Value investing and monetary policy

Latest evidence from the US.

Bachelor’s Thesis
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Abstract
This paper's key contribution is to answer whether value stocks can outperform other stocks and create excess returns for investors in an environment where the Federal Reserve exercises contractionary monetary policy to increase interest rates in the US economy. To analyze this, I divide the recent decade into 5 different monetary policy periods during which the federal funds rate has been either rising, falling or staying same. I construct 3 different portfolios based on companies' book-to-market equity ratios and compare the return performance of these portfolios during these different monetary policy periods. The results suggest that value stocks can offer better returns but not without significant increases in portfolio's risk profile.

Keywords value stocks, monetary policy, interest rates
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1 Introduction and research question

The research question of this paper is simple in its nature: Are value stocks a good investment in an environment where interest rates are rising in the US. economy? This is especially relevant question now that interest rates have risen above zero for the first time in a long time and it seems that zero interest rate era has been coming to its end. In order to answer this question, I first have to define what is considered as “good investment”. Here the research question and the following analysis done in this paper boils down to two parts. First, I want to know whether value stocks yield better returns to investors than other stocks that are not considered as value stocks. Second part is to find out if value stocks yield positive abnormal returns after adjusting for risk which these stocks tend to have.

The way I measure the interest rate changes in the US. economy is by looking at the changes in the effective federal funds rate (FFRE), the main monetary policy tool of Federal reserve. Federal funds rate is deeply intertwined with other US. interest rates having substantial effect on all the other interest rates in the US. economy (Bernanke & Reinhart, 2004). Therefore, I might use concepts such as “rising interest rates in the US. economy” and “rising federal funds rate” interchangeably in this paper.

My hypothesis is that value stocks outperform other stocks when interest rates are rising in the economy. The motivation behind this assumption is that market participants on average price equities based on their expectations of future net cash flows discounted to present moment. Therefore, changes in the discount rate or the expected cashflows will change stock prices. When the interest rates are rising in the economy market participants update their discount rates to higher level which results in declining stock prices in general (Willem Thorbecke, 1997). This applies to all stocks, but the price decreasing effect of these rising discount rates should be substantially more pronounced in growth stocks which usually have their expected cash flows far in the future. Conversely value stocks tend to be more mature companies earning positive net cash flows in the present (Fama & French, 2007) making their stock prices more immune to rising discount rates.

The rising interest rates will also increase companies’ cost of capital. Growth companies must often have access to additional capital in order to fund their growth and if this capital becomes more expensive it will have negative effects on their growth, having diminishing
effects on their future net cash flows. This is backed by a finding that monetary shocks have larger effects on small companies than a large ones (Willem Thorbecke, 1997). Again, as a more mature companies, value companies tend not to need additional financing as they are already profitable. Future cashflows are less affected making prices of value stocks more immune to rising interest rates.

As contractionary monetary policy has two ways of affecting stock prices, via expected cashflows and discount rates, I presume value stocks will offer better returns on these contraction-ary monetary policy periods. This presumption seems to be true as portfolios consisting of value stocks outperform other portfolios in both of my time periods when the federal funds rate has been increasing.

When it comes to excess returns my hypothesis is that value stocks do not offer consistent positive excess returns on periods where interest rates are rising. The motivation behind this assumption is that market participants are on average aware of the factors discussed above that have an effect on particular set of stocks (Fama, 1970). Data on interest rates as well as balance sheet items is public information and therefore changes in interest rates should be reflected in the stocks prices before individual investor has time to take advantage of this data when making investment decisions. Markets should be efficient enough that one cannot generate positive excess returns with so simple investment strategy as this is. I don’t observe any statistically significant alphas for the value portfolios during these contractionary monetary policy periods after risk adjustment, so it seems that my hypothesis holds in this regard also.

