Disentangling value, growth, and the equity risk premium

The discounted cash flow (DCF) model is a theoretically sound method to value stocks. However, any model is only as good as the inputs and, as JASON TEH explains, the cost of equity capital is one of those DCF inputs that can create problems.

JASON TEH is a senior quantitative analyst at Investors Mutual.

The Capital Asset Pricing Model (CAPM) formulated in the mid-1960s provided an important step in providing an appropriate cost of capital for valuation models. However, in the last three decades, market anomalies have been observed that cannot be explained by conventional theory. Therefore, if the CAPM cost of capital does not reflect other risk factors priced by the market, valuation models such as the Discounted Cash Flow (DCF) Model, that relies on cost of capital measures may lead to misleading conclusions.

Before we cast away the DCF models or the CAPM, this article aims to show that by using the CAPM framework and understanding the nature of some of the DCF inputs appropriately, theoretical valuations from the DCF models may not differ from reality. Further, by understanding how these inputs behave in reality it helps explain the performance differential between value and growth stocks over time[1].

THEORETICAL FOUNDATIONS

The price, P, of a continuously growing (at rate g) stream of cash flows can be written as a present value (at a required rate of return, k) and expressed in terms of the next period's cash flow, CF, as

$$P = \frac{CF}{k - g}$$

If k is the cost of capital and is derived from the CAPM as the risk free rate, Rf, plus beta, b, times the equity risk premium, ERP, P can be written as

$$P = \frac{CF}{R_f + bERP - g}$$

The components of the CAPM cost of capital can be summarised as follows:

R_f: – The risk-free rate is the price of time, that is, it is the reward for postponing current consumption to the future.
ERP: – The equity risk premium measures

investor's risk preference and is the price of risk aversion. That is, it is the expected reward over the risk-free rate that investors demand as compensation for an investment uncertainty. The size of the equity risk premium is dependent on how risk averse investors are. The more risk averse the larger the equity risk premium.

b: – Beta is the sensitivity of a stock to investor's risk preferences. That is, the greater the sensitivity (beta) to the equity risk premium the greater is the risk profile of a stock.

For example, if a stock had a beta of two, it is two times as risky as the average stock since the beta for the market is one. Hence if the equity risk premium was 5% then investors expect 10% return above the risk free rate as compensation for bearing the risk of investing in a stock with a beta of two.

If investors were to become less risk averse, equities are perceived to be less risky than bonds, hence investors expect a lower return on equities over the risk free rate. Since bonds are not affected by changes in the equity risk premium the price of equities increases relative to the price of bonds.

The opposite occurs if investors were to become more risk averse, equities would under-perform relative to bonds. Further, changes in investor risk aversion helps explain why the performance of equities are generally more volatile than bonds because bond valuations are not affected by changes in the equity risk premium.

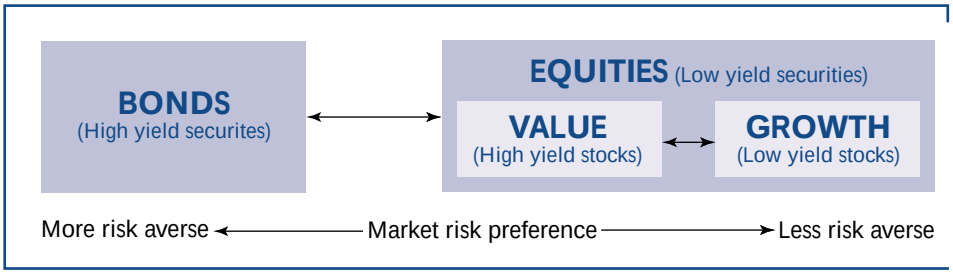
Changes in the equity risk premium also have the same systematic effects on the performance of value and growth stocks in the equity markets. To continue from the first equation, if CF is expressed as a return on equity, r, times the current book value per share, B, then P of a stock can be written as

$$P = \frac{rB}{R_f + bERP - g}$$

Dividing through by B, P/B has the following expression

$$P/B = \frac{r}{R_f + bERP - g}$$

FIGURE 1 **High yield securities (bonds and value stocks) and low yield securities (equities and growth stocks)**



Typically, growth (value) stocks are companies with greater (lesser) growth potential and hence command a higher (lower) P/B value[2]. However, growth opportunities are usually not without risk since the larger the growth outlook the larger the risk associated with achieving that growth. Hence betas would typically be higher (lower) for growth (value) stocks[3].

