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ABSTRACT

Pro forma estimation of financial statements often builds on constant ratios to sales revenue. While constant ratios may be relevant for established firms operating in predictable industries, they yield non-informative and possibly misleading information when applied to new firms, and particularly to technology ventures. Because new firms grow and change rapidly, a robust analysis should be based on intimate familiarity with the specific firm's business plan. This paper presents an alternative approach that links the firm's budget, as derived from its business plan, to pro forma financial statements, and to valuation models. The resulting estimated firm value is less sensitive to exogenous parameter assumptions than other methodologies.

JEL Classification: G17, G32, L26, M13
Keywords: Valuation, Business plan, Entrepreneurship, Pro forma financial statements

I. Introduction

A COMMON APPROACH TO MODELING PRO FORMA financial statements is assuming constant ratios of expense and capital spending to sales revenue, or to items in the balance sheet (Arnold and James, 2000), in accordance with industry averages. Among the more important parameters that enter into such models are the exogenous assumptions on the annual growth rate of sales and the ratio of cost of goods sold (COGS) to sales. While this approach may be relevant to mature firms, in the case of new technology firms a smart choice of parameters may present almost any firm as

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extremely profitable. Indeed, during the internet bubble of the late 1990s, researchers questioned whether those new-technology firms were valued in a manner that is related to traditional financial statements (Core, Guay, and Van Buskirk, 2003, Trueman, Wong, and Zhang, 2000). Evidently, throughout the early stages of introducing a new technology to the market, the interactions between financial statement variables do not obey linear and predictable rules. Rather, they are often the result of activities that do not characterize mature firms, such as allocating more resources to research and development than to production or marketing, or up-scaling production and sales by tens or even hundreds of percent. Whenever a financial ratio varies considerably over time, a pro forma analysis based on its assumed consistency becomes non-informative. To accommodate this issue we present a different approach, which builds on a generic budget model of operations and capital. By explicitly representing the financial implications of specific business-plan activities into the budget model, the analyst measures their profitability implications for the venture, irrespective of linearity assumptions. We argue that because the resulting budget represents firm-specific operations, and because the pro forma financial statements and valuations are mostly driven from the budget, the end result is highly robust.

The problem of rapidly changing financial ratios, sales growth rates, and profitability measures of new technology firms has been modeled by Schwartz and Moon (2000, 2001), who applied a real-options approach in a simplified, stochastic pro forma model. Their model allows for periodic changes in the expected growth rate of sales, to its standard deviation, and to other variables. It yields a path-dependent valuation model, which, after calibration and estimation, yields a rational pricing model. Our focus is intentionally tilted to preferring an insider-out perspective, (i.e., we assume that the analyst knows the firm and its management, strategy, and capabilities, and she or he follows a consistent business plan). Schwartz and Moon (2003) acknowledge the need to be highly informed of the specific firm, at least in estimating the model parameters[2]. An additional difference between our approaches is the sensitivity to initial conditions. Schwartz and Moon (2000) estimate firm value through the stochastic simulation approach, as if an outsider analyst is observing the firm's reported data and simulates its possible paths of evolution. By so doing, they find

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[2] When discussing the need to estimate the model parameters, Schwartz and Moon (2000) write: "*The determination of some parameters, however, requires the use of judgment, which can come only from a thorough knowledge of the specific situation", p. 64.*

that valuation is highly sensitive to the estimated benchmark parameters. This path-dependency problem is minimized by using our approach, because path dependency evolves through the implementation of the business plan, rather than an outsider's statistical projection of past performance.

Our model is made of three key sections, and is readily representable on a worksheet. For this reason we present some of the equations, especially those involving IF statements, in an Excel format[3]. The first section presents a generic budget model built from a firm's business plan. The second section contains the pro forma financial statements, which, aside from a few parameters, are directly derived from the budget model. The interactions between the balance sheet (BS) and the profit and loss (P&L) statements are solved recursively and solve, for the net profit. The third section converts the estimated net profit to free cash flow. It then allows the analyst to modify equity capital requirements, as well as long-term debt, such that the accumulated free cash flow remains positive at a satisfactory level. This section ends with a robust valuation model, which incorporates the estimated free cash flows, three alternative models for terminal value estimation, and allows the analyst to conduct sensitivity analyses to relevant parameters.