2 Data

In my research I use all publicly traded securities listed on NYSE and Nasdaq in order to get a sufficient representation of all the US stocks in my sample. My main data source is Datastream Refinitive Eikon. I use Datastream’s data on companies’ total assets, market value and total return index. In order for a firm to be included in the sample it must have data on total assets and market value in Datastream before the starting point of each monetary policy period. In addition, total return index data has to be found on every month during each monetary policy period in order for a company to be included in the sample. Sample size
varies between different monetary policy periods as there is different amount of data available during different time periods.

Original datasets fetched from Datastream have more observations than eventually end up in my sample. This is due to removing companies that have data on all three variables on Datastream but with closer inspection the data includes empty values, zeros, N/A-values and Error-values. Original datasets also include return data and market value data on indices themselves and they are also removed from my sample. Returns are calculated using Datastream total return index which takes dividends into account. I measure the return performance of each portfolio using monthly returns. For more detailed information on variables, see Appendix 1.

Factor data as well as risk free rates are from Kenneth French data library which uses CRSP data on all US securities and one month T-bill rate as a risk-free rate.

3 Methodology

3.1 Monetary policy periods

My research is essentially examining the relationship between monetary policy and stock returns in the US. Even though the Federal Reserve and the Federal Open Market Committee have multiple tools at their disposal when deciding on monetary policy issues I will be looking at just one key tool when defining the direction on which monetary policy is changing. This tool is the effective federal funds rate. There are also other tools such as quantitative easing, forward guidance and yield curve control which are ever more prevalent in today’s monetary policy toolkit (Bernanke, 2020). Thus, it needs to be addressed that more research needs to be done taking into account these other tools as well in order to get more comprehensive picture of the monetary policy state in the US. However, for the purpose of this paper the effective federal funds rate gives sufficient representation of the monetary policy implemented in the US.

In order to measure the stance of monetary policy I divide the recent decade into 5 different monetary policy periods during which federal funds rate has been either rising, falling or
I define 3 different states based on the changes in effective federal funds rate. These states are defined as stable, contractionary and expansionary state. Because these states occur on specific time periods, I refer to them as monetary policy periods.

In the stable periods there are no significant changes in the monetary policy and the effective federal funds rate stays approximately the same. In the expansionary periods the federal funds rate is falling and the federal reserve clearly exercises loose monetary policy. In the contractionary periods the monetary policy is clearly tightening and federal funds rate is increasing.

**Figure 1. Monetary policy periods**

<table>
<thead>
<tr>
<th>Period</th>
<th>t</th>
<th>t+1</th>
<th>%FFER(t)</th>
<th>%FFER(t+1)</th>
<th>Δ</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
<td>26.11.2013 - 26.10.2015</td>
<td></td>
<td>0.08</td>
<td>0.12</td>
<td>0.04</td>
<td>2506</td>
</tr>
<tr>
<td>Contractionary</td>
<td>26.12.2015 - 26.6.2019</td>
<td></td>
<td>0.24</td>
<td>2.38</td>
<td>2.14</td>
<td>2882</td>
</tr>
<tr>
<td>Expansionary</td>
<td>26.08.2019 - 26.03.2020</td>
<td></td>
<td>2.13</td>
<td>0.65</td>
<td>-1.48</td>
<td>3555</td>
</tr>
<tr>
<td>Stable</td>
<td>26.05.2020 - 26.03.2022</td>
<td></td>
<td>0.05</td>
<td>0.2</td>
<td>0.15</td>
<td>3712</td>
</tr>
<tr>
<td>Contractionary</td>
<td>11.04.2022 - 26.09.2022</td>
<td></td>
<td>0.33</td>
<td>2.56</td>
<td>2.23</td>
<td>4938</td>
</tr>
</tbody>
</table>

FFRE being the federal funds effective rate
Δ being the change in FFRE during the monetary policy period

I’m using a total of 5 periods in my research. These periods start at late 2013 and end in 2022 so that there is at least one of each period included in my time series sample. Specific dates chosen for each period are arbitrary in a sense that there are no particular, pre-defined breakpoints in changes of federal funds rate which would trigger the start to each of these periods.

