Financial Statement Forecasting and Financing

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Using a "plug" figure or "slack term" within a pro forma analysis is the standard method to allow a forecasted balance sheet to have assets equal to liabilities and equity. Seemingly, different types of plug values are demonstrated to be mathematically linked to each other. Further, by exploring cash as a plug figure, a solution emerges for a "target revenue growth rate" in which cash is not depleted. If a private equity venture can generate revenue growth above the target revenue growth rate, cash will accumulate and improve the return on the private equity investment.

Keywords: pro forma analysis, additional required funds, private equity

INTRODUCTION

Forecasting financial statements is necessary for determining firm value, budgets, project profitability, and private equity investment gains. The methods for producing a forecast have common properties, however, the methods diverge in how financing is implemented. The primary reason for the differences is the goal of producing the forecast. If determining appropriate financing is the goal, then the source or sources of financing are left as variables to be determined within the forecast. If financing is already determined, such as in a private equity transaction, the goal becomes the profitability of the venture and determining the level of cash retained by the firm through time.

This article aims to illustrate the different methods for financial forecasting and how each method differs in how financing is implemented. The first methods demonstrated are appropriate for budgeting, firm valuation, and project assessment. Equity and/or debt are the sources of financing and are determined within the forecast. If the financing source increases over time, strategies for raising capital can be considered and implemented optimally. Suppose the source of financing decreases through time. In that case, it is an indication that current operations are suitable for maintaining projected growth and strategies can focus on how best to reduce financing or to seek new investments for excess financing.

The next method considers equity and debt financing at a given level, consequently, the level of cash through time determines if the financing is suitable. Losing cash through time indicates under-capitalization, while increasing cash through time indicates the possibility of reducing the financing or rewarding shareholders with a dividend. This method works very well with evaluating private equity transactions.

The first section of the article considers either using equity or debt as the source of financing and illustrates the connection between the two methods. In the second section the connection between debt and equity financing is adjusted to consider specific proportions of debt and equity possibly as a matter of firm policy.

In the third section, debt and equity financing are at set levels and cash becomes the variable of interest. The previous sections will illustrate how the determination of cash through time is related to the construction of the models. Section four concludes the article.

Section 1: Equity or Debt Financing and the Additional Funds Required (ARF) Calculation

These forecasting models can be used to determine the financing level needed for project considerations or the firm as an ongoing entity. Technically, if it is assumed that financing needs will be met in the future, the models can also be used for firm valuation with a terminal value at some point in the future. However, firm valuation will likely require a particular mix of debt and equity, making the model presented in the next section more appropriate.

To simplify the exposition, current assets, fixed assets, current liabilities, and long-term debt will be considered as single accounts rather than more granular sets of accounts. Equity will be split between stock and retained earnings. It is certainly possible to expand the balance sheet into more accounts, but it will not change how the models work.

In the first model, all revenue growth will be funded using additional equity (i.e. stock) and the funding will be raised at the beginning of the given period. This makes stock the "plug" or "slack term" which is set at a value to make the balance sheet "balance." In TABLE 1, a pro forma forecast for the income statement and the balance sheet is generated for one year into the future based on current values (Year 0) and assumptions about future growth and proportional relationships.

The difference between the forecasted total assets and forecasted total liabilities and equity is the "additional required funds" (ARF) for the balance sheet.

TABLE 1
PRO FORMA FINANCIAL STATEMENTS AND ARF

Panel A: Inputs	
Revenue growth rate [g(Rev)]:	10%
Gross profit margin (GPM)*:	40%
Selling, General, Administrative growth rate g(SGA)]:	2%
Depreciation periods**:	20
Interest rate on debt:	8%
Tax rate:	40%
Dividend Payout Ratio:	20%
Current Assets growth rate [g(C/A)]:	10%
Fixed Assets growth rate [g(F/A)]:	10%
Current Liabilities growth rate [g(C/L)]:	10%

