

Equity Investing in a Rising Rate Environment



2017

“Interest rates are to asset prices as gravity is to the apple. When there are low interest rates, there is a very low gravitational pull on asset prices”

-Warren Buffett

The United States has not experienced a prolonged period of rising interest rates in a long time. In the early 1980s, under Federal Reserve Chairman Paul Volcker's watch, the Fed Funds rate peaked at 20%. Treasury rates followed suit, and remained elevated throughout most of Volcker's tenure, which ended in August 1987 when Alan Greenspan took the reins. In the three decades since, the US experienced a protracted period of falling, and eventually ultra-low rates.

Chart 1: 10-Year Treasury Note (% yield)
12/31/1962 – 12/31/2016, Monthly



Unlike Warren Buffett, whose first investment partnership formed in 1956, many contemporary investors have little-to-no experience investing during periods of rising and/or elevated interest rates. In view of this, we thought a research piece addressing the topic would be a useful learning exercise—particularly given the Federal Reserve's recent rate hike and indications for more of the same. Our paper will consider various interest rate conditions of the past 50+ years and explore the equity market's behavior during the different environments.

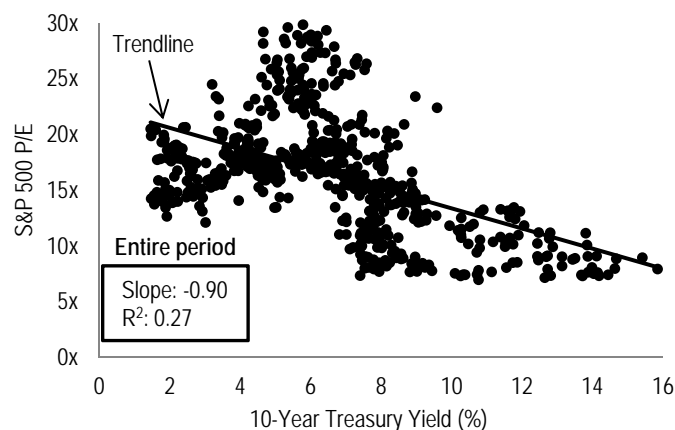
Importantly, we are not in the business of predicting future interest rates. When making an investment, we consider various interest rate scenarios but do not base our investment thesis on a prediction of the future interest rate environment. For example, we have several positions in securities that would benefit from a rise in interest rates but represent attractive investments even if rates remain low. This paper should not be interpreted as an

interest rate prophecy but rather an empirical study of equity behavior in various interest rate environments.

It's all relative

Most people find thinking in relative terms is easier than thinking in absolute terms. For example, imagine a subscription to your favorite periodical costs \$100 for the print version, \$100 for the digital version, or \$100 for both the print and digital versions. It may be difficult to determine whether any of these options are worth \$100. It is easy to determine, however, that the third option is superior *relative* to the first two options. The clever architects of such pricing proposals understand this, and hope the presence of a superior *relative* option is enough to entice a purchase. Similarly, it may be difficult to determine whether a stock with an earnings yield¹ of 10% (i.e. P/E of 10x) is an attractive investment. The answer is almost certainly “no” if a risk-free bond is available at 20% and more likely “yes” if it yields 2%. A logical person, therefore, would surmise that stocks should trade at higher price multiples in low rate environments than in high rate environments. Chart 2 tests this claim empirically, and indeed does identify a negative relationship between interest rates and stock multiples historically.

Chart 2: Regression of S&P 500 P/E ratio and 10-Yr Tr Yield
12/31/1962 – 12/31/2016, Monthly



¹ Inverse of the price-to-earnings ratio, or E/P

For those of us a little rusty on statistical analysis, the slope measures the *direction* of the relationship and the R² measures the *strength* of the relationship. The -0.90 slope from Chart 2 indicates that for a 1% decrease in the Treasury yield, the multiple on the S&P 500 increases by an average of 0.9x. The R² of 0.27 from Chart 2 indicates that 27% of the change in the S&P 500's P/E ratio is explained by the change in the treasury yield. The low R² is surprising—the relationship between price multiples and interest rates is weaker than we expected. Many factors besides interest rates influence stocks of course, but interest rates are an important one. When we segment the 50+ year period from Chart 2 into various interest rate regimes, however, we observe more powerful results.

