cơ sở lý thuyết CỦA việc THIẾT LẬP MÔ HÌNH ĐỊNH GIÁ DOANH NGHIỆP

A THEORETICAL analysis OF Modeling firm valuation

Suggestions:

**Tóm tắt -** Giá trị nội tại của một doanh nghiệp là vấn đề quan tâm hàng đầu của các cổ đông, nhà đầu tư, người cho vay và các bên có lợi ích liên quan đến doanh nghiệp. Hiện nay, các phương pháp phổ biến được áp dụng để ước tính giá trị nội tại của doanh nghiệp là DDM, RIM, DCM, and Ohlson-Juettner model. Nghiên cứu này cung cấp tổng quan về các phương pháp định giá doanh nghiệp. Trên cơ sở đó, nghiên cứu này phân tích và đưa ra mô hình tổng quát về định giá doanh nghiệp, đồng thời, nghiên cứu này chỉ rõ cách thức để cụ thể hóa các thành phần và các biến trong mô hình định giá doanh nghiệp. Nghiên cứu này giúp làm rõ bản chất của việc xây dựng một mô hình định giá doanh nghiệp và rút ra các hàm ý hữu ích cho việc thiết lập mô hình định giá doanh nghiệp trong điều kiện Việt Nam.

**Từ khóa –** giá trị nội tại của doanh nghiệp; định giá doanh nghiệp; mô hình định giá doanh nghiệp; các thuộc tính giá trị; giá trị kết thúc**Abstract -** Intrinsic value of a firm is a primary concern of shareholders, investors, and lenders and other stakeholders in the economy. There are common valuation models often used to estimate intrinsic value of a firm: DDM, RIM, DCM, and Ohlson-Juettner model. The author implements generalizations of existing valuation models to provide a theoretical base for selecting, modeling and applying valuation approaches in practice. This paper provides a general structure of valuation models and point out how to construct the components and variables of a valuation model and how to fit valuation attributes into the model. The study also suggests way to modeling the evolution of future expected value streams of a firm. In addition, the modeling of a valuation model also requires risk adjustment to fit in the model. This paper helps to clarify the insights of formulating a valuation model and suggest useful implications for practice in the context of Vietnam.

**Key words -** firm valuation; valuation models; intrinsic value; valuation attributes; terminal value

# Introduction

All stakeholders such as shareholders, investors, and lenders have much interest in knowing the value of a firm. This task would involve estimating firm value for investment judgment. Traditionally, simple methods to fulfill this task include utilizing ratios such as PER (Price Earnings Ratio), and PBR (Price Book Ratio), or market multiples such as the book-to-market ratio (B/P), the earnings-to-price (E/P), and the dividend yield (D/P). However, “these simple valuation heuristics” “have little predictive power” in recent years ([10], p1695, 1696). More practical models have been developed to address this issue.

In this paper, an analysis of the structure of valuation models is implemented to come up with a generalization of valuation models built upon different valuation attributes. Then, a detailed analysis of the components of a valuation model will help highlight the insights of formulating a valuation model. Together with the development of the Vietnamese securities markets, firm valuation has become a big issue. This paper contributes more understanding to firm valuation and lay down some foundations for the practice.

# Overview of valuation models

Dividend Discount model (DDM)

It is perceived that, from the view of an acquirer/owner, the value-relevant outcomes from investing an asset are the net cash flows received from using that asset. In the case of shares, the future value-relevant cash flows are dividends which are distributed to common shareholders. In accordance with the general agreement on a stock’s intrinsic value as stated in Lee, Myers, and Swaminathan [10], and others, the intrinsic value of a stock can be expressed as follows:

 (PVD)

where: *IVt =* the intrinsic value of the firm’s equity at date *t*; *Dt =* net dividends paid at date *t*; *ρ =* the cost of equity; and *Et*[.]*=* the expected value operator conditioned on the date *t* information.

Discounted residual income model (RIM)

This valuation method is theoretically developed in Ohlson ([12]), and Feltham and Ohlson ([5]). In addition, derivations of this model also appear in many of accounting, finance and economics papers since 1930s ([6]). The residual income model (RIM) is based on the clean surplus relation (CSR) to relate the valuation function to accounting data:

 (CSR)

where: *Et =* the earnings for the period *t*; *BVt* *=* (net) book value at date *t*.

Constructed on the assumption of CSR, the residual income model (RIM) equation is as follows:

 (RIM)

where: *BVt=* (net) book value at date *t*; , residual income for the period *t*.

