

CAS Exam 8 Study Note: P&C Insurance Company Valuation

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Abstract

This study note was prepared for use on the CAS Exam Syllabus. Its purpose is to describe various valuation approaches presented in introductory finance textbooks and to discuss practical implementation issues that arise when using these methods to value a Property & Casualty insurance company.

The methods described focus on those used by practitioners, including the dividend discount model, the discounted cash flow model using free cash flow, the abnormal earnings model and relative valuation using multiples. Applications of option pricing methods in equity valuation are briefly discussed, including the real options framework.

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1. Introduction

This study note was prepared for use on the CAS Exam Syllabus. Its purpose is to describe various valuation approaches presented in introductory finance textbooks and to discuss practical implementation issues that arise when using these methods to value a Property & Casualty insurance company.

2. Summary of Valuation Methods

This section provides a brief overview of several methods used to value the common shareholders' equity of financial and non-financial companies. Discussion of the various practical implementation issues for P&C insurance company valuation will be covered in subsequent sections.

2.1 Dividend Discount Model (DDM)

The DDM is the basic model presented in introductory finance textbooks. The method is based on the premise that the equity value of any firm is simply the present value of *all* future dividends. To apply this methodology, dividend payments are forecasted for all future periods and then discounted to present value using an appropriate (risk-adjusted) discount rate. Alternatively, dividends can be forecasted over a finite horizon and a terminal value can be used to reflect the value of all remaining dividends to be received beyond the explicit forecast horizon.

2.2 Discounted Cash Flow (DCF)

The DCF method is closely related to the DDM approach discussed above. However, rather than forecast and discount the actual dividends, the DCF method focuses on *free cash flow*.

The free cash flow is defined as all cash that could be paid as a dividend, regardless of whether or not it actually will be paid in the period it is generated. Free cash flow is measured net of any amounts required to be reinvested in the firm to maintain its operations and generate growth at the rate assumed in the forecasts.

The implicit assumption in this method is that the free cash flow not paid as a dividend is invested to earn an appropriate (risk-adjusted) return. When an investment earns a fair risk-adjusted rate of return, there is no positive or negative effect on the value of the firm from retaining rather than paying out the free cash flow.

There are two variations of this approach. These variations are referred to as the *Free Cash Flow to the Firm* (FCFF) approach and the *Free Cash Flow to Equity* (FCFE) approach.

- FCFF – In this variation, the focus is on the free cash flow to the entire firm, prior to taking into account any debt payments or tax consequences associated with the debt payments¹. FCFF thus represents the cash that could be paid to all sources of capital, including both the debtholders and the equity holders. Discounting the FCFF produces a value for the entire firm. The value of the equity portion of the firm is then determined by subtracting the market value of the debt from the total firm value. The ease with which most debt instruments can be valued makes it relatively easy to value the equity portion of the firm using this indirect approach.
- FCFE – In this variation, the focus is on the free cash flows to the equity holders only, as opposed to the free cash flows to the entire firm. The free cash flow to equity, FCFE, therefore represents the cash generated by the firm, over and above its reinvestment and debt financing costs, which *could* be paid to the shareholders of the firm. This is estimated using the same approach used to estimate the FCFF, with the additional step of subtracting the debt payments, net of their associated tax consequences, from the free cash flow to the firm to

¹ Debt payments are deductible for corporate tax purposes.

derive the free cash flow to equity. The resulting valuation thus represents the equity valuation directly by determining the present value of these free cash flows.

An important distinction between the FCFF and FCFE methods is that they each use a different discount rate. The FCFF approach uses a discount rate that reflects the overall risk to both debtholders and equity holders (a so-called weighted average cost of capital); the FCFE approach uses a discount rate that reflects the risk to the equity holders only.

2.3 Abnormal Earnings (AE)

The AE method separates the book value of the firm from the value of the future earnings. The book value of a firm represents the value of the firm's equity assuming that the firm earns only the investors' required return on book value in all future periods. Valuations in excess of book value must therefore be the result of earnings in excess of the investors' required earnings. These earnings in excess of the investors' required earnings are referred to as the "abnormal earnings"². The abnormal earnings in all future periods can be discounted and then added to the current book value to obtain the equity value of the firm.

An important distinction between this method and the DDM and DCF methods discussed earlier is that these latter methods both adjust the accounting-based net income measure into a cash flow measure, such as dividends paid or free cash flow. This translation is done to remove any potential distortions introduced by accounting rules designed to defer the recognition of revenues and expenses.

While it makes sense to unwind accounting distortions, some analysts point out that these distortions eventually unwind themselves. In some cases, using unadjusted accounting values may actually provide a more accurate valuation than would result using "cash flow" figures derived from unwinding certain accounting distortions, especially when applied over finite horizons³.

Another important distinction between the abnormal earnings approach and the DCF or DDM approaches is that this method focuses on the *source* of value creation – the firm's ability to earn a return on equity in excess of investors' required returns. The DCF and DDM focus only on the effect of this value creation – the firm's ability to pay cash flows to its owners.

2.4 Relative Valuation Using Multiples

One common characteristic of the previously discussed methods is that they all require detailed assumptions regarding revenues, expenses, growth rates, etc. in perpetuity. These assumptions, when taken together, result in forecasts of key valuation variables such as dividends, free cash flows or earnings.

The net effect of all of these assumptions can often be summarized as a "multiple" to be applied to a selected financial measure, such as next-period's earnings, cash flow or book value, which will be demonstrated in more detail later in this study note. When these assumptions regarding revenues, expenses, growth rates, etc. are the same for comparable firms, then a shortcut valuation can be estimated using the multiples calculated from the valuation of these comparable firms. In other words, the firm's equity can be valued *relative* to other firms.

Valuation multiples of comparable firms play an important role in all valuations. Even when the multiples are not being used to perform the primary valuation, the valuation multiples of comparable firms often serve as a critical reasonableness check, indicating whether or not the assumptions driving the DDM, DCF or Abnormal Earnings approaches make sense in the aggregate and whether they differ materially from the assumptions inherent in the valuations of other comparable firms.

² This method of valuation often appears under a variety of other names, including the "residual income" method or the "economic value added" method. The latter terminology was popularized by consulting firm Stern Stewart in the 1990s as "EVA™" and is a registered trademark of that firm. The more generic term "abnormal earnings" is used in this study note.

³ See Sougiannis, Theodore and Penman, Stephen H., "A Comparison of Dividend, Cash Flow, and Earnings Approaches to Equity Valuation".

2.5 Option Pricing Theory

In a 1974 paper⁴, Robert Merton showed that the equity of a firm could be viewed as a call option on the assets of the firm with a strike price equal to the (undiscounted) value of the liabilities. The equity owners can be thought of as having sold the assets of the firm to the debtholders but have the right to buy back the assets by repaying the face value of the debt on the maturity date.

Using this perspective of equity as a call option, some analysts have attempted to use option pricing formulas such as the Black-Scholes formula, or more typically variations of this formula, to value the equity of a firm.

Although theoretically sound, this approach is difficult to implement. There are numerous practical limitations associated with determining the necessary inputs, accurately reflecting the real-world complexity of many firms' capital structure (e.g. there are often multiple classes of debt with multiple maturity dates), and other issues.

Nonetheless, the theoretical foundation of option pricing has recently proven to be useful in thinking about specific sources of value from so-called *real options*. Some examples of real options include options to expand current operations, options to make follow-on investments, options to abandon projects and other forms of managerial flexibility.

Given this overview of the various valuation approaches, the next section of this study note will discuss their specific application to the valuation of P&C insurance companies.

⁴ See Merton, Robert C. "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates".

3. Dividend Discount Model (DDM)

3.1 Overview of the DDM

The DDM in many ways serves as the foundation of the other methods that will be covered in this study note. As a result, a relatively detailed explanation is warranted. But given the coverage of this approach in introductory finance textbooks⁵, it should be sufficient to simply summarize the key points here.

To begin, one can think of the value of a share of stock as the discounted (present) value of the expected future dividends. Since this definition includes all dividends paid, there is no need to adjust this definition in the case of firms that do not *currently* pay dividends – eventually some dividends will have to be paid, even if they merely represent a liquidating dividend at some distant date.

In symbols,

$$V_0 = \frac{E(Div_1)}{(1+k)} + \frac{E(Div_2)}{(1+k)^2} + \frac{E(Div_3)}{(1+k)^3} + \dots$$

where, $E(Div_i)$ reflects the expected dividends to be paid at the end of period i and k is the appropriate discount rate (see below).

In the case where dividends are expected to grow (in perpetuity) at a constant rate, g , this can be simplified as:

$$V_0 = \frac{E(Div_1)}{k-g}$$

In the more general case, dividends may be projected over a finite horizon and then assumed to grow at a constant rate in perpetuity beyond that horizon. For example, if a three-year horizon is used, the formula can be written as the present value of each of the next three dividends plus the present value of the *remaining* future dividends beginning in year four. Since the dividends are assumed to grow at a constant rate in perpetuity beginning in year four, the previous formula can be used to represent this value at the end of the third year, which is referred to as the *terminal value*.

The resulting formula in the case of a three year horizon is therefore,

$$V_0 = \frac{E(Div_1)}{(1+k)} + \frac{E(Div_2)}{(1+k)^2} + \frac{E(Div_3)}{(1+k)^3} + \frac{\text{Terminal Value}}{(1+k)^3}$$

$$\text{where, Terminal Value} = \frac{E(Div_4)}{k-g}$$

Before getting into the details of how to estimate the dividends, the growth rates and the appropriate discount rate, consider the following example.

Example 1 – Application of DDM

Assume that as of the end of 2004, the expected dividends for an insurance company are estimated as follows:

Table 1: Estimated Dividends

<u>Year</u>	<u>Expected Dividend</u>
2005	100
2006	120
2007	135
2008	150
2009	165

⁵ See Bodie, Kane and Marcus (6th Edition), Chapter 18.

From 2009 on, the dividends are expected to grow at a constant rate of 5% per year and the appropriate risk adjusted discount rate is 15%.

The DDM can be used to value of the equity of this firm as of the end of 2004.

The first step is to calculate the PV of each of the first five dividends using the discount rate of 15%. This gives a value of the dividends to be earned during the next five years (excluding the dividends beyond that point) as follows:

$$V_{2005-2009} = \frac{100}{1.15} + \frac{120}{1.15^2} + \frac{135}{1.15^3} + \frac{150}{1.15^4} + \frac{165}{1.15^5} = 434$$

To value the remaining dividends beyond 2009, note that the dividends are expected to grow at a rate of 5% from year 2010 on. This suggests that the 2010 dividend is $165 * 1.05 = 173.25$ and the value *as of the end of 2009* is:

$$V_{2009} = \frac{E(Div_{2010})}{k - g} = \frac{173.25}{.15 - .05} = 1,732.5$$

This value of 1,732.5 represents the *terminal value* as of the end of the explicit dividend forecast horizon. The present value of this amount as of the end of 2004 is $1,732.5 / 1.15^5 = 861$.

Adding the present value of this terminal value to the present value of the dividends for years 2005 through 2009, the total value of all future dividends is $V_{2004} = 434 + 861 = \$1,295$.

3.2 Terminal Value

In the previous example, the dividends from year 2010 on were worth a total of \$1,732.5 as of the end of 2009 and had a present value of \$861 as of the end of 2004. This *terminal value* beyond the explicit dividend forecast horizon is driven largely by the assumption of 5% perpetual dividend growth beyond 2009. Given the fact that the terminal value represents 66.5% of the total value of the firm's equity, it is important to consider these terminal value assumptions carefully.

For convenience, the terminal value as of the end of 2009 can be expressed as:

$$\text{Terminal Value} = \frac{173.25}{.15 - .05} = 165 * \frac{1.05}{.15 - .05} = 165 * 10.5 = Div_{2009} * 10.5 = 1,732.5$$

In other words, the terminal value at the end of 2009 is worth "10.5 times the 2009 dividend". This suggests treating 10.5 as a *multiple* to be applied to the current dividend amount as of the terminal date. This multiple effectively summarizes in one number the net effect of the following assumptions:

- i) Dividends will grow at a constant rate forever;
- ii) The growth rate is 5%;
- iii) The appropriate discount rate is 15%.

3.3 Application of the DDM

The following three key assumptions are required to implement the DDM:

- Expected Dividends During Forecast Horizon
- Dividend Growth Rates Beyond Forecast Horizon
- Appropriate Risk-Adjusted Discount Rate

Each of these assumptions will be discussed in more detail in this section.

3.3.1 Expected Dividends During Forecast Horizon

Forecasting expected future dividends is a complex exercise with a substantial degree of uncertainty. Fundamentally, this will involve forecasts of revenues, expenses, investment needs, cash flow needs and other values for several future periods. These forecasts will require careful consideration of prior business written, expected renewals and new business written.

For the sake of brevity, this study note will assume that such forecasts have already been performed. The models used for these forecasts will not be discussed here. For a detailed discussion of the process one might follow to prepare these forecasts for a generic firm, see *Business Analysis & Valuation*, by Palepu, Bernard and Healey. For a more focused discussion of how this could be done for a P&C insurance company, see *The Application of Fundamental Valuation Principles to Property/Casualty Insurance Companies*, by Blackburn, Jones, Schwartzman and Siegman or *Using the Public Access DFA Model: A Case Study* by D'Arcy, Gorvett, Hettinger and Walling.

3.3.2 Dividend Growth Rates Beyond Forecast Horizon

Estimates of growth rates for revenues, expenses and other variables are inherently part of the process of estimating dividends during the forecast horizon.

Beyond the explicit forecast horizon though, growth rates used in the terminal value calculation are more difficult to determine. One simple approach is to use the growth rates during the explicit forecast horizon to extrapolate the future growth rates.

Another approach is to base the growth rate on the dividend payout ratio, representing the portion of earnings paid as dividends⁶, and the return on equity, which represents the profit per dollar of reinvested earnings. This reflects the fact that growth in earnings, and hence dividends, is driven by the retention of some portion of the current period's earnings so that they can be reinvested to generate additional future period income.

