Computing Free Cash Flows and Growth Opportunities

The following discussion provides students with an opportunity to deepen their understanding of how investors and managers can become confused about the concepts of free cash flows and growth opportunities. The discussion about free cash flows extends the material in Chapter 2 that dealt with the example of eBay's financial statements in 2001 and 2002, notably its income statements and statements of cash flows. The discussion about how earnings growth can be mistaken for growth opportunities includes an alternative approach to valuation, known as the residual income method.

A2.1   eBAY'S FINANCIAL STATEMENTS

Mary Meeker developed her free cash flows using EBITDA, an income statement variable. Exhibit A2.1 displays eBay's income statement for the years 2001 and 2002. For 2001 EBITDA, Meeker used $229.4 million. This figure is close to, but not exactly the same as, the value $227.07 million of operating income before depreciation reported in eBay's income statement.

EXHIBIT A2.1
eBay Income Statement

Note: Values given are in $ millions.
Source: Compustat.

	Dec-01	Dec-02
Sales (net)	748.82	1214.10
Cost of goods sold	84.77	153.24
Gross profit	664.06	1060.86
Selling, general, & admin. expenses	436.99	630.09
Operating income before depreciation	227.07	430.77
Depreciation, depletion, & amortiz.	86.64	76.58
Operating income after depreciation	140.43	354.20
Interest expense	2.85	1.49
Nonoperating income/expense	25.37	35.73
Special items	0	9.70
Pretax income	162.94	398.13
Income taxes − total	80.01	145.95
Minority interest	−7.51	2.30
Income before extraordinary items & discontinued operations (EI&DO)	90.45	249.89
Extraordinary items	0	0
Discontinued operations	0	0
Net income (loss)	90.45	249.89

EXHIBIT A2.2
eBay Annual Statement of Cash Flows

Note: Values given are in $ millions.

Source: Compustat.

	Dec-01	Dec-02
Indirect Operating Activities		
Income before extraordinary items	90.45	249.89
Depreciation and amortization	86.64	76.58
Extraordinary items and disc. operations	0	0
Deferred taxes	0	0
Equity in net loss (earnings)		
Sale of property, plant, and equipment and sale of investments − Loss (gain)	0	−21.38
Funds from operations − Other	116.11	135.58
Accounts receivable − Decrease (increase)	−50.22	−66.40
Inventory − Decrease (increase)	0	0
Accounts payable and incrued liab. − Increase (decrease)		
Income taxes − Accrued − Increase (decrease)	9.50	41.11
Other assets and liabilities − Net change	−0.37	64.52
Operating activities − Net cash flow	252.11	479.90
Investing Activities		
Investments − Increase	602.49	723.31
Sale of investments	738.99	727.46
Short-term investments − Change		
Capital expenditures	57.42	138.67
Sale of property, plant, and equipment	4.56	
Acquisitions	111.73	59.41
Investing activities − Other	−1.73	36.17
Investing activities − Net cash flow	−29.82	−157.76
Financing Activities		
Sale of common and preferred stock	123.71	252.18
Purchase of common and preferred stock		
Cash dividends	0.32	0
Long-term debt − Issuance	0	
Long-term debt − Reduction	21.89	0.06
Current debt − Changes		
Financing activities − Other	0	−0.05
Financing activities − Net cash flow	101.51	252.07
Exchange rate effect	−1.70	11.13
Cash and cash equivalents − Increase (decrease)	322.10	585.34
Direct Operating Activities		
Interest paid − Net	2.20	1.49
Income taxes paid	0	2.38

Consider next eBay's statement of cash flows for the years 2001 and 2002 (Exhibit A2.2). The statement of cash flows is the primary source of data used to compute eBay's free cash flows, conventionally defined.