Panel B: Pro Forma Financial Statements		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00[a]
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00[b]
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00[c]
Depreciation:	$ 1,000.00	$ 1,100.00[d]
Earnings Before Interest and Taxes (EBIT):	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 720.00[e]
Earnings Before Taxes (EBT):	$ 1,280.00	$ 1,560.00
Tax:	$ 512.00	$ 624.00[f]
Earnings After taxes (EAT):	$ 768.00	$ 936.00
Dividends:	$ 153.60	$ 187.20[g]
Paid to Retained Earnings:	$ 614.40	$ 748.80
Balance Sheet:	**Year 0:**	**Year 1:**
Current Assets:	$ 6,000.00	$ 6,600.00[h]
Fixed Assets:	$ 20,000.00	$ 22,000.00[i]
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 22,500.00
Current Liabilities:	$ 500.00	$ 550.00[j]
Long-term Debt:	$ 9,000.00	$ 9,000.00
Common Stock:	$ 10,500.00	$ 10,500.00
Retained Earnings:	$ 1,000.00	$ 1,748.80
Total Liabilities and Equity:	$ 21,000.00	$ 21,798.80
ARF for Year 1 = Total Assets − Total Liabilities and equity = $701.20		

[*] Gross profit margin (GPM) = (Revenue − Cost of Goods Sold) ÷ Revenue based on Year 0 information

[**] Depreciation is assumed to be straight-line

[a] = Revenues (Year 0) × (1 + g(Rev)) = $10,000 × (1 + 10%)

[b] = Revenues (Year 1) × (1 − GPM) = $11,000 × (1 − 40%)

[c] = Selling, General, Administrative (Year 0) × (1 + g(SGA)) = $1,000 × (1 + 2%)

[d] = Fixed Assets (Year 1) ÷ Depreciation periods = $22,000 ÷ 20

[e] = Long − term Debt (Year 1) × Interest rate on debt = $9,000 × 8%

[f] = EBT (Year 1) × Tax rate = $1,580 × 40%

[g] = EAT (Year 1) × Dividend Payout Ratio = $1,008 × 20%

[h] = Current Assets (Year 0) × (1 + g(C/A)) = $6,000 × (1 + 10%)

[i] = Fixed Assets (Year 0) × (1 + g(F/A)) = $20,000 × (1 + 10%)

[j] = Current Liabilities (Year 0) × (1 + g(C/L)) = $500 × (1 + 10%)

ARF in TABLE 1 is calculated to be $701.20 based on the forecasted financial statements. Allow the stock account for Year 1 to be ARF plus the stock account value in Year 0 and the balance sheet in Year 1 will now balance (see TABLE 2).

TABLE 2
PRO FORMA FINANCIAL STATEMENTS USING ONLY EQUITY FINANCING

Pro Forma Financial Statements (see TABLE 1 for inputs and associated calculations)		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
Depreciation:	$ 1,000.00	$ 1,100.00
EBIT:	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 720.00
EBT:	$ 1,280.00	$ 1,560.00
Tax:	$ 512.00	$ 624.00
EAT:	$ 768.00	$ 936.00
Dividends:	$ 153.60	$ 187.20
Paid to Retained Earnings:	$ 614.40	$ 748.80
Balance Sheet:	**Year 0:**	**Year 1:**
Current Assets:	$ 6,000.00	$ 6,600.00
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 22,500.00
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,000.00
Common Stock:	$ 10,500.00	$ 11,201.20
Retained Earnings:	$ 1,000.00	$ 1,748.80
Total Liabilities and Equity:	$ 21,000.00	$ 22,500.00

$\text{Stock}_1 = \text{Stock}_0 + \text{ARF}_1 = \$10{,}500.00 + \$701.20 = \$11{,}201.20$
or $\text{Stock}_1 = \text{Total Assets}_1 - \text{Total Liabilities}_1 - \text{Retained Earnings}_1$
$= \$22{,}200.00 - (\$550.00 + \$9{,}000.00) - \$1{,}748.80 = \$11{,}201.20$

The connection between ARF and equity financing (or an "equity plug") is very apparent in that the forecasted stock account is simply the previous level of stock scaled up by ARF (or scaled down if the ARF is negative).

In the second model, all revenue growth is funded using long-term debt (assuming all financing is raised at the beginning of the given period). Increasing the level of long-term debt by ARF does not allow the balance sheet to balance (see TABLE 3).