The rest of the paper describes the budget model in Section II, the pro forma statements in Section III, and the valuation part in Section IV. Section V presents conclusions and insights to the papers' contributions to analysts and the literature.

II. Generic budget model

The budget structure is presented in Exhibit 1. It is made of twelve tables, some of which serve to collect input data, while others are calculated from inputs or calculations. All tables can be thought of as matrixes relevant for the enterprise being evaluated. Tables 1 – 6 have dimensions mXn, where m=number of products, or sources of revenue, and n=estimation periods (normally 0,1,…,5). Tables 7 – 9 present manpower cost, and have dimensions qXn, where q=number of employee groups. It is important to distinguish and summarize separately the list of employees denoted as "Direct Labor" from those denoted "Indirect Labor." While the former is part of

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[3] Interested readers may obtain the model on an Excel file from the author through email: hlevy@som.bgu.ac.il

operating expenses in the P&L, the latter constitutes general, administrative, research and development, and marketing expenses. This distinction therefore allows one to form more accurate profitability measures of the firm. It should be noted that this important distinction is absent from existing models.

Table 10 includes as many expense items as needed to appropriately represent the structure of the sales and marketing expenses in the firm. While some of the expense items are simple inputs, others may be a fraction of sales (possibly of specific products) depending on the firm's commission agreements with its sales force. Table 11 lists all general and administrative expenses, and Table 12 lists capital expenditure items. All tables should have a table-specific summary line (a vector of 1Xn) that will later feed into the financial statements.

Exhibit 1
Description of the different tables of the budget model

Table 1:	Input expected unit sales, by product
Table 2:	Input average selling price per unit, by product
Table 3:	Items in Table 1 times corresponding items in Table 2
Table 4:	Input variable cost per unit (excluding direct labor cost), by product
Table 5:	Items in Table 1 times corresponding items in Table 4
Table 6:	Items in Table 3 minus corresponding items in Table 5
Table 7:	Manpower requirements, direct and indirect, by positions (1=100%)
Table 8:	Input average position cost to employer, including all social benefits and taxes
Table 9:	Items in Table 7 times corresponding items in Table 8
Table 10:	Row Vector #1: Expected percentage commission paid on sales. (optional)
	Row Vector #2: Items in Row Vector #1 times total sales[3] (optional)
	Additional row vectors: Specific marketing expenditure items as needed
Table 11:	Input relevant G&A expense items
Table 12:	Input relevant additions to fixed assets per year (period).

There are two key advantages to this generic budget model. First, the budget details are verifiable across several dimensions, and therefore enable a robust valuation methodology. For example, the forecast of unit sales can, and should, be verified by the sales and marketing department, making sure they can allocate the sales force and meet sales projections. Further, it should be coordinated with the manufacturing department, making sure the items can be produced given the planned production capacity. Consistently, the capital budget must reflect the deployment of production capabilities with the relevant lead-time, and so on. Second, the different tables of the model constitute all the expected expense and capital budgets of the firm, and therefore they can be mapped directly into the financial statements. This is advantageous because the analyst need not estimate market share percentages and\or growth rates of sales.

III. Pro forma financial statements

A. Parameters

Our BS and P&L statements are built primarily from data drawn from the budget, and to a lesser extent from data in Exhibit 2 below. The budget feeds the most important items in the P&L (i.e., those items that determine a significant part of each period's profit or loss). Before delving into the detailed equations of the model, it is important to be aware of several parameters that determine a few items in the BS. We take all these parameters as time varying, albeit the impact that some of them have on the period's profit and loss, and consequently on firm's valuation, are negligible.

The first parameter of Exhibit 2 represents a fiscal policy assumption concerning the government's expected corporate tax rates. Alternatively, if the firm is eligible for reduced tax rates for some reason this assumption can be reflected in a similar manner. Next, the firm's dividend policy, contingent on positive net profit, should be listed throughout the pro forma years. The contingent leverage policy of the firm, which may be realized if the firm's equity capital (Equity stock + Retained earnings) is positive, is determined by the ratio of the third row.