Discounted cash flow model (DCM)

The discounted cash flow model (DCM) has a long standing in the field of finance. There are various versions of DCM, however, a general model is applied in this paper. To understand this model in connection to the above models and how this model relates a firm’s market value to accounting data, it is suggested that one should review the work of Feltham and Ohlson ([5]). In their paper, the division of a firm’s activities into operating and financial activities is crucial to the development of the models. The separation between financial and operating activities ensures that a firm’s equity value equals the value of operating activities plus the value of the financial assets. The following presents the discounted cash flow model (DCM) equation:

 (DCM)

where: *FAt =* financial assets, net of financial obligations, date *t*; *ρw* is the weighted average cost of capital; *Ct* *=* cash flows realized from operating activities, net of investments in those activities, date *t*.

Ohlson-Juettner model (OJM)

Ohlson and Juettner ([14]) provide a model that relates the firm value to forthcoming earnings per share (eps1), usual measure of growth (g2), two-year-ahead eps (eps2), and an assumed perpetual growth rate gamma (*γ*). As Gode and Mohanram ([8]) comments, the model has two appealing features. First, the model substitutes earnings for dividends as in the RIM case but unlike the RIM case, it does not require forecasts of book values or return on equity (ROE). Second, the model is parsimonious; *γ* determines the perpetual growth rate as well as the decay rate of the growth of the expected eps-sequence as a function of the future date.

 (OJM)

where: eps1 is forthcoming earnings per share, assumed to be greater than 0; and *g2* captures the usual measure of growth, %Δ*eps*2 *≡* (*eps*2 *–* *eps*1)/*eps*1 ; *γ* is assumed to be perpetual growth rate

# The development of valuation models

In this section, the author analyzes and proposes the development of a valuation model based on the previous models.

## A generic model

A valuation model formulation normally must start from the assumption that the firm value is measured by the capitalization of the expected dividend sequence. This feature clearly determines that all the above models should be equivalent to each other as they come out from the same origin. Developed on this basis, a model generally has two components: an initial net book value of assets or an initial capitalization of value-relevant variables, and a capitalized future expected value-relevant sequence. The choice of the value-relevant variables is crucial to the empirical validity of the models. In addition, playing an important role in capitalizing the value-relevant sequences is the choice of a discounted factor, or the cost of capital. Using the Ohlson and Juettner ([14])’s algebraic machinery, one can generalize the machinery formation of a model expression as follows:

As a first step, the introduction of the following algebraic identity is central:

0 ≡ *Bt* + *R*-1(*Bt* + 1 – *R*.*Bt*) + *R*-2(*Bt*+2 – *R*.*Bt* + 1) + …

(i)

where *R* = 1 + *ρ* and  can be any sequence of numbers that satisfy the condition *R*-*TBT* → 0 as T → .

Adding the present value equation of the future expected dividends (PVD) and equation (i) yields the **generic model**:

 (ii)

The development of the model then turns to the selection of a value-relevant variable. For the RIM model, put *Bt* = expected book value per share (bvps), and assume clean surplus accounting so that *epst* = Δ*bvlpst* + *dpst*, one can then derive the RIM equation. With respect to the DCM model, consider *Bt* = *FAt* and use the relation *FAt* = *Ct* + *R.FAt*-1 - *Dt*, the DCM equation now follows. The OJM model selects *Bt* = *epst* + 1/*ρ* to generate its valuation equations. It is obvious that the introduction of a clean surplus relation is essential in a model development. In the case of RIM and DCM, and their derivation models, the clean surplus relations warrant a direct link between future accounting data and firm value. There is no need for any other assumptions about how accounting attributes relate to dividends. As long as one applies the clean surplus accounting for future periods’ forecasts, the relation in expression (ii) will hold. The situation is a bit different with the OJM model where Ohlson and Juettner ([14]) choose to capture the evolution of the earnings through their short-term and long-term growth expressions, rather than using a specific clean surplus relation.

The next issue concerns how to quantify the value-relevant sequences. Toward a solution, one can further expand the expressions of the variables. The requirements of any derivations are the empirical validity and practical usefulness. Apparent outcomes are the appearances of more degrees of freedom. All the derived models then face the difficulty dealing with their degrees of freedom. Generally, it is observed that there are two approaches to work with this issue. First, one can focus on modeling the evolution of the value-relevant sequences. This task requires assumptions about the future expectations. As should be the case, care must be put into this step to ensure that the model has its empirical validity. The other approach is about formulating a terminal value for the sequences. Compared with the first approach, this approach is more about a technical application. The two approaches will be discussed in the following sections.