Typically, the term *plowback ratio* is used to refer to that portion of earnings retained and reinvested in the firm and the firm's return on equity (ROE) is often used to indicate the income generated from such reinvestment. Combining these, the growth rate, g , is estimated as:

$$g = \text{plowback} * \text{ROE}$$

The assumed growth rate plays a significant role in the ultimate valuation, particularly due to its impact on the terminal value estimate. When estimating the terminal value, the growth rate should reflect the steady-state perpetual growth rate and should not reflect any bias resulting from higher than normal short-term growth estimates. For instance, a growth rate in excess of the growth rate for the entire economy should be assessed carefully, as this implies the firm's share of the total economy will eventually rise to unreasonable levels.

It is important to recognize that high growth rates do not necessarily increase the value of the firm. If all other assumptions were held constant, then mathematically this would be the case. However, assumptions about growth rates, dividend payout rates and the risk-adjusted discount rate cannot be made independently of each other. For instance, simultaneously high growth rates and high dividend payout rates are unlikely to be sustainable and so the effects of high growth rates are likely to be offset by lower dividend amounts.

Additionally, the dividend payments for firms with high growth rates are likely to be riskier (in a systematic risk sense) than those of firms with low growth rates. The high growth firms often depend upon a favorable economic climate for their growth, which introduces more systematic risk. As a result, the effects of high growth rates are likely to be offset by discounting the dividends to present value using higher risk-adjusted discount rates.

3.3.3 Appropriate Risk-Adjusted Discount Rate

A key element of the previous example is the appropriate discount rate to use in the calculation of the present value of the expected cash flows. An entire study note could be devoted to this topic alone. Some of the most important issues associated with the choice of discount rates will be discussed here; additional details are available from various sources contained in the References section of the paper⁷.

⁶ Since stock buybacks are economically equivalent to large cash dividends, these should be included in any reference to "dividends" in the text.

⁷ See, in particular, Bodie, Kane and Marcus and Cornell, Bradford, 1993, *Corporate Valuation: Tools for Effective Appraisal and Decision Making*, Business One Irwin, New York, NY.

3.3.3.1 Risk-Adjusted Discount Rates vs. Risk-Adjusted Cash Flows

When valuing uncertain or risky cash flows, it is important to reflect this risk in the value that is calculated. The most common approach to making this risk adjustment is to discount the cash flows at a risk-adjusted discount rate that is higher than the risk free rate, thereby producing a value that is lower than it otherwise would be in the absence of this risk.

However, reflecting this risk in the discount rate is not the only way to accomplish this objective. Alternative approaches that incorporate the risk adjustment directly in the cash flows may even be preferred. Halliwell⁸, for instance, presents compelling arguments for reflecting risk adjustments in the cash flows, using utility theory to produce *certainty equivalent* cash flows that can be discounted at risk free discount rates. This approach is closely related to the *risk neutral* valuation approach widely used to value derivative securities, as well as other probability transform methods advocated for pricing insurance risks, such as the Proportional Hazard Transform or the Wang Transform^{9,10}.

While the certainty equivalent, risk-neutral and probability transform approaches are appealing on theoretical grounds, the use of risk-adjusted discount rates is currently more common in practice. No clear consensus yet exists on how to apply these alternative approaches consistently in many real-world applications. Therefore, this study note will follow the more common approach using risk-adjusted discount rates and will focus on some of the principal issues involved in this process.

3.3.3.2 Private vs. Equilibrium Market Valuation

Before addressing specific methods of determining discount rates, it is important to make a distinction between a *private valuation* and an *equilibrium market valuation*.

In a private valuation, individual investors are assumed to have their own view of "risk" and to hold different existing portfolios. Any potential investment is assessed relative to the investor's existing portfolio. As a result, the value of any stream of risky or uncertain cash flows may have a different value to different investors.

In an equilibrium market valuation, it is often assumed that all investors hold the same portfolio, assess the risk associated with a new investment in an identical fashion and also have the same estimates of future cash flows. Alternatively, it can be recognized that investors will not have identical risk and cash flows assessments, but only the marginal investor's risk and cash flow assumptions will determine the "market" price of the investment. In this case, it is not necessary to assume that every investor will place the same value on a given investment, but if an investor's private valuation differs from others' valuations they simply will not trade at the market price.

Theoretical rate of return models often used to determine risk-adjusted discount rates tend to focus on market equilibrium rates of return. As a result, they serve as a useful starting point for determining any one investor's appropriate discount rate for a given opportunity, but may not reflect all factors that need to be considered by any specific investor.

3.3.3.3 Determining the Discount Rate

The most popular model used to estimate (equilibrium) shareholder return expectations is the Capital Asset Pricing Model (CAPM)¹¹. The CAPM attempts to describe the relationship between the "risk" of an equity investment and the return investors *expect* to earn on that investment. In this model, risk is defined in terms of the investment's *beta*, a measure of systematic risk (risk that cannot be diversified away in a large portfolio). The beta reflects the degree to which the percentage changes in *market value* (the rates of return) co-vary with the rates of return on a hypothetical portfolio

⁸ See Halliwell, Leigh J., "A Critique of Risk-Adjusted Discounting".

⁹ See Wang, Shaun, "Insurance Pricing and Increased Limits Ratemaking by Proportional Hazards Transforms".

¹⁰ See Appendix C of Halliwell.

¹¹ The discussion of only the CAPM as the source of discount rates in this study note is not intended to suggest a particular preference for this model. Other models, including Arbitrage Pricing Theory (APT), a Multi-factor CAPM or the Fama-French 3-Factor Model could certainly be used in place of the CAPM throughout.

consisting of all risky assets that an investor may choose to invest in. This portfolio of all risky assets is referred to as the *market portfolio*.

Mathematically, the CAPM can be expressed as follows:

$$k = r_f + \beta (E[r_m] - r_f)$$

where,

k = expected or required equity return

r_f = risk free rate

$E[r_m]$ = expected market return

$E[r_m] - r_f$ = expected equity market risk premium

β = Beta, a measure of the systematic market risk

This model is mechanically trivial to implement. However, there are important considerations to note when estimating beta, the risk-free rate and the expected equity market risk premium.

3.3.3.3(a) Estimating Beta

There are two common methods used to determine the beta for the purposes of valuation – measuring the target firm’s beta directly or using an industry-wide beta.

- ***Firm Beta*** - Historical stock price data of the firm can be used to directly measure the CAPM Beta. The estimation is performed using a linear regression of the company’s returns against the market returns. The company’s historical beta can then be assumed to remain constant for the prospective period. Betas measured in this way are commonly reported by Bloomberg and other sources, sometimes inclusive of various statistical adjustments to improve the estimates, as discussed in Bodie, Kane and Marcus¹².
- ***Industry Beta*** - Beta estimates for individual firms are often unreliable due to statistical issues affecting individual firm data and changes in firm risk over time. Somewhat more reliable and stable are industrywide mean or median values. For example, Cummins and Phillips¹³ estimate an industry-wide CPM beta for P&C insurers of approximately 0.843. This estimate reflects an average across all P&C insurers, each with different mixes of business and different degrees of financial leverage (debt). Therefore, the industry average should be interpreted carefully and adjustments may be required to reflect factors such as:
 - a. **Mix of Business** – With respect to adjustments for different mixes of business, ideally only those firms with a comparable mix to the firm being valued should be used. However, as the definition of “comparable firms” gets more precise, the number of eligible firms drops significantly and the result becomes less reliable. Ultimately, judgment is needed.
 - b. **Financial Leverage** – When firms raise capital by issuing debt, the leverage that is introduced impacts the degree of risk to the equity holders, making cash flows to equity holders riskier and the betas higher. This effect will show up in any estimates of the betas of firms with debt outstanding and therefore may make the betas of different firms difficult to compare.

To make the various betas easier to compare and to allow for the use of an industrywide mean or median beta, the beta is often defined to reflect solely

¹² See Bodie, Kane and Marcus, Chapter 10.

¹³ See Cummins and Phillips, "Estimating the Cost of Equity Capital for a Property-Liability Insurer", March 2004

the business risk of the firm and not the effect of debt leverage. This is the beta that would exist had the firm been capitalized entirely with equity and is often referred to as the *all-equity beta*.

Introductory finance texts provide a full description of how one could *de-lever* the equity betas to estimate the beta for an all-equity firm, so that material will not be reviewed here¹⁴. However, once the average all-equity beta for the industry is obtained, the equity beta for any particular firm would be found by readjusting the beta to reflect the amount of debt leverage for that particular firm¹⁵.

While this approach to de-levering and then re-levering industry betas is often covered in the introductory finance textbooks, its application to insurance company valuation is somewhat limited, and perhaps unnecessary. This is because policyholder liabilities also result in leverage effects that are not fully accounted for when the beta is adjusted solely for debt leverage. Therefore, it may be reasonable to assume that the *total leverage* of all firms in the insurance industry is similar and that the appropriate leveraged equity return for any particular firm is based on the industry average equity beta, without any further adjustments.

In the above discussion, the focus was on the beta for the equity of the firm so that the expected returns to the equity holders can be measured. The equity holders' returns expectations are relevant because the intent of the DDM is to value the dividends *to the equity holders*. These expected returns to the equity holders will differ from the firm's *weighted average cost of capital* (WACC), which reflects the returns to both debt¹⁶ and equity providers. The WACC is a commonly referenced estimate of the "cost of capital" but is not directly used in the DDM. An alternative valuation model that does use the WACC will be discussed in a subsequent section.

Below are some representative estimates of equity betas for various publicly traded insurers and reinsurers as of October 2004¹⁷:

Table 2: P&C Insurer and Reinsurer Equity Betas (Oct. 2004)

<u>Company</u>	<u>Beta</u>
American International Group, Inc	0.89
The Allstate Corporation	0.38
The Progressive Corp.	0.83
Chubb Corporation	0.72
ACE Limited	0.72
XL Capital Ltd.	0.59
CNA Financial Corporation	0.64
Market Value Weighted Average	0.79

¹⁴ See Brealey & Meyers, Principles of Corporate Finance.

¹⁵ The so-called Miles-Ezzel formula reflects the relationship between the levered equity return and the all-equity return. The levered return, r_e , is related to the unlevered equity return (r), the pre-tax debt return (r_d), the effective corporate tax rate (T) and the market values of the debt (D) and equity (E) according to the formula:

$$r_e = r + (1-T)(D/E)(r-r_d).$$

¹⁶ The debt return used in the WACC formula is usually the after-tax yield on the debt.

¹⁷ Source: Yahoo! Finance

3.3.3.3(b) Estimating the Risk Free Rate

The risk-free rate plays an important role in the standard CAPM. It should be based on current yields on risk free securities, which are often represented using zero-coupon U.S. Treasury yields.

To properly reflect the shape of the term structure, it is also appropriate to discount each cash flow at a rate that reflects the time to payment. Therefore, one would want to use a different required return for each time period, k_t , to discount each cash flow at time period t , rather than a single discount rate k for all time periods. This will also involve estimating a different equity risk premium (see below) for each time period.

In practice, it is common to avoid this complexity and instead use a single risk free rate and a single equity risk premium for all maturities. One still has a choice of which maturity to use for the risk free rate. The options include:

- 90-Day T-Bills – These are the purest “risk free” instruments as they are free of both credit and reinvestment risk. In textbook applications these are the securities most often used.
- Maturity Matched T-Notes – Some practitioners prefer to use a Treasury security with a term that matches the average maturity of the cash flows being valued.
- T-Bonds – Yields on 20-year Treasury bonds likely represent the most reasonable current estimate of the long run average *short-term* yields. These are also the most stable and the most logical choice for corporate decision-making because they come closest to matching the duration of the market portfolio and of the cash flows being valued.

However, long-term yields also reflect a liquidity or term premium. As a result, the historical term premium between long-term and short-term yields should be netted out of the long-term yields. Bradford Cornell estimates that this term premium has historically been approximately 1.2%¹⁸.

For the remainder of this study note, the risk free rate will be based on the 20-year T-bond yield, adjusted to reflect a 1.2% term premium, as a proxy for the long term average short-term yield.

3.3.3.3(c) Estimating the Equity Market Risk Premium

The actual spread between the market return and the short-term risk free rate has historically averaged approximately 6% to 8%. As a result, some authors recommend using this as a forecast of the future equity risk premium.

However, many authors have noted a so-called *equity premium puzzle* in that the historical premiums seem too high relative to any commonly proposed theories of investor behavior. Many attribute the historical return premium over risk free investments to be the result of good luck on the part of equity investors and/or bad luck on the part of bond investors. A 2004 CAS paper by Derrig and Orr¹⁹ surveys the literature on the equity risk premium and documents estimates of the expected equity risk premium ranging from 4% to 8%, somewhat lower than the historical average.

The key considerations in determining the appropriate equity risk premium include the following:

- Short-term vs. Long-term Risk Free Rates as Benchmark – The market risk premium reflects the spread between the expected market return and the risk free rate. Since the risk free rate appears twice in the CAPM formula, it is important to use a consistent definition of the risk free rate in both the CAPM formula and in the measurement of the market risk premium. If a short-term yield is used in the CAPM, the market risk premium should be measured relative to short-term yields. Alternatively, if long-term yields are

¹⁸ See Cornell, *Corporate Valuation*, Chapter 7.

¹⁹ Derrig, Richard A. and Elisha D. Orr, "Equity Risk Premium: Expectations Great and Small".

used as the risk free rate, the market risk premium should reflect the spread between the market returns and the long-term risk free yields.

- Arithmetic vs. Geometric Averages – When calculating average risk premiums, a choice must be made between arithmetic and geometric averages. Generally, arithmetic averages are preferred for single period forecasts. However for multiple period forecasts or long-term averages, geometric averages are preferred²⁰.
- Historical vs. Implied Risk Premiums – As noted in the Derrig and Orr study, risk premiums can be estimated based on either historical averages or by estimating the risk premium that is implied by current market prices.

For the historical risk premiums, a choice has to be made with respect to the time period over which to measure the average returns, as the equity risk premium has fluctuated significantly over the past 75 or so years.

The table below demonstrates the effect of using different time periods (as well as different choices for the risk free asset and arithmetic vs. geometric averages):

Table 3: Historical U.S. Risk Premiums²¹

Period	Stocks vs. T-Bills		Stocks vs. T-Bonds	
	Arithmetic	Geometric	Arithmetic	Geometric
1928-2000	8.41%	7.17%	6.53%	5.51%
1962-2000	6.41%	5.25%	5.30%	4.52%
1990-2000	11.42%	7.64%	12.67%	7.09%

Note that the use of historical data, as shown in the above table, is not the only approach used to estimate risk premiums. An alternative method is to infer the equity risk premium from current market prices. For instance, one could use the DDM on an aggregate market index and solve for the risk premium given assumptions about the risk free rate, aggregate dividends and aggregate growth rates.