The rest of the parameters represent expected ratios of the firm with respect to sales, such as the ratios of receivables, inventory, or payables. In the long run these ratios would normally converge to industry norms. Depreciation rate represents the weighted average rate of depreciation on the firm's fixed assets. Rates of interest on credit balances and short- and long-term debt should be entered based on expectations. The average maturity of long-term debt is used to calculate principal payments.

B. The balance sheet

Our balance sheet is intentionally simple in terms of the number of items it is built of, serving to minimize the number of exogenous parameters in the financial statements. However, unlike other models that use a single "plug equation" to balance the balance sheet (e.g., Copeland, Koller, and Murrin, 1994, Benninga and Sarig, 1997, Arnold and James, 2000), our BS incorporates two "plug equations." Our first plug equation calculates "Cash and Bank Deposits," and the second calculates "Short Term Debt." The reason is that if one is positive, the other is essentially zero. That is, it makes no sense to assume that a firm that uses short-term debt will concurrently hold material cash or other short-term deposits (we ignore small balances, which the user can incorporate as constants within the IF statements). As a result, we have two "IF" statements that render one of these items zero while the other obtains a positive value that balances the BS. The specific equations of the BS and P&L are given in Exhibit 3.

Exhibit 2
Time-varying parameters

TIME-VARYING PARAMETERS	**Name**
Tax Rate	TAX_RATE
Contingent Dividend Payout %	DIV_RATE
Contingent LTD/Equity Ratio	LTD_EQ_RATIO
Receivables/Sales	REC_S
Inventories/Sales	INV_S
Payables/Sales	PAY_S
Depreciation Rate	DEPR_RATE
Credit Rate	CREDIT_RATE
Short Term Debt Rate	STD_RATE
Long Term Debt Rate	LTD_RATE
Average LTD Period	LTD_YRS

Let us describe the way our BS is computed: First note that Receivables (REC) and Inventories (INV) are calculated by multiplying sales of year t (as given in Table 3 of the budget) by the constant ratio as presented in Exhibit 2. Second, fixed assets at cost (ATCOST) are estimated based on Table 12 of the budget model and the level of ATCOST in the previous year. After subtracting accumulated depreciation

Exhibit 3 – Equations of Balance Sheet and Profit and Loss Statements

BALANCE SHEET

Name	Item	Equation at period *t* (subscript "*t*" omitted if all arguments refer to "*t*")	Comments
	ASSETS		
CASH	Cash & Bank Deposits	=IF(TLIABIL-(REC+INV+NFA)<0, 0, TLIABIL-(REC+INV+NFA))	If the value in this cell is negative, place zero, otherwise place the value
REC	Receivables	=SALES*REC_S	Calculated based on Exhibit 2 parameter
INV	Inventories	=SALES*INV_S	Calculated based on Exhibit 2 parameter
ATCOST	At cost	=TINVS_CF$_t$+ATCOST$_{t-1}$	The sum of investment in FA from the budget model at *t*, plus ATCOST at *t*-1
AC_DEPR	Accumulated Deprec.	=AC_DEPR$_{t-1}$+(ATCOST$_{t-1}$+ATCOST$_t$)/2*DEPR_RATE	This assumes that new fixed assets are purchased, on average, at mid-year
NFA	Net Fixed Assets	=ATCOST-AC_DEPR	
TASSETS	TOTAL ASSETS	=(CASH+REC+INV+NFA)	
	LIABILITIES		
STD	Short Term Debt	=IF((TASSETS-CASH-(AP+LTD+EQUITY+RET_ER))>0, TASSETS-CASH-(AP+LTD+EQUITY+RET_ER),0)	If TASSETS-CASH is higher than the sum of all other liabilities, use short-term debt, or zero otherwise.
AP	Accounts Payable	=SALES*PAY_S	Calculated based on Exhibit 2 parameter
LTD	Long-Term Debt	=IF((EQUITY+RET_ER)>0,LTD_Equity_Ratio*(EQUITY+RET_ER),0)	LTD can only be raised if (EQUITY+RET_ER)>0, and according to the LTD_Equity_Ratio.
EQUITY	Stock	=STOCK$_{t-1}$+EQUITY_RAISING$_t$	From Table B of Exhibit 4
RET_ER	Accumulated Retained Earnings	=RET_ER$_{t-1}$+RETAINED$_t$	From P&L statement
TLIABIL	TOTAL LIABILITIES	=STD+AP+LTD+EQUITY+RET_ER	

