Relationships among Financial Performance Measures

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This article examines financial performance measures and discusses the divergence in view points among Treasurers and CFOs. It discusses the linkages among these measures, and attempts to provide an integrated analysis for individual and joint application of these measures in financial planning and analysis. It advocates that to maximize the shareholder value, which is generally calculated as the discounted value of its future free cash flow, a firm needs to ensure that the return on invested capital exceeds the cost of capital both in short- and long-term. The article also concludes that Treasurers and CFOs need to deploy a combination of financial measures to evaluate management's marginal contribution to the firm's value in short- and long-term.

INTRODUCTION

Practitioners generally agree that a firm's goal should be to maximize shareholder wealth as measured by the market price of the firm's stock. Firms can influence share price through their current and expected performance. Therefore, the creation of performance measures linked to the firm's market performance is a key to creating shareholder wealth. Developing a single measure of performance that captures all facets of a firm's value creation process is not an easy task. The Treasury group within a finance organization is generally responsible for a firm's functions such as investor relations, cash management and financing policies. In addition, the Treasurer/CFO is responsible for recommending financial performance measures for evaluation of capital projects and internal and external reporting of operating performance on a monthly, quarterly and annual basis.

This article attempts to evaluate financial performance measures and investigate their linkages for practical applications in financial management of operating a business. We also examine how these measures can be useful in financial planning and analysis. Finally, we make recommendations on how practitioners can evaluate management's marginal contribution to a firm's value.

This paper has three main contributions. First, it provides a review of popular financial performance measures and discusses the divergence in view points among practitioners. Second, it derives and explains the relationship between free cash flow and the return on invested capital to a firm. Third, using basic accounting identities and the financial theory of valuation in a multi-period world, the paper derives a degree of equivalence among the financial performance measures, which helps to make specific recommendations to the Treasurers and CFOs. The final section provides conclusions.

LITERATURE REVIEW

The Treasurer/CFO is generally responsible for recommending financial performance measures for evaluation of capital projects and reporting of operating performance. The finance literature contains broad discussions of financial performance measures. Many authors including Arzac (2007), Clinton and Chen (1998), Estridge and Lougee (2007), and Martin, Petty, and Rich (2005), provide an appraisal of some of these measures. Copeland and Dolgoff (2006), Copeland, Koller, and Murrin (1994), Rappaport (1998), Stewart (1991), and provide scrutiny of various financial performance measures. Their research evaluates shareholder value measures including free cash flow (FCF), return on invested capital (ROIC), economic value added (EVA), and market value added (MVA).

Bacidore, Boquist, Milbourn, and Thakor (1997) and Ferguson and Leistikow (1998) have made valuable contributions and support Jensen and Murphy (1990), Milbourn (1996), and Rappaport(1999), who assert that the stock price is the right metric for judging firm performance. But, they also argue that external factors outside of the control of the firm's managers drive stock price. Bowen and Wallace (1999) recommend a balanced combination of financial performance measures and other operating measures such as new orders, quality, cycle time, operating up-times, inventory levels, on-time delivery, and new product development.

The theory of agency costs plays a pivotal role in establishing financial objectives for a firm. Lambert and Larcker (1985) identify three major conflicts: First, shareholders expect their managers to maximize their financial return, but also recognize that managers may derive "non-pecuniary" benefits from their control of corporate resources. Second, shareholders and managers may have different viewpoints on the appropriate decision-making time horizon. Third, managers and shareholders may disagree in their attitudes toward the risk of potential investment strategies.

The commonly deployed financial measures of performance by the Treasurers include free cash flow to a firm (FCF), net present value (NPV), ROIC, EVA or MVA. Graham and Harvey (2001), Mulford and Comiskey (2005), Nurnberg (2006), Penman (2006, 2007), and Zenner and Clark (2009) discuss some of these measures. We appraise each of these popular measures along the lines of Baker and Deo (2014).