Dissecting history into three periods

Chart 3 segments historical interest rates into three different periods. Period 1 represents a period of rising rates, Period 2 falling rates, and Period 3 ultra-low (and still falling) rates.

Chart 3: 10-Year Treasury Note (% yield)
12/31/1962 – 12/31/2016, Monthly

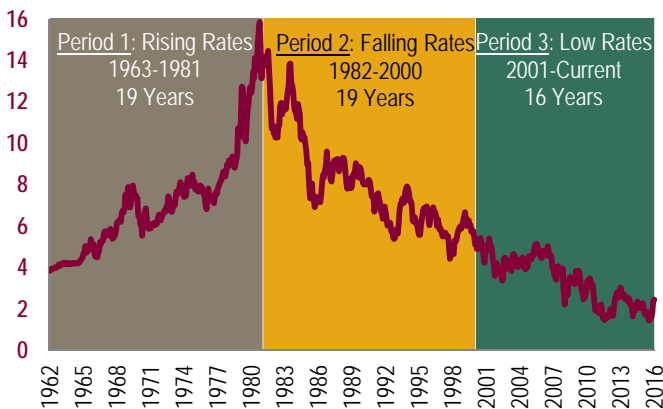
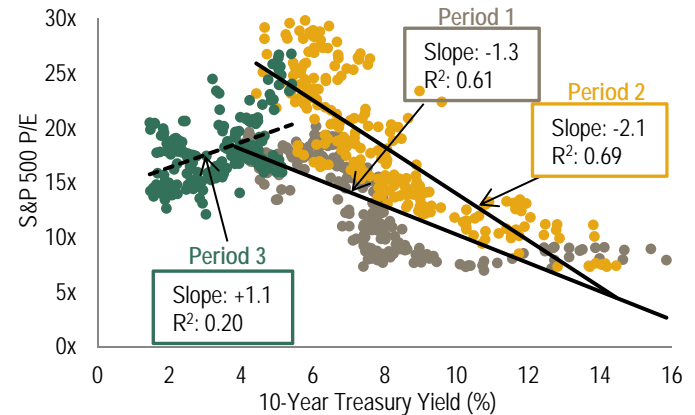


Chart 4 is the identical regression from Chart 2, but segmented into these three periods. In both Period 1 (rising rates) and Period 2 (falling rates), we observe a relatively strong negative relationship between interest rates and equity valuations, as we expect. When rates are high, investors are less willing to pay high multiples for stocks, and vice-versa. This relationship breaks down in Period 3, however, during the ultra-low rate environment. During this period, the slope is actually positive but the low R² suggests a very weak relationship (i.e. nearly random). It appears as though once interest rates fall below a certain threshold, further changes have little effect on equity valuations.

Chart 4: Regression of S&P 500 P/E ratio and 10-Yr Tr Yield
12/31/1962 – 12/31/2016, Monthly



Charts 5, 6, and 7 are line charts comparing interest rates and earnings multiples for each of the three periods. These charts may make it easier to see the negative relationship in Periods 1 and 2, and the lack of a relationship during period 3.

Past performance is not a guarantee or a reliable indicator of future results.