I’m mostly interested in contractionary periods because my goal is to determine if value stocks perform the best when interest rates in the economy are rising. In most cases contractionary monetary policy is one of the key drivers behind rising interest rates in the economy (Sarno & Thornton, 2003), hence the interest in these particular periods. Other periods are used as a control periods. Value stocks indeed have had higher returns in the past (Chen & Zhang, 1998 & Basu, 1977) but this is widely due to increased risk although there are other factors affecting this value premium also. By using stable periods and expansionary periods
as control periods for monetary policy I can distinguish whether possible higher returns on particular group of stocks are due to changes in interest rates or some entirely different factor.

3.2 Book Equity to Market Equity

My analysis follows closely that of (Fama & French 1993). My goal is to construct three different stock portfolios and compare the returns of these portfolios during the different monetary policy periods. One portfolio will be consisting of only value stocks while other portfolio will have only growth stocks in it. The third portfolio will have stocks that are defined neither as a growth stock or a value stock.

In order to determine which stock is a value stock I calculate BE/ME ratios for every stock in the sample before the beginning of each monetary policy period. BE/ME stands for “Book Equity to Market Equity” and it is a ratio between company’s total assets and market capitalization. Besides BE/ME ratio there exists lots of other measurements such as P/E ratio, but I use BE/ME ratio in my research because it is most widely used indicator of stock’s value-growth orientation in the finance literature (Chan & Lakonishok, 2004).

If company has a large balance sheet size relative to its market capitalization it is considered to be a value stock. Conversely stocks with low values on total assets relative to market capitalization are considered to be growth stocks. Other stocks are put into a “middle” category. When referring to value stocks in this paper I specifically mean stocks that have a high BE/ME ratio.

\[
BE/ME = \frac{Total\ Assets_t}{Market\ Capitalization_t}
\]

Where

- Total assets = Sum of all balance sheet items
- Market Capitalization = Share price * Total amount of shares outstanding
- \( t \) = time prior the starting point of a monetary policy period (figure 2, balance sheet data)
3.3 BE/ME Breakpoints

“High” or “low” BE/ME-ratio does not define clearly enough what stocks should be regarded as growth stocks or value stocks. To get clear breakpoints on BE/ME-ratios I sort all the stocks listed on New York Stock Exchange (NYSE) before the start of each monetary policy period. Sorting is done based on stocks’ BE/ME-ratios. I divide the NYSE stocks into three groups based on their ranking at the BE/ME-ratio: top 30%, middle 40% and bottom 30%. Lowest BE/ME observation in the top group will be referred as top breakpoint and highest BE/ME observation in the bottom group will be referred as bottom breakpoint. These breakpoints will be used when allocating stocks to different portfolios for specific monetary policy periods.

The 30/40/30 division is arbitrary meaning that the breakpoints could be for example 25/50/25 or some other combination. However these are the same breakpoints that (FAMA & FRENCH, 1992) use in their paper and I see no reason that other breakpoints would change the results or the interpretations of this paper significantly.

3.4 Portfolio formation

Portfolios are formed by using all publicly listed stocks in NYSE and Nasdaq. Sample size changes between different periods as there is more data available in Datastream on more recent periods. Therefore, on more recent periods more companies fulfill the data requirements to be in the sample. Portfolios are formed once before the start of each monetary period and they hold the same assets throughout the whole period.