Exhibit 3 – Continued

PROFIT & LOSS STATEMENT

Name	Item	Equation at period *t* (subscript "*t*" omitted if all arguments refer to "*t*")	Comments
SALES	Sales	=TOTAL_SALES	Reference to Table 3 of budget
COGS	Cost of Goods Sold (COGS)	=TOTAL_VARIABLE_COST (COGS)	Reference to Table 5 of budget
DIR_LAB	Direct Labor	=TOTAL_DIRECT LABOR	Reference to Table 9 of budget
NOI	Net Operating Income	=SALES-COGS-DIR_LAB	
G&A&M	G&A and Marketing	=TOTAL_DIRECT LABOR+TOTAL_M&S+TOTAL_G&A	References to Tables 9, 10, and 11 of budget
DEPREC	Depreciation	=AC_DEPR$_t$- AC_DEPR$_{t-1}$	
EBIT	EBIT	=NOI-G&A&M-DEPREC	
INTER	Net Interest Paid (Earned)	=LTD*LTD_RATE+STD*STD_RATE-CASH*CREDIT_RATE	Calculated based on Exhibit 2
PBT	Earnings Before Tax	=EBIT-INTER	
TAX	Tax Payments	=IF(ACC_PBT<0,0,TAX_RATE*MIN(ACC_PBT,PBT))	See explanation in the text
NET_PRO	Net Profit	=PBT-TAX	
DIV_PAY	Dividend Payout $	=IF(NET_PRO<0,0,NET_PRO*DIV_RATE)	
RETAINED	Retained Earnings	=NET_PRO-DIV_PAY	
Supplemental calculation			
ACC_PBT	Accumulated PBT	=IF(AND(ACC_PBT$_{t-1}$>0,PBT$_t$<0),NET_PRO$_t$,AC_PBT$_{t-1}$+PBT$_t$)	See explanation in the text

(AC_DEPR), one obtains net fixed assets (NFA)[4]. Our first plug number, CASH equals the difference between all financial resources (TLIABIL) and all uses (REC+INV+NFA). If the difference is negative, i.e., there is a need for more resources, the formula places zero in CASH, but if it is positive, the difference (i.e., excess resources), is classified as CASH.

On the liabilities side, accounts payable (AP) is calculated as a fraction of sales, representing average payment arrangements. Long-term debt (LTD) is calculated by multiplying the period-t parameter LTD_EQUITY_RATIO by the sum of equity capital (EQUITY+RET_ER), but only if this sum is positive. This represents an assumption that long-term debt will not be granted unless shareholders demonstrate their faith in the firm by making total equity positive (one can modify the equation and require a specific hurdle). The level of equity stock investment (EQUITY) is the sum of previous year balance plus current year equity raised. The latter is an input that the analyst plugs into Table 14 ¬(Financing Activities) as detailed in the Valuation section of the model below. Lastly, Accumulated Retained Earnings (RET_ER) is the sum of previous year RET_ER plus current year Retained Earnings (RETAINED), from the P&L.

This brings us to explain how the second plug number is calculated: Short Term Debt (STD) is calculated by applying an IF statement where we subtract all resources of funds on the liabilities side from total uses (other than cash) on the assets side (TASSETS-CASH-(AP+LTD+EQUITY+RET_ER)). If this difference is positive (i.e., there are more uses than resources of funds), then this difference implies a need for more short term debt (the difference enters into STD). If, however, this difference is negative, meaning there are more resources than uses, then there is no need to raise short-term debt, and STD becomes zero.