POPULAR FINANCIAL PERFORMANCE MEASURES

Free Cash Flow

Free cash flow to the firm (FCF) is the firm's operating cash flow less capital reinvestment to sustain its operations and shore up its growth. Therefore, FCF represents a cash flow that the firm is free to distribute to its investors without negatively affecting a firm's future earnings and placing at risk its long-term well-being. Equation 1 provides the ingredients of FCF.

$$\text{FCF} = \text{Operating income} + \text{Depreciation} - \text{Capital expenditures} - \text{Operating working Capital} - \text{Cash taxes} \quad (1)$$

FCF is derived from the firm's financial statements. FCF measure is unstable, it should not be used as a short-term measure for business units that require high capital intensity and have a large asset structure. A firm's expected FCF over its life cycle determines the firm's value to investors.

Net Present Value

The net present value (NPV) is the sum of the present value of the expected free cash flows (FCFs). The weighted average cost of capital (WACC) is used as the discount rate to find the present value, and this rate reflects the underlying risk and it takes into account the returns required by all suppliers of capital. The NPV is a long-term measure and is deployed in resource allocation decisions. It also helps to identify key value drivers. NPV encompasses all future incremental cash flows, and therefore requires long-term forecasts of incremental cash flows. NPV measures value creation in dollars and is in harmony with shareholder value maximization. Finally, its serves as a major decision rule in project selection

(Baker, Singleton, and Veit (2011). Therefore, it is not surprising that NPV is endorsed by practitioners and it is the most commonly used measure of financial performance.

Return on Invested Capital

ROIC is a measure of an investor's percentage return on capital. in the firm. ROIC is calculated by dividing net operating profit after taxes and depreciation (NOPAT) by average invested (operating) capital. NOPAT is a firm's earnings before interest and taxes (EBIT) multiplied by 1 minus the tax rate. Operating capital includes notes payable, long-term bonds, preferred stock, and common equity. The operating capital is the sum of the average debt liabilities and the average stockholder's equity. If ROIC exceeds its WACC, a firm generates value. ROIC is useful as a short- and a long-term measure.

In response to misuse of rate-based measures by some practitioners, Clinton and Chen (1998) argue that ROIC can provide a moving target on assumptions about reinvestment that may or may not be true. This problem is eliminated in the dollar-based residual-based measures such as EVA or NPV. Dillion and Owers (1997) claim that managers acting in a self-interest mode may initially approve projects that have an acceptable percentage return for the firm overall, but then discard these projects because the return is less than the current return for the business unit.

Economic Value Added

Economic profit is the income measured after deducting the cost of capital (Brealey, Myers, and Marcus (2004)). The economic profit is also known as economic value added or EVA (Stowe and Gagne (2013). Stern Stewart & Company have been marketing the EVA as the measure of the profitability of a firm and as an indicator of management performance. A firm is economically profitable when it creates wealth for its shareholders, and EVA can be calculated as follows:

$$\text{EVA} = \text{NOPAT} - (\text{Invested capital} \times \text{WACC}) \quad (2)$$

where NOPAT is net operating profit after taxes; invested capital is the fund used to finance a firm's project; and WACC is the weighted-average cost of capital. The term in the parenthesis represents the capital charge and is calculated as invested capital times WACC. A positive EVA indicates that the firm has created value since it earned in dollar terms more than its cost of capital. Alternatively, by multiplying and dividing by invested capital, the incremental or annual EVA can be calculated as follows:

$$\text{Incremental or annual EVA} = (\text{ROIC} - \text{WACC}) \text{ X Invested Capital} \quad (3)$$

The EVA measure helps to tie shareholder wealth creation to both the income statement and balance sheet items. Therefore, EVA entails management to think about prudent management of both assets and expenses in their decision making process. For instance, it attempts to overcome a crucial shortcoming in accounting earnings by including a capital charge. EVA modifies the traditional accounting measures with accounting adjustments to generate surrogates for economic based measures in the calculation of both the NOPAT and invested capital.

EVA measures shareholder value for a single period. As a result, it serves as a short-term measure. The single-period EVA is different from FCF for the same period. EVA measures periodic development towards the multi-period shareholder value and thus serves as a complementary measure to the free cash flow. Operating managers can employ EVA as an operational metric to help understand the sources of value creation and destruction.