A2.2   FREE CASH FLOWS

To understand how to derive eBay's free cash flows from the preceding financial statements, consider the derivation based on sources and uses. By funds is

meant long-term securities, long-term debt, and equity. The traditional sources of funds are:

- Net income (adjusted for cash flow from other income).
- Depreciation.
- Change in long-term debt.
- New stock issue.

where net income and depreciation correspond to internal equity, being cash flows from operations after interest and tax. The traditional uses of funds are:

- Change in net working capital (including cash).
- Investment defined as the change in net fixed assets plus depreciation.
- Dividend payout.

In the preceding arrangement of sources and uses of funds, the various items are implicitly treated as having a positive sign. However, when an item has a negative sign, its designation changes. For example, if a new stock issue is negative, then the item denotes share repurchase rather than share issue and becomes a use of cash rather than a source of cash.

Net income (adjusted for cash income from other income) corresponds to cash flow from operations minus depreciation and amortization, plus the change in those working capital items that appear in Indirect Operating Activities in the statement of cash flows. Exhibit A2.3 displays eBay's sources and uses for 2001 and 2002.

Deriving Free Cash Flows

In order to balance its budget, a firm's total sources of funds must equal its total uses of funds. Free cash flows are obtained by rearranging the equality between sources and uses, with the addition of some common terms to both, to arrive at two versions of free cash flows: the sources of free cash flow and the uses of free cash flow.[1]

EXHIBIT A2.3

	Dec-01	Dec-02
Cash flow from operations, incl. change in operating net working capital, excl. depreciation	206.56	364.09
Depreciation	86.64	76.58
Change in long-term debt	−21.89	−0.06
New stock issue + other financing	122.02	263.26
Total sources	**393.33**	**703.87**
Change in net working capital	363.19	546.11
Investment	29.82	157.76
Dividends	0.32	0
Total uses	**393.33**	**703.87**

Sources of Free Cash Flow

Net income (adjusted for cash flow from other income).

Depreciation.

Interest.

− Investment.

− Change in net working capital − Change in short-term debt.

Uses of Free Cash Flow

Interest.

Dividend payout.

− Change in long-term debt − Change in short-term debt =
Change in total debt.

− New stock issue.

Notably, uses of free cash flow must equal sources of free cash flow.

Interpreting Sources of Free Cash Flow

The sum of net income and depreciation represents the cash flow from operations, after interest and taxes, plus other income. Adding interest paid results in cash flow from operations before interest, but after taxes.[2] Subtracting the change in net working capital, the change in short-term debt, and the value of investment leads to the cash flows that can be paid to investors, after the company has paid for additional working capital and additional fixed assets. In the statement of cash flows (Exhibit A2.2) the item for change in short-term debt is described as current debt.

Interpreting Uses of Free Cash Flow

As far as cash is concerned, investors receive interest and dividends, but write checks to the company when they purchase new issues of stock and grant new loans. Therefore, the net cash flow to investors is the sum of dividends and interest minus the sum of new issues and change in total debt.

Cash Earnings

Mary Meeker computed free cash flows as after-tax EBITDA less the change in noncash working capital and capital expenditures. In this respect, the free cash flows that Mary Meeker computed were closer to earnings than they were to dividends. Subtracting noncash working capital effectively served to transform after-tax EBITDA from an accrual-based variable to a cash-based variable. And subtracting capital expenditures allowed her to treat capital expenditures as costs, again on a cash basis instead of an accrual basis, thereby eliminating the need to have a depreciation expense. That is, the free cash flows Meeker computed proxy for cash earnings plus interest.

Given the small amount of debt in Exhibit 2.3, Meeker's free cash flows were essentially cash earnings. Moreover, in adding the $2.3 billion in cash to obtain "full

value" in Exhibit 2.3, Mary Meeker implicitly assumed that this cash would not be used to fund internal projects at a future time.

Meeker effectively computed the value of eBay as the present value of its expected future cash earnings stream. Keep in mind that the dividend discount model involves discounting the future dividend stream, not the future earnings stream. Treating the value of equity as the present value of its future earnings stream is typically a mistake.