TABLE 3
PRO FORMA FINANCIAL STATEMENTS WITH LONG-TERM DEBT INCREASED BY ARF

Pro Forma Financial Statements (see TABLE 1 for inputs and associated calculations)		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
Depreciation:	$ 1,000.00	$ 1,100.00
EBIT:	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 776.10
EBT:	$ 1,280.00	$ 1,503.90
Tax:	$ 512.00	$ 601.56
EAT:	$ 768.00	$ 902.34
Dividends:	$ 153.60	$ 180.47
Paid to Retained Earnings:	$ 614.40	$ 721.87
Balance Sheet:	**Year 0:**	**Year 1:**
Current Assets:	$ 6,000.00	$ 6,600.00
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 22,500.00
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,701.20
Common Stock:	$ 10,500.00	$ 10,500.00
Retained Earnings:	$ 1,000.00	$ 1,721.87
Total Liabilities and Equity:	$ 21,000.00	$ 22,473.07
$\text{Long} - \text{term Debt}_1 = \text{Long} - \text{term Debt}_0 + \text{ARF}_1$ $= \$9{,}000.00 + \$701.20 = \$9{,}701.20$		

The reason that increasing the long-term debt by ARF does not work is because every additional dollar of long-term debt generates additional interest expense in the income statement causing the paid to retained earnings to reduce. As the paid to retained earnings reduces, the retained earnings in the equity portion of the balance sheet also reduces. Notice, the retained earnings for Year 1 in TABLES 1 and 2 is $1,748.80, which is greater than the retained earnings of $1,721.87 in Year 1 in TABLE 3. Because of this "feedback" that reduces equity, a one dollar increase in long-term debt does not generate a one dollar increase in the total liabilities and equity.

To illustrate, increase long-term debt by $Z, the paid to retained earnings and in turn, retained earnings on the balance sheet reduces by:

$Z×Interest rate×(1-Tax rate)×(1-Dividend payout ratio) (1)

Consequently, the increase of $Z in long-term debt has the following net effect on the total liabilities and equity:

$Z-$Z×Interest rate×(1-Tax rate)×(1-Dividend payout ratio)
=$Z×[1-Interest rate×(1-Tax rate)×(1-Dividend payout ratio)] (2)

The bracketed term in equation (2) can be viewed as a debt adjustment factor (DAF) for the ARF. Equation (3) displays the DAF portion of equation (2), along with applicable values from TABLE 1:

DAF=[1-Interest rate×(1-Tax rate)×(1-Dividend payout ratio)]
DAF=[1-8%×(1-40%)×(1-20%)]=0.9616 (3)

Take ARF and divide it by the DAF to produce the value that is necessary to increase long-term debt and have the balance sheet balance in Year 1.

ARF÷[1-Interes rate×(1-Tax rate)×(1-Dividend payout ratio)]
$701.20÷0.9616=$729.20 (4)

TABLE 4 illustrates the pro forma financial statements having long-term debt increased by $729.20. This value for the forecasted long-term debt (or a "debt plug", $9,729.20 = $9,000.00 + $729.20) allows the balance sheet to balance.

TABLE 4
PRO FORMA STATEMENTS USING ONLY DEBT FINANCING

Pro Forma Financial Statements (see TABLE 1 for inputs and associated calculations)		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
Depreciation:	$ 1,000.00	$ 1,100.00
EBIT:	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 778.34
EBT:	$ 1,280.00	$ 1,501.66
Tax:	$ 512.00	$ 600.66
EAT:	$ 768.00	$ 901.00
Dividends:	$ 153.60	$ 180.20
Paid to Retained Earnings:	$ 614.40	$ 720.80
Balance Sheet:	**Year 0:**	**Year 1:**
Current Assets:	$ 6,000.00	$ 6,600.00
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 22,500.00
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,729.20
Common Stock:	$ 10,500.00	$ 10,500.00
Retained Earnings:	$ 1,000.00	$ 1,720.80
Total Liabilities and Equity:	$ 21,000.00	$ 22,500.00

$$\text{Long} - \text{term Debt}_1 = \text{Long} - \text{term Debt}_0 + [\text{ARF}_1 \div \text{DAF}_1]$$
$$= \$9{,}000.00 + [\$701.20 \div 0.9616] = \$9{,}729.20$$