Taking these considerations into account, it is difficult to recommend any single value to be used for the equity risk premium. Any analysis should consider a range of possible values and the impact of different assumptions should be reviewed. A baseline risk premium of 5.5% will be used throughout the remainder of this study note and sensitivity analysis will be performed.

3.4 P&C Insurance Company Example

In this section, a simplified example of the DDM will be used to demonstrate the valuation of a P&C insurance company. To keep the discussion focused on the valuation methodology and not the detailed accounting issues, the example will rely upon simplified extracts from forecasted financial statements prepared in accordance with U.S. GAAP accounting rules.

²⁰ See Damodaran, *Investment Valuation*

²¹ Source: Damodaran, *Investment Valuation*

Example 2 – DDM for Sample Insurance Company

Consider the following 5-year forecasts of the financial results for Sample Insurance Company. The data below shows actual (2004) and 5 years of forecasted (2005 – 2009) income statement and balance sheet items, each according to U.S. GAAP.

Table 4: U.S. GAAP Income Statement (\$000's)

	2004	2005	2006	2007	2008	2009
<u>Selected US GAAP Income Statement Items</u>						
Net Income Before Tax	14,598	15,366	16,134	16,941	17,788	18,678
Corporate Income Tax	<u>5,109</u>	<u>5,378</u>	<u>5,647</u>	<u>5,929</u>	<u>6,226</u>	<u>6,537</u>
Net Income After Tax	9,489	9,988	10,487	11,012	11,562	12,141
<u>Selected US GAAP Balance Sheet Items</u>						
Total Assets	471,550	493,359	523,125	558,165	598,112	642,413
Total Liabilities	371,550	388,365	412,887	442,421	476,588	514,818
US GAAP Equity	<u>100,000</u>	<u>104,994</u>	<u>110,238</u>	<u>115,744</u>	<u>121,525</u>	<u>127,595</u>
Total Liabilities and Equity	471,550	493,359	523,125	558,165	598,112	642,413
Dividends Paid (50% of NI)	4,744	4,994	5,244	5,506	5,781	6,070

The following additional information is available for Sample Insurance Company:

- Dividend Payout Ratio – The firm has a current dividend payout ratio equal to 50% of its after-tax net income and intends to maintain this payout ratio indefinitely.
- Risk Free Rate – The current yield²² of the 20-year U.S. Treasury Bond is approximately 4.33% with annual compounding. This rate will be used as the risk free rate.
- Company's Equity Beta – The company's actual equity beta cannot be estimated directly because it is a relatively new company with limited historical equity price data.
- Equity Betas for Peer Companies – The industry beta for this company's closest peers is estimated to be 0.84. The companies in the peer group have comparable levels of financial leverage (debt outstanding as a percentage of the firm value) and operating leverage (premiums as a percentage of GAAP equity).

The following steps are used to implement the DDM to value this company:

Step 1: Determine Dividend During Forecast Period

These amounts were provided in the table above and are summarized here for convenience:

Table 5: U.S. GAAP Income Statement (\$000's)

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Dividends Paid	4,994	5,244	5,506	5,781	6,070

²² As of June 2, 2004, the 20-year CMT yield with semi-annual compounding is 5.47%. Subtracting the 1.2% term premium and converting to an annually compounding basis results in the 4.33% risk free rate.

Step 2: Estimate Dividend Growth Rate Beyond Year 2009

Refer to the selected financial data shown below:

Table 6: Selected Financial Data

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
GAAP Equity Beginning of Period)	100,000	104,994	110,238	115,744	121,525
GAAP Equity (End of Period)	104,994	110,238	115,744	121,525	127,595
Net Income	9,988	10,487	11,012	11,562	12,141
Dividend	4,994	5,244	5,506	5,781	6,070

Based on these values, the following values needed to estimate the growth rate in dividends beyond the 2009 forecast horizon are obtained:

Table 7: Growth Rate Data

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Dividend Payout Ratio	50.0%	50.0%	50.0%	50.0%	50.0%
Plowback Ratio	50.0%	50.0%	50.0%	50.0%	50.0%
ROE = NI / Beginning GAAP Equity	10.0%	10.0%	10.0%	10.0%	10.0%
<u>Dividend Growth Rate</u>					
Expected Plowback Ratio	50.0%				
Expected Average ROE	10.0%				
Growth Rate	5.0%				

As shown in the table, the formula expressing the growth rate as the plowback ratio multiplied by the ROE is used to obtain a growth rate of 5.0% beyond the forecast horizon. This is consistent with the dividend growth rate during the forecast horizon. This may not always be the case, for instance, if the long-term average ROE or dividend payout ratios are expected to differ from the short-term values during the forecast horizon.

Step 3: Estimate Required Equity Return

The CAPM equity beta, based on the equity betas of peer companies, was stated earlier and assumed to equal 0.84. Using CAPM with the following parameters, the appropriate discount rate is estimated to be 8.95%, as shown below.

Table 8: Discount Rate

Risk Free Rate	4.33%
Equity Risk Premium	5.50%
Equity Beta	0.84
Discount Rate	8.95%

Step 4: Determine Value

The dividends and terminal value amounts can now be combined to estimate the total equity value by discounting each amount at the 8.95% discount rate:

Table 9: Valuation Using DDM

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>Terminal Value</u>
Dividend	4,994	5,244	5,506	5,781	6,070	161,354
PV Factor	0.918	0.842	0.773	0.710	0.651	0.651
PV	4,584	4,418	4,257	4,103	3,954	105,110
Value	126,426					

The terminal value was determined based on an assumption of constant growth beyond 2009 of 5.0%, the discount rate of 8.95% and the year 2009 dividends of 8,099.

$$\text{Terminal Value} = \frac{6,070 * (1.05)}{.0895 - .05} = 161,354$$

The present value of this terminal value estimate is then $161,354/1.0895^5 = 105,110$.

The total estimated value of the equity is then the sum of the present values of the five dividend payments and the terminal value, which totals \$126.4 million.

Step 4: Sensitivity Analysis

Notice that the present value of the terminal value component is approximately \$105 million. This means that 83% of the total value of the firm is reflected in the terminal value, which assumes perpetual growth in dividends of 5%. The magnitude of the terminal value relative to the total value of the firm suggests the need to be very careful about the sensitivity of the result to this growth assumption.

Below is a table that shows the sensitivity of the terminal value and the total equity value to estimates of the growth rates. The different rates shown represent the results of alternative assumptions regarding the ROE beyond the forecast horizon, with the dividend payout rate remaining constant. For example, if the ROE were to decline to the level of the investor's required return (8.95%) the growth rate would decline to 4.475%. The resulting total valuation would decrease from \$126.4 million to \$114.2 million. This represents a reduction of 9.7%.

Table 10: Sensitivity to Alternative Growth Rate Assumptions

<u>Growth Rate</u>	<u>Nominal Terminal Value</u>	<u>PV Terminal Value</u>	<u>Equity Value</u>
4.000%	127,531	83,077	104,393
4.475%	142,543	92,856	114,172
5.000%	161,354	105,110	126,426
6.000%	218,108	142,081	163,397

The sensitivity of the firm value to the estimated discount rate can also be tested. For instance, using alternative assumptions about the equity risk premium would result in the following alternative estimates of the CAPM discount rate and equity value:

Table 11: Sensitivity to Alternative Equity Risk Premium

<u>Equity Risk Premium</u>	<u>CAPM Discount Rate</u>	<u>Equity Value</u>
4.0%	7.69%	185,644
5.5%	8.95%	126,426
6.0%	9.37%	114,276
8.0%	11.06%	82,407

Combining these ranges of discount rates and ranges of growth rates beyond the forecast horizon, the following estimates of total equity value would be obtained:

Table 12: Sensitivity to Growth and Discount Assumptions

<u>Discount Rate</u>	<u>Growth Rate Beyond Forecast Horizon</u>			
	<u>4.000%</u>	<u>4.475%</u>	<u>5.000%</u>	<u>6.000%</u>
7.69%	140,176	133,887	185,644	284,921
8.95%	104,393	114,172	126,426	163,397
9.37%	96,198	108,039	114,276	143,082
11.06%	73,081	88,328	82,407	95,419

Notice that the valuation in this table ranges from a low of \$73 million to a high of \$285 million. This is a rather large range. But recall that the growth rates and discount rates are not independent of each other. Rapid growth is unlikely to be possible without assuming more risk; stable, low growth businesses are unlikely to exhibit high systematic risk. In the case of the previous table, the equity risk premium was varied but the estimated CAPM betas were not altered to ensure consistency with the assumed growth rates. This suggests that the more extreme values in the table are less realistic than many of the other entries in the table.

4. Discounted Cash Flow

The valuation approach based on the present value of future dividends is easy to understand. A fair amount of detail for that model was presented because many of the elements of the application to a real valuation exercise apply equally well to other methods. However, the dividend discount model (DDM) has some important limitations. Actual dividend payments are highly discretionary and can be difficult to forecast. In addition, the increased use of stock buybacks as an efficient vehicle for returning funds to shareholders requires that, at a minimum, a fairly liberal definition of “dividend” be adopted.

An alternative, though very closely related, approach is to focus on *free cash flows* rather than dividends. The free cash flows represent all of the cash that could be paid out as dividends or other payments to the capital providers, after making appropriate adjustments to reflect amounts needed to support current operations and the expected growth. The key difference between this approach, referred to here as the discounted cash flow (DCF) method, and the DDM is simply the recognition that free cash flow not paid as a dividend immediately would be invested to earn a fair risk adjusted return (i.e. it would not be stuffed in a drawer). As long as this can be assumed to be the case, there is no impact on value, positive or negative, from not paying the funds out immediately. For the purpose of valuation, it is acceptable to assume that the entire free cash flow is in fact paid as a dividend.

The DCF approach abstracts away from actual dividend policy and focuses on the cash that could be paid in each future period. This is not meant to suggest that “cash flow” is measured exactly as it might be defined under Generally Accepted Accounting Principles (GAAP). This is because free cash flow also reflects the capital expenditures needed to maintain the firm’s operations and generate the earnings growth inherent in the forecasts.

When applying the free cash flow approach, there are two alternative methods used. One approach is to focus on the free cash flows to the entire firm and the other approach is to focus on the free cash flow to the equity holders only.

4.1 Free Cash Flow to the Firm

The Free Cash Flow to the Firm (FCFF) approach values the entire firm and then subtracts off the market value of the debt to value the equity indirectly. This valuation methodology is discussed in some detail in Chapter 18 of Bodie, Kane and Marcus as well as other introductory finance texts. While this approach has many advantages when applied to most industries, it is problematic when applied to financial services firms such as insurance companies.

Damodaran discusses the difficulties applying the FCFF method to banks and insurance companies. His key points can be summarized as follows:

- Policyholder Liabilities vs. Debt - The FCFF method values the entire firm and then subtracts off the value of the debt to value the equity. This approach treats the debt as a source of capital that is more like the equity of the firm rather than a part of the firm’s normal business activities. As noted earlier with respect to the levered equity beta, the distinction between debt and policyholders liabilities for a P&C insurance company is rather arbitrary and there is no economic rationale for different treatment of these two sources of liability.
- WACC and APV – The FCFF approach is applied by first using the firm’s weighted average cost of capital (WACC) as the discount rate for the free cash flows to determine the value of the entire firm. The market value of the debt is then subtracted from this amount to determine the value of the equity.

Alternatively, the free cash flows could be discounted using the unlevered, all-equity discount rate (assuming that there is no debt) to derive the value of the firm without consideration of the debtholders’ claims, the tax consequences of the debt or the impact of debt on the riskiness of the equity holders’ claims. The equity value is determined by subtracting the market value of the debt from the firm value and then making two adjustments. The first adjustment reflects the debt’s tax consequences by adding the

value of the debt's tax shields. The second adjustment reflects the debt's effect on equity risk by incorporating an estimate of the potential cost of financial distress. This alternative approach is often referred to as an Adjusted Present Value (APV) approach.

In either case, the existence of policyholder liabilities makes it difficult to precisely define either the WACC or the unlevered, all-equity discount rate needed for the APV approach.

Since this study note focuses on valuation for P&C insurance companies, the FCFF approach will not be presented in any detail here²³.

4.2 Free Cash Flow to Equity

When valuing insurance companies, it is preferable to focus on the free cash flow to equity (FCFE) method. FCFE is very similar to FCFF but it reflects free cash flows *after* deductions for interest payments, net of any tax consequences of these interest payments, and any net change in borrowings (i.e. repayment of debt and new debt issued). This focus on the cash flows to the equity holders also means that the discount rate reflects only the risk to the equity holders rather than the WACC mentioned above. This allows the use of the levered equity return as the discount rate, which is useful given the difficulties identified earlier with the estimation of the unlevered equity return for P&C insurance companies.

The typical textbook definition of FCFE is summarized as shown in the following table:

Table 13: Definition of Free Cash Flow to Equity

	Net Income
<i>plus</i>	Non-Cash Charges (Expenses)
<i>less</i>	Net Working Capital Investment
<i>less</i>	Capital Expenditures
<i>plus</i>	<u>Net Borrowing</u>
	Free Cash Flow to Equity (FCFE)

Typically, expenses that are deducted under U.S. GAAP accounting but do not represent actual cash expenditures are added back to the reported net income to determine the cash flow available to be paid to equity holders. These amounts are referred to in the table above as *Non-Cash Charges*. For a P&C insurer, the most significant of these “non-cash” expense items on the income statement are the increases in the loss and expense reserves. These increases in reserves have a large impact on the reported income but not on the actual cash flow. This would seem to suggest that changes in reserves could be added back to net income, but this is not the case, as will be explained below.

Notice that two other components of the free cash flow to equity calculation include changes in net working capital and capital expenditures. Both of these amounts represent uses of cash flow needed to maintain the firm's operations and support the growth that is planned. *Working Capital Investment* shown in the above table reflects net short term (non-cash) assets held to facilitate company operations, such as inventory or accounts receivable. *Capital Expenditures* typically refer to investment in property, plant, equipment and other physical items. For P&C insurance companies, net working capital is not typically significant and will not be discussed in detail here²⁴.

The definition of capital expenditures for P&C insurance companies is more complicated because it must be adjusted to include changes in loss and expense reserve balances as well as increases in capital held (“invested”) to meet regulatory and/or rating agency capital requirements consistent with the company's business plan.