Finally, a valuation model should observe the Miller and Modigliani ([11])’s proposition, i.e. the intrinsic value of a firm is insensitive to dividend payout policies. It is hard to interpret a model which is not payout irrelevant. This requirement is to ensure that the developed model has economic sense.

## Structuring the evolution of value-relevant variables

In the development of a valuation model, one can rely on examining the evolution of the future expected value-relevant sequence to derive practical versions of the model. This process can be done by either structuring the growth or modeling the evolution of the value-relevant variables on the basis of appropriate assumptions.

In the OJM model, two dividend-irrelevant eps-growth measures are specified to describe how the expected earnings sequence evolves. The two eps-growth measures provide enough information about the value-relevant sequence to build up the valuation model. Although the empirical validity of the assumption used to develop the model is still of concerns, the practicality of the model is no less than obvious. With respect to the near-term growth in eps, the measure is usually available with the provision of analyst forecasts (FY1 and FY2 eps). More concern is the long-term growth in eps. It is quite challenging to concretize a quantity at some distant expectations. Ohlson and Juettner ([14]) claim that the relation *epst*+1/*epst* would approximate the long-term growth in eps (*γ*) as *t* approaches infinity, provided that the asymptotic dividend policy is “sufficiently generous” (p.357), i.e. *dpst*/*epst* ≥ (1 + *ρ* *–* *γ*)/*ρ*. Therefore, “the limit growth should correspond to the very long run steady state in which a firm’s growth in expected enough equals the growth in expected GNP” ([14], p359). As such, it may be argued that the long-term growth in eps should be the same for all firms. On the other hand, this would overstate future earnings for firms whose decay in growth rate exceeds the long-term growth rate, and vice versa ([8]). Alternatively, one may think of the convergence of *epst*+1/*epst* to the long-term growth rate in a more narrow extent, the firm’s industry level, and in a time range of about 10-15 years.

In relation to the RIM model, Ohlson ([12]) deals with the issue by introducing a model for the evolution of the central variable, residual income (abnormal earnings), *RI*. The related assumptions imply that the market price fully reflects all public information available at date *t*. The information set includes all publicly available financial accounting information and other information, *vt*. These components of information are incorporated into the following linear information dynamics (LID):

 (LID)

where *ω* measures the persistence of current residual income in mapping into next-period residual income, *η* represents the extent to which current *v* mapping into residual income beyond next period, and *ε*1,2 are the disturbance terms being zero-mean unpredictable but otherwise unrestricted. The other information, in nature, captures all value-relevant events that have not given impact to the financial statements, and should be recognized as a factor in the prediction of future residual income.

It is noted that assumption LID is not only built up for the development of the RIM model. Much broader, assumption LID combined with the PVD and CSR assumptions forms the earnings-book values-dividends framework (EBD) ([13]). By utilizing the EBD framework, one can yield other derivations beyond the RIM equation. In particular, two equivalent expressions for firm value of current accounting data and other information can be produced as follows:





where:  *m* = *ρω*/(*R* – *ω*) 0; and ; (|*ω*|, *|η| < R*)

The existence of *v* emphasizes the fact that the other information does play role in estimating firm value. One needs to take the other information into account when predicting future residual income. Hand ([9]) supports Ohlson ([13]) by repeating that “while ignoring *v* may be of analytic interest, doing so makes the Ohlson model ‘patently simplistic’” (p.123). Nevertheless, there are claims that *v* is unspecified. To this issue, Ohlson ([13]) insists that as long as one accepts the assumption that expected earnings are as observable as realized earnings, *v* can be substituted with simple algebra operation. Variable *v* is defined as part of the next period’s expected residual income in excess of the purely autoregressive forecast:

*vt* = *Et*[*RIt*+1] - *ωRIt*

Using this definition of *v* to rewrite the above *IV* expressions leads to the other two equivalents:



where: *=* *R*(1 *–* *ω*)(1 *–* *η*)/[(*R* *–* *ω*)(*R* *–* *η*)]  0;*=* - *ρωη*/[(*R* *–* *ω*)(*R* *–* *η*)] 0;  *=* *Rρ*/[(*R* *–* *ω*)(*R* *–* *η*)] > 0; and= 1 due to the dividend irrelevancy property.

The coefficients for expected *RIt*+1 and *Et*+1 are always positive. In contrast, the coefficients for *RIt* and *Et* are plausibly non-positive (when *ω*, *η* ≥ 0), suggesting that, given current book value, the expected next-period earnings and residual income, the magnitude of current income or residual income negatively relates to the implied growth in earnings.