Changes to the investor's risk preference, as measured by the equity risk premium, will affect the valuations of both value and growth stocks in different ways through its beta. Given that growth stocks have higher betas than value stocks they are more sensitive to any changes in the equity risk premium. Hence any changes to the equity risk premium will have a larger effect on the valuations of growth stocks than value stocks.

If the market were to become more risk averse and the equity risk premium expands investors would steer away from high beta companies with volatile earnings (such as the new technology sector) than low beta companies with more stable earnings (such as the utility sector). The opposite would occur if investors were less risk averse.

Similar to the performance of equities being more volatile than bonds, the performance of growth stocks are also typically more volatile than value stocks because they are more sensitive to changes in market risk preferences, due to their higher beta.

Although the valuations of value stocks are still affected by changes to the equity risk premium its influence is less due to their lower betas, hence these type of stocks tend to be less volatile and more sensitive to changes in the risk-free rate.

To illustrate further how changing risk preferences can affect the market equilibrium, the financial markets can be divided into high and low yielding assets. (Figure 1) In terms of market equilibrium, the investor's risk preference plays an important role in the demand for assets. When investors become less risk averse the demand for low yield assets, which offer more growth potential, will tend to increase.

Therefore, investors who can invest in both bonds and equities will tend to shift more of their portfolio allocation to equities. Other investors who have to be fully invested in equities will tend to skew their portfolios more to growth stocks.

At the same time the low yield end of the market will have a stronger incentive to supply more capital. For example, it was not surprising that when new technology stocks were bid to exuberant levels in the late 1990s, the technology sector was a very active IPO market. And as long as demand outstrips supply the prices will be bid even higher.

The process reverses when investors become more risk averse. Under this scenario, the demand for high yield assets, which offer more certainty in returns, will increase with a corresponding increase in their prices.

Although investors risk preferences are difficult to measure it should have a systematic effect on the relative performance of equities versus bonds and growth versus value stocks.

To examine whether the markets risk preference systematically affects the performance of various segments of the financial markets we use United States data given it has the longest time series of data[4]. Figure 2 illustrates the yearly performance

difference between S&P500 Barra Growth and S&P500 Barra Value indices and the yearly performance difference between the S&P500 and a US 30-year Accumulation Bond Index since December 1980 to March 2001[5].

Figure 3 depicts the average yearly return difference between growth and value stocks within different ranges of yearly return difference between equities and bonds.

Figure 2 shows that the cycle of relative performance of equities and bonds tend to coincide with the relative performance cycle of growth and value stocks. Further, figure 3 shows that the relationship is nearly monotonic. That is, the average relative return between growth and value stocks increase in a linear fashion from its lowest relative return when bonds outperform equities to a high relative return when equities outperform bonds. However, the relative outperformance of growth stocks over value stocks appears to level off when equities outperform bonds at extreme levels.

The relationship between the monthly performance difference between the S&P500 Barra Growth / Value indices and the monthly performance difference between S&P500 / US 30 year bonds can be expressed in a regression equation as:
Growth – Value = -0.09% + 0.13 (S&P 500 – U.S. 30 year Bonds)

The relationship is statistically significant at the 5% level with the regression coefficient significant with a t-statistic of 3.72. The systematic relationship between the relative performance of equities versus bonds and growth versus value stocks confirms that changes in investors risk preferences are a driving force behind relative performance between value and growth stocks.

FIGURE 2 **Relative performance between S&P500 and US bond vs relative performance between S&P500 barra growth and value stocks (Dec 1980 – March 2001)**