C. The profit and loss statement

Our P&L presents the firm's estimated profitability, but its accuracy and relevance depend on the consistency of data entered into the budget model and the

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[4] It is assumed here that book values are consistent with market values of net fixed assets. This assumption is relevant for the case whenever the Modigliani and Miller (1958) approach is used to determine the discount rate.

firm's business plan. We highlight this linkage because it is a key in determining whether the pro forma analysis is informative. As noted, an important advantage of this model is that its underlying assumptions are verifiable across different aspects of the firm's operations.

The P&L starts with estimated sales (from Table 3), subtracts COGS (Table 5), and direct labor (Table 9) to yield net operating income (NOI)[5] . EBIT is obtained next by subtracting G&A and Marketing expenses (Tables 9, 10, 11) and current depreciation (the difference between AC_DEPRt-AC_DEPRt-1). The only remaining exogenous parameters are the tax rate (TAX_RATE), the contingent dividend payout (DIV_RATE), and the leverage policy (LTD_EQ_RATIO), as detailed in Exhibit 2.

The calculation of tax payments is somewhat more complex, as it accounts for loss carried forward, even in cases where a sequence of profitable years is interrupted by years of losses more than once (most models do not do that). The reason this attribute is important in our model is the fact that we do not assume an exogenous growth rate for sales. Absent this assumption, profitability might not increase monotonically. To implement this attribute we calculate Accumulated Profit Before Tax (ACC_PBT), in the following manner on the Excel spreadsheet:

=IF(AND(ACC_PBTt-1>0, PBTt<0), NET_PROt, AC_PBTt-1+PBTt)   (1)

As long as the firm is profitable, or started with losses but continues with gains, this formula accumulates gains from one year to the next (the right-most term, AC_PBTt-1+PBTt). However, in order to reset the ACC_PBT calculator, this statement requires that two conditions be met: First, that ACC_PBTt-1 is strictly positive, and second, that PBTt is strictly negative. Jointly these conditions imply that the firm changed phases from profits to losses. If this occurs, the current loss, NET_PROt, replaces the value of ACC_PBTt, and this calculator starts accumulating losses. If future years are profitable, current profits will be added to the accumulated losses, until none remains (i.e., loss carried forward fully). However, this poses a problem in the first year of gains (after a series of losses), because the firm should be taxed on the lowest between current-year profits and ACC_PBT, net of any loss carried

[5] From a pure accounting perspective, our measure of NOI should actually be denoted "contribution margin", because it does not include variable marketing cost.

forward. To incorporate that we devised this formula in the Tax Payment (TAX) calculation:

=IF(ACC_PBT<0,0,TAX_RATE*MIN(ACC_PBT,PBT)) (2)

This statement implies that if ACC_PBT is negative, the firm needs not pay any taxes (TAX becomes zero). But otherwise, the firm's tax payment is the product of the TAX_RATE times the minimum between ACC_PBT or PBT. For example, if the firm earned a $100 PBT this year, but ACC_PBT is $80 (because it carried a loss of $20 from previous year), it will pay taxes on $80, not $100.

Finally, note that as in all worksheet-based models of financial statements, Retained Earnings (RETAINED) from the P&L enters into Accumulated Retained Earnings (RET_ER) in the BS. This changes the ratio of long-term-debt to equity and the entire level of the BS, therefore changing short-term debt, cash, and interest payments, which in turn change the P&L in a circular way.[6] While circular reference models will not necessarily converge to a stable solution, the way our model is structured assures convergence.

IV. Valuation model

To determine the firm's value we discount two elements separately. First we discount the period Free Cash Flow (FCF), normally spanning over the periods 0,1,…,5. The limit at period 5 is warranted if longer detailed projections become less informative due to increasing uncertainty. If the simulated pro forma is conducted for mature and stable firms like hotels, or utilities, the projection can be extended as necessary (in the Excel model this means copying the last column rightward). If possible, the last year, period 5, should reflect a steady-state year. The second element of the valuation model is made of the expected terminal value of the firm, discounted to the present. We provide three alternative valuation approaches to the terminal value and calculate a weighted average.