Recall why discounting earnings instead of dividends to arrive at value is erroneous. The traditional valuation formula is based on the premise that the firm is expected to pay D_1 in dividends next year and to grow at the constant rate g. Here dividends are assumed to comprise free cash flows. The associated valuation formula is

$$PV = \frac{D_1}{r - g}$$
$$= \frac{\text{Expected dividend next year}}{\text{Required return} - \text{Growth rate}}$$

Suppose that the firm plans to pay out a fixed fraction d of earnings. If the firm is expected to earn E_1 next year, then $D_1 = d \times E_1$. Therefore, the valuation formula can be written in terms of future earnings as follows:

$$PV = d \times \frac{E_1}{r - g}$$
$$= \text{Payout ratio} \times \frac{\text{Expected earnings}}{\text{Required return} - \text{Growth rate}}$$

In examining the last equation, notice the presence of the dividend payout ratio on the right-hand side of the last equation. The equation stipulates that the value of the firm is the product of its payout ratio and the present value of its future earnings stream. When the payout ratio is small, the value of the firm's equity is much less than the present value of the future earnings stream.

By April 2003, eBay had neither initiated a dividend nor announced its intention to do so. Mary Meeker's valuation error is that she effectively used earnings instead of dividends to arrive at eBay's value. Of course, she claimed to be using free cash flows. However, what she called free cash flows were actually cash earnings (plus interest), not free cash flows. In other words, she framed cash earnings as free cash flows and then treated the present value of those flows as the value of eBay's equity.

A2.3 CONFUSING GROWTH OPPORTUNITIES AND EARNINGS GROWTH

Reliance on PEG-based thinking leads investors to view firms with high earnings growth rates as having high growth opportunities.

PEG

The PEG-based valuation heuristic relies on P/E being proportional to the firm's growth rate. However, a firm's intrinsic P/E ratio is not pegged to a constant PEG. For example, for a firm with zero growth opportunities, the intrinsic P/E is $1/r$, one over the required return. However, as will be discussed, PEG can fall anywhere in the range $1/100r^2$ to $+\infty$.

Notably, the long-term growth rate g is just the product of the plowback ratio $(1 - d)$ and the expected ROE. Because the expected ROE is just r when the firm has zero growth opportunities, the PEG ratio in this case is just

$$\text{PEG} = \frac{P_0/E_1}{100 \times (1 - d) \times r} = \frac{1}{100 \times (1 - d)r^2}$$

In other words, when the firm plows back all its dividends $(d = 1)$, PEG is just equal to $1/100 \times r^2$. However, as the plowback ratio falls toward zero, the growth rate falls toward zero. In turn the PEG ratio climbs to infinity.

A point made in Chapter 2 is that at the time of Mary Meeker's report, eBay had not earned its required return. Suppose that eBay has zero growth opportunities, its required return is 12 percent as Meeker assumed in her analysis, and the firm plows back all its earnings $(d = 0)$. In that case, the theoretical value of PEG is $1/(100 \times 0.12^2) = 0.69$. In contrast, Meeker uses a PEG ratio of 1.5.[3]

In the textbook valuation model, a firm's intrinsic P/E ratio depends on its growth opportunities PVGO (NPVGO) rather than its growth rate g. The traditional valuation formula

$$P_0 = \frac{E_1}{r} + \text{PVGO}$$

can be rewritten as the following expression for P/E:

$$\frac{P_0}{E_1} = \frac{P_0}{P_0 - \text{PVGO}} \times \frac{1}{r}$$

When the firm has zero growth opportunities, meaning PVGO is equal to zero, then P_0/E_1 reduces to $1/r$. However, as PVGO becomes positive, P_0/E_1 rises. Of course, the maximum value for PVGO is P_0. As PVGO approaches P_0, P_0/E_1 rises to infinity.