Chart 5: S&P 500 P/E and 10-Yr Tr Yield
12/31/1962 – 12/31/1981, Monthly

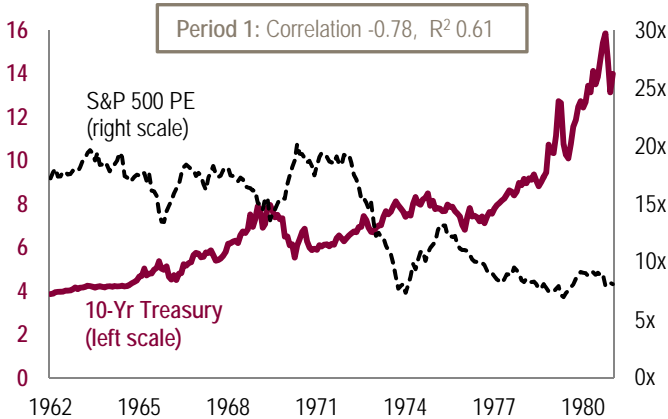


Chart 6: S&P 500 P/E and 10-Yr Tr Yield
12/31/1981 – 12/31/2000, Monthly

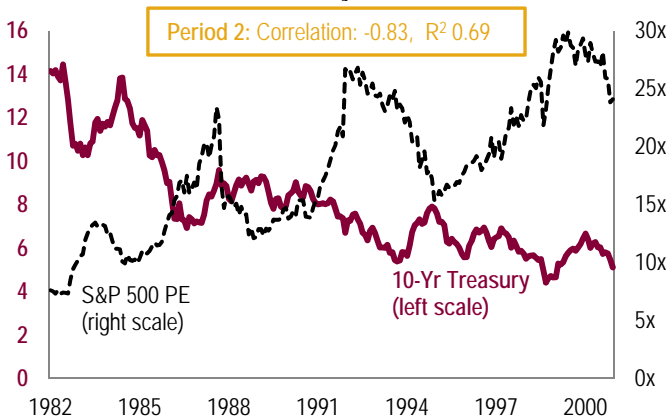
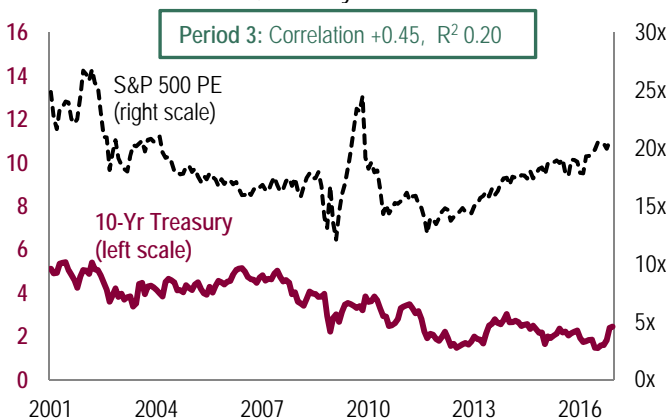


Chart 7: S&P 500 P/E and 10-Yr Tr Yield
12/31/2000 – 12/31/2016, Monthly



It is not clear why the negative relationship between equity price multiples and interest rates broke down in Period 3 (Chart 7). As previously noted, interest rates are not the only factor that drive price multiples. The underlying economic environment, investor risk appetite, valuation of real assets, the geopolitical landscape,

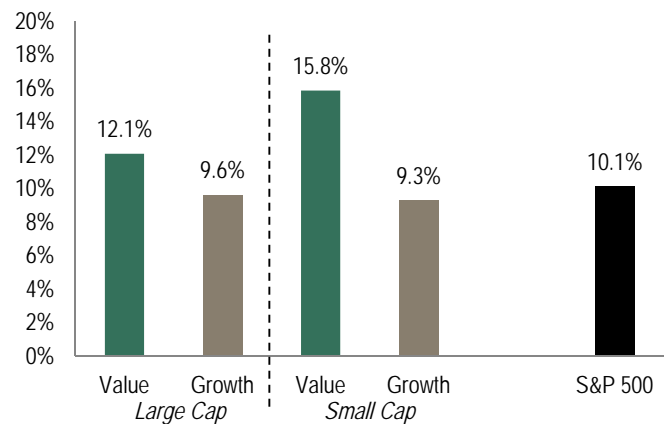
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and a host of other, often interrelated factors each affect equity valuations. Period 3 encompasses the tech bubble burst and the financial crisis—both had palpable influences on equity valuations. Additionally, the moves from 4% to 14% (Period 1) and from 14% to 5% (Period 2) dwarf the move from 5% to 2.5% (Period 3). Throughout most of history, however, there appears to be a relatively strong inverse relationship between interest rates and equity valuations. We will now explore this relationship further by evaluating how specific segments of the equity market behave during different interest rate environments.