The valuation model obtains most of its data from the P&L and BS statements. It is comprised of the equations detailed in Exhibit 4. Table A of Exhibit 4 constitutes

[6] When applying the model on an Excel worksheet the user should make sure the worksheet is set to accommodate iterative calculations.

the standard transformation of net profit or loss, from the P&L statement to FCF, before financing activities (Brealey, Myers, and Marcus, 2009, Fletcher and Ulrich, 2010). Table B lists the cash flow implications of financing activities. Because the amount of equity raised is a managerial decision, the analyst may plug in different values until the cash-flow implications are satisfactory, primarily with respect to Accumulated Balance, at the bottom row of Table B. If the amount raised by issuing equity shares is too little, the firm will be forced to use Short-Term Debt, while rendering Cash to be zero. Clearly, management would normally prefer to raise sufficient equity capital such that Accumulated Balances throughout the periods are deemed "sufficient". The level of sufficient balances depends on the level of uncertainty in the firm's expected cash flows.

An additional item deserving a brief explanation is the calculation of LTD Principal Repayment (row k in Exhibit 4). We use the Excel formula PPMT, which requires, as the second input parameter, the current period of the loan. For lack of a better default, we add one to the first period of the pro forma analysis (typically 0, denoted PERIOD). The reason for adding one is that Excel will not calculate the principal repayment if the value in this entry is lower than one. The practical implication is that this calculation implicitly assumes that the loan was taken on the first day of the first period.

Table C accommodates an analyst's estimate of the risk-adjusted discount rate for the firm, which may vary across years. This parameter may be estimated by the CAPM Beta, by using comparable firms' cost of equity capital, or by other means. We note that the user should not use the Weighted Average Cost of Capital (WACC) of Modigliani and Miller (1958) in the case of a new technology firm. The reason is that the derivation of the WACC assumes stationary cash flows. Because this model applies to both new technology ventures (which, by definition, do not resemble the riskiness of existing technologies) and to existing technologies, we let the user determine the appropriate discount rate. Nevertheless, should the user conclude that WACC is applicable, then the capital structure of the firm must be accounted for, as leverage changes over time. In this case the cost of equity capital within the WACC changes with leverage.

Because the discount rate may vary throughout the estimation period, the cash flow of period T must be discounted by the product of all discount rates preceding T.

Formally, the present value of the cash flow at T may be expressed as:

$$PV(CF_T) = \frac{CF_T}{\prod_{t=0}^{T}(1+k_t)} \tag{3}$$

Table C concludes by discounting each of the cash flows by the appropriate discount rates ( ). By summing the discounted cash flows, one obtains the net present value of this venture, for the periods 0 – T.

The last remaining step in the valuation section is estimating the terminal value of the firm, as if it were sold or liquidated on the first day after the last pro forma period (T) has ended. Table A of Exhibit 5 presents three alternative ways to estimate the terminal value of the firm. First is a multiplier of free cash flow. It is assumed that the FCF of the last period ($2,401 in period 5 of our example) represents a typical year of the FCF, and it is multiplied by an industry-relevant multiplier. We assume here that the multiplier is 4.5, therefore the period-5 amount is $10,802. Using equation (3), the present value of this amount is $3,540. The second alternative is based on the dividend growth model, where the period-5 cash flow, assumed to grow to infinity at a constant rate, g, is discounted by the period-5 discount rate (representing the long-term discount rate). This valuation method amounts to $10,936 in period 5 and, after discounting by (3), its present value is $3,583. Third is the multiplier based on net profit, here taken as 5.0. It yields a $12,479 terminal valuation with a discounted value of $4,089. This method will be less meaningful if the firm is losing, therefore its weighted value in the overall assessment of terminal value assessment will be lower than the other two methods.

In a steady-state firm, the three estimation techniques should not diverge from one another materially. In technology firms, however, periods 0 – T might yield negative profits, rendering methods A and C less informative, while future growth opportunities will be more reliably estimated by using the growth model of method B. If the PV of the terminal values greatly exceed the NPV of periods 0 – 5 cash flows, this implies that the profit opportunities the venture offers are primarily long-term, an aspect that increases the risks for shareholders, and therefore higher discount rates are required. An appropriate representation of the risks involved (i.e., increasing the cost of capital), would reduce the PV of terminal value. Unfortunately, there is no prescription for the "proper" interactions and balance between these arguments.