EVA does have some deficiencies. Young (1999) argues that the computation of EVA requires numerous methodologies for numerous adjustments and this may to lead to disagreeable computations. Additionally, EVA calculation relies critically on invested capital, and therefore it is most suitable to mature and capital-intensive firms. Baker, Deo, and Mukherjee (2009) investigate major concerns about EVA in three different categories: computational, effectiveness, and measurement.

Market Value Added

Market value added (MVA) is a long-term measure of shareholder value. Equation 4 shows that MVA is calculated as the sum of the expected EVAs discounted at a risk-adjusted WACC (r).

$$MVA = \sum_{t=1}^{\infty} \frac{EVA_t}{(1+r)^t} \tag{4}$$

While EVA is a single-period metric, the MVA is corresponding long-term wealth measure.

RELATIONSHIPS AMONG FINANCIAL PERFORMANCE MEASURES

The finance literature is abounding with numerous financial performance measures. Selecting a measure is not easy given that the trends in popularity of these measures vacillate over time. Copeland and Dolgoff (2006) and Jensen and Meckling (2009) discuss the issues involved in making a selection from an array of financial measures. Irrespective of the selection path taken, it needs to ensure that selected measure will provide the most reliable incentives to maximize shareholder value. Dodd and Johns (1999) contend that using a single financial measure to manage a firm's operations makes no sense in today's complex environment. However, practitioners continue to search for the measure of financial performance that will portray the outcomes of current management actions on the value of future cash flows (Financial Management Association, 2006). Martin, Petty, and Wallace (2009) point out that the search for the best measure of performance has led to fierce completion among consulting firms selling a variety of flavors of value-based management. Hartman (2000) and Shrieves and Wachowicz (2001) utilize complex algebraic derivations to examine the relationship among the financial performance measures. Stewart (1991) examines the effect of a firm's ROIC on its valuation.

The recent bankruptcies of major firms and the uproar in the media regarding uncontrolled executive compensation, has provided some consulting to promote a variety of home-grown performance measures. Unfortunately, these attempts have generated more controversies than any resolutions. In practice computations of these economic or cash flow based measures are performed using the income statement items such as revenues, costs, expenses, and asset and liability items from the balance sheet. Based on the definition, each financial performance measure uses a unique set of accounting data and associated adjustments. Not only this has led to differences in opinions and interpretations, but the resolution efforts to reconcile these differences have been attempted using financial relations and complex equations.

Relationship Between FCF and ROIC

While economic and financial theory provides a basic framework for understanding financial measures (Baker and Deo (2014)), these measures are calculated using accounting information such as revenues, costs, and expenses from the income statement and various assets and liabilities from the balance sheet. Therefore, we investigate the relationship among these measures from an accounting and finance perspective.

The fundamental value of a corporation is the sum of the present value of its future cash flows and the discount rate reflects the riskiness of the cash flows. Unfortunately, a firm's annual FCF is inherently volatile. For example, a large capital program can cause a temporal change in spending and a decline in FCF and a delay in capital spending can improve the FCF for given year. Therefore, the discretionary nature of the long-term and operating capital can easily alter the FCF for a given year to the detriment of value creation in the long-term (Copeland et al., 1994).

The FCF is a primarily a function of earnings potential and reinvesting operating capital for growth. A business unit with potential for high growth prospects in operating earnings, which normally occurs during the early part of its life cycle, will generally require a higher level of reinvestment, leading to a lower level of FCF. On the other hand, a business unit with low growth rates in operating earnings and with normally lower associated capital reinvestment, which usually occurs during the latter part of its life cycle, also exhibits a lower level of FCF. Although the two business units may earn lower FCF, they

differ in valuation due to their growth prospects: the former business commands a higher valuation while the latter has a lower risk-adjusted valuation.

As discussed earlier, EVA measures shareholder value for a single period. As a result, it helps to identify initial impact and serves as a short-term measure. Although the single-period EVA is generally different from FCF for the same period, EVA progresses toward the all-period (multi-year) shareholder value and serves as a complementary measure to the DCF valuation**.** However, for a given year, EVA is positive only if the ROIC exceeds the cost of capital. In other words, regardless of the sign of the FCF for a single year, value creation is ensured in the long-run if the ROIC exceeds the cost of capital. Although a single-period measure cannot totally sum up the long-term impact on value creation or the underlying drivers even if management is responsible for the current decisions, we investigate these relationships among the financial measures in a multi-period world.