Growth, value, large, and small

To evaluate behavior by size and style going back more than 50 years, we will use the Fama/French benchmark returns². The data series' have longer histories than popular contemporary indexes like Russell or MSCI. Chart 8 shows the performance of four indexes compared to the S&P 500 going back to 1962. As famously observed by Professors Eugene Fama and Kenneth French, small cap has outperformed large cap and value has outperformed growth.

Chart 8: Annualized Performance
12/31/1962 – 12/31/2016



Charts 9, 10, and 11 depict annualized performance for these benchmarks segmented into the same three periods used in our prior analysis.

² The Fama/French benchmark portfolios are rebalanced quarterly using two independent sorts, on size (market equity, ME) and book-to-market (the ratio of book equity to market equity, BE/ME). The size breakpoint (which determines the buy range for the Small and Big portfolios) is the median NYSE market equity. The BE/ME breakpoints (which determine the buy range for the Growth, Neutral, and Value portfolios) are the 30th and 70th NYSE percentiles.

Chart 9: Annualized Performance - Period 1 (Rising Rates)
12/31/1962 – 12/31/1981

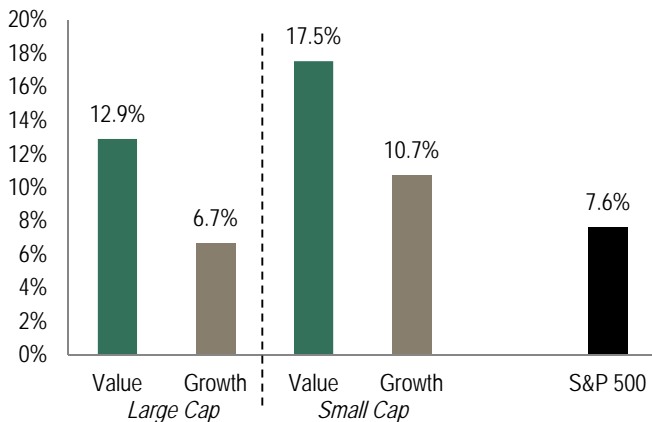


Chart 12: Annualized Performance – All Rising Rate Months
12/31/1962 – 12/31/2016

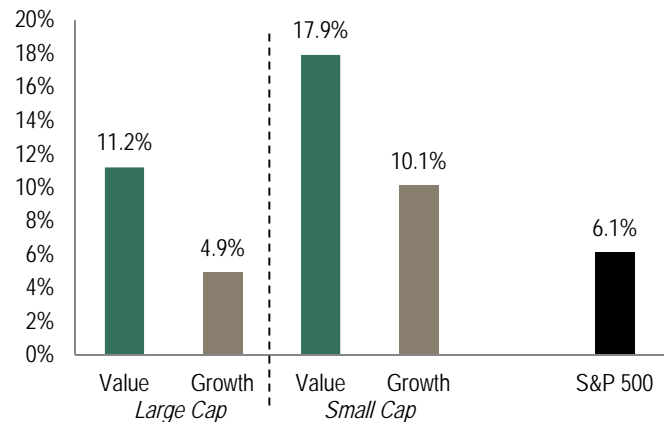


Chart 10: Annualized Performance - Period 2 (Falling Rates)
12/31/1981 – 12/31/2000

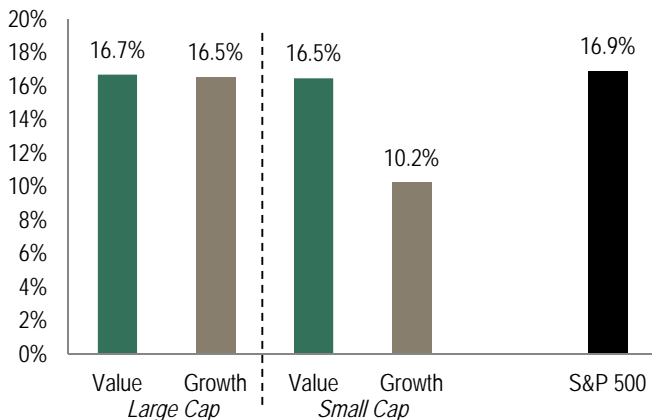


Chart 13: Annualized Performance – All Falling Rate Months
12/31/1962 – 12/31/2016

