The Adjusted-Present-Value Approach to Valuing Leveraged Buyouts 1)

Introduction

A leveraged buyout (LBO) is the acquisition by a small group of equity investors of a public or private company financed primarily with debt. The equityholders service the heavy interest and principal payments with cash from operations and/or asset sales. The shareholders generally hope to reverse the LBO within three to seven years by way of a public offering or sale of the company to another firm. A buyout is therefore likely to be successful only if the firm generates enough cash to serve the debt in the early years, and if the company is attractive to other buyers as the buyout matures.

In a leveraged buyout, the equity investors are expected to pay off outstanding principal according to a specific timetable. The owners know that the firm’s debt-equity ratio will fall and can forecast the dollar amount of debt needed to finance future operations. Under these circumstances, the adjusted-present-value (APV) approach is more practical than the weighted-average-cost-of-capital (WACC) approach because the capital structure is changing. In this appendix, we illustrate the use of this procedure in valuing the RJR Nabisco transaction, the largest LBO in history.

The RJR Nabisco Buyout

In the summer of 1988, the price of RJR stock was hovering around $55 a share. The firm had $5 billion of debt. The firm’s CEO, acting in concert with some other senior managers of the firm, announced a bid of $75 per share to take the firm private in a management buyout. Within days of management’s offer, Kohlberg Kravis and Roberts (KKR) entered the fray with a $90 bid of their own. By the end of November, KKR emerged from the

1) Beispiel ist entnommen aus Ross/Westerfield/Jaffe, Corporate Finance, 6. Aufl., S. 489-494.
ensuing bidding process with an offer of $109 a share, or $25 billion total. We now use the APV technique to analyze KKR's winning strategy.

The APV method as described in this chapter can be used to value companies as well as projects. Applied in this way, the maximum value of a levered firm \( V_L \) is its value as an all-equity entity \( V_U \) plus the discounted value of the interest tax shields from the debt its assets will support \( \text{PVTS} \). This relation can be started as

\[
V_L = V_U + \text{PVTS} = \sum_{t=1}^{\infty} \frac{UCF_t}{(1 + r_0)^t} + \sum_{t=1}^{\infty} \frac{T_C r_B B_{t-1}}{(1 + r_B)^t}
\]

In the second part of this equation, \( UCF_t \) is the unlevered cash flow from operations for year \( t \). Discounting these cash flows by the required return on assets, \( r_0 \), yields the all-equity value of the company. \( B_{t-1} \) represents the debt balance remaining at the end of year \( t-1 \). Because interest in a given year is based on the debt balance remaining at the end of previous year, the interest paid in year \( t \) is \( r_B B_{t-1} \). The numerator of the second term, \( T_C r_B B_{t-1} \), is therefore the tax shield for year \( t \). We discount this series of annual tax shields using the rate at which the firm borrows, \( r_B \).

KKR planned to sell several of RJR's food divisions and operate the remaining parts of the firm more efficiently. Table 1 presents KKR's projected unlevered cash flows for RJR under the buyout, adjusting for planned asset sales and operational efficiencies.
Table 1: RJR Operating Cash Flows (in $ millions)

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<tbody>
<tr>
<td>Operating income</td>
<td>$2,620</td>
<td>$3,410</td>
<td>$3,645</td>
<td>$3,950</td>
<td>$4,310</td>
</tr>
<tr>
<td>Tax on operating income</td>
<td>891</td>
<td>1,142</td>
<td>1,222</td>
<td>1,326</td>
<td>1,448</td>
</tr>
<tr>
<td>After-tax operating income</td>
<td>1,729</td>
<td>2,268</td>
<td>2,423</td>
<td>2,624</td>
<td>2,862</td>
</tr>
<tr>
<td>Add back depreciation</td>
<td>449</td>
<td>475</td>
<td>475</td>
<td>475</td>
<td>475</td>
</tr>
<tr>
<td>Less capital expenditures</td>
<td>522</td>
<td>512</td>
<td>525</td>
<td>538</td>
<td>551</td>
</tr>
<tr>
<td>Less change in working capital</td>
<td>(203)</td>
<td>(275)</td>
<td>200</td>
<td>225</td>
<td>250</td>
</tr>
<tr>
<td>Add proceeds from asset sales</td>
<td>3,545</td>
<td>1,805</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlevered cash flow (UCF)</td>
<td>$5,404</td>
<td>$4,311</td>
<td>$2,173</td>
<td>$2,336</td>
<td>$2,536</td>
</tr>
</tbody>
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Table 2: Projected Interest Expenses and Tax Shields (in $ millions)

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</thead>
<tbody>
<tr>
<td>Interest expenses</td>
<td>$3,384</td>
<td>$3,004</td>
<td>$3,111</td>
<td>$3,294</td>
<td>$3,483</td>
</tr>
<tr>
<td>Interest tax shields (T_c=34%)</td>
<td>1,151</td>
<td>1,021</td>
<td>1,058</td>
<td>1,120</td>
<td>1,184</td>
</tr>
</tbody>
</table>

With respect to financial strategy, KRR planned a significant increase in leverage with accompanying tax benefits. Specifically, KRR issued almost $24 billion of new debt to complete the buyout, raising annual interest costs to more than $3 billion. Table 2 presents the projected interest expense and tax shields for the transaction.