First, we develop the relationship between the FCF and ROIC as shown in Equation 5

$$FCF = NOPAT + DEP - (\Delta NOWC + NCS) \quad (5)$$

where NOPAT is operating income (or EBIT assuming other income is zero) less cash taxes paid; DEP is depreciation; ΔNOWC is the change in net operating working capital; and NCS is net capital spending. Rearranging, FCF = NOPAT – (ΔNOWC + NCS – DEP). Dividing and multiplying NOPAT by total net operating capital results in

$$FCF = (NOPAT/\text{Total net operating capital}) \times (\text{Total net operating capital}) - (\Delta NOWC + NCS - DEP) \quad (6)$$

$$= R \times (\text{Total net operating capital}) - \text{Additional investment in net operating capital}, \quad (7)$$

where R is ROIC = NOPAT/Total net operating capital. The total net (investment in) operating capital is the sum of the investments in net operating (short-term) working capital and net operating long-term assets. The FCF for a given year or for a short-term can be negative for several reasons. First, the return on capital can be negative or less than the cost of capital reflecting mismanagement of its core operations. Second, the additional investment in net operating capital can be high due to large long-term investment. In the short run, although a firm may have low or negative FCFs, from Equation 3, as long as the return on capital exceeds the cost of capital, the investment is creating value for the firm. The concept of NOPAT found by adding the after-tax interest payments to the net profit after taxes is central to both approaches, but the computational similarities end here. The FCF approach focuses on the annual total cash flows obtained by deducting total net investment from the net operating cash flow, whereas the EVA approach requires defining the annual total investment in the firm.

ROIC clearly plays a pivotal role because it serves as an annual indicator of value or the potential for creation of long-term positive FCF. ROIC indicates whether the short-term FCF is justifiable. In summary, because the goal of the firm is to maximize shareholder wealth, all three measures are needed. ROIC indicates the efficiency of resource utilization; EVA helps to gauge the short-term dollar value creation; and FCF facilitates measuring the long-term dollar value creation over the planning horizon.

Relationships among Financial Measures from Accounting and Finance Perspectives

Stern Stewart & Company, a New York consulting firm, developed EVA in 1982 to promote value-maximizing behavior in corporate managers. As Keys, Azamhuzjaev, and Mackey (2001) point out, EVA is similar to traditional measures of operating profit but accounts for the charges incurred in using capital invested in a business and attempts to shun the constraints of generally accepted accounting principles (GAAP). As an economic measure, EVA is consistent with valuation principles and financial theory. As previously shown, Equation 2 provides the basic equation for this performance metric: EVA = NOPAT – (Invested capital x WACC). According to Martin and Petty (2000), the calculations of both the NOPAT

and operating capital involve making various adjustments to convert from accrual accounting to economic values.

When calculating EVA, depreciation is not added back. Although it is not a cash expense, depreciation is a cost because worn-out assets must be replaced. Thus, depreciation is deducted when determining EVA. Our calculation of EVA assumes that the true economic depreciation of the company's fixed assets exactly equals the depreciation used for tax purposes (Shrieves and Wachowicz, 2001). If this were not the case, adjustments would be needed to obtain a more accurate measure of EVA.

We proceed to derive the relationship between FCF and EVA. The Equation 8 restates the Equation 4 and reiterates that market value added (MVA) is defined as the sum of the expected EVAs discounted at a risk-adjusted discount rate:

$$\Delta MVA = \sum_t \text{present value of EVA} \tag{8}$$

Substituting for EVA from Equation 2,

$$MVA = \sum_t \text{present value of NOPAT} + \sum_t \text{present value of (–invested capital x WACC)} \tag{9}$$

From Equation 5, FCF = NOPAT + DEP – ΔNOWC – NCS. Rearranging,

$$FCF = NOPAT - (\Delta NOWC + NCS - DEP) \tag{10}$$

But from Equation 2, NOPAT = EVA + (Invested capital x WACC). Substituting for NOPAT in Equation 10

$$FCF = EVA + (\text{Invested capital x WACC}) - (\Delta NOWC + NCS - DEP) \tag{11}$$

In the same vein, Equation 11 for FCF in the mutiperiod world may be rewritten as,

$$\sum_t \text{present value of FCF} = \sum_t \text{present value of } (NOPAT - (\Delta NOWC + NCS - DEP)) \tag{12}$$

The sum of the present value of FCF represents the value or NPV of the firm.