On May 20, 2003, eBay's stock closed at $97.75 per share. On that day the average analyst estimate of its EPS for the coming four quarters was $1.56. That produced a forward P/E for eBay of 62.7.

The Market's Judgment about eBay's (N)PVGO

If eBay were priced according to the textbook approach, its PVGO (NPVGO) would have been the difference between its stock price ($97.75) and the present value of the zero growth perpetuity E_1 ($1.56), discounted at r (12 percent). That is, PVGO per share would have been $97.75 - ($1.56/12\%) = $84.75. In other words, on May 20, 2003, the market appears to have judged the fraction of eBay's value stemming from its growth opportunities to be 87 percent ($84.75/$97.75).

Let us remind ourselves what exactly produces positive growth opportunities. The expected ROE exceeds the required return on equity r. As was mentioned, on page 32, from the time it became a public company through 2003, eBay did not earn its required return.

Book-to-Market Equity: What Makes eBay a Growth Stock?

Residual income is a straightforward concept. Imagine that shareholders have invested $1,000 of their money in an all-equity financed firm, either buying its shares when first issued or when managers retained their earnings and plowed them back into the firm. Suppose that shareholders require a return of 12 percent (r) in order to be willing to hold the stock. In that case, shareholders require earnings to be 12 percent of $1,000, or $120, in order to feel adequately compensated. Call this $120 the charge to (equity) capital. Imagine that earnings over the next year turn out to be $200, $80 more than the charge to (equity) capital. Call this $80 residual income, or economic value added (EVA).[4]

One of the most important features about EVA is the role it plays in valuation. As shown in the following, the present value of the firm's cash flows to equity, FVE, can be expressed as the sum of book equity (owners' equity) and the present value of the future EVA stream, discounted at the required return r. That is,

$$\text{FVE} = \text{BV} + \text{PV (of future EVA stream, discounted at } r)$$

where

$$\text{FVE} = \text{fundamental value of firm's equity at end of current year}$$

$$\text{BV} = \text{owners' equity at end of current year}$$

$$\text{PV (of future EVA} \ldots) = \text{present value of future expected EVA stream, discounted at the required return on equity}$$

EVA and Value

The following discussion explains why the fundamental value of equity can be expressed as the sum of book value of equity and the expected value of the future discounted EVA stream. By definition,

$$\text{EVA}_t = E_t - (r \times \text{BE}_{t-1})$$

where

$$\text{EVA}_t = \text{EVA at date } t$$

$$E_t = \text{earnings at date } t$$

$$\text{BE}_{t-1} = \text{book value of equity at end of date } t - 1$$

$$r = \text{required return on equity.}$$

DIV_t is dividends paid out at date t.

Assume that the firm will not issue new shares of stock in the future. Clean surplus accounting implies that owners' equity BE_t is obtained by adding income

statement retained earnings $E_t - \text{DIV}_t$ to the previous value of owners' equity BE_{t-1}. That is,

$$\text{BE}_t = \text{BE}_{t-1} + (E_t - \text{DIV}_t)$$

This last equation can be rewritten as

$$E_t = \text{DIV}_t + (\text{BE}_t - \text{BE}_{t-1})$$

Therefore

$$\begin{aligned} \text{EVA}_t &= E_t - (r \times \text{BE}_{t-1}) \\ &= \text{DIV}_t + (\text{BE}_t - \text{BE}_{t-1}) - (r \times \text{BE}_{t-1}) \end{aligned}$$

Solve for DIV_t to obtain

$$\text{DIV}_t = \text{EVA}_t + (1+r)\text{BV}_{t-1} - \text{BV}_t$$

According to the dividend discount model, the fundamental value of equity is the sum

$$\text{FVE}_0 = \frac{\text{DIV}_1}{1+r} + \frac{\text{DIV}_2}{(1+r)^2} + \frac{\text{DIV}_3}{(1+r)^3} + \cdots$$