In all cases, structuring the evolution of value-relevant variables is critically dependent on the empirical power of the assumptions. The assumptions may lead to the simplification of valuation models, but it may also help to develop theories of the valuation concerns. In the future, what is a striking task is testing the practicality of these assumptions and derived theories empirically.

## Formulating terminal values of value-relevant sequences

In focusing on estimating a firm’s value, an approach that appears more practical is formulating terminal value for a particular valuation model. In other words, the evolution of an expected value-relevant variable is now embodied in the terminal value of the expected stream of the variable. A terminal value of a model represents part of the model capturing the future expected value-relevant stream/sequence beyond the horizon over which the flows of the variable are forecasted. Following this approach, a model is transformed to a version containing two parts: a forecasted part to a horizon and a terminal value. There are alternative approaches that have appeared in the literature. For example, the terminal value of the RIM model in Frankel and Lee ([6]) and Gebhardt, Lee and Swaminathan ([7]) is calculated as the present value of expected residual income at the horizon as a perpetuity. The assumption is that this model allows for mean reversion in ROE and any incremental economic profits (from new investments) after the horizon are zero. Lee et al. ([10]) and Dechow et al. ([2]) as stated in Frankel and Lee ([6]) also provide various forms of terminal values. It is apparently that any simple approaches to formulating terminal values must adopt restrictive assumptions about the evolution of valuation attributes. Distinctly, Penman ([15]) provides a thorough analysis of formulating a terminal value.

The transformation of other models for a finite *t* + *T* from (ii) generally resembles the following:

 

where: *Bt* is a measured stock of value at time *t*; *Xt*+τ is a measured flow of value from *t* + 1 to *t* + *T*;

 is the forecasted part of the model; and *TVt*+T is the terminal value of the value-relevant sequence.

The forecasted part is not an issue here simply because the flows to a horizon are already forecasted by some certain ways, for example, analyst forecasts or extrapolation. What a formulation of a terminal value must resolve is the errors arising from that formulation. Penman ([15]) reveals two kinds of errors. The first one arises because accounting measurement error is recognized in the value attributes over the period *t*+*T*. It is transitory and absorbed into expected book value by *t*+*T*. The second represents a persistent property of the accounting principles and a permanent displacement between book value and price.

Following Penman ([15]), to formulate a terminal value for a finite horizon valuation model, it is necessary to specify three forecast periods. The first period up to the horizon is set up for forecasting accounting stocks and flows for the forecasted part. It is always possible to determine an accumulated stock at the horizon representing the stocks and flows of the forecasted part. The second stage considers forecasts past the horizon to combine with the accumulated stock to calculate the terminal value. Yet the third period is required with forecasts of stocks and flows to determine the weights given to Period 1 accumulated stock and Period 2 flows in the terminal value calculation. The crucial role in determining the weights, and thus the terminal value, rests with a measurement error parameter. This parameter is “the expected change or growth” (p.311) in the premium which is defined as the difference between the expected firm value and book value over the third period. In essence, the parameter reflects accounting principles that affect the expected book value and determine measured earnings relative to stock return. Thus, “it can also be interpreted as the expected change” in the valuation error (p.311). Comparing to Ohlson ([12]), Penman ([15]) indicates that, whereas weights for earnings and book value in Ohlson ([12]) are applied with parameters assumed to be known at *t*, and other information is added to determine firm value, the accounting parameter used here is worked out through “pro forma future accounting numbers without other information” (p.320) at *t*.

A final point is that a finite horizon model should also observe the Miller and Modigliani ([11])’s proposition. In particular, a dollar change in the forecasted part due to dividend payout causes the calculated terminal value to be displaced by the same present value amount.

## Risk adjustment

All the valuation models require a risk adjustment in either the expectation or the discount rate (*ρ*). Since all the models are considered equivalent to each other, it can be said that one needs to find the way to equate the incorporated risk in the applied model to the risk inherent in the anticipated dividend sequence. According to Ohlson ([12]), a firm’s cost-of-equity should encompass the risk inherent in the valuation attributes. There are three approaches as mentioned in Ohlson ([12]).