It can now be stated that the equity financing (i.e. equity plug) and the debt financing (i.e. debt plug) are connected by the ARF calculation (a subscript indicates the associated year).

$$\text{Equity plug}_1 = \text{Stock}_0 + \text{ARF}_1 \quad (5)$$

$$\text{Debt plug}_1 = \text{Long} - \text{term Debt}_0 + [\text{ARF}_1 \div \text{DAF}_1] \quad (6)$$

$$\text{DAF}_1 = [1 - \text{Interest rate}_1 \times (1 - \text{Tax rate}_1) \times (1 - \text{Dividend payout ratio}_1] \quad (7)$$

The techniques introduced above are similar to the techniques of Kester (1987), Arnold and Eisemann (2007) and Arnold (2012). As stated earlier, these models will provide the forecasted levels of debt or equity needed to sustain revenue growth. This information can lead to analyses concerning budgeting, raising capital, and project viability if the financial statements are confined to a given project. To consider firm value, technically possible with these models, a better model will have capital raised based on a firm's target debt-to-equity (D/E) ratio. Having a target D/E ratio is generally consistent with a firm's future capital raises and adds an element of determining what strategically may be the best mix of debt and equity going into the future.

Section 2: Equity and Debt Financing Using a Target D/E Ratio

Introducing a target D/E ratio creates a third model. Changing the D/E ratio into its component debt ratio and equity ratio will not be sufficient to adjust ARF because of the need to use the DAF calculation when financing debt. What is needed is an adjusted debt ratio (ADR, note: an adjusted equity ratio can also be calculated as 1 – ADR) to integrate the DAF calculation:

$$\text{ADR}_1 = (D/E) \times \text{DAF}_1 \div [1 + (D/E) \times \text{DAF}_1] \quad (8)$$

Having computed the ADR, the equity plug and debt plug are calculated in the following manner:

$$\text{Equity plug}_1 = \text{Stock}_0 + \text{ARF}_1 \times (1 - \text{ADR}_1) \quad (9)$$

$$\text{Debt plug}_1 = \text{Long} - \text{term Debt}_0 + [(\text{ARF}_1 \times \text{ADR}_1) \div \text{DAF}_1] \quad (10)$$

Before continuing, it should be noted that the target D/E ratio is based on stock and long-term debt rather than total assets, total liabilities, and total equity:

$$\text{Debt ratio} = \text{Long} - \text{term Debt} \div [\text{Long} - \text{term Debt} + \text{Stock}] \quad (11)$$

$$\text{Equity ratio} = \text{Stock} \div [\text{Long} - \text{term Debt} + \text{Stock}] \quad (12)$$

$$\text{D/E} = \text{Debt ratio} \div \text{Equity ratio} \quad (13)$$

Assuming a target D/E of 2.00, i.e. $2.00 of long-term debt will be raised relative to every $1.00 of stock being raised, TABLE 5 demonstrates how TABLE 1 changes when using a target D/E ratio.

TABLE 5
PRO FORMA FINANCIAL STATEMENTS USING A TARGET D/E RATIO of 2.00

Pro Forma Financial Statements (see TABLE 1 for inputs and associated calculations)		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
Depreciation:	$ 1,000.00	$ 1,100.00
EBIT:	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 758.38
EBT:	$ 1,280.00	$ 1,521.62
Tax:	$ 512.00	$ 608.65
EAT:	$ 768.00	$ 912.97
Dividends:	$ 153.60	$ 182.59
Paid to Retained Earnings:	$ 614.40	$ 730.38
Balance Sheet:	**Year 0:**	**Year 1:**
Current Assets:	$ 6,000.00	$ 6,600.00
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 22,500.00
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,479.75
Common Stock:	$ 10,500.00	$ 10,739.87
Retained Earnings:	$ 1,000.00	$ 1,730.38
Total Liabilities and Equity:	$ 21,000.00	$ 22,500.00

