MSCI Barra RESEARCH BULLETIN

Value-Growth Dynamics in Interest Rate Cycles | May 2008

Overview

A slowing economy has renewed interest in the impact of interest rates, inflation, and monetary policy on equity markets. Intuitively, a case can be made that growth stocks (stocks whose cash flows are further out in the future) should be more sensitive to interest rates than their value counterparts. Showing that they are, however, is by no means a straightforward task given the difficulties with empirical time series tests of this type.

In this article, we look at whether growth stocks truly are more interest-rate sensitive, or "long-duration," than value stocks. Recent papers (see Campbell and Vuolteenaho (2004) and Lettau and Wachter (2005))[1] suggest that growth stocks do co-vary more with interest rates (specifically, the theoretical discount rate) while value stocks co-vary more with shocks to cash flows. We provide insight here into the interest rate sensitivity of the MSCI Value and Growth Indices and their underlying drivers using the Barra style factors. We find that between 1985 and 2008 the MSCI USA Growth Index did have longer duration than the MSCI USA Value Index, and that this sensitivity was linked to a number of stock-level growth-related attributes including historical and predicted growth in earnings, recent earnings changes, and book-to-price. Overall, in declining rate periods, growth stocks generally have earned a substantial premium over their value counterparts when other factors are controlled for.

Equity Duration

Duration (sensitivity to interest rates) is a term normally confined to the world of fixed income. But for many decades, the notion of equity duration has floated around in the literature. The idea is that stocks whose cash flows are further out in the future should be more sensitive to interest rates. There are a variety of ways to measure equity duration but the basic form is based on the Dividend-Discount Model and was first proposed by Casabona, Fabozzi, and Francis (1984)[2]. Here, the duration of a stock is expressed as:

$$Duration = -\frac{\partial P / P}{\partial k} = \frac{1}{k - g} \qquad (1)$$

where

$P =$ stock price

$k =$ discount rate (i.e., interest rate for our purposes)

$g =$ firm's growth rate

Duration is simply the negative of the change in price given a small change in the discount rate. This discount rate, not to be confused with the Fed discount rate, is the rate of return required by investors and represents the time value of money. The higher the growth rate of future cash flows, the longer the duration of the stock. Any stock attribute which captures higher growth in the future (or just as importantly, "perceived" higher growth), including P/E, low BTP, historical earnings growth, forecast earnings growth, etc., will likely have some relationship to duration.

[1] Campbell, John, and Tuomo Vuolteenaho (2004), "Bad Beta, Good Beta," *American Economic Review*, American Economic Association, Vol. 94(5), pages 1249-1275, December.
Lettau, Martin, and Jessica Wachter (2005), "Why is Long-Horizon Equity Less Risky? A Duration-Based Explanation of the Value Premium," CEPR Discussion Paper No. 4921.

[2] Casabona, Patrick, Frank Fabozzi, and Jack Francis (1984), "How to Apply Duration to Equity Analysis," *The Journal of Portfolio Management*, Winter 1984.

Also, we can imagine that stocks that pay little-to-zero current dividends are also likely to be longer in duration since evidence has shown that fast-growing stocks do tend to pay less current dividends.

Indexes and Interest Rates: MSCI USA Growth Index versus MSCI USA Value Index

The MSCI USA Growth and Value Indices are constructed using a methodology based on z-scores for individual stocks. Value characteristics are captured by three variables: book-to-price, 12-month forward earnings to price, and dividend yield. Growth characteristics encompass five variables: long-term forward earnings per share growth, short-term forward EPS growth, current internal growth, long-term historical EPS growth, and long-term historical sales per share growth.

To measure sensitivity to interest rates, we could simply regress the index returns on interest rate changes. However, these types of time-series regressions are notoriously noisy and fraught with estimation issues.[3] Here, we keep things simple and divide up interest rate regimes since 1985 into stable periods and those with moderate-to-aggressive rate changes and compare the factor volatilities. The classification of interest rate regimes is the key here. The results vary depending on the interest rate series we use to define regimes. In Table 1, we show the results using the federal funds rate adjusted for inflation.[4] Details on the regimes are in the Appendix.[5]

Table 1: MSCI USA Growth and Value Index Performance in Different Real Interest Rate Regimes, January 1985 to March 2008
(Annualized Returns)

	MSCI USA Growth Index	MSCI USA Value Index
Stable	14.89%	15.11%
Increasing	15.79%	16.32%
Decreasing	2.18%	0.22%

Table 1 shows the average annualized returns to the MSCI USA Value and Growth Indices for our different real rate regimes. The three regimes shown are non-overlapping and include all months from January 1985 to March 2008. If growth stocks are more interest-rate sensitive, we would expect the MSCI USA Growth Index to earn higher returns than the MSCI USA Value Index in decreasing rate periods and lower returns in increasing rate periods. This is in fact what we do see. Falling rates are favorable for stocks with strong long-term growth potential while rising rates are not.