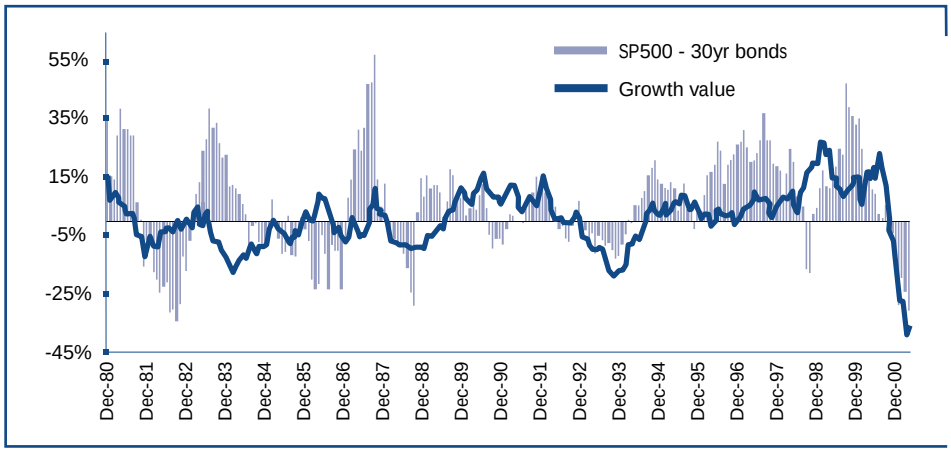
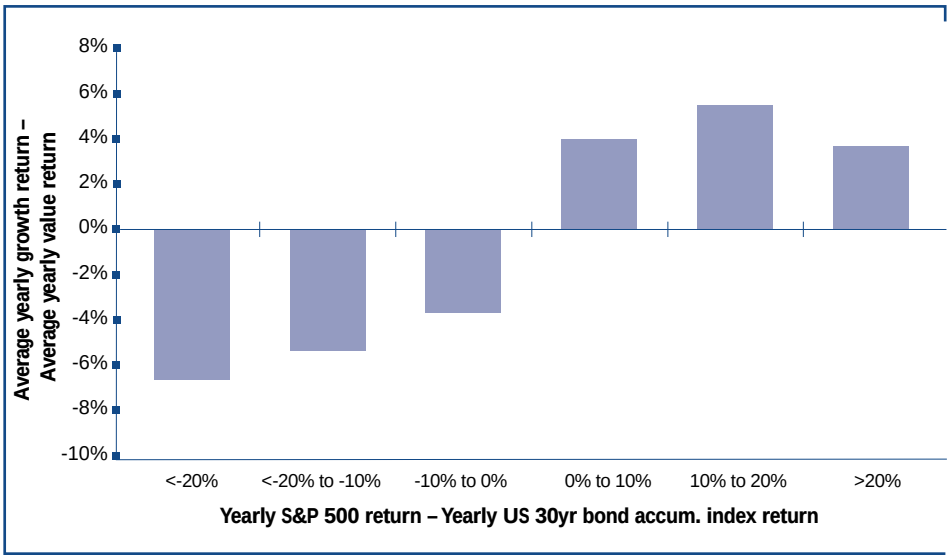


FIGURE 3 **Average relative performance between growth and value and relative performance between equities and bonds (Dec 1980–March 2001)**



IMPLICATIONS

The cost of equity capital

The CAPM have been criticised for not being able to explain various market anomalies, including the P/B and the firm size effect. Long-term studies have shown that value stocks and small capitalisation stocks tend to outperform growth stocks and large capitalisation stocks respectively inconsistent with the implications of the CAPM.

Since these anomalies could not be explained using the CAPM framework, many researchers have argued that the cost of capital should include these factors since they may be proxies for unknown risk factors that the market may be pricing. Hence, the following three-factor equity cost of capital has been proposed in academic literature[6]:

$$ER = R_f + b_{Mkt}ERP + b_vV + b_{Sz}Sz$$

Where:
ER = equity cost of capital or expected return
R_f = Risk-free rate
b_{Mkt} = Market risk premium beta, which is the original CAPM beta
ERP = Equity risk premium
b_v = Value premium beta
V = Value premium
b_{Sz} = Size premium beta
Sz = Size premium

Fama and French (1995) proposed that the value premium in particular has been said to proxy for firms experiencing more distress conditions. They found that growth stocks have on average higher return on equity (ROE) than value stocks for four years before and at least five years after portfolio formation.

Hence, if profitability proxies for risk related to financial distress they suggest that the valuations should include a distress factor which cannot be explained by the CAPM.

While there is no disagreement that some value stocks may be distressed which results in falling share prices, other value stocks trade at a lower P/B because they are operating in a mature industry that has lower opportunities for growth. For example, the Utilities industry is more mature than many of the new technology companies and will thus have lower growth prospects but have more stable earnings.

Further, this article has shown that the changes to the investors risk preferences as measured by the changes in the equity risk premium drives both the relative performances of equities versus bonds and growth versus value stocks over time. Hence, the value factor proposed in the three-factor cost of capital model should capture similar information to the equity risk premium factor.