From Equations 9 and 12 for MVA and NPV, $\sum_t$ present value of EVA or MVA will equal to $\sum_t$ present value of FCF or NPV if

$$\sum_t \text{Present value of NOPAT} + \sum_t \text{Present value of (–invested capital x WACC)} = \sum_t \text{Present value of NOPAT} - (\Delta NOWC + NCS - DEP) \tag{13}$$

Rearranging, the equality holds if

$$\sum_t \text{Present value of } \Delta NOWC + NCS = \sum_t \text{Present value of DEP} + \sum_t \text{Present value of (invested capital x WACC)} \tag{14}$$

Generally, the ΔNOWC is small compared to NCS and its summation over time is zero though differences due to the time value of money may lead to a small non-zero value. During the early stage of its life cycle, a project requires investment in operating working capital and during the latter stage of the life cycle the project recovers all or a portion of this investment. This NOWC is unaffected by seasonal or other temporary movements between different currents assets and non-interest bearing current liabilities. Therefore, substituting, $\sum_t$ present value of (ΔNOWC) = 0 in Equation 14, the equality of MVA and NPV holds if

$$\sum_t \text{present value of (NCS)} = \sum_t \text{present value of (DEP)} + \sum_t \text{present value of (invested capital x WACC).} \quad (15)$$

The net capital spending (NCS) in the left hand side of the above equation is the change in year-over-year gross plant, and the sum of these changes over the life of the firm represents the total capital investment in the operating long-term assets in the firm. The right hand side of Equation 15 represents the return of the capital (via depreciation, DEP) and a return on capital (via the capital charge, which is invested capital x WACC). Because this is true, the conclusion is that the sum of the present value of EVA or MVA equals the sum of the present value of FCF or NPV. MVA and NPV measure total incremental value and are not equal to the total value of the firm.

Shrieves and Wachowicz (2001) demonstrate the equality in the above equation. They conclude that the FCF approach focuses on the periodic total cash flows obtained by deducting total net investment and adding net debt issuance to the net operating cash flow, whereas the EVA approach requires defining the periodic total investment in the firm. Hartman (2000) concludes that EVA permits producing a present worth that is consistent with traditional NPV analysis using real cash flows. The difference in a given year is attributed to the capital allocation methodology and using tax versus the true or economic (EVA) depreciation.

Of course, for a given year the values of EVA and FCF may differ due to the differences in computational methodology. The MVA measures the impact of managerial actions since beginning a firm while EVA measures the managerial impact for one year.

CONCLUSIONS

An array of measures is available to assess a firm's financial performance. We appraise popular measures including FCF, NPV, ROIC, EVA, and MVA. Although these measures are economically related to each other, practitioners and specifically the Treasurers and CFOs have provided dissimilar interpretations. In turn, these differences in viewpoints lead to accounting adjustments in their calculations, and result in contradictory perspectives. We demonstrate that accounting and financial framework is available to help reconcile differences among these measures of financial performance. We advocate that to maximize its shareholder value via its free cash flow, a firm needs to ensure that the return on invested capital exceeds the cost of capital in the short- and long-term. We specifically point out the short-term aspect of this requirement as the calculation of NPV entails a long-term forecast of incremental FCF over the entire life of the project, which in practice may not transpire as forecasts of cash flows beyond a certain period of time become questionable. We recommend the practitioners deploy a set of multiple measures to gauge a comprehensive picture of a firm's financial performance: (1)

On an annual basis or for the short-term, the measures such as the percentage measure ROIC or the dollar measure EVA; and (2) for the long-term, the measures such as the NPV, which is the risk-adjusted sum of the present value of FCF or MVA, which is the risk-adjusted sum of the present value of EVA.

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