$$\mathrm{ADR}_1 = (\mathrm{D/E}) \times \mathrm{DAF}_1 \div [1 + (\mathrm{D/E}) \times \mathrm{DAF}_1]$$
$$= 2.00 \times 0.9616 \div [1 + 2.00 \times 0.9616] = 0.6579091$$
$$\mathrm{Stock}_1 = \mathrm{Stock}_0 + \mathrm{ARF}_1 \times (1 + \mathrm{ADR}_1)$$
$$= \$10{,}500.00 + \$701.20 \times (1 - 0.6579091) = \$10{,}739.87$$
$$\mathrm{Long-term\ Debt}_1 = \mathrm{Long-term\ Debt}_0 + [\mathrm{ARF}_1 \times \mathrm{ADR}_1 \div \mathrm{DAF}_1]$$
$$= \$9{,}000.00 + [\$701.20 \times 0.6579091 \div 0.9616] = \$9{,}479.75$$

This third model is more complicated than the first two models, however, definite connections between the three models exist based on ARF and DAF once the ADR is calculated. As stated previously, this model is effective for determining a firm's value because the model maintains a firm's target D/E ratio. In order to calculate a firm value, the financial statements are forecasted for several years to produce forecasted cash flows. The last cash flow generates a terminal value for all future cash flows beyond the forecasted period. The forecasted cash flows are discounted along with the terminal value and summed to produce a firm value.

When considering private equity transactions, firm value is determined as a multiple of EBITDA (earnings before interest and taxes plus depreciation and amortization, = Revenue – Cost of Goods Sold – Selling, General, Administrative). The value of a private equity transaction considers the price of acquisition as a multiple of EBITDA (EBITDAX), the future sale of the firm based on forecasted EBITDA and forecasted EBITDAX, and the amount of cash dispensed to the seller (i.e. the "cash sweep"). Consequently, forecasting in this scenario has debt and equity set at a particular level and the level of cash becomes the "plug", i.e. the value that makes the balance sheet "balance." Usually, a "Statement of Cash

Flow" is added to the income statement and balance sheet forecasts. In the next section, a "cash plug" is introduced with a definite relationship to ARF and then the cash plug is expanded upon with a statement of cash flow.

Section 3: Cash as a Plug Value for Private Equity Transactions

In TABLE 6, TABLE 1 is adjusted to have a separate account for cash within the current assets and cash is assumed to not grow in the same manner as the non-cash current assets. Further, EBITDA is introduced to the income statement. Consistent with private equity transactions, long-term debt and stock are set at specific levels that do not change. Cash becomes the "plug" for the balance sheet.

TABLE 6
TABLE 1 WITH CASH, EBITDA, AND ARF CALCULATION

Panel A: Inputs		
Revenue growth rate [g(rev)]:	10%	
Gross profit margin (GPM):	40%	
Selling, General, Administrative growth rate [g(SGA)]:	2%	
Depreciation periods:	20	
Interest rate on debt:	8%	
Tax rate:	40%	
Dividend Payout Ratio:	20%	
Non-Cash Current Assets growth rate [g(C/A)]:	10%	
Fixed Assets growth rate [g(F/A)]:	10%	
Current Liabilities growth rate [g(C/L)]:	10%	
Panel B: Pro Forma Financial Statements		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
EBITDA:	$ 3,000.00	$ 3,280.00
Depreciation:	$ 1,000.00	$ 1,100.00
EBIT:	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 720.00
EBT:	$ 1,280.00	$ 1,560.00
Tax:	$ 512.00	$ 624.00
EAT:	$ 768.00	$ 936.00
Dividends:	$ 153.60	$ 187.20
Paid to Retained Earnings:	$ 614.40	$ 748.80
Balance Sheet:	**Year 0:**	**Year 1:**
Cash:	$ 1,000.00	$ 1,000.00
Non-Cash Current Assets:	$ 5,000.00	$ 5,500.00[a]
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00

Total Assets:	$ 21,000.00	$ 22,400.00
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,000.00
Common Stock:	$ 10,500.00	$ 10,500.00
Retained Earnings:	$ 1,000.00	$ 1,748.80
Total Liabilities and Equity:	$ 21,000.00	$ 21,798.80

$\text{ARF for Year 1} = \text{Total Assets} - \text{Total Liabilities and Equity} = \$601.20$

[a] $= \text{Non} - \text{Cash Current Assets}_0 \times \big(1 + \text{g(C/A)}\big) = \$5{,}000 \times (1 + 10\%)$

Because cash is an asset, the ARF is subtracted from cash to balance the balance sheet or cash is set to: total liabilities and equity less non-cash current assets less net fixed assets.