First, the cost of capital may be expressed as a sum of a risk-free rate (*Rf*)plus a risk premium. A typical model for estimating the cost of capital is CAPM. CAPM states that a firm’s cost-of-equity equals a risk-free rate plus beta multiplied by a risk premium which is expected return on the market portfolio minus *Rf*. This approach is simple and convenient for many empirical applications or evaluations of the models and “practical” investment analyses. However, this approach may not stand strongly on theoretical grounds. It cannot explain about the sources of risk incorporated in the discount factor. Fama and French ([3]) find evidence that market *Beta* does not seem to help explain the cross-section of average stock returns, and thus hardly capture the risk which should be subsumed in the cost of capital. This situation poses an issue of how to determine the risk factors relevantly, which is sometimes based on ad hoc trials. Fama and French ([3]) show that size and especially book-to-market equity should be powerful risk factors. In Fama and French ([4]), apart from size and book-to-market factors (represented by mimicking excess returns), an excess market return factor (for an established market portfolio of stocks) and two bond-market factors (proxies for unexpected changes in interest rates and corporate’ likelihood of default) can capture common variation in stock returns (and also bond returns). Although there is overlap in the effects of the factors which are due to the correlation between the excess market return and the other factors, especially the two term-structure factors, all the factors demonstrate themselves as proxies for risk factors.

The second approach summarized by Ohlson ([12]) involves adjusting the value-relevant series for the risk rather than the discounts factor. Following modern finance theory ([12]), this approach relies on generalized measure theory in lieu of the probabilistic structure necessary to define the *E\*t*[.] operator for the value-relevant series in relation to the economy’s underlying implicit price system. The risk-adjusted value-relevant series are then discounted at the risk-free rate ([1]).

The third approach involves modeling correlations between disturbance terms in explanatory models for the value-driver variables (e.g. dividends, (abnormal) earnings, non-accounting information) of the valuation functions and the implicit price system. In this approach, the cost of capital is endogenous to reflect the risk in the value-driver variables. The limitation of this approach is that it ignores important concepts such as leverage ([12]).

Despite the fact that it seems to be ad hoc in the accommodation of risk, Penman ([15]) see that “most practical valuation techniques apply a risk-adjusted discount rate to expectations” as in PVD (p.305). In addition, it is observed that many valuation applications use flat non-stochastic discount rates. The reasoning for using constant discount rates may rest on Gebhardt et al. ([7])’s argument that “if the market has consistently ascribed a higher (or lower) discount rate to certain firms or industries, chances are it will continue to do so in the future” (p.170). As a consequence, even though it is possible that the power of the cost-of-capital estimates is affected by some measurement errors, the cost-of-capital estimates can be adjusted to reflect the market’s long-term assessment of a firm’s risk level.

## Implications

The overview and generalizations in this paper provide a theoretical base for selecting, modeling and applying valuation approaches in practice. From the analysis, this paper suggests that, in the context of Vietnam, applying the RIM and DCM would be suitable in valuing the Vietnamese listed firms. The DCM is a traditional valuation approach that has long standing in the finance and accounting field. On the other hand, the RIM has increasingly been advocated as a practical alternative in financial statement analysis texts and valuation practice. The DDM is the basis model but hard to apply in the context of unstable payout policies of the Vietnamese firms and the limitation in forecasting the value streams for a finite horizon solution. The OJM is a rather parsimonious valuation model but it does not fully ground in accounting constructs. In particular, different to the RIM and DCM, the OJM is not based on a clean surplus relation. Thus, an articulation among accounting constructs and firm value is not clear as the RIM and the DCM can do. It can help to express the relationship between firm value and earnings but by excluding book value in the valuation the model omits the valuation role of book value and makes the model more speculative. In fact, the speculative characteristic of the OJM is that the valuation is based on forecasting the future earnings. Furthermore, the OJM requires forecasting earnings per share (*eps*) and thus, forecasting shares outstanding is also necessary. This also adds more uncertainty to the valuation compared to the RIM and DCM. On the basis of the practicality of the models, the RIM and the DCM are possible valuation alternatives for valuing the Vietnamese firms. In terms of the discount rate, flat non-stochastic risk-adjusted discount rates can be applied in equity valuation, in which the discount rates are estimated for individual firms to incorporate more firm-specific information into the valuation.

# Conclusion

The overview of the models shows that all models emanate from the assumption that the firm value equals the present value of expected future dividends. The development of a model is implemented by applying relations among accounting constructs into some algebraic machinery. Of all the relations, the clean surplus relations are essentially introduced to replace accounting attributes for dividends. These accounting relations and assumptions about the evolution of accounting variables are critical for a model to have economic sense. A developed valuation model should provide a direct link between future financial data and firm value. The paper generalizes existing valuation models to provide a theoretical base for selecting, modeling and applying valuation approaches in practice. This paper provides a general structure of valuation models and point out how to construct the components and variables of a valuation model and how to fit valuation attributes into the model. This paper helps to clarify the insights of formulating a valuation model and suggest useful implications for practice in the context of Vietnam.

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