²³ The interested reader should refer to Damodaran's *Investment Valuation* for a thorough treatment of this valuation approach.

²⁴ Refer to Damodaran and Stowe, et. al. for extensive discussion of the other components of Non-Cash Charges and Net Working

- Treatment of Increase in Loss and Expense Reserves – Recall that the FCFE represents the cash flow that *could* be paid to shareholders in any particular period. In the simple case of a two year insurance policy where the firm collects the premium net of expenses up front and then pays claims at the end of the second period, it would not be sufficient to treat the net premiums as the (positive) free cash flow in the first period and the claim payments as the (negative) free cash flow in the second period. This is because some of the premium collected in the first period is not *free* to be paid to shareholders. Instead, some portion of the premium must be held in claim reserves, usually on an undiscounted basis.

The implication of this is that when calculating FCFE, changes in loss and expense reserves can be included in the definition of capital expenditures. Since these changes in reserves reflect the most significant *Non-Cash Charges*, which according to the usual definition of FCFE would be added back to Net Income, and also reflect a significant portion of *Capital Expenditures*, which would be subtracted from Net Income, these two adjustments will cancel each other out. The result is that the increases in loss and expense reserves, which have already been reflected in the net income figures, can be ignored in the steps used to estimate FCFE through adjustments to net income.

- Treatment of Increase in Required Capital – In addition to reserve requirements, insurers are subject to regulatory and/or rating agency capital requirements. Just as a widget manufacturer must invest capital in machinery to make widgets, an insurance company must invest capital before it can sell an insurance policy. Such regulatory minimum capital requirements should be treated as "capital expenditures" for the purposes of determining free cash flow. Furthermore, the ability of an insurer to meet its growth targets and profitability targets is tied closely to public perception of its financial strength and credit standing. Therefore, capital required to maintain the firm's target credit rating implied by the business plan should also be treated as equivalent to a capital expenditure. In both of these cases, the regulatory and rating agency capital requirements serve to reduce the free cash flow relative to U.S. GAAP definitions of net income.

To focus attention on the valuation methodology as opposed to accounting and regulatory issues in this study note, specific regulatory or rating agency capital requirements will not be addressed here. In the numerical examples shown, the minimum capital requirements are approximated using simplified capital standards that are meant to mirror Standard & Poor's guidelines applicable to AA-rated insurers. The interested reader should refer to Standard & Poor's "Property/Casualty Insurance Ratings Criteria" for more information on this important aspect of valuation.

In a real-world application, there are likely to be multiple constraints on free cash flow resulting from the need to hold capital in the firm. The most binding constraint could be the result of regulatory restrictions, rating agency restrictions or perhaps management's own assessment of the capital needed to support the risk-taking activities of the firm without negatively impacting the firm's ability to achieve its growth plans. In this case it would be necessary to determine the most binding constraint on capital and assess how it impacts free cash flow.

The resulting definition of FCFE that can be used for P&C insurers is therefore adjusted as follows:

Table 14: Simplified Definition of Free Cash Flow to Equity for P&C Insurer

	Net Income
<i>Plus</i>	Non-Cash Charges – Excluding Changes in Reserves
<i>Less</i>	Net Working Capital Investment
<i>Less</i>	Increase in Required Capital
<i>Plus</i>	<u>Net Borrowing</u>
	Free Cash Flow to Equity (FCFE)

Example 3 – Free Cash Flow to Equity Calculation for ABC Insurance Company

Consider a hypothetical P&C insurer, ABC Insurance Company. In the current period the company had beginning U.S. GAAP Equity equal to \$103.500 million and U.S. GAAP Net Income equal to \$17.193 million. Based on their internal financial model that reflects their growth plans for the coming year, they have determined that the capital needed (at the start of their next accounting period) to maintain their AA-rating is \$108.624 million.

For simplicity, assume that there are no non-cash charges included in the net income figure other than changes in reserves, there are no net working capital investments and there are no increases in borrowings.

The Free Cash Flow to Equity for this firm in the current period can be calculated as follows:

Table 15: Calculation of Free Cash Flow to Equity for ABC Insurance Company (\$ Millions)

Beginning US GAAP Equity	103.500
Net Income	<u>17.193</u>
Ending US GAAP Equity - Before Dividends	120.693
Minimum Capital - Based on Target S&P AA Rating	108.624
Beginning US GAAP Equity	<u>103.500</u>
Increase in Required Capital	5.124
Net Income	17.193
Non Cash Charges (Excluding Change in Reserves)	0
Net Working Capital Investment	0
Capital Expenditures = Increase in Required Capital	5.124
<u>Net Borrowing</u>	<u>0</u>
Free Cash Flow to Equity	12.069

Notice that the FCFE could also be calculated as the difference between the ending GAAP equity and the minimum required capital, as shown here:

Table 16: Alternative Calculation of Free Cash Flow to Equity for ABC Insurance Company

Ending US GAAP Equity - Before Dividends	120.693
Minimum Capital - Based on Target S&P AA Rating	<u>108.624</u>
Free Cash Flow to Equity	12.069

4.3 Applying the FCFE Method

Once the FCFE values are determined, much of the remainder of the valuation exercise is similar to what was done using the DDM. The free cash flows during the forecast horizon are valued using an appropriate risk-adjusted discount rate and the terminal value is estimated by assuming a constant growth rate in free cash flow and an appropriate discount rate.

Below, several details regarding this methodology will be addressed. The financial model for ABC Insurance Company used in *Example 3* above will be used as a reference. The Net Income, Equity and Free Cash Flow to Equity amounts for the years 2005 – 2009 were calculated using the same methodology and the key elements are summarized as follows:

Table 17: Free Cash Flow to Equity for ABC Insurance Company 2005 – 2009 (\$000's)

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Beginning US GAAP Equity	103,500	108,624	113,274	117,648	122,422
Net Income	<u>17,193</u>	<u>17,236</u>	<u>17,446</u>	<u>18,376</u>	<u>18,967</u>
Ending US GAAP Equity - Before Dividends	120,693	125,860	130,720	136,024	141,388
Minimum Capital - Based on Target S&P AA Rating	108,624	113,274	117,648	122,422	127,250
Beginning US GAAP Equity	<u>103,500</u>	<u>108,624</u>	<u>113,274</u>	<u>117,648</u>	<u>122,422</u>
Increase in Required Capital	5,124	4,650	4,374	4,774	4,828
Free Cash Flow to Equity	12,069	12,586	13,072	13,602	14,139

4.3.1 Growth Rates

Earlier in the discussion of the DDM approach, growth rates were estimated using historical averages or by relying on the fundamental principle that growth is the result of income that is reinvested in the firm and that subsequently earns a positive return (ROE).

When using the FCFE method, it is important to note the implicit assumption that *all* free cash flow to equity is paid to shareholders. Therefore, the definition of reinvestment for purposes of determining growth rates is slightly different than it was in the DDM. In that case it was sufficient to simply compare the dividends paid to the firm's net income.

For a P&C insurance company, the best determinant of growth is the portion of net income that is used to increase the capital base of the firm, since the capital base of the firm determines the *maximum* growth that can be achieved given the regulatory and rating agency constraints²⁵.

Combining this with the return on equity provides an estimate of the growth rate beyond the forecast horizon, as shown below using the ABC Insurance Company example data.

Table 18: Estimated Growth Rate Beyond Forecast Horizon (\$000's)

	2005	2006	2007	2008	2009
Net Income	17,193	17,236	17,446	18,376	18,967
Free Cash Flow to Equity	<u>12,069</u>	<u>12,586</u>	<u>13,072</u>	<u>13,602</u>	<u>14,139</u>
Reinvested Capital	5,124	4,650	4,374	4,774	4,828
Reinvestment Rate	29.8%	27.0%	25.1%	26.0%	25.5%
Beginning Capital	103,500	108,624	113,274	117,648	122,422
ROE	16.6%	15.9%	15.4%	15.6%	15.5%
Free Cash Flow Growth Rate					
During Forecast Horizon		4.3%	3.9%	4.1%	3.9%
Beyond Forecast Horizon - Estimated					3.9%

²⁵ It can be argued that growth is also constrained by the firm's investment in quality personnel. See Damodaran, Investment Valuation, for a more detailed discussion of this issue.

In the above table, the following calculations are shown:

- Reinvested Capital = Net Income – Free Cash Flow
- Reinvestment Rate = Reinvested Capital / Net Income
- ROE = Net Income / Beginning Capital
- Forecast Horizon Growth Rate = $FCFE_t / FCFE_{t-1}$
- Horizon Growth Rate = $Reinvestment\ Rate_{2009} * ROE_{2009} = 3.9\%$

4.3.2 Discount Rate

The appropriate discount rate for this method is determined in essentially the same manner as in the DDM. It is, however, important to ensure that the assumption regarding the riskiness of the cash flows is consistent with the assumption regarding the distribution of the free cash flow to shareholders.

Compared to the DDM, the FCFE model assumes that more cash is distributed to shareholders in each period because *all* cash that could be paid as a dividend is assumed to be paid. The values used in the calculation are not impacted by the firm's actual dividend policy. This does not affect the overall valuation because of the implicit assumption that any cash that was not distributed in the form of dividends and was not needed to support growth in the insurance operations would be invested in marketable securities and would earn an appropriate risk-adjusted return. Investments in marketable securities should generally be a zero net present value activity and so value is neither created nor destroyed from this activity.

The riskiness of the dividend cash flows can be thought of as representing an average of the riskiness of the insurance operations and the investment operations. As a result, it is likely to be the case that the appropriate discount rate in the FCFE model is different than the discount rate in the DDM model. The two models assume different proportions of investment income and underwriting income because the FCFE method pays out all free cash flow while the DDM model pays out only the assumed dividends and reinvests the balance in marketable securities. The DDM model's measure of risk is therefore impacted by a larger proportion of the risk coming from marketable securities than from underwriting risk.

Specifically quantifying this difference in risk is a challenge. When the CAPM is used as the basis for the risk-adjusted discount rate, what matters is systematic risk and not total risk. For most practical purposes the precision of the discount rate calculation is low enough that this distinction is often ignored. Therefore, for simplicity the example below will assume the same discount rates can be used in the DDM and FCFE models.

4.3.3 Example of FCFE Method Using ABC Insurance Company Data

The following example uses the data referenced above in Table 17 for the ABC Insurance Company to demonstrate the FCFE method and to perform sensitivity analysis of the results.

Example 4 – Valuation of ABC Insurance Company using FCFE Method

Using the estimated FCFE for ABC Insurance Company, the 3.9% growth rate assumption discussed in the text and the same 8.95% discount rate assumption used earlier, the calculations using the FCFE method are as shown below.

Table 19: Valuation Using Free Cash Flow to Equity Method (\$000's)

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>Terminal Value</u>
FCFE	12,069	12,586	13,072	13,602	14,139	290,899
PV Factor	0.918	0.842	0.773	0.710	0.651	0.651
PV	11,078	10,603	10,108	9,654	9,210	189,499
Value	240,152					

The terminal value shown above was determined based on an assumption of constant growth beyond 2009 of 3.9%, the discount rate of 8.95% and the year 2009 FCFE of 14,139.

$$\text{Terminal Value} = \frac{14,139 * (1.039)}{.0895 - .039} = 290,899$$

The total estimated value of the equity is the sum of the present values of the five FCFE amounts and the present value of the terminal value. The total equity value is \$240.2 million.

Sensitivity Analysis

Notice that the discounted terminal value is $290,899 / (1.0895^5) = 189,499$. This means that 79% of the total value of the firm is reflected in the terminal value, which assumes perpetual growth in FCFE of 3.9%. This suggests the need to be very careful about the sensitivity of the results to this growth assumption.

Below is a table that shows the sensitivity of the terminal value and the total equity value to estimates of the growth rates. The different rates shown represent the results of alternative assumptions regarding the ROE beyond the forecast horizon. For example, if the ROE were to decline to the level of the investor's required return (8.95%) then the growth rate would decline to 2.3%. The resulting equity valuation would decrease from \$240.2 million to \$192.3 million, a reduction of 20%.

Table 20: Sensitivity to Alternative Growth Rate Assumptions

<u>Growth Rate</u>	<u>Terminal Value</u>	<u>PV of Terminal Value</u>	<u>Total Equity Value</u>
2.3%	217,507	141,689	192,342
3.1%	249,185	162,325	212,978
3.9%	290,899	189,499	240,152
4.8%	357,052	232,593	283,246

The sensitivity of the firm value to the estimated discount rate can also be tested. For instance, using alternative assumptions about the equity risk premium would result in the following alternative estimates of the CAPM discount rate and equity value:

Table 21: Sensitivity to Alternative Equity Risk Premium

<u>ERP</u>	<u>Discount Rate</u>	<u>Equity Value</u>
4.0%	7.69%	320,023
5.5%	8.95%	240,152
6.0%	9.37%	221,706
8.0%	11.06%	169,355

Combining these ranges of discount rates and ranges of growth rates beyond the forecast horizon, the following estimates of total equity value would be obtained:

Table 22: Sensitivity to Growth and Discount Assumptions

Discount Rate	Growth Rate Beyond Forecast Horizon			
	<u>2.3%</u>	<u>3.1%</u>	<u>3.9%</u>	<u>4.8%</u>
7.69%	237,683	266,794	320,023	419,443
8.95%	185,829	212,978	240,152	283,246
9.37%	180,823	201,211	221,706	252,652
11.06%	146,872	160,882	169,355	181,227

Notice that the valuation in this table ranges from a low of approximately \$147 million to a high of \$419 million. It may be unrealistic to assume that the highest growth rates and the lowest discount rates would apply simultaneously, making the most extreme values potential less reliable. Nonetheless, this highlights the wide range of results that can be obtained and the need to carefully consider all of the assumptions made.

4.3.4 Observations Regarding Example 4

Before proceeding further, some important observations with respect to the application of the FCFE method are noted.