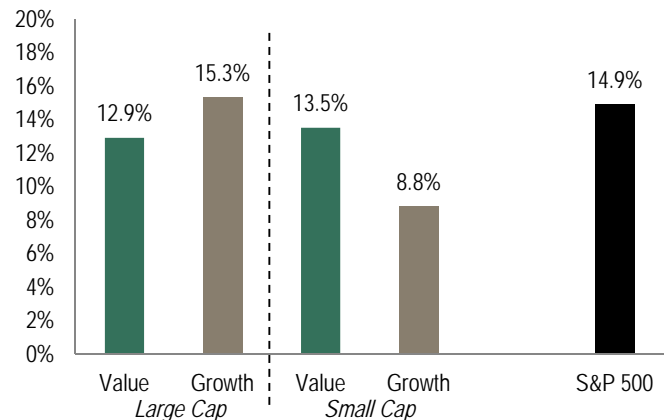
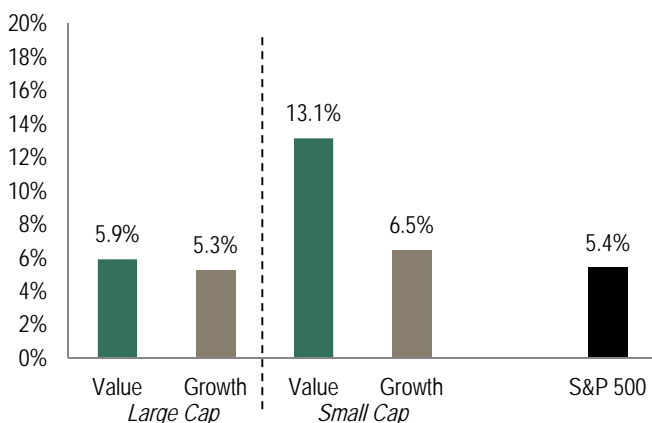


Chart 11: Annualized Performance - Period 3 (Low Rates)
12/31/2000 – 12/31/2016



It is debatable which methodology is superior (Charts 9-11 or Charts 12-13) but the chief observations are the same either way:

1. Equities as a group performed better when rates were falling.
2. Value outperformed Growth when rates rose.
3. Small Value outperformed Small Growth irrespective of the interest rate environment.

We have already explored the idea that equities should receive a boost when interest rates fall, and vice-versa. Why, though, does value appear to outperform growth when interest rates rise? Our theory is equity duration.

Duration for equities?

In the fixed income world, duration is a closely followed risk metric that approximates a bond's price sensitivity to changes in interest rates. The sooner a bond pays back an investor the shorter the bond's duration, everything else equal. Chart 14

Rather than grouping the performance into Periods 1, 2, and 3, Charts 12 and 13 segment the entire 50+ year period into two groups: 1) All months when interest rates rose, and 2) All months when interest rates fell.

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depicts two hypothetical 10-year bonds. Bond A pays a \$10 coupon annually and returns \$100 of principal in year 10; Bond B pays no annual coupon but returns \$260 of principal in year 10. Using an interest rate (i.e. discount rate) of 10%, both of these bonds have a present value of \$100. If the interest rate falls to 8%, the value of both bonds rise but Bond A rises less than Bond B. If the interest rate increases to 12%, the value of both bonds fall but Bond A falls less than Bond B. Bond A has a lower duration than Bond B, and therefore is less sensitive to change in interest rates.

