, because of speculation and small volume of transactions. One interviewee mentioned that 4 companies represent more than 80% of the transaction volume in the stock market.

Conclusion

The WACC version is largely used in Brazil and seems to be the most appropriate for valuations in the **country. The CFE version has been also used but it does not have any** special advantage over WACC.

One of the arguments, used by CFE proponents, against WACC, was that the cost of equity capital r_e did not require the estimation of debt ratio based on market values. This would be only true if we were not expecting to change the original debt ratio in the future. Otherwise it would also require the estimation of debt ratio based on market values in **order to calculate the new r_e. The bigger the debt ratio the greater the return on equity.**

Other argument of CFE proponents was that it has more flexibility to change debt ratio. This is true as long as a new return on equity is estimated every time debt ratio is changed. Therefore, it will not be correct to use the CFE method in a situation that debt ratio is changing and applying only one discount rate for all periods. The reason is that r_e should go up with increases in the debt ratio and go down with decreases in debt ratio. Similarly, when using the WACC version in a situation that debt ratio is changing the most correct approach would be to calculate one rate for each period.

In summary, all the arguments against WACC given by the companies that use CFE are debatable and, at the end, WACC seems to be better, not because it performs best but because it is the standard.

Note:

I realized during my initial contacts with the consulting/banks that managers were worried about the purpose of the study, and how their practices were going to be compared with their competitors. In order to reduce this understandable apprehension, I assured to the interviewees that their names were not going to be presented in the report. Additionally, because the purpose of this paper is to understand what the trends are and not what individual companies are doing, I also was not going to mention any specific information about the companies in the paper.

References

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