- Terminal Value – The terminal value calculated in the previous example (\$290,899) was based on assumptions of the Year 2009 FCFE, the growth rate beyond that point and the discount rate. This terminal value is $290,899/14,139 = 20.6$ times the Year 2009 FCFE. In other words, the impact of the growth rate and discount rate assumptions could have been combined into a single multiple of the FCFE and expressed the terminal value as "20.6 times" FCFE.
- Average Discount Rates – Most firms' overall earnings and cash flows represent the total amounts across a variety of businesses, each with their own risk profile. The discount rate therefore represents an average discount rate reflecting the average risk from all of these separate businesses and activities. To the extent that the mix of business or degree of financial leverage is changing, these changes should be reflected in different discount rates for different time periods or cash flows.
- Market Value of Net Cash Flows – The use of a single discount rate for the *net* free cash flow to equity implicitly discounts each of its components at the same rate. Therefore, cash flows from investment returns and cash flows from liability payments, as well as other cash flows, are discounted at the same weighted average rate, even though the risk characteristics of the component cash flows likely vary considerably. It is worth considering whether this is appropriate.

Most textbook presentations of the FCFE approach focus on the valuation of industrial firms in which investments in cash and marketable securities are usually minimal. In these cases, the definition of FCFE does *not* include investment income on currently held marketable securities. These non-operating assets are excluded from the valuation and added back in at their current market values at the end. For insurance companies, this distinction between operating and non-operating assets is considerably more difficult to make. As a result, it is typical to include investment income cash flows in the definition of FCFE.

Including investment returns in the definition of free cash flow and then calculating their present value at an average rate for all cash flows is unlikely to reproduce a present value equal to the market value of the investment at inception. When investments are restricted to marketable securities, especially those most often found in P&C insurance investment

portfolios, \$1,000 invested in stocks is worth the same on the date of the investment as \$1,000 invested in corporate bonds or \$1,000 invested in risk-free bonds. It is true that their income and cash flow profiles differ and so their *future* value will differ. However, their present values at the date the investment is made should be identical. This result will only occur though if the discount rates used to determine the present values differ and reflect the riskiness of the respective investments. The use of an average rate for all cash flows will not produce the correct value for any particular investment.

When future investment cash flows are included in the aggregate cash flows, it can appear to be the case that value is either created or destroyed based on different assumptions about the asset portfolio composition. This misleading result occurs because the discount rate used reflects the average risk for the entire firm's net cash flows rather than the appropriate risk-adjusted rate for the investment asset cash flows themselves.

Similarly, using an average discount rate to calculate the present value of liability cash flows is unlikely to produce an accurate risk-adjusted value for this liability, as the appropriate risk-adjusted discount rate for liability cash flows is a rate *below* the risk free rate²⁶. This would reflect the positive risk premium that would have to be paid in order to transfer this uncertain liability to a third party.

For this reason, some analysts argue that the assets and liabilities should be valued separately to ensure *market consistent* valuation of each. But separately valuing each component of the free cash flow may not be practical. This is because the cash flow specific risk-adjusted discount rates may be extremely difficult to quantify. This is particularly true for assets and liabilities that are not currently reflected on the firm's balance sheet.

As a result, this study note will follow the common practice of discounting net cash flows at an average rate. Sensitivity testing can be used to ensure that assumptions regarding investment policy have reasonable and appropriate impacts on the value of the firm. Further discussion of this issue in the context of the valuation of life insurance companies can be found in Girard.

²⁶ See Butsic, "Determining the Proper Interest Rate for Loss Reserve Discounting: An Economic Approach".

5. *Abnormal Earnings Valuation Method*

The DCF approach to valuation just described is relatively simple to understand and focuses attention directly on the net cash flow generating capacity of the firm. Furthermore, the process of thinking through the cash flow generating activities of the firm, quantifying the firm's capital needs and contemplating the risk factors is an important and worthwhile part of any valuation exercise.

However, the DCF method suffers from some practical weaknesses. To estimate free cash flows, the analyst must first forecast financial statements (income statements and balance sheets) according to a specific set of accounting standards (U.S. GAAP, U.S. Statutory or International Accounting Standards). Then, a variety of adjustments are made to the forecasts of net income to estimate the free cash flow. The resulting values for free cash flow (to equity) may then bear little resemblance to the forecasts that management is familiar with, such as the values used within the firm's internal planning process, the financial results of peer companies or the forecasts of external analysts. This might make it difficult to assess the reasonableness of the forecasted free cash flows or estimate their future growth rates.

An alternative method that relies more directly on accounting measures of net income rather than cash flows is referred to here as the Abnormal Earnings (AE) approach. Using this method, the accounting net income is not adjusted to reflect cash flows. Instead, reported book value and forecasted net income under the applicable accounting framework are used directly.

Before presenting this approach, it is useful to note that finance textbooks have long advocated a preference for cash flow models as opposed to accounting-based earnings models in order to accurately reflect the timing of the cash flows and to avoid problems associated with arbitrary methodology choices that may not represent real effects on firm value. More recently, several academics and practitioners have demonstrated that a discounted accounting-based earnings approach often produces more accurate valuation estimates and may offer additional benefits by framing the problem differently than the traditional cash flow models²⁷.

5.1 Background on Abnormal Earnings Method

Recall from the pricing of bonds that the value of a default free bond merely represents the present value of its coupon and principal payments, discounted at the appropriate (maturity matched) zero-coupon yields. In the event that the coupon rate and the yields are equal, the bond's market value will equal its face value (principal amount). This is because the periodic interest paid on the bond, based on its coupon rate, is exactly equal to the periodic interest that investors demand. Similarly, if the coupon rate exceeds the yields, the bond will have a *higher* value than the face value; if the coupon rate is below the yields then its market value will be *below* the face value.

This same concept can be extended to the valuation of a firm based on its accounting values. The book value of the firm reflects the value of the firm's equity capital, at least according to a specific accounting standard (e.g. U.S. GAAP). If the firm can earn a return on this capital exactly equal to a "normal" return demanded by its shareholders, then the market value of the firm's equity should exactly equal its book value²⁸. This is similar to the notion that the market value and face value of a bond are equal if the coupon rate and yield are equal.

This suggests that positive (negative) deviations from book value must be due to the firm's ability to earn more (less) than this "normal" rate demanded by shareholders. By focusing attention solely on these "abnormal" earnings, the present value of all future abnormal earnings can be calculated and added to the book value to determine the total value of the firm's equity.

²⁷ See Sougiannis and Penham.

²⁸ For simplicity, I will assume that the assets and liabilities are both fairly stated on the balance sheet according to the appropriate accounting methods and that there is no systematic bias in the reported book value.

In mathematical terms, the abnormal earnings (AE) in any given period, t , are equal to:

$$\begin{aligned} AE_t &= \text{Net Income}_t - [\text{Required Equity Return}_t * \text{Book Value of Equity}_{t-1}] \\ &= NI_t - k * BV_{t-1} \\ &= (ROE_t - k) BV_{t-1} \end{aligned}$$

where, NI_t is the net income for period t , BV_{t-1} is the beginning book value for period t , ROE_t is the return on equity in period t and k is the required return.

Of course, the actual abnormal earnings for future periods at the time of the valuation are not known. The expected values of these abnormal earnings, denoted $E[AE_t]$, are used.

Then the value of the equity of the firm is simply:

$$\begin{aligned} \text{Value of Equity} &= \text{Beginning Book Value of Equity} + \text{PV}(\text{Expected Abnormal Earnings}) \\ &= BV_0 + \sum_{t=1}^{\infty} \frac{E[AE_t]}{(1+k)^t} \end{aligned}$$

Just as with the DDM and DCF approaches, the abnormal earnings approach is typically implemented by forecasting abnormal earnings for several periods (the forecast horizon). Then, a terminal value must be calculated that reflects abnormal earnings beyond this forecast horizon.

In the DDM and DCF valuation approaches, the terminal value calculation usually assumes that the dividends or free cash flows will continue in perpetuity and often the amounts are assumed to grow at a constant rate. In the case of the AE method, these terminal valuation assumptions are often different. Abnormal earnings are less likely to continue in perpetuity and are more likely to decline to zero as new competition is attracted to businesses with positive abnormal earnings.

The difficulty of achieving sustained growth in abnormal earnings is one reason why practitioners often favor the AE approach. This method forces the analyst to explicitly consider the limits of growth from a value perspective. Growth in earnings may be easy to achieve by simply increasing the book value of the firm, but this growth adds value only if the earnings exceed the shareholders' expected returns. Normal earnings growth does not add value; only abnormal earnings add value.

5.2 Accounting Distortions

It may be surprising that the arbitrary nature of certain accounting rules does not necessarily limit the usefulness of unadjusted earnings for valuation purposes. How, for instance, can one ignore the reality that P&C insurance reserves must be carried at their nominal value rather than their discounted value?

To reconcile this apparent weakness, note that the abnormal earnings approach includes both the current book value and the discounted value of future abnormal earnings in the value of the equity. As a result, accounting rules that distort estimates of earnings will also distort the estimates of book value²⁹ and will eventually reverse themselves. This is an important point and is worth demonstrating. An example used by Palepu, Bernard and Healy, in their textbook, *Business Analysis and Valuation*, will be used here.

Assume a manufacturing firm could have capitalized \$100 of expenditures and included them in the value of its inventory, but instead decided to treat these costs as a current period expense. Both their income and end-of-period book value will be reduced by \$100 in the current period. For instance, assume that their book value would have been \$1,000 had they capitalized these costs but is only \$900

²⁹ Technically, for this to be true the forecasts must satisfy what is referred to as the "clean surplus condition". The clean surplus condition assumes that changes in book value solely reflect earnings, dividends and capital contributions. It precludes accounting entries that impact book value without flowing through earnings, such as in the case of foreign currency translations under U.S. GAAP accounting. U.S. and international accounting standards do not always adhere to the clean surplus condition, so adjustments may be required. See Ohlson, *Earnings, Book Values and Dividends in Equity Valuation* for more details.

as the result of expensing these costs. Further assume that they will sell the inventory for \$200 in two years and that the required rate of return is 13%.

As shown in the table below, the two approaches will begin with different book values. In the first period, there are no earnings. In the second period, the goods are sold for \$200, causing one method to report income of \$100 and one method to report income of \$200. But the use of different starting book values causes the resulting equity values, found by adding the present value of the Period 1 and Period 2 abnormal earnings to the book value, to be identical.

Table 23: Demonstration of Self-Correcting Accounting

	Method 1	Method 2
	<u>Capitalize Cost</u>	<u>Expense Cost</u>
Beginning Book Value	1,000.00	900.00
<u>Period 1</u>		
Sales	0.00	0.00
less Inventory Cost	0.00	0.00
Earnings	0.00	0.00
less Required Return * Book Value	130.00	117.00
Abnormal Earnings	-130.00	-117.00
PV(Abnormal Earnings) = AE/1.13	-115.04	-103.54
<u>Period 2</u>		
Sales	200.00	200.00
less Inventory Cost	<u>100.00</u>	<u>0.00</u>
Earnings	100.00	200.00
less Required Return * Book Value	<u>130.00</u>	<u>117.00</u>
Abnormal Earnings	-30.00	83.00
PV(Abnormal Earnings) = AE/1.13 ²	-23.49	65.00
<u>Value</u>	<u>861.46</u>	<u>861.46</u>

It is important to not take too much comfort from the self-correcting nature of the accounting entries. The example above seems to suggest that the choice of accounting methods is irrelevant. However, there are many reasons to prefer an accounting system that reflects the economic reality as accurately as possible. The accounting values will influence the perception of the business' performance by those performing the valuation and could affect the choice of assumptions. So while the DCF and AE approaches will produce the *same* value, they may produce an incorrect value if the accounting system severely distorts the perception of value creation.

More importantly, as will be shown in the detailed discussion below, the DCF and AE approaches result in a significantly different split between the value within the forecast horizon and the value attributed to the terminal value. A more accurate accounting system will result in more of the value being accurately reflected in the book value (or within the forecast horizon) and less of it attributed to the terminal value. Given the healthy skepticism needed to assess terminal value estimates, this could be an important consideration in some valuations.

5.3 Application to P&C Insurance Companies

5.3.1 Example

To see how the abnormal earnings approach could be used to value a P&C insurance company, the example used earlier will be continued. The following components of the AE method are highlighted for clarity:

- **Book Value** – The beginning book value is perhaps the easiest component to estimate, since it will in most cases be the reported book value of the equity of the firm. Nonetheless, two adjustments may need to be made. First, any systematic bias in the reported asset and liability values should be eliminated. For P&C insurers, this may involve restating the reported loss reserves. Second, it is common to make an adjustment to reflect the *tangible book value* rather than the reported book value. The tangible book value of the firm is simply the reported book value adjusted to remove the impact of intangible assets such as goodwill. In subsequent periods, the (tangible) book value is adjusted to reflect the net income less dividends and share repurchases plus any capital contributions³⁰.
- **Net Income During Forecast Horizon** – The net income estimates for the forecast horizon are determined using the same forecasting models used earlier. Here, no adjustments are made to reflect free cash flows. In this process it is acceptable, though not necessary, to adjust the accounting basis to remove any biases that may exist in the accounting system and develop net income estimates that more closely reflect economic reality.

For example, under U.S. GAAP accounting P&C loss reserves generally are not discounted³¹. Some analysts would therefore argue that the book value should be adjusted to reflect the discounted loss reserves as this might more closely reflect the economic value of these liabilities. If this is done, then there should be a corresponding adjustment to the assumed ROE, since the same earnings will be generated from a larger capital base.

If reserves are discounted, it is also important to consider what rate is appropriate to discount the loss reserves. Some would use a risk-free rate. However, this would not truly reflect the economic value of the liabilities unless the liabilities were adjusted to also include a risk margin³².

- **Required Rate of Return³³** – As in the DDM and DCF approaches, the required return used in an AE valuation should reflect the equity investors' appropriate discount rate. The CAPM can be used for this purpose.
- **Abnormal Earnings** – Abnormal earnings equal the amount by which net income exceeds the required income. Required income is the product of the required rate of return and the beginning of period book value.
- **Growth Rate Beyond Forecast Horizon** – In this model growth in abnormal earnings reflects both the growth rate in the book value of the firm as well as the amount by which the ROE exceeds the required return. Even in cases where the book value is growing significantly, as in the case where dividends are not paid and the invested asset portfolio grows, abnormal earnings could be declining and could even be zero. For this reason, terminal value growth rates under this method will quite often be very low (or negative).

Recalling the clean surplus condition discussed in Footnote 29, it is also important to ensure that the growth in book value that is assumed does not require additional capital contributions. Otherwise, the valuation will not accurately reflect the value to the current equity holders.

³⁰ This follows the "clean surplus condition" discussed in Footnote 29.