TABLE 7
TABLE 6 WITH CASH DECREASED BY ARF

Pro Forma Financial Statements (see TABLE 6 for inputs and associated calculations)		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 11,000.00
Cost of Goods Sold:	$ 6,000.00	$ 6,600.00
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
EBITDA:	$ 3,000.00	$ 3,280.00
Depreciation:	$ 1,000.00	$ 1,100.00
Earnings Before Interest and Taxes (EBIT):	$ 2,000.00	$ 2,280.00
Interest:	$ 720.00	$ 720.00
Earnings Before Taxes (EBT):	$ 1,280.00	$ 1,560.00
Tax:	$ 512.00	$ 624.00
Earnings After taxes (EAT):	$ 768.00	$ 936.00
Dividends:	$ 153.60	$ 187.20
Paid to Retained Earnings:	$ 614.40	$ 748.80
Balance Sheet:	**Year 0:**	**Year 1:**
Cash:	$ 1,000.00	$ 398.80
Non-Cash Current Assets:	$ 5,000.00	$ 5,500.00
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 21,798.80
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,000.00
Common Stock:	$ 10,500.00	$ 10,500.00
Retained Earnings:	$ 1,000.00	$ 1,748.80

Total Liabilities and Equity:	$ 21,000.00	$ 21,798.80

$\text{Cash}_1 = \text{Cash}_0 - \text{ARF}_1 = \$1{,}000.00 - \$601.20 = \$398.80$
or $\text{Cash}_1 = \text{Total liabilities and Equity}_1 - \text{Non} - \text{Cash Assets}_1 - \text{Net Fixed Assets}_1$
$\text{Cash}_1 = \text{Cash}_0 - \text{ARF}_1 = \$1{,}000.00 - \$601.20 = \$398.80$
or $\text{Cash}_1 = \text{Total Liabilities and Equity}_1 - \text{Non-cash Current Assets}_1 - \text{Net Fixed Assets}_1$
$= \$21{,}798.80 - \$5{,}500.00 - \$15{,}900.00 = \$398.80$

Generating a Statement of Cash Flow, which determines the change in cash, is an exercise in deconstructing the change in the balance sheet accounts with a linkage to the income statement through the EAT. Although not very obvious, the calculation is related to the ARF calculation.

First consider the change in total equity (ΔEquity):

$$\Delta\text{Equity} = \text{change in Stock} + \text{Change in Retained Earnings} \quad (14)$$

Change in retained earnings equals paid to retained earnings from the income statement. Further paid to retained earnings equals EAT less dividends. Equation (14) becomes:

$$\Delta\text{Equity} = \text{change in Stock} + \text{EAT} - \text{Dividends} \quad (15)$$

Next, consider the change in total liabilities (ΔLiabilities):

$$\Delta\text{Liabilities} = \text{change in Long} - \text{term Debt} + \text{change in Current Liabilities} \quad (16)$$

Next, consider the change in total assets (ΔAssets):

$$\Delta\text{Assets} = \text{change in Cash} + \text{change in Non} - \text{Cash Assets} + \text{change in Net Fixed Assets} \quad (17)$$

The change in net fixed assets equals the change in fixed assets plus depreciation. Equation (17) becomes:

$$\Delta\text{Assets} = \text{change in Cash} + \text{change in Non} - \text{Cash Current Assets} + \text{change in Fixed Assets} - \text{Depreciation} \quad (18)$$

For the balance sheet to balance:

$$\Delta\text{Assets} = \Delta\text{Liabilities} + \Delta\text{Equity} \quad (19)$$

Equation (19) is expanded using Equations (15), (16), and (18) and solving for the change in cash:

$$\text{change in cash} = [\text{change in Long} - \text{term debt} + \text{change in Current liabilities}] + [\text{change in Stock} + \text{EAT} - \text{Dividends}] - [\text{change in Non} - \text{Cash Current Assets} + \text{change in Fixed Assets} - \text{Depreciation}] \quad (20)$$

In TABLE 8, Equation (20) is re-arranged with an associated computation using the information from TABLE 7.