Chart 14: Hypothetical Bond Example

	Bond A		Bond B	
	Coupon	Principal	Coupon	Principal
Year 1	10	0	0	0
Year 2	10	0	0	0
...	10	0	0	0
Year 10	10	100	0	260
<i>NPV @ 10%</i>	100		100	
<i>NPV @ 8%</i>	113		120	
<i>NPV @ 12%</i>	89		84	

Duration is a rarely cited risk when evaluating equities though conceptually it is no different from bonds. A stock that distributes earnings to shareholders sooner has a shorter duration than a stock that distributes earnings further into the future. The former better describes a value stock and the latter a growth stock. Value stocks more often represent established businesses with more modest growth prospects, but that are returning a higher percentage of current/near term cash earnings to shareholders; growth stocks are more often less established businesses with higher growth prospects, but that are reinvesting current/near term cash earnings back into the business. Value investors generally extract cash earnings earlier while growth investors extract cash earnings later. In fact, we could relabel "Bond A" and "Bond B" from Chart 14 to "Value Stock" and "Growth Stock", respectively.

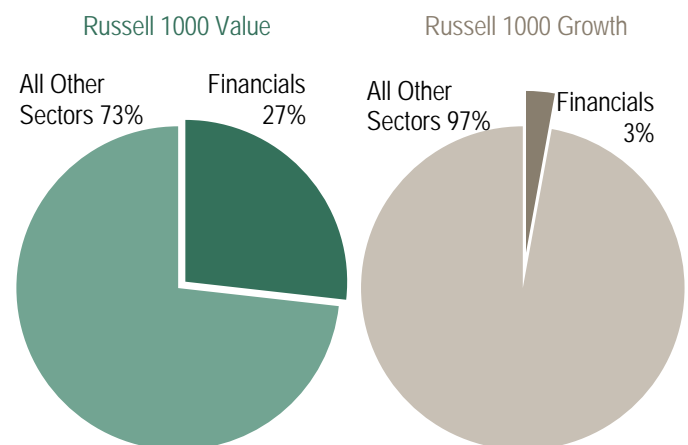
A final thought: The financial sector

When interest rates rise, most sectors face a higher interest expense/higher cost of capital, which impedes earnings. The financial sector is a notable exception, however, as a rise in interest rates often coincides with a boost in earnings. Banks earn net interest income, which is essentially interest received minus interest paid. This spread is relatively tight when rates are low but widens when rates rise. Insurance companies benefit from a rise in rates because they are able to invest the premiums they receive from customers in higher yielding securities. We expected to observe that financials have outperformed the broad

market during rising rate periods and underperformed during falling rate periods but empirical evidence was weak. We attribute this paradox to a considerably different regulatory environment. As an example, the interest charged on loans and the interest paid on deposits was heavily restricted until a series of deregulatory legislation began in the late 1970s. Because interest rates peaked in 1981 and have essentially been in decline since, we do not have a good comparison period to evaluate how deregulated financials have done in a rising rate period.

As we look forward, it is difficult to envision a scenario where interest rates rise and financials underperform the market. This should further benefit value over growth given that financials comprise a larger portion of value portfolios/indices than growth portfolios/indices.

Chart 15: Financial Sector Weight
12/31/2016



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Summary

A rise in interest rates is generally bad for equities because it makes other investment opportunities more compelling on a relative basis, most notably fixed income. However, one must consider the reason rates are rising. If the Fed has decided to increase rates because the economy is strong and at risk of overheating, then corporate earnings are likely to be robust and equities should do fine. If the Fed has decided to increase rates to combat inflationary pressures even though it risks a recession (e.g. late 1970s/early 1980s), then equities are less likely to hold up. Historically, value stocks have outperformed growth stocks in rising rate environments, which we attribute to shorter duration. We are uncertain as to what type of interest rate environment will transpire, but should rates rise, value appears the place to be.

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All investments contain risk and may lose value. Equity securities may have greater risks and price volatility than U.S. Treasuries and bonds, where the price of these securities may decline due to various company, industry and market factors. Investing in value stocks presents the risk that value stocks may fall out of favor with investors and underperform growth stocks during given periods. Investing in small and medium-sized companies involves greater risks than those associated with investing in large company stocks, such as business risk, significant stock price fluctuations and illiquidity. Impact of interest rates on equity markets are subject to uncertainty and may change based on varying factors (market, sector-level, economic, political and etc.).

Chart sources: 1, 3: Bloomberg; 2, 4-7: Bloomberg, S&P; 8-13: Fama/French benchmarks (link is included in the paper); 14: H&W; and 15: Bloomberg, Russell.

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