So why do value stocks seem to outperform growth stocks on a risk adjusted basis in past studies which has led to many researchers proposing a value factor in the cost of capital calculations?

Although past studies examined value and growth stocks over a long time period they are nonetheless time period specific. For example, if we examine the 15-year period between December 1975 and December 1990 the average yearly performance difference between S&P 500 Barra Value and S&P 500 Barra Growth indices was 3.5% per annum.

This result is similar to several other studies that document the value premium over this 25-year time period [7]. Further, as expected from the theoretical foundations section, value stocks outperformed with less risk (standard deviation of yearly returns = 15%) compared to growth stocks (standard deviation of yearly returns = 18%).

However, if we updated the performance data to the most recent years the results appear to have changed. Between the period December 1975 and March 2001 (25 years and 3 months) value stocks on average outperformed growth stocks by 0.6% per annum.

Value stocks still had less risk (14% standard deviation) than growth stocks (17% standard deviation). The value premium shrunk from 3.5% to 0.6% per annum due to the strong performance of growth stocks in the 1990s. This was the result of the equity risk premium shrinking in the 1990s, which was evident by the strong outperformance of equities over bonds over this time period (see Figure 2).

Including the recent performance data it appears that the value premium may be disappearing. However, it is still puzzling that high beta growth stocks did not outperform low beta value stocks in a time period when equities, a riskier asset class, have outperformed bonds.

One may speculate that in the future, growth stocks will continue to outperform value stocks and may create a growth premium consistent with the CAPM whereby high beta stocks should have higher returns than low beta stocks.

However, there is potentially another factor besides changes in the equity risk premium that may affect the relative performance between value and growth stocks. This factor is systematic underestimation of earnings growth for value stocks and overestimation of earnings growth for growth stocks.

Consequently, value stocks will tend to have more positive earnings surprises while growth stocks tend to have more negative earnings surprises [8]. Hence, forecasted earnings should be adjusted, not the cost of equity capital, to reflect the inherent forecast bias the market places on growth and value stocks.

Discounted cash flow model

Given that the DCF model is the leading choice of valuation techniques among professional investors it is important that all the inputs of the model are fully understood and measured appropriately[9].

In the same way that forecasted earnings growth in the next three to five years may be different compared to long-term earnings growth, the equity risk premium in the near term may be different to the long-term equity risk premium.

However, given the difficulty in forecasting the equity risk premium in the near term, market practitioners often keep it constant as the historical long run equity risk premium. If the equity risk premium is assumed to be constant the DCF models can only differentiate growth and value stocks through the earnings growth component of the valuation.

However, this assumption essentially ignores the stock's beta and any changes in the equity risk premium. Hence DCF models will have difficulty in valuing internet or technology stocks as occurred in the late 1990s when the performance of these growth stocks skyrocketed but then came crashing down in 2000.

This time period offered a unique and clear example of how changes in investors risk preferences affect the performance of financial markets. Before the technology crash, when a prolonged period of strong economic growth with benign inflation environment may have made investors less risk averse, growth stocks that had the highest growth prospects but the highest risk profile (high beta) had very rapid price rises.

However, when the market sensed that there might be economic trouble in the future, investors became more risk averse, and subsequently the same type of stocks came crashing down just as quickly.

Blind adherence to historical equity risk premiums may result in faulty estimates since they do not reflect the variation in short to medium term equity risk premiums. Hence incorrect valuations and conclusions may result.

Style rotation or market timing

Since the performance of one investment style is not guaranteed from one time period to another (see Figure 1), style rotation strategies have been proposed to enhance portfolio returns. This strategy involves switching investments from either value or growth stocks in anticipation that the style chosen will outperform the market as a whole.

This article has highlighted that the relative performance cycle between value versus growth stocks and equities versus bonds is linked by changes in the equity risk premium. Therefore, style rotation strategies are similar to market timing strategies between equities and bonds whereby both

strategies attempt to anticipate changes in the market risk preferences. Various market signals have been used to anticipate changes in the equity risk premium and one that is highlighted by Jensen, Johnson and Mercer (1998) is monetary policy decisions. They investigated the consistency of the value premium across monetary policy conditions and found that value investing provides significant (generally insignificant) returns when the Federal Reserve is following an expansive (restrictive) monetary policy.