³¹ One notable exception is certain tabular workers' compensation reserves.

³² See Butsic or the CAS Fair Value White Paper.

³³ The terms "cost of capital" or "hurdle rate" are quite commonly used to refer to this required return in this context.

Example 5 – Abnormal Earnings Valuation for ABC Insurance Company

Using the same financial model results for ABC Insurance Company as in the previous example, key financial statement variables are summarized below and used to estimate the Abnormal Earnings in each period of the forecast.

Table 24: Calculation of Abnormal Earnings

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
GAAP Equity - Beginning of Year	103,500	108,624	113,274	117,648	122,422
Required Return	8.95%	8.95%	8.95%	8.95%	8.95%
Normal Earnings	9,263	9,722	10,138	10,529	10,957
Net Income	17,193	17,236	17,446	18,376	18,967
Abnormal Earnings	7,930	7,514	7,308	7,847	8,010

To estimate the equity value, it is important to estimate the growth rate of the abnormal earnings. One fairly optimistic approach would be to estimate the rate of growth in the book value of the firm and assume that the difference between the ROE and the required return is constant in perpetuity.

Table 25: Calculation of Abnormal Earnings Growth Rates

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
GAAP Equity - Beginning of Year	103,500	108,624	113,274	117,648	122,422
GAAP Equity - End of Year	<u>108,624</u>	<u>113,274</u>	<u>117,648</u>	<u>122,422</u>	<u>127,250</u>
Growth in Book Value	5,124	4,650	4,374	4,774	4,828
Book Value Growth Rate	5.0%	4.3%	3.9%	4.1%	3.9%

These book value growth rates and constant abnormal earnings as a percentage of book value would result in an abnormal earnings growth rate of roughly 4.0%. Using that assumption in perpetuity would be very optimistic. It is more likely that the difference between ROE and the required return will decline to zero over a finite time horizon. For simplicity here, abnormal earnings will be assumed to be constant (growth rate equal to zero) and the valuation will be done using different assumptions with regard to the time horizon over which the abnormal earnings will persist.

The simplest case to show first is the case where abnormal earnings continue in perpetuity.

Table 26: Valuation Using Abnormal Earnings Method – Constant AE in Perpetuity

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>Terminal Value</u>
Abnormal Earnings	7,930	7,514	7,308	7,847	8,010	89,494
PV Factor	0.918	0.842	0.773	0.710	0.651	0.651
PV	7,279	6,330	5,651	5,569	5,218	58,299
Sum of PV(AE)	88,345					
Beginning Book Value	<u>103,500</u>					
Total Equity Value	191,845					

To calculate the Terminal Value in the table above, the 2009 abnormal earnings of \$8,010 are assumed to be constant and continue in perpetuity. When discounted to the valuation date, the terminal value represents 30% of the total equity value.

Sensitivity Analysis

In any valuation exercise, it is important to test the sensitivity of the results to many of the key assumptions. For example, the terminal value assumed abnormal earnings in perpetuity. As noted, abnormal earnings should often be assumed to decline to zero over some finite horizon. In the long run, abnormal earnings require that the firm earn an ROE in excess of the shareholders' required return. These will be sustainable only if there is a competitive advantage that will not ultimately be competed away.

In the numerical example above, the abnormal earnings were assumed to continue in perpetuity. A more realistic assumption is that the firm is able to earn abnormal returns (i.e. achieve an ROE in excess of the shareholders' required return) for only n -years after the forecast horizon. The following table shows what would happen if the abnormal earnings declined linearly over a 5-, 10- or 15-year period³⁴. In this case, the terminal value estimates and the resulting total equity values would be as shown below:

Table 27: Sensitivity of Equity Value to Abnormal Earnings Horizon

Year	AE	PV of AE	AE	PV of AE	AE	PV of AE
2010	6,675	6,126	7,282	6,683	7,509	6,892
2011	5,340	4,499	6,553	5,521	7,009	5,904
2012	4,005	3,097	5,825	4,504	6,508	5,032
2013	2,670	1,895	5,097	3,618	6,007	4,264
2014	1,335	870	4,369	2,846	5,507	3,587
2015	0	0	3,641	2,177	5,006	2,993
2016	0	0	2,913	1,598	4,505	2,473
2017	0	0	2,184	1,100	4,005	2,017
2018	0	0	1,456	673	3,504	1,620
2019	0	0	728	309	3,004	1,275
2020	0	0	0	0	2,503	975
2021	0	0	0	0	2,002	716
2022	0	0	0	0	1,502	493
2023	0	0	0	0	1,001	302
2024	0	0	0	0	501	138
Terminal Value		16,486		29,030		38,681
PV of Terminal Value		10,740		18,911		25,198
AE During Forecast Horizon		30,047		30,047		30,047
Beginning Book Value		<u>103,500</u>		<u>103,500</u>		<u>103,500</u>
Total Equity Value		144,287		152,458		158,745

The assumption of constant abnormal earnings in perpetuity resulted in \$58,299 of terminal value. This value declines substantially (to \$10,740, \$18,911 or \$25,198), if the abnormal earnings eventually decline to zero over a 5-, 10- or 15-year horizon. This emphasis on the ability of the firm to generate abnormal earnings, which is the real source of value creation, is one of the key advantages of this method as compared to the DDM and DCF methods.

³⁴ For this analysis, the assumption is that there are n more years of potential abnormal earnings and that the amount decreases by $1/(n+1)$ times the 2009 estimated abnormal earnings each year. This ensures n additional years of positive abnormal earnings.

5.3.2 Observations Regarding Example 5

As demonstrated in the previous example, the AE approach takes a different perspective than the DDM and DCF methods. Neither dividends nor free cash flows are really *sources* of value creation. Instead, these measures are more accurately the *consequences* of value creation. By emphasizing the firm's ability to earn abnormal profits, the abnormal earnings approach makes use of assumptions that are more directly tied to value creation.

An additional benefit of the approach is that it de-emphasizes the importance of the terminal value estimates and the assumptions that drive those. In the examples demonstrating the DDM and DCF methods, the terminal values represented 83% and 79% of the total equity value. In the AE estimate, the terminal value represented only 30% of the total equity value even when the abnormal earnings were expected to continue in perpetuity.

These points are emphasized here to remind the reader that the AE method is not simply an algebraic recharacterization of the free cash flow method. Blackburn, et. al. demonstrate that under consistent assumptions these approaches are, in fact, mathematically equivalent. However, the two methods may not necessarily produce the same answers in practice. The use of one method or the other may cause the analyst to focus on different aspects of the business and could result in different assumptions being made.

6. Relative Valuation Using Multiples

The DDM, DCF and AE methods discussed so far share as a critical starting point the availability of long-term forecasts of key financial statement variables. Given the popularity of dynamic financial models in recent years and the simplistic nature of the presentation here, this may not have seemed like a daunting exercise. This is misleading. In reality, reliable forecasts of publicly traded insurers are extremely difficult for outsiders to build.

First, an outsider or minority investor may not have access to data in sufficient detail to properly parameterize the model. Second, without the kind of market knowledge and specific planning data used by company executives, growth and rate adequacy estimates may be difficult to obtain. And third, even a relatively short horizon such as 5 years may stretch the limits of one's forecasting ability.

In this section, a methodology for valuation that appears to avoid the need to deal with these forecasts is presented. In reality, this approach requires the same assumptions needed to prepare the detailed forecasts in the DDM, DCF and AE models are used, though not as explicitly. As a result, this approach tends to appear to be easier to implement.

6.1 Price-Earnings Ratio

6.1.1 P-E Ratio Based on Fundamentals

In various earlier discussions of the terminal value it was noted that one could collapse all of the assumptions underlying a DDM, DCF or Abnormal Earnings into a single multiple.

For instance, in the DDM model a constant dividend payout rate and constant growth rate in perpetuity result in the following formula for the price (per share) of the equity:

$$P_0 = \frac{E(\text{Earnings Per Share}_1) * \text{Dividend Payout Rate}}{k - g}$$

Dividing both sides by the expected earnings per share (EPS) and dropping, for convenience, the expected value operator, this can be written as:

$$\frac{P_0}{EPS_1} = \frac{\text{Dividend Payout Rate}}{k - g}$$

This indicates that the "Price-Earnings Ratio" (P-E ratio) is tied directly to the DDM and can be used to summarize, in a single number, the combined effect of the constant dividend payout rate, the constant growth rate and the appropriate discount rate. The price is then simply this P-E ratio times the expected earnings per share next period.

To see what "typical" P-E ratios might be, assume that the ROE is fixed at 15% but that the dividend payout ratios and discount rates are allowed to vary. The ROE, dividend payout rates and growth rate are linked through the formula,

$$g = (1 - \text{Dividend Payout Rate}) * ROE$$

As a result, the following range of P-E ratios could be obtained using different discount rates and dividend payout rates:

Table 28: Illustrative P-E Ratios (ROE = 15%)

Discount Rate	Dividend Payout Ratio		
	40%	50%	60%
10.0%	40.0	20.0	15.0
12.5%	11.4	10.0	9.2
15.0%	6.7	6.7	6.7

Notice that when the discount rate and the ROE are both 15%, the P-E ratio is constant across different dividend payout rates. This demonstrates a point made previously that the dividend payout

ratio, and hence the growth rate, does not affect the value of the firm if the firm's ROE is equal to the discount rate.

6.1.2 Representative P&C Industry P-E Ratios

In the basic formula for the P-E ratio shown above, the estimated future period's earnings were used as the basis for determining the ratio of price to "earnings". The P-E ratio could also be presented in terms of the prior period's earnings; often both approaches are used in practice. To avoid confusion, the former approach using expected future earnings is referred to as the *forward* or *leading* P-E ratio; the latter approach using prior period's earnings is referred to as the *trailing* P-E ratio.

The following table indicates the trailing and forward P-E ratios of several P&C insurers as of June 6, 2005:

Table 29: P&C Insurance Trailing and Forward P-E Ratios³⁵

<u>Company</u>	<u>Market Capitalization (\$ B)</u>	<u>Trailing P-E Ratio</u>	<u>Forward P-E</u>
American International Group	142.17	14.85	9.89
Hartford Financial Services	22.13	10.07	9.12
Chubb Corporation	16.47	9.92	10.07
ACE Limited	12.55	11.57	7.14
XL Capital Ltd.	10.44	9.24	7.33
Sample Average	203.76	13.44	9.52
P&C Insurance Industry ³⁶	517.18	13.07	NA

In this table, the trailing P-E ratios are based upon current market prices and 2004 GAAP earnings. It is important to recognize that these trailing P-E ratios for any individual company can be distorted by unusually positive or negative earnings surprises in the past year. For this reason, analysts will often favor the use of *core earnings* that smooth the effects of unusual, non-recurring events or the use of forward P-E ratios that reflect analyst estimates of prospective earnings. The forward P-E ratios shown reflect consensus analyst estimates of prospective earnings.

6.1.3 Alternative Uses for P-E Ratios

The P-E ratio can be used for several purposes:

- Validation of Assumptions – The number of assumptions required to forecast financial results and estimate terminal values can be daunting. In many cases, it may be difficult to verify each assumption against objective benchmarks. However, once the valuation is performed it may be possible to recharacterize the value as a ratio to forward or trailing earnings and compare the resulting P-E ratio to the P-E ratios implied by the market values of peer companies.

This is instructive because if two firms are expected to have comparable growth rates, dividend payout rates, discount rates, etc. then they should have comparable P-E ratios. If differences in P-E ratios cannot be explained as a result of differences in one or more of these key variables, this might indicate that one or more of the assumptions are inappropriate.

³⁵ Source: Yahoo! Finance, June 6, 2005.

³⁶ The industry average trailing P-E is weighted by market value. The universe includes all firms included in the Yahoo! Finance P&C Insurance Industry sector but excludes Berkshire Hathaway (an outlier with significant non-insurance operations) as well as Renaissance Re (due to an apparent data error) and any firm with negative earnings in the most recent period. Industry-wide forward P-E ratios were not available and are not shown.

- **Shortcut to Valuation** – Aside from the validation of an otherwise full-fledged forecast and valuation, the P-E ratio of peer companies might serve as a useful shortcut to valuation in cases where industry average performance is expected. In this case, a group of peer companies would be selected and their mean or median P-E ratios could be used. Of course, given the skewed nature of such ratios, the median industry P-E may be preferred.
- **Terminal Value** – Even in instances where a full valuation based on separate forecasts is performed, it may be useful to rely on peer P-E ratios to help guide the terminal value calculation.

In this case, the one additional point to note is that a reasonable terminal value should be based on assumptions appropriate as of the end of the forecast horizon. If, for instance, the industry is expected to experience excessive short-term growth and then slow down to a low-growth steady state, the current valuations of peer companies will reflect this short-term high growth rate to some extent. The current P-E ratios may therefore overstate the appropriate P-E ratio at the forecast horizon.

6.2 Price to Book Value Ratio

The P-E ratio described above is just one of numerous "multiples" that can be used in this way. As another example, consider the Price-Book Value multiple (or equivalently the Price to Tangible Book Value). The P-BV ratio is commonly preferred over the P-E ratio when valuing banks, insurance companies and other financial services firms with substantial holdings in marketable securities.

6.2.1 P-BV Ratio Based on Fundamentals

As before, the P-BV ratio is tied directly to the other methods discussed.

For instance, consider the abnormal earnings approach, which can be written as:

$$\begin{aligned} \text{Price} &= \text{BV}_0 + \sum \frac{\text{AE}_i}{(1+k)^i} \\ &= \text{BV}_0 + \frac{[\text{BV}_0 * \text{ROE}_1 - \text{BV}_0 * k]}{(1+k)} + \frac{[\text{BV}_1 * \text{ROE}_2 - \text{BV}_1 * k]}{(1+k)^2} + \frac{[\text{BV}_2 * \text{ROE}_3 - \text{BV}_2 * k]}{(1+k)^3} + \dots \end{aligned}$$

If the book value is assumed to grow at a constant rate, g , and the ROE is assumed to be constant, then this can be written as:

$$\begin{aligned} \text{Price} &= \text{BV}_0 + \frac{\text{BV}_0[\text{ROE} - k]}{(1+k)} + \frac{\text{BV}_0(1+g)[\text{ROE} - k]}{(1+k)^2} + \frac{\text{BV}_0(1+g)^2[\text{ROE} - k]}{(1+k)^3} + \dots \\ &= \text{BV}_0 + \frac{\text{BV}_0[\text{ROE} - k]}{(k - g)} \end{aligned}$$

Finally, dividing both sides by the beginning book value, the P-BV ratio is given as:

$$\frac{\text{Price}}{\text{BV}} = 1 + \frac{\text{ROE} - k}{k - g}$$

Note that this derivation assumed that the growth rate in book value and the excess return per period ($\text{ROE} - k$) would persist in perpetuity. This will rarely be the case. The excess returns would eventually invite competition that will put pressure on the ROE, the growth rate or both. Alternate formulas that reflect a period after which the excess returns decline to zero can be easily derived³⁷. Nonetheless, the previous formula demonstrates the important link between the P-BV multiple and fundamental firm characteristics such as the ROE, the growth rate and the discount rate.