We now use the data from Tables 1 and 2 to calculate the APV of the RJR buyout. This valuation process is presented in Table 3.
The valuation presented in Table 3 involves four steps.

**Step 1:** Calculating the present value of unlevered cash flows for 1989-93. The unlevered cash flows for 1989-93 are shown in the last line of Table 1 and the first line of Table 3.
These flows are discounted by the required asset return, $r_0$, which at the time of the buyout was approximately 14 percent. The value as of the end of 1988 of the unlevered cash flows expected from 1989 through 1993 is

$$\frac{5.404}{1.14} + \frac{4.311}{1.14^2} + \frac{2.173}{1.14^3} + \frac{2.336}{1.14^4} + \frac{2.536}{1.14^5} = $12.224 \text{ billion}$$

**Step 2: Calculating the present value of the unlevered cash flows beyond 1993 (unlevered terminal value).** We assume the unlevered cash flows grow at the modest annual rate of 3 percent after 1993. The value, as of the end of 1993, of these cash flows is equal to the following discounted value of a growing perpetuity:

$$\frac{2.536(1.03)}{0.14 - 0.03} = $23.746 \text{ billion}$$

This translates to a 1988 value of

$$\frac{23.746}{1.14^5} = $12.333 \text{ billion}$$

As in Step 1, the discount rate is the required asset rate of 14 percent. The total unlevered value of the firm is therefore ($12.224+$12.333 =) $24.557 billion. To calculate the total buyout value, we must add the interest tax shields expected to be realized by debt financing.

**Step 3: Calculating the present value of interest tax shields for 1989-93.** Under the prevailing U.S. tax laws in 1989, every dollar of interest reduces taxes by 34 cents. The
present value of the interest tax shields for the period from 1989-93 can be calculated by
discounting the annual tax savings at the pretax average cost of debt, which was
approximately 13.5 percent. Using the tax shields from Table 2, the discounted value of
these tax shields is calculated as

\[
\frac{1,151}{1.135} + \frac{1,021}{1.135^2} + \frac{1,058}{1.135^3} + \frac{1,120}{1.135^4} + \frac{1,184}{1.135^5} = \$3.877 \text{ billion}
\]

Step 4: Calculating the present value of interest tax shields beyond 1993. Finally, we
must calculate the value of tax shields associated with debt used to finance the
operations of the company after 1993. We assume that debt will be reduced and
maintained at 25 percent of the value of the firm from that date forward. Under this
assumption it is appropriate to use the WACC method to calculate a terminal value for
the firm at the target capital structure. This in turn can be decomposed into an all-equity
value and a value from tax shields.

If, after 1993, RJR uses 25-percent debt in its capital structure, its WACC at this target
capital structure would be approximately 12.8 percent. Then the levered terminal value
as of the end of 1993 can be estimated as

\[
\frac{2.536(1.03)}{0.128 - 0.03} = \$26.654 \text{ billion}
\]

Since the value of the company is the sum of the unlevered value plus the value of
interest tax shields, it is the case that
Value of tax shields (end 1993) = \( V_L(\text{end 1993}) - V_U(\text{end 1993}) \)

\[ = 26.654 \text{ billion} - 23.746 \text{ billion} \]

\[ = 2.908 \text{ billion} \]

To calculate the value, as of the end of 1988, of these future tax shields, we again discount by the borrowing rate of 13.5 percent to get

\[ \frac{2.908}{1.135^5} = $1.544 \text{ billion} \]

The total value of interest tax shields therefore equals \((3.877 + 1.544) = 5.421 \text{ billion}\).

Adding all of these components together, the total value of RJR under the buyout proposal is $29.978 billion. Deducting the $5 billion market value of assumed debt yields a value for equity of $24.978 billion, or $109.07 per share.

**Concluding Comments on LBO Valuation Methods.**

As mentioned earlier in this chapter, the WACC method is by far the most widely applied approach to capital budgeting. One could analyze an LBO and generate the results of the second section of this appendix using this technique, but it would be a much more difficult process. We have tried to show that the APV approach is the preferred way to analyze a transaction in which the capital structure is not stable over time.

* A good argument can be made that since post-1993 debt levels are proportional to firm value, the tax shields are as risky as the firm and should be discounted at the rate \( e \).
Consider the WACC approach to valuing the KKR bid for RJR. One could discount the operating cash flows of RJR by a set of weighted average costs of capital and arrive at the same $30 billion total value for the company. To do this, one would need to calculate the appropriate rate for each year since the WACC rises as the buyout proceeds. This occurs because the value of the tax subsidy declines as debt principal is repaid. In other words, there is no single return that represents the cost of capital when the firm's capital structure is changing.

There is also a theoretical problem with the WACC approach to valuing a buyout. To calculate the changing WACC, one must know the market value of a firm's debt and equity. But if the debt and equity values are already known, the total market value of the company is also known. That is, one must know the value of the company to calculate the WACC. One must therefore resort to using book-value measures for debt and equity, or make assumptions about the evolution of their market values, in order to implement the WACC method.