Substituting for DIV_t from the previous equation leads to the expression

$$\begin{aligned} \text{FVE}_0 = {} & \frac{\text{EVA}_1}{(1+r)} + \frac{\text{EVA}_2}{(1+r)^2} + \frac{\text{EVA}_3}{(1+r)^3} + \cdots \\ & + \frac{\text{BV}_0 - \text{BV}_1}{1+r} + \left(\frac{\text{BV}_1}{(1+r)} - \frac{\text{BV}_1}{(1+r)^2} \right) \\ & + \left(\frac{\text{BV}_2}{(1+r)^2} - \frac{\text{BV}_3}{(1+r)^3} \right) + \cdots \end{aligned}$$

As long as the rate at which BV_t grows over time is less than r, FVE is the sum of the beginning of period book value plus the present value of the expected future EVA stream, the last equation implies that

$$\text{FVE}_0 = \text{BV}_0 + \frac{\text{EVA}_1}{1+r} + \frac{\text{EVA}_2}{(1+r)^2} + \frac{\text{EVA}_3}{(1+r)^3} + \cdots$$

Suppose that a firm's market value of equity equals its fundamental value of equity FVE. Consider the firm's intrinsic ratio of book-to-market equity $\text{BME} = \text{BV}/\text{FVE}$. A firm that always expects to earn its required return and nothing more, will have an expected EVA stream consisting of zeros. Therefore, the previous equation indicates that the book-to-market ratio of such a firm will be 1. However, a firm with positive growth opportunities will have a book-to-market ratio that is less than 1. Firms with low book-to-market ratios are called growth firms, whereas firms with high book-to-market firms are called value firms.

On May 20, 2003, eBay's book value of equity was \$12.71 on a per-share basis. Its stock price was \$97.75. Therefore the ratio of eBay's book-to-market equity was \$12.71/\$97.75 = 0.13. That definitely made eBay stock a growth stock.

The Growth Opportunities Formula

Consider the traditional valuation formula involving growth opportunities:

$$P_0 = \frac{E_1}{r} + \text{PVGO}$$

This formula is appropriate for firms whose expected ROE and growth rate g stay constant over time. However, for firms whose future values of ROE and g are expected to vary over time, the traditional valuation formula might not hold. In this case, valuation based on growth opportunities involves beginning with first principles.

First principles state that the value of the firm is the sum of two terms. The first term is what the firm would be worth if its growth opportunities were zero. In general this value is associated with a firm that pays out 100 percent of its earnings as dividends. The second term is the present value of the future NPV stream that is generated by plowing back earnings when expected ROE exceeds required return r.

The growth opportunities valuation method and the residual income valuation method are not the same. Nevertheless, both explicitly focus on the difference between ROE and r. When ROE and r are equal, expected EVA $= 0$. When ROE exceeds r, expected EVA > 0. Notably, the residual income method is easier to use, in that computing the present value of the future EVA stream is typically easier to do than computing the (net) present value of growth opportunities. Because EVA underlies book-to-market equity, the basis for characterizing stocks as being either growth or value, the residual income method also ties directly into the factors that lead a firm's stock to be a growth stock.

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[1] Move "Investment" and "Change in net working capital" from uses to sources, and move "Change in long term debt" and "New stock issue" from the sources group to the uses group, inserting minus signs. Then add "Interest" paid and "$-$Change in short-term debt" to both sources and uses.

[2] If you add together Net, Depn, and Interest you get EBITDA-tax, after-tax earnings before interest, tax, depreciation, and amortization.

[3] Typically, P/E ratios are forward looking and have the form P_0/E_1, where the 0 subscript refers to the present and the 1 subscript refers to the next 12 months. A trailing P/E ratio has the form P_0/E_0, where the earnings pertain to the previous 12-month period.

[4] EVA has been trademarked as a term by the consulting firm Stern-Stewart.