Their results highlight that the relative performance of value and growth stocks coincide with changes in the equity risk premium. That is, investors risk aversion tends to be higher (leading to the outperformance of value stocks) when the economy is slowing. During these time periods the Federal Reserve will typically have expansionary policies.

CONCLUSION

This paper shows that complicated valuation models are not required to explain the valuation differences and hence the relative performance between value and growth stocks. By understanding that the equity risk premium is dynamic, the DCF models can be used to explain the performance differentials between value and growth stocks.

Failure to understand the dynamic nature of the equity risk premium can lead to valuations that may seem overvalued or undervalued relative to the market, when in fact the valuations may be fairly priced. This paper also highlights the importance of changes to the equity risk premium in style rotation strategies.

Further given that the relative performance between value and growth stocks are linked to changes in the equity risk premium it makes no sense that the value premium anomaly discovered by researchers should be included in the cost of equity capital calculations. The value premium anomaly is probably more likely due to other factors such as the systematic earnings forecast bias the market places on value and growth stocks.

REFERENCES

Capaul, C., Rowley, I., and Sharpe, W.F., Jan-Feb 1993, *"International Value and Growth Stock Returns,"* Financial Analyst Journal.

Bernard, V., Thomas, J., and Whalen J., 14, 1997, *"Accounting-Based Stock Price Anomalies: Separating Market Inefficiencies From Research Design Flaws,"* Contemporary Accounting Research.

Fama, E.F. and French, K.R., June 1992, *"The Cross-Section of Expected Stock Returns"* Journal of Finance.

Fama, E.F. and French, K.R., 1993, 33, *"Common Risk Factors in the Returns on Stocks and Bonds"* Journal of Financial Economics

Fama, E.F. and French, K.R., March 1995, *"Size and Book-to-Market Factors in Earnings and Returns"* Journal of Finance.

Fama, E.F. and French, K.R., December 1996, *"The CAPM is Wanted, Dead or Alive"* Journal of Finance.

Fuller, R., Huberts, L., Levinson, M., Winter 1993, *"Returns to E/P Strategies, Higgledy-Piggledy Growth, Analysts' Forecast Errors, and Omitted Risk Factors,"* Journal of Portfolio Management.

Harris, R.S. and Marston, F.C., Sep-Oct 1994, *"Value versus Growth Stocks: Book-to-Market, Growth, and Beta,"* Financial Analyst Journal.

Jensen, G.R., Johnson, R.R., and Mercer, J.M., Winter 1998, *"The Inconsistency of Small-Firm and Value Stock Premiums"*, Journal of Portfolio Management.

LaPorta, R., Lackonishock, J., Shleifer,A., and Vishny, R., 52, 1997, *"Good News for Value Stocks: Further Evidence on Market Efficiency"* Journal of Finance.

Rosenberg, B., Reid, K., and Lanstein, R., Spring 1985, *"Persuasive Evidence of Market Inefficiency,"* Journal of Portfolio Management.

NOTES

1 Growth (value) stocks typically have higher (lower) Price/Book value of equity, Price/Sales, Price/Earnings, and Price/Cash Flow ratios.

2 Fuller, Huberts and Levinson (1993) provide evidence that high PE stocks do in fact have higher future earnings growth rates than low PE stocks but they tend to mean revert after a period of a few years.

3 The relationship between risk and growth is empirically supported by studies such as Capaul, Rowley and Sharpe (1993) and Harris and Marston (1994) that document growth stocks typically have higher historic betas than value stocks

4 Apart from Australia not having a long history of data, the introduction of dividend imputation in 1987 complicates the relationship between the changes in the equity cost of capital and the relative performance of equities versus bonds and growth versus value stocks.

5 The S&P500 Barra Value and Growth indexes are created ranking the stocks by price to book market value of equity (P/B) and dividing the sample in half. See www.barra.com/research for further details.

6 The debate on whether the size premium should be included in the cost of equity capital is not discussed in this article.

7 This time period covers most of the time period analysed in several academic studies that documented the value premium phenomenon published in the late 1980s and 1990s such as Rosenberg, Reid and Lanstein (1985) and Fama and French (1992, 1993, 1995, 1996).

8 See La Porta, Lackonishok, Shleifer and Vishny (1997) and Bernard, Thomas and Whalen (1997).

9 More than 60% of Australian equity fund managers used the discounted cash flow model according to Macquarie Research Equities 3rd Poll of Institutional Investor's Stock Selection Criteria 2000. J