³⁷ For example, if after 5 years the ROE is assumed to decline to the level of the cost of capital, the P-BV ratio would be:

$$\frac{\text{Price}}{\text{BV}} = 1 + \frac{\text{ROE} - k}{k - g} \left(1 - \left(\frac{1+g}{1+k} \right)^5 \right).$$

If a constant ROE of 15% is assumed, the growth rate and the discount rate can be varied to derive the following range of P-BV ratios:

Table 30: Illustrative P-BV Ratios (ROE = 15%)

Discount Rate	Growth Rates		
	0%	2%	4%
10.0%	1.50	1.63	1.83
12.5%	1.20	1.24	1.29
15.0%	1.00	1.00	1.00

6.2.3 Representative P&C Industry P-BV Ratios

The P-BV ratios for several P&C insurers are shown below:

Table 31: P&C Insurance Trailing P-BV Ratios³⁸

Company	Market Capitalization (\$ B)	Trailing P-BV
American International Group	142.17	1.77
Hartford Financial Services	22.13	1.54
Chubb Corporation	16.47	1.57
ACE Limited	12.55	1.25
XL Capital Ltd.	10.44	1.34
Sample Average	203.76	1.67
P&C Insurance Industry	517.18	1.54

6.2.3 Alternative Uses for P-BV Ratios

Just as in the case of the P-E ratios, the P-BV ratio can be used to validate other forecasts, serve as a shortcut or be used as a terminal value estimate in other approaches. Because it is linked directly to these other methods, industry peer P-BV multiples can serve as a useful benchmark.

6.3 Firm vs. Equity Multiples

Recall the two alternative methods of applying the DCF approach. The FCFE method values the entire firm and subtracts the value of debt to obtain the equity value; the FCFE method values the equity directly. The two examples shown above, the P-E and the P-BV, both focus on per share equity measures in the denominator. These multiples could just as readily have used a firmwide measure, such as firmwide revenue or total asset value as the basis for a multiple. However, for the same reasons that valuing the equity directly using free cash flows to equity (FCFE) is preferred when valuing P&C insurers, it is preferable to avoid firmwide valuation multiples and limit the use of multiples to equity measures.

6.4 Market vs. Transaction Multiples

The P-E and P-BV ratios shown above were based on the market price of the companies' shares on a particular day, their most recent financial statement values and current analyst estimates for next year's earnings and book value. Of course the market value and forecasted financial statement values fluctuate, sometimes significantly, from day to day and so it may often be useful to observe these ratios over a number of time periods.

³⁸ Source: Yahoo! Finance, June 6, 2005.

Some practitioners prefer to avoid these fluctuations of market multiples and focus instead on *transaction multiples* based on actual merger or acquisition prices or initial public offerings (IPOs). For example, below is a table of recent transaction multiples for several P&C insurance companies:

Table 32: Transaction Multiples³⁹

<u>Company</u>	<u>P-E</u>	<u>P-BV</u>	<u>Transaction</u>	<u>Year</u>
Aspen Insurance Holdings Ltd.	13.10	1.10	IPO	2003
AXIS Capital Holdings Ltd.	28.60	1.40	IPO	2003
Endurance Specialty Holdings Ltd.	13.20	1.00	IPO	2003
Infinity Property and Casualty Corp.	13.90	0.90	IPO	2003
Mercer Insurance Group, Inc.	20.00	0.70	IPO	2003
United National Group, Ltd.	18.50	1.30	IPO	2003
Safety Insurance Group, Inc.	24.50	1.30	IPO	2002
Montpelier Re Holdings, Ltd.	20.20	1.00	IPO	2002
Travelers Property Casualty	17.50	1.00	IPO	2002

One advantage of transaction multiples is that typically the price in these transactions is based on a complex negotiation with sophisticated parties on both sides. As a result, some practitioners consider these prices to be more meaningful than multiples based solely on current market prices. However, there are several reasons to be cautious:

- **Control Premiums** – M&A transaction prices typically contain what might be considered "control premiums" that reflect the buyer's willingness to pay more for a company in order to gain control of its operations and make different strategic and managerial decisions than the current management. In these cases, the multiples based on current operations and/or current analyst forecasts might be misleading.
- **Overpricing in M&A Transactions** – Academic studies of M&A transactions⁴⁰ show that when mergers and acquisitions increase total shareholder value, most of these gains accrue to the target firm's shareholders and not the acquiring firm. This suggests that acquiring firms have a tendency to overpay. There are multiple causes for this, including managerial hubris, the difficulties of integrating management structures and the failure of planned synergies to fully materialize. But regardless of the reason, it would be prudent to consider this when using M&A transaction multiples.
- **Underpricing in IPO Transactions** – When firms undertake an initial public offering (IPO) there is a great deal of disclosure and thorough analyses conducted by the firm's bankers as well as investors. This analysis conducted during the IPO process ought to suggest a greater degree of reliability for IPO prices than general market prices. However, the underpricing of IPOs, reflected in the downward bias in initial offering prices, has been widely recognized and documented in numerous academic studies⁴¹. In recent years, particularly during the technology bubble of the late 1990s, a misalignment of the investment bankers' and managers' interest with those of the shareholders greatly exacerbated this problem⁴². IPO pricing multiples should therefore be interpreted carefully.
- **Reported Financial Variables** – Even in cases where the prices in M&A and IPO transactions are more reliable, it may not be the case that the reported multiples are as accurate. This is because the reported multiples will be based on either the prior period's

³⁹ Source: Conning & Company

⁴⁰ See Damodaran, *Investment Fables*

⁴¹ See Ritter, "Initial Public Offerings"

⁴² See Partnoy, *Infectious Greed*

financials statements or some published analysts' estimates of next period's financial statements. The prices themselves may have been based on different forecasts. As a result, the multiples may not accurately reflect the buyer's underlying assumptions about growth rates, ROE assumptions and discount rates.

- Underlying Economic Assumptions – By definition, transaction multiples will typically come from *past* transactions that may have been carried out in a different economic environment. Key valuation variables that are imbedded in these multiples, such as interest rates, industry growth rates and industry profitability outlooks, may no longer be appropriate.

To understand the potential variation in valuation multiples over time, consider the following table of P&C insurance multiples over a 10-year period:

Table 33: P&C Insurance Industry Mean Market Multiples⁴³

<u>Year</u>	<u>Price to Earnings</u>	<u>Price to Book Value</u>
1985	21.0	1.5
1986	10.0	1.6
1987	19.0	1.2
1988	12.0	1.5
1989	10.0	1.3
1990	11.0	1.5
1991	15.0	1.3
1992	15.0	1.1
1993	18.0	1.4
1994	<u>9.0</u>	<u>1.3</u>
Average	14.0	1.4

Even during this short time period, P&C valuation multiples exhibit variation that would be significant in practice, with high and low multiples as much as 50% above and 36% below the mean multiples.

⁴³ Source: Conning & Company

Example 6 – Relative Valuation

Consider a P&C insurer with projected 2005 Earnings of \$1.5 billion and a beginning book value of \$10 billion. Using the average forward P-E ratio for the five firms shown in Table 29 and the average trailing P-BV ratio for the five firms shown in Table 31, the following three estimates of the value of this firm can be produced:

Table 34: Valuation Based on Earnings and Book Value Multiples

Method 1: Forward P-E Ratio	
Forward Earnings	\$1.50 B
P-E	9.52
Equity Value	\$14.28 B
Method 2: Trailing P-BV Ratio	
Trailing Book Value	\$10.00 B
Trailing P-BV	1.67
Equity Value	\$16.70 B
Average	\$15.49 B

It is important to recognize that this example utilized the average forward P-E and trailing P-BV ratios for five selected companies that did not necessarily have identical operations. In an actual application, it would be important to assess the appropriateness of each of the peer companies used in this average. Companies with different underlying fundamentals (growth rates, risk profiles, leverage ratios, etc.) would not be expected to have identical P-E or P-BV ratios and therefore the peer group has to be carefully constructed.

6.5 Application of Relative Valuation for Multi-Line Firms

Among the key issues to assess in the selection of peer companies is the comparability of the underlying businesses. This becomes particularly difficult in a realistic application because most insurers operate in a variety of markets, each with their own growth rates and risk profiles. The universe of closely comparable firms is actually quite small.

This issue is best illustrated by deviating for a moment from the focus on P&C insurers only and considering how relative valuation might be applied to a multi-line insurer with P&C, Life, and Financial Services businesses. In each case, relative valuation can be used with the segment-specific financial measures and multiples based on firms that operate in only the specific segment of interest. Alternatively, peer companies with comparably diverse operations can be used along with the firmwide financial measures. In either case, the peer groups are likely to be quite limited and considerable effort will be required to assess the results.

6.5.1 Use of Pure Play Peers

Consider the case of a hypothetical diversified insurer, referred to here as Study Note Insurer (SNI). SNI is assumed to represent a diversified financial services firm with operations that include P&C insurance, life insurance and other financial services businesses such as trading, premium financing, etc.

The valuation of SNI would proceed in the following fashion:

- Collect Financial Data by Segment

Separate the firm into its distinct business segments, each with its own growth rate, profitability and risk level. The three business segments used include:

- P&C Insurance
- Life Insurance
- Financial Services

Use either published financial reports (for trailing values) or independent forecasts (for forward looking values) to obtain key financial variables for each of SNI’s segments. In practice, this could prove to be more of a challenge than it appears, depending on the degree of segment detail provided in the firm’s financial statements.

In the table below, segment-specific trailing earnings for the most recent fiscal year and an allocation of the total book value of the firm to each business segment are shown. The book values might reflect adjustments for reserve adequacy, the removal of goodwill or similar adjustments to ensure comparability with other firms.

Table 35: SNI P&C Segment Financial Data (\$ Millions) – Actual Amounts from Latest Fiscal Year

<u>Current Year</u>	<u>P&C</u>	<u>Life</u>	<u>Fin Services</u>
Earnings	561	839	478
Book Value	3,058	6,160	2,137

Also of interest might be a *smoothed* estimate of earnings that reflects a forward-looking best-estimate of next period’s earnings. These smoothed earnings will remove any unusual results from the most recent period and reflect amounts that might reflect a more useful base from which to project future earnings. In practice, it is common to use current actual book value and an average ROE to derive the smoothed earnings. For simplicity, the analysis is limited to the use of trailing earnings in this example.

- Peer Company Selections (Pure Play Companies)

The next step is to identify peer companies in each of the business segments. Ideally, one would want to identify publicly traded firms whose operations consist solely of either P&C insurance, life insurance or financial services businesses. The reliance on single-business entities, known as “pure play” firms, is intended to ensure that the underlying financial characteristics of each business are reflected.

To ensure that the selected companies are appropriate peers for each of SNI’s segments, it would be necessary to compare the firms’ respective businesses (products offered, markets served, etc.). The ROE, financial leverage and growth rates of the firms would be reviewed to ensure that the firms were comparable on all of these bases.

To highlight the limitations one might encounter, only two peers are identified for the P&C segment and one of them is assumed to have negative trailing earnings that make its trailing P-E ratio meaningless. Four life insurance and two financial services two peers are also identified.

- Choice of Multiples

To avoid relying on a single multiple, several valuation multiples would be used, such as Price/Earnings (trailing) and Price/Book Value (trailing).

The following table shows the peer multiples for the P&C segment:

Table 36: P&C Insurance Segment Peer Multiples

<u>Multiple</u>	<u>P&C Peer 1</u>	<u>P&C Peer 2</u>	<u>Simple Average</u>
P-E	17.07	N/A	17.07
P-BV	1.75	2.27	2.01

The Life Insurance segment multiples are as follows:

Table 37: Life Insurance Segment Peer Multiples

<u>Multiple</u>	<u>Life Peer 1</u>	<u>Life Peer 2</u>	<u>Life Peer 3</u>	<u>Life Peer 4</u>	<u>Simple Average</u>
P-E	20.10	19.06	13.77	25.78	19.68
P-BV	2.41	2.33	3.00	4.25	3.00

And the Financial Services segment multiples are as follows:

Table 38: Financial Services Segment Peer Multiples

<u>Multiple</u>	<u>Asset Mgt Peer 1</u>	<u>Asset Mgt Peer 2</u>	<u>Simple Average</u>
P-E	29.75	19.89	24.82
P-BV	6.10	2.78	4.44

- Application of Multiples for Segment Valuation

The P&C segment financial data is then combined with the P&C peer multiples to obtain the following estimates of the value of the P&C segment.

Table 39: P&C Segment Valuation (\$ Millions)

<u>Valuation Basis</u>	<u>SNI Amount</u>	<u>Peer Multiple</u>	<u>Segment Value</u>
Earnings	561	17.07	9,576
Book Value	3,058	2.01	6,147
Average			7,862

Similar analyses are done for the other two segments, as shown in the following two tables.

Table 40: Life Segment Valuation (\$ Millions)

<u>Valuation Basis</u>	<u>SNI Amount</u>	<u>Peer Multiple</u>	<u>Segment Value</u>
Earnings	839	19.68	16,512
Book Value	6,160	3.00	18,480
Average			17,496

Table 41: Financial Services Segment Valuation (\$ Millions)

<u>Valuation Basis</u>	<u>SNI Amount</u>	<u>Peer Multiple</u>	<u>Segment Value</u>
Earnings	478	24.82	11,864
Book Value	2,137	4.44	9,488
Average			10,676

- Total Firm Value

The total value of SNI's equity would reflect the sum of the segment values, as shown in the table below:

Table 42: SNI Valuation Summary (\$ Millions)

<u>Segment</u>	<u>Value</u>
P&C Insurance	7,862
Life Insurance	17,496
Financial Services	<u>10,676</u>
Total	36,034

- Validation Against Other Diversified Insurers

Since the universe of possible peer companies by segment is very limited, it may be difficult to select more than a few firms in each segment. If these selected peer companies are not truly comparable, the results could be biased.