For each monetary policy period there will be three portfolios. I will be referencing to these portfolios as value-portfolio, middle-portfolio and growth-portfolio. Return performance of these portfolios, especially the value-portfolio, will be key part of this study. Top breakpoints and bottom breakpoints are used to define which portfolio each stock is allocated in. Before each monetary policy period every stock in the sample that has a BE/ME ratio above top breakpoint is allocated to value-portfolio. Conversely every stock with BE/ME ratio below bottom breakpoint is allocated to growth-portfolio. Rest of the stocks are allocated to middle portfolio.
One should notice there is a time gap between the balance sheet data items and the starting point of monetary policy periods. This is to ensure that market participants are aware of the most recent balance sheet data items so that they can take latest accounting variables into account when making investment decisions. The time gap is at least one quarter but in some periods it can be more. In this context the portfolios’ return performance should be insensitive to the fact whether there is 3, 6, 9 or 12 month gap between accounting data and return data (Basu, 1983). This seems to hold true even though some year-end fiscal reports aren’t made public before April (Alford et al., 1994) which would indicate that one quarter gap in my analysis wouldn’t be enough.

### 3.5 Return calculations

Return calculations are done by using Datastream total return index data between 26.11.2013 and 26.09.2022. Total return index takes into account security’s appreciation in price as well as dividends which are assumed to be invested back into the same security at the ex-dividend date.

\[
RI_t = RI_{t-1} \times \frac{P_t + D}{P_{t-1}}
\]

Where

\( RI_t \) = Return Index on day \( t \)

\( RI_{t-1} \) = Return Index on previous day

\( P_t \) = Share price on day \( t \)

\( P_{t-1} \) = Share price on previous day

\( D \) = Dividend
I use monthly returns in my analysis when comparing the performance of the portfolios. Therefore, the final monthly returns for individual stocks are calculated by dividing the return index value of month $m$ with the return index value one month prior month $m$.

\[ r_{\text{monthly}} = \left( \frac{R_{I_m}}{R_{I_{m-1}}} - 1 \right) \times 100 \]

I use equally weighed portfolios as well as value weighted portfolios in all categories when comparing return performance of the portfolios. I use market capitalizations as weights when calculating value weighted averages for portfolios. The market capitalization data is the same data that is used in calculating BE/ME ratios for individual stocks.
4 Results

4.1 Portfolio returns

At a first glance the results seem to suggest that my hypothesis is true. Value stocks indeed seem to perform better than other stocks in an economy where interest rates are rising. This is due to two observations found in the results. First, the value portfolio has the best returns on both contractionary monetary policy periods when comparing to other equally weighed portfolios. With monthly returns of 1.43% and -1.74% value portfolio is clear winner on both contractionary periods, outperforming the S&P500 index also. Second, on the other monetary policy periods where interest rates are not rising other portfolios outperform the value portfolio.

The latter observation is more important when looking into the relationship of interest rates and return performance of value stocks. If value stocks would outperform other stocks in all periods it would not really tell us anything valuable other than that investors are compensated for more risky investments. However now that we see other portfolios getting better returns in stable and expansionary periods we can start to investigate if there really is a connection between interest rates and value stock returns.

Figure 3. Average monthly portfolio returns on equally weighed portfolios. Best performing portfolio on each period is highlighted.

<table>
<thead>
<tr>
<th></th>
<th>Stable</th>
<th>Contractionary</th>
<th>Expansionary</th>
<th>Stable</th>
<th>Contractionary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>0.0077</td>
<td>0.0143</td>
<td>-0.0346</td>
<td>0.0060</td>
<td>-0.0174</td>
</tr>
<tr>
<td>MIddle</td>
<td>0.0038</td>
<td>0.0094</td>
<td>-0.0336</td>
<td>0.0071</td>
<td>-0.0210</td>
</tr>
<tr>
<td>Growth</td>
<td>0.0177</td>
<td>0.0127</td>
<td>-0.0195</td>
<td>0.0135</td>
<td>-0.0232</td>
</tr>
</tbody>
</table>

When investigating value weighed portfolios, they give us slightly different results than their equally weighed counterparts. Other portfolios still outperform the value portfolio on all non-contractionary periods. However now the value portfolio outperforms other portfolios only on the latest contractionary period instead of both.
4.2 Risk factors and excess returns