TABLE 8
STATEMENT OF CASH FLOW WITH TABLE 7 INFORMATION

EAT	$ 936.00
plus Depreciation	$ 1,100.00
less change in Non-Cash Current Assets	$ 500.00
plus Change in Current Liabilities	$ 50.00
less Change in Fixed Assets	$ 2,000.00
plus Change in Long-term Debt	$ 0.00
plus Change in Stock	$ 0.00
less Dividends	$ 187.20
equals Change in Cash	($ 601.20)

Note: Change in Cash equals negative of ARF_1

As noted in TABLE 8, the Statement of Cash Flow is another version of calculating ARF, demonstrating how this model and the previous three models have a common connection. Worthy of further discussion is how the cash account is reduced significantly despite having positive earnings.

This is an example of under-capitalization. There is not enough debt and/or equity funding for the firm to sustain its cash balance as it grows. The growth requires additional fixed assets and net working capital. There are a few options to consider:

- Additional external funding to get the firm to a size in which additional fixed assets and additional net working capital are not large investments that deplete cash (perhaps through economies of scale).
- Work more efficiently with the current funding to reduce the need for additional fixed assets and additional net working capital before cash is depleted. In other words, accept the current growth rate as is and reduce costs (i.e. reduce the investment in additional fixed assets and additional net working capital).
- Grow faster with the current level of additional fixed assets and net working capital investments. In other words, grow at a level to justify current levels of additional fixed assets and additional net working capital.

Private equity transactions tend to follow the last option of making a resource investment for high revenue growth. The question becomes: How high must revenue growth be to not deplete cash? Setting the Statement of Cash Flow to zero and then back-solving for revenue growth rate [g(rev)] produces the following equations (subscript indicates year):

$$\mathrm{A} = (1 - \text{Tax rate}) \times (1 - \text{Dividend Payout Ratio}) \tag{21}$$

$$\begin{aligned}\mathrm{B} = {} & \text{Salary, Genral, Adminstrative Expenses}_0 \times \big(1 + \mathrm{g(SGA)}\big) \times \mathrm{A} \\ & + \text{Long} - \text{term Debt}_0 \times \text{Interest rate on Debt} \times \mathrm{A} \\ & + \text{Non} - \text{Cash Current Asstes}_0 \times \mathrm{g(C/A)} \\ & - \text{Current Liabilities}_0 \times \mathrm{g(C/L)}\end{aligned} \tag{22}$$

$$\mathrm{C} = \text{Fixed Assets} \times \big[\mathrm{g(F/A)} + \big(1 + \mathrm{g(F/A)}\big) \times (\mathrm{A} - 1) \div \text{Depreciation periods}\big] \tag{23}$$

$$\text{Target g(Rev)} = (\mathrm{B} + \mathrm{C}) \div [\text{Revenue}_0 \times \mathrm{GPM} \times \mathrm{A}] - 1 \tag{24}$$

Entering the associated values from Table 6 into equations (21) through (24):

$$\mathrm{A} = (1 - 40\%) \times (1 - 20\%) = 0.48 \tag{25}$$

$$B = \$1{,}000 \times (1 + 2\%) \times 0.48 + \$9{,}000 \times 8\% \times 0.48 + \$5{,}000 \times 10\% - \$500 \times 10\% = \$1{,}285.20 \quad (26)$$

$$C = \$20{,}000 \times [10\% + (1 + 10\%) \times (0.48 - 1) \div 20] = \$1{,}428.00 \quad (27)$$

$$\text{Target g(Rev)} = (\$1{,}285.20 + \$1{,}428.00) \div [\$10{,}000.00 \times 40\% \times 0.48] - 1 = 41.3125\% \quad (28)$$

Setting revenue growth to 41.3125% will make the change in cash and ARF_1 equal to zero (see TABLE 9).