As an alternative to the segment valuation, other diversified insurance/financial services firms could also be used as the source of peer multiples. These diversified firms would be selected so that they are similar to SNI in many respects – similar businesses, similar ROE, similar S&P claims paying rating, similar CAPM betas, etc.

Peer multiples for three diversified insurers are summarized as follows:

Table 43: Peer Multiples – Diversified Insurance/Financial Services

<u>Multiple</u>	<u>Diversified Peer 1</u>	<u>Diversified Peer 2</u>	<u>Diversified Peer 3</u>	<u>Average</u>
P-E	17.53	16.89	11.48	15.30
P-BV	2.34	2.25	1.35	1.98

When the average multiples are applied to SNI's total earnings and book value across all segments, the following results are obtained:

Table 44: SNI Valuation – Diversified Insurance/Financial Services Peers (\$ Millions)

<u>Valuation Basis</u>	<u>SNI Amount</u>	<u>Peer Multiple</u>	<u>Equity Value</u>
Earnings	1,878	15.30	28,733
Book Value	11,355	1.98	22,483
Average			25,608

Additional Considerations

The following additional observations are made with respect to the above example:

- Choice of Peer Companies – The valuation relied heavily on the assumption that the average multiples for the selected peer companies are appropriate for SNI. The validity of the chosen peer companies depends on whether the ROE, growth rate and discount rate assumptions are comparable for these firms (or at least the net effect is comparable). This is ultimately a matter of informed judgment.

Consider, for instance, the peer companies selected for the Life Insurance segment:

Table 45: Comparison of Life Segment Peer P-E Multiples

Life Peer 1	20.10
Life Peer 2	19.06
Life Peer 3	13.77
Life Peer 4	<u>25.78</u>
Simple Average	19.68

The first two firms' multiples are approximately equal to the average multiple. However, one firm's P-E is approximately 30% lower than this average and another firm's P-E is approximately 30% higher than this average. As a result, which of these four firms are included in the average multiple calculation can have a material impact. Determining which of the firms has operations most like SNI's operations is important.

Notice also that the valuation used trailing P-E ratios in the analysis. The large differences in P-E ratios could merely reflect special circumstances in the latest reporting year for one or more of these firms that caused their earnings to be artificially lower or higher than expected. This may not truly reflect differences in expected ROEs, growth rates or discount rates and therefore should not be used to proxy for the appropriate ROE, growth and discount rate assumptions that would be used in an explicit DCF valuation.

Growth rates and discount rates for SNI and their peers could very well differ substantially due to underlying fundamental differences in their operations.

- Simple Average vs. Weighted Average Multiples – Notice that when valuing the various segments, the peer companies' respective multiples were averaged using a simple average. If the peer firms are not roughly the same size, a weighted average might be more appropriate.

7. Option Pricing Methods

Many recently published valuation textbooks now include extensive discussion of the use of option pricing theory in the valuation of the equity of a firm. This section briefly discusses the rationale behind this approach and its potential applicability to insurance company valuation.

Two related approaches are presented: (a) valuing the equity as a call option rather than as a discounted stream of future dividends, cash flow or abnormal earnings and (b) the valuation of *real options* as an additional source of value to be added to the DCF, AE or relative valuation results.

7.1 Valuing Equity as a Call Option

7.1.1 Background

This method is based on Merton's characterization of equity as a call option on the company's assets, with a strike price equal to the face value of the debt.

When a firm is owned entirely by equity holders, they own all of the assets of the firm – the physical assets plus the income that those assets produce over the life of the company. If the equity holders issue debt (i.e. borrow money), then the equity holders no longer own all of the value of the firm, V . Instead, they own the excess of the value of the firm over the debt that they have to repay at time T , denoted D . In other words $E_T = \max(V_T - D, 0)$, which looks like a call on the value of V_T with a strike price of D .

When the equity holders borrowed the present value of D , they gave all of the assets of the firm to the bondholders, who will keep them if the debt is not repaid. However, by repaying the debt at time T , the equity holders have the right to buy back the assets of the firm by paying D . If $V_T < D$ on that date, they will not buy the assets back and will let the bondholders keep the assets. In other words, they will default.

To value the equity of a firm as a call option on the assets, the Black-Scholes option pricing formula can be used, with some modifications. For instance, instead of using the value of the stock and its volatility as inputs, the value and volatility of all of the firm's assets are the critical inputs. In addition, the strike price is set equal to the face value of the debt and the expiration date for the option is set equal to the (single) expiration date of the debt.

7.1.2 Application to P&C Insurers

For many years after Merton's original presentation, this approach remained a purely theoretical discussion and was not commonly used as a valuation framework because of its many practical limitations. In recent years, as option pricing methods have become more widely understood, the use of this approach has grown. For instance, a variation of this approach is now used to estimate probabilities of default for publicly traded firms⁴⁴.

However, when it comes to the valuation of P&C insurance companies, this is still largely a theoretical model. The reason for this is similar to why equity valuation methods rather than firm valuation methods are generally preferred for insurance company valuations – the notion of "debt" for an insurance company is not well defined. An insurer's policyholder liabilities are essentially indistinguishable from other debt from the perspective of the equity holder. Given the complexity of the policyholder liabilities, a single expiration date for all of an insurer's "debt" cannot be readily approximated.

Given the limitations of this approach in a practical valuation analysis, this approach will not be explored further in this study note.

⁴⁴ The most widely known application is the Moody's/KMV Credit Default Model.

7.2 Real Options Valuation

7.2.1 Background on Real Options

Another use of option pricing theory of relevance to valuation is the real options framework. The real options approach attempts to value various sources of managerial flexibility that can often be thought of as put and call options. Some of the most common real options include the following⁴⁵:

- Abandonment Option – Many projects can be terminated early and the investment sold for its liquidation value less closing-down costs. This option is valued as an American put on the value of the project with a strike equal to the net liquidation proceeds.
- Expansion Option – Projects that are successful often contain an option to expand the scope of the project and capture more profits. This is valued as an American call option on the (gross) value of the additional capacity with a strike price equal to the cost of creating the capacity.
- Contraction Option – This is the opposite of the expansion option. It is valued as an American put on the (gross) value of the lost capacity with a strike equal to the cost savings.
- Option to Defer – Otherwise known as the option to wait, this is an American call on the value of a project. It essentially measures the value of being able to hold off on a project until more information is known – hence, preventing the bad outcomes at the expense of maybe giving up some interim revenue in the good outcomes.
- Option to Extend – This is an option to extend the life of a project by paying a fixed amount. It is valued as a European call option on the asset's future value.

The argument that managerial flexibility has value that should be included within the equity valuation is appealing. However, care must be taken to distinguish between managerial choices that have value and managerial choices that do not. For instance, all firms have the "flexibility" to buy assets at their market prices, but this does not in itself create value. Value is created only when assets can be purchased at less than their fair value or when the firm has exclusive access to opportunities.

7.2.2 Example of Real Option Analysis

The valuation of real options is considerably more complex than the valuation of options on financial instruments. Practices vary widely with respect to implementation of standard option pricing models for these sorts of options. For the sake of clarity, this section will provide a brief demonstration of just one particular method used by some insurance company equity analysts. The example will be intentionally simplified to highlight the rationale behind this methodology. The specific formulas used here have certain limitations and may not be applicable in all situations.

Assume an insurer has a *new* business opportunity that it has not yet exploited due to uncertainty with regard to its value. Based on current assumptions, the opportunity will require an initial investment of \$500 million and will generate an expected ROE (in perpetuity) of 8.95%, exactly equal to its cost of capital. There is uncertainty with respect to the ROE that will be achieved, but this uncertainty will diminish over a three year period.

Using the Abnormal Earnings valuation methodology, it is easy to see that the *gross* value of the opportunity equals the initial book value of \$500 million because the expected abnormal earnings are equal to zero in every future period. Given the required investment of \$500 million, the *net* value of this opportunity is zero and there would be no incentive for the firm to enter into this business.

Nonetheless, there may be a real option value to consider here. Assume that the firm's flexibility allows it to essentially lock in the required investment for a set period, say 3 years for the sake of the example. During this time the uncertainty with respect to the ROE that can be achieved will be

⁴⁵ This list is taken from Hull. Other sources for more information on real options valuation include Damodaran and Trigeorgis.

resolved. If it turns out that the ROE on this business exceeds the current expected value of 8.95% in perpetuity and the firm can still invest only \$500 million in book value to enter the business, then there may be a real option value associated with this flexibility.

The value of their flexibility to delay making the investment may be estimated using the Black-Scholes option pricing formula and an assumption regarding the volatility of the value of the business' cash flows. The volatility assumption would be based upon the volatility of the ROE and would be impacted by other valuation factors such as whether the abnormal earnings continue in perpetuity. For the sake of simplicity, the volatility is arbitrarily set at 20% for this example.

The specific formula is summarized as follows:

$$\text{Real Option Value} = AN(d_1) - Ie^{-rT}N(d_2)$$

where A = Current Value of Cash Flows (\$500), I = Required Investment (\$500), r = continuously compounded risk-free interest rate (4.55%), T = Time to Expiration (3), and σ = Volatility of Current Value (20%). As in the standard Black-Scholes model, $N(\)$ is the standard normal CDF, and d_1 and d_2 are defined as follows:

$$d_1 = \frac{\ln(A/I) + (r + \sigma^2/2)T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(A/I) + (r - \sigma^2/2)T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T}$$

Table 46: Real Option Value of New P&C Insurance Opportunities

Asset Value (A)	500
Strike Price (I)	500
Volatility (σ)	20.0%
Time to Expiration in years (T)	3.00
Risk Free Rate (r)	4.55%
d_1	0.567
d_2	0.221
$N(d_1)$	0.715
$N(d_2)$	0.587
Option Value (\$ Millions)	101.1

As a result of these calculations, it would be appropriate to include an additional \$101.1 million to the valuation of the firm. The underlying new business opportunity does not have any value to the firm now, even if the investment were made to enter the business. However, the firm's ability to wait for three years before committing to the investment provides it with a real option. The value of this option, as opposed to the value of the underlying business, should be added to the estimates produced by valuing all of the firm's existing businesses.

7.2.3 Practical Considerations

The calculations described in the previous example were intended to demonstrate the concepts underlying attempts to include the value of managerial flexibility in the value of a firm. In practice, it may be substantially more difficult to a) identify the new businesses for which some real option value may exist, b) assess the current value of these businesses and c) determine whether the firm actually has the ability to enter these businesses at a fixed price or at a price that otherwise differs from the

businesses' market value. It is appropriate to contemplate the potential for firms to have exclusive rights or exclusive abilities to capitalize on new business opportunities, but placing a dollar value on these opportunities requires considerably more judgment and insight than the simplified example here might suggest.

7.2.4 Key Valuation Considerations

In addition to the practical considerations raised in the previous section, there are also a variety of technical issues that must be considered in the actual valuation formula. The following is a sample of some of these considerations:

- **Valuing the Underlying Business Cash Flows** – In this example the gross value of the business was valued using the AE method but the abnormal earnings were assumed to continue in perpetuity. This assumption made the value of the underlying cash flows change each period primarily as the result of the volatility of the ROE.

In practice, abnormal earnings periods usually have a finite life. As a result, after each period passes with the option not exercised, the gross value of the cash flows will decline. This effect is comparable to the effect on the stock price after cash dividends are paid and adjustments to the option valuation formula similar to those made when valuing options on stocks that pay dividends may be appropriate.

- **Time to Option Maturity** – In this example the time to maturity was assumed to be known and had a finite value. In practice, real options are likely to have uncertain maturities – or possibly no maturity date at all.
- **Exercise Type** – The example was simplified by assuming that the option could be exercised only at maturity. In practice, real options are more likely to be American-style options that can be exercised any time until maturity. Appropriate adjustments to the option pricing formula would therefore be made in these cases⁴⁶.
- **Appropriate Valuation Formula** – This example used the Black-Scholes formula to value the option. For certain real options, the implicit assumption of a lognormal underlying asset price distribution may be inappropriate and other valuation formulas may be appropriate.

7.2.5 Assessing the Reasonableness of Real Option Values

To assess the reasonableness of the real option valuation results, it is helpful to consider the following characteristics that make real options more valuable:

- Options are more valuable when new information will be discovered prior to their expiration date that will allow for a more informed decision. If no new information exists, then waiting to make a decision might be convenient but it won't necessarily add significant value to the firm.
- Expansion options are valuable only if there is some exclusive right or ability to exercise them. It is not sufficient to say that new business opportunities might come along in the future. If there is competition, other firms might also attempt to capitalize on these opportunities, driving up the exercise cost and eroding any net value impact to the firm upon exercise.
- The exercise price must be fixed in order for the option to have value. As an extreme example, an "option" to purchase an asset at some future date at the then current market price does not have any value.

⁴⁶ See Hull.

8. Additional Considerations

Given the limited scope of this study note, a variety of complicating factors have been ignored. This section will include a partial list of these factors, but readers are encouraged to review the sources included in the References section for more complete details.

Topics of particular interest may include the following:

- **Complex Capital Structures** – The valuation methods discussed here reflect the value to all of the stakeholders who have a claim on the equity value of the firm. These stakeholders may include a broader group than just the current shareholders of the firm. Determining that value of the common shareholders' interests therefore might require more than just dividing the total equity value by the number of outstanding common shares.

One adjustment may include special consideration for preferred shareholders. Another more complicated adjustment is to reflect the value of any outstanding warrants or employee stock options. These are call options issued by the firm to investors, management or other employees. The value of the publicly traded shares must take into account the effect on firm value and the number of shares outstanding if and when these options are exercised.

- **Valuation of Non-Operating Assets** – The methods discussed here assumed that the assets of the firm were used to generate the earnings and cash flows depicted in the valuation formulas. Other assets may require special considerations.
- **International Considerations** – A variety of issues associated with international operations have been ignored, including methods needed to assess the consolidated financial statements for globally diversified firms and methods used to reflect currency risk in the valuation methods.

The text by Damodaran and the text by Stowe, Robinson, Pinto and McLeavey each provide complete discussions of these and other related valuation topics.

9. References

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