Exhibit 4
Valuation model of the firm at the end of period *t*

	A. FREE CASH FLOW ($,000)	
		Equation at period *t* (subscript "*t*" omitted if all arguments refer to "*t*")
a	Net Profit	=NET_PRO
b	Add Back Depreciation	=DEPREC
c	Less Increase in Inventories	$=-(INV_t-INV_{t-1})$
d	Less Increase in Receivables	$=-(REC_t-REC_{t-1})$
e	Add Increase in Payables	$=AP_t-AP_{t-1}$
f	Cash-Flow from Operating Activities	=a+b+c+d+e
g	Less Increase in Fixed Assets At-Cost	$=-(ATCOST_t-ATCOST_{t-1})$
h	FCF before Financing Activities	=f+g

	B. FINANCING ACTIVITIES	
i	Equity Raising	Input data
j	Change in Loans (LTD+STD)	$=(STD_t+LTD_t)-(STD_{t-1}+LTD_{t-1})$
k	LTD Principal Repayment	=PPMT(LTD_RATE, PERIOD+1, LTD_YRS, LTD)
l	Dividend Payment	=-DIV_PAY
m	Total Resources	=i+j+k+l
n	Periodic Balance	=h+m
o	Accumulated Balance	$=o_{t-1}+n_t$

	C. PV OF FCF (PERIODS 0-6)	
p	Risk Adjusted Discount Rate	Input data
q	Discount Factor	$=(1+q_{t-1})*(1+p_t)$
r	Annual Cash Flow PV	$=h_t/q_t$
s	Cash Flow NPV	$=SUM(r_0+r_1+r_2+\ldots+r_5)$

Exhibit 5
Estimating terminal value

A. PV OF TERMINAL VALUE	0	1	2	3	4	5
Terminal Value Method A:						
CF_5*Multiplier(CF):	m(CF)=	*4.5*				10,802
Terminal Value (A) PV	**3,540**					
Terminal Value Method B:						
CF_5*(1+g)/(k-g):	g =	*2.5%*				10,936
Terminal Value (B) PV	**3,583**					
Terminal Value Method C:						
Net-Profits$_5$*Multiplier(NP):	m(NP)=	*5.0*				12,479
Terminal Value (C) PV	**4,089**					

B. Total Company Value	Method A	Method B	Method C
Cash Flow NPV	1,875	1,875	1,875
Terminal Value	3,540	3,583	4,089
Total Company Value	**5,415**	**5,458**	**5,964**
Subjective Method Weights	*25%*	*40%*	35%
Weighted Value NPV:	**5,624**		

Note: Input data cells in italics.

Lastly, Table B assigns weights of relevance that the analyst places on each of the three ways the terminal value is calculated, according to his or her belief of the more relevant valuation method. The analyst than adds the NPV of periods 0 – 5 FCF, and by simple multiplication obtains the weighted average overall value of the venture. Based on the financial information this model yields, the analyst can conduct sensitivity analyses, what-if scenarios, and calculate financial ratios to examine the robustness of the results.[7]

[7] To illustrate the rather moderate impact that exogenous parameters have on the firm's value, consider the case where the ratio of inventories/sales (INV_S), which at a benchmark model was 15%, obtains values of 10% (20%), as INV_S declines (increases), respectively. Such variations of ±33% in the benchmark parameter increase (reduce) the firm's valuation by about 7.2% to the relevant direction. Similar results are obtained when altering receivables to sales or payables to sales.

V. Summary and Conclusions

This paper presents a pro forma financial statements model that builds on a detailed business plan, where the latter's key operational implications are represented in a budget. By so doing, the model replaces most of the constant ratios to sales that most pro forma models assume as exogenous parameters. Should the analyst use the budget to reflect the firm's operational activities as prescribed by the business plan, the resulting pro forma statements would reflect the firm's prospects rather accurately. The reason is that once the budget feeds the financial statements, the remaining exogenous parameters have little effect on the key measures of performance. As a result, our valuation model, which transforms the net income into cash flow and adds terminal value, obtains robust results that the analyst can justify based on operational aspects. This makes the model highly relevant for the valuation of early stage, new technology ventures, as well as mature and stable firms.

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