[3] First, there is the issue of which interest rate series to use (Fed Funds rate, discount rate, 3-month T-bill, 1-month CD, etc.). Second, there is the issue of whether lead-lag relationships are more appropriate to equity-interest rate comovements. Lastly, there is the fundamental problem that duration should capture sensitivity to interest rates, everything else held constant. Using a simple linear regression, it is extremely difficult to separate out the effects of other drivers of equity returns.

[4] We use the 12-month change in the Consumer Price Index (including Food and Energy) to proxy for inflation here.

[5] In a previous MSCI Barra Research bulletin, "Rate Cuts and Factor Returns" (March 2008), we focused solely on the two previous instances of aggressive rate-cutting: 9/18/2007 to 3/18/2008 and 12/31/2000 to 12/31/2001. There, we examined the performance of all the style factors and found that Earnings Yield and (Dividend) Yield performed relatively well in both periods. Our definition of interest rate regimes here is only slightly different in this article.

Drivers of Interest-Rate Sensitivity: Which Style Factors in USE3?

Next, we ask whether we can see at a more granular level which factors are driving the overall sensitivity of the MSCI USA Growth Index to interest rates. Growth attributes are captured by different factors in the Barra U.S. equity (USE3) risk model. The benefit of decomposing sources of return by factor model is that we can more clearly identify which stock attributes are driving the long-duration characteristic of the MSCI USA Growth Index relative to Value. In the model, there are 13 style factors, each of which captures a facet of stock returns that comes from an individual attribute (for example, P/E, market cap, trading activity, etc.). The returns to these factors are both net of the market and net of all other attributes, making them well-suited to the task at hand.[6] The relevant factors are:

1) **Growth:** The Growth factor captures the behavior of stocks that have higher than average five-year payouts, total asset and earnings growth, predicted earnings growth, recent earnings changes, and variability in capital structure. Stocks with ***positive*** exposure to Growth should be more sensitive to interest rates.

2) **Value:** The Value factor captures the behavior of stocks that have higher than average book-to-price. Stocks with ***negative*** exposure to Value should be more sensitive to interest rates.

3) **Earnings Yield:** The Earnings Yield factor captures the behavior of stocks with higher than average analyst-predicted E/P, trailing annual E/P, and average E/P over the previous 5 years. Stocks with ***negative*** exposure to Earnings Yield should be more sensitive to interest rates.

4) **Yield:** The Yield factor captures the behavior of stocks with higher than average predicted dividend yield.[7] Stocks with ***negative*** exposure to Yield should be more sensitive to interest rates.

The first attribute is straightforward—firms experiencing fast-growing earnings are growth stocks. The second two attributes, which capture BTP and E/P, have a somewhat different interpretation. Here, investors appear to be valuing future cash flows. BTP captures perceived growth with respect to a firm's current book value whereas E/P captures perceived growth with respect to the last year's earnings. Stocks perceived by investors to be fast-growing will have low BTP and low E/P; or conversely high PTB and high P/E. The fourth attribute, dividend yield, is indirectly linked to growth. It is widely observed that many growth stocks forgo paying dividends for some period of time.

Table 2 shows the current exposures of the MSCI USA Growth and Value Indices to the four factors named above.

Table 2: Exposures of the MSCI USA Growth and Value Indices to Barra Style Factors, May 2008

	Growth	Value	Earnings Yield	Yield
MSCI USA Growth Index	0.24	-0.29	-0.22	-0.46
MSCI USA Value Index	-0.28	0.33	0.27	0.51

[6] Previous empirical studies of duration take one of several approaches. One approach is based on the Fama-French method and assesses the risks of decile-sorted portfolios based on Book-to-Market, Price-to-Dividend, and other characteristics reflecting "growth" stocks. A second approach tries to directly measure equity duration such as the empirical method in Leibowitz (1986)'s seminal paper. Leibowitz, Martin (1986), "Total Portfolio Duration: A New Perspective on Asset Allocation," *Financial Analysts Journal*, Sept-Oct 1986.

[7] Predicted dividend yield is estimated using a stock's past history of dividends and its market price behavior.

The MSCI USA Growth Index has had on average a positive exposure to the Barra Growth factor, and negative exposure to Value, Earnings Yield, and Yield. Conversely, the MSCI USA Value Index has had a negative exposure to Growth, and a positive exposure to the other three factors. Table 3 shows the returns to these factors using the same interest rate periods we defined earlier. Our aim is to understand which, if not all, of the factors help explain the MSCI USA Growth Index premium over Value in falling rate regimes, and discount in rising rate regimes.