TABLE 9
TABLE 6 WITH REVENUE GROWTH OF 41.3125%

Pro Forma Financial Statements (see TABLE 6 for other inputs and associated calculations)		
Income Statement:	**Year 0:**	**Year 1:**
Revenues:	$ 10,000.00	$ 14,131.25
Cost of Goods Sold:	$ 6,000.00	$ 8,478.75
Selling, General, Administrative:	$ 1,000.00	$ 1,020.00
EBITDA:	$ 3,000.00	$ 4,632.50
Depreciation:	$ 1,000.00	$ 1,100.00
Earnings Before Interest and Taxes (EBIT):	$ 2,000.00	$ 3,532.50
Interest:	$ 720.00	$ 720.00
Earnings Before Taxes (EBT):	$ 1,280.00	$ 2,812.50
Tax:	$ 512.00	$ 1,125.00
Earnings After taxes (EAT):	$ 768.00	$ 1,687.50
Dividends:	$ 153.60	$ 337.50
Paid to Retained Earnings:	$ 614.40	$ 1,350.00
Balance Sheet:	**Year 0:**	**Year 1:**
Cash:	$ 1,000.00	$ 1,000.00
Non-Cash Current Assets:	$ 5,000.00	$ 5,500.00
Fixed Assets:	$ 20,000.00	$ 22,000.00
Accumulated Depreciation:	$ 5,000.00	$ 6,100.00
Net Fixed Assets:	$ 15,000.00	$ 15,900.00
Total Assets:	$ 21,000.00	$ 22,400.00
Current Liabilities:	$ 500.00	$ 550.00
Long-term Debt:	$ 9,000.00	$ 9,000.00
Common Stock:	$ 10,500.00	$ 10,500.00
Retained Earnings:	$ 1,000.00	$ 2,350.00
Total Liabilities and Equity:	$ 21,000.00	$ 22,400.00
$ARF_1 = 0$		
$\text{Cash}_1 = \text{Total Liabilities and Equity}_1 - \text{Non} - \text{Cash Current Assets}_1 - \text{Net Fixed Assets}_1 = \$22{,}400.00 - \$5{,}500.00 - \$15{,}900.00 = \$1{,}000.00 = \text{Cash}_0 - \text{ARF}_1$		

A higher growth rate, such as 45%, will allow cash to grow to $1,070.80, which is the scenario a private equity venture prefers to see. This is a very high growth rate, however, private equity ventures generally do not pay dividends.

Setting the Dividend Payout Ratio to zero reduces the "target revenue growth" rate to a more reasonable 27.250%, i.e. if revenue growth is higher than 27.250%, the firm will accumulate cash. This accumulation of cash makes the private equity venture more profitable because when the firm is sold in the future, the proceeds include the selling price (= ending EBITDA × EBITDA multiple) and a portion of the cash that is in excess of the cash needed for operations. The proportion of cash received by the seller is known as the "cash sweep" which will increase as more cash accumulates.

When viewing equations (21) through (24), one can see other ways to reduce the "target revenue growth rate" (e.g. reducing taxes or lower the interest rate on debt). Some of the items can be negotiated and/or better tax environments can be sought. Again, the calculation is technically related to the ARF calculation due to the Statement of Cash Flow from which these equations are derived being related to the ARF calculation. Consequently, the ARF calculation is the "unifying thread" throughout the different models.

CONCLUSION

The purpose of this paper is to demonstrate a new integrated presentation of pro forma analysis that illustrates the need for a balance sheet plug (i.e. the existence of ARF) and how the three typical candidates for plugs: the equity plug, the debt plug, and the cash plug are actually related in their composition (via ARF). This makes the ARF calculation pedagogically beneficial and analytically beneficial.

When considering cash as a plug under circumstances common in private equity financing, unlike the case of the equity and debt plugs, ARF is applied as an adjustment to assets rather than to liabilities and equity. In fact, the negative of ARF is generated by the Statement of Cash Flow as the change in cash. From the Statement of Cash Flow, a "target revenue growth rate" emerges as the value where cash is not depleted. In fact, growing revenue at a higher rate than the target revenue growth rate allows cash to accumulate which is very advantageous for a private equity venture. Viewing the target revenue growth rate calculation and its parameters allows the practitioner to see elements that can be adjusted to improve the return on a private equity venture.

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