Table 3: Factor Returns in Different Real Rate Regimes, January 1985 to March 2008
(*Annualized Returns)*

	Growth	Value	Earnings Yield	Yield
Stable	-1.17%	0.10%	3.94%	-1.34%
Increasing	-2.34%	1.49%	3.77%	-1.29%
Decreasing	-0.34%	-0.42%	4.84%	-0.14%

The premium earned by the MSCI USA Growth Index over the MSCI USA Value Index in falling interest rate regimes seems to be driven by only two of the Barra factors—Value and (Dividend) Yield. It is ***not*** driven by Growth or Earnings Yield (if it did, these return in Table 3 would be positive and negative, respectively.)[8] On the other hand, when interest rates are rising, the MSCI USA Growth Index's poor performance relative to Value ***is*** linked to Earnings Yield as well as Growth and Value, but not to Yield. The asymmetry in how these factors behave in rising versus falling rates deserves further investigation and may be important in shedding light on how attributes of growth versus value stocks are priced by investors.

Summary

We have merely scratched the surface with respect to how equities behave in different interest rate cycles. For instance, recent papers have found evidence that while interest-rate sensitive stocks are riskier (have higher total volatility and higher market beta), their premium is actually negative compared to their short duration counterparts.[9] This new "equity duration paradox" is one more asset pricing puzzle to be explained. Understanding how interest rates affect stock-level equities has become relevant not just for plans matching assets to their liabilities but also for equity managers.

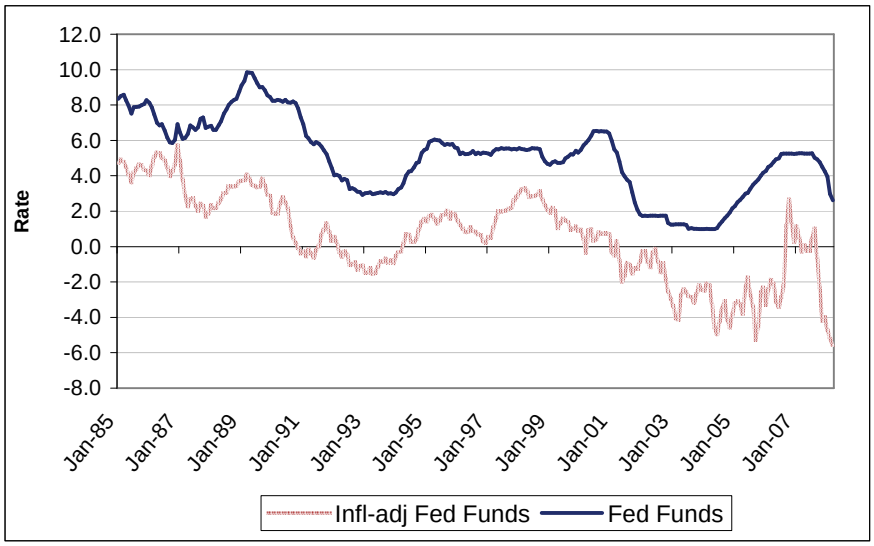
[8] Table 3 shows that stocks with higher than average E/P (i.e., value stocks by one measure) earned significant returns in excess of the market during the period shown. However, the contribution of this source of return to the relative performance of the MSCI USA Growth and Value Indices was not enough to make the latter outpace the former overall. In other words, the contribution to both index returns from Earnings Yield was outweighed by the contributions to return from other factors.

[9] For example, see DeChow, Patricia, Richard Sloan, and Mark Soliman (2004), "Implied Equity Duration: A New Measure of Equity Security Risk," *Review of Accounting Studies*, Vol. 9, No. 2-3, pp. 197-228.

Appendix

Interest rate regimes can be classified in numerous ways. Figure 1 shows the evolution of a number of rates over time.

Figure 1: Evolution of Interest Rates in the U.S., January 1985 – March 2008



Using real versus nominal interest rates can have a significant impact since inflation has been shown to behave quite differently in increasing versus decreasing rate periods. Empirical evidence suggests that in decreasing rate cycles, inflation tends to be subdued whereas it tends to rise when rates are rising thus dampening the actual interest rate change measured in real terms. Table A1 shows the classification of interest rate regimes we use in this article.

Table A2: Classification of Interest Rate Regimes (Real)

	Type	Beginning Adj. Rate	Ending Adj. Rate	Change in Adj. Rate
December 1986 - November 1987	Decreasing	5.17	1.69	-3.48
March 1988 - March 1989	Increasing	2.18	4.05	1.87
September 1989 - January 1993	Decreasing	3.82	-1.48	-5.30
May 1993 - December 1994	Increasing	-1.50	1.55	3.05
December 1996 - March 1998	Increasing	0.19	3.29	3.10
December 2000 - March 2002	Decreasing	0.70	-0.87	-1.57
January 2006 - October 2006	Increasing	-3.31	2.65	5.96
August 2007 - March 2008	Decreasing	1.00	-5.56	-6.56

Data: Federal Funds Effective Rate, Source: Federal Reserve Bank of New York

Data: CPI (Consumer Price Index for All Urban Consumers: All Items, Seasonally adjusted, Series = CPIAUCSL), Source: Bureau of Labour Statistics

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