This far I have only investigated the sheer return performance of different portfolios in a context of interest rate changes. However, these returns do not take risk into account. This results in a fact that the value portfolios in my analysis can just be inherently riskier, therefore yielding better returns for investors. It can be that monetary policy never had an effect on value stock returns in the first place. To make sure that outperformance of the value portfolios do not result from risk I use Fama-French 3-factor model:

\[
R_{i,t}^e = \alpha_t + \beta_{i,M} R_{M,t} + \beta_{i,SMB} SMB_t + \beta_{i,HML} HML_t + \varepsilon_{i,t}
\]
where $R_{i,t}$ is the monthly return on the value portfolio excess of risk-free rate. Respectively $R_{M,t}$ is the monthly market return excess of risk-free rate. SMB (small minus big) and HML (high minus low) are risk factors capturing size and value premiums of stock returns. Data on all the factors as well as risk free rate is from Kenneth French’s data library.

I use the 3-factor model instead of normal Capital asset pricing model (Sharpe, 1964) because I want the model to capture as much as cross-sectional variation in average stock returns as possible. Of the regressions I run on each monetary policy period I manage to get an average $R^2$ of 0.8153 meaning that the model performs fairly well at taking into account the risk factors affecting returns of the value portfolio across the different monetary policy periods.

My goal is to find out whether value portfolio generates excess returns after risk adjustment. That is why I am generally interested in resulting $\alpha$ after regressing excess returns of the value portfolio on different risk factors. Factor-betas are there simply to capture risk, therefore I’m not really interested in the values of factor specific betas. I perform the regression analysis for value weighed portfolios as well as equally weighed portfolios for each monetary policy period so that there is a total of 10 intercept figures at the end of my analysis.

In accordance with my hypothesis the value portfolio does not generate positive excess returns on contractionary monetary policy periods. On latest contractionary period, both equally and value weighed portfolio generate statistically significant negative alphas, -0.072 and -0.012 respectively. The superior performance of these portfolios is entirely caused by excessive risk and there is actually a negative excess return for the value portfolio. The interpretation of this is that an investor would take on excessive risk compared to the return he would rationally expect to get by investing into this portfolio. This is of course dependent on the assumption that the 3 factors capture the risk correctly (Sharpe, 1964). On the other contractionary period there is a positive and a negative intercept depending on portfolio weighing but they are both statistically insignificant meaning there are no positive abnormal returns in this period either.
Figure 5. Resulting intercepts and their respective p-values after regressing excess returns of the value portfolio on 3 different risk factors. These factors are MRK, SMB and HML. Regressions are performed for each monetary policy period and are done to both equally weighed as well as value weighed portfolios.

<table>
<thead>
<tr>
<th>Equal weighed portfolios</th>
<th>$\alpha$</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
<td>0.003391</td>
<td>0.498</td>
</tr>
<tr>
<td>Contractionary</td>
<td>0.006265</td>
<td>0.2353</td>
</tr>
<tr>
<td>Expansionary</td>
<td>0.01312</td>
<td>0.339</td>
</tr>
<tr>
<td>Stable</td>
<td>0.018528</td>
<td>0.04201*</td>
</tr>
<tr>
<td>Contractionary</td>
<td>-0.07216</td>
<td>0.0443*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value weighed portfolios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
</tr>
<tr>
<td>Contractionary</td>
</tr>
<tr>
<td>Expansionary</td>
</tr>
<tr>
<td>Stable</td>
</tr>
<tr>
<td>Contractionary</td>
</tr>
</tbody>
</table>

The results also extend to stable and expansionary periods. Value portfolio does not generate statistically significant positive excess returns on these periods either. Exception is the one statistically significant positive alpha of 0.0185 on the latter stable period. However, this alpha disappears when portfolio formation changes from equal weights to value weights. The positive alpha is most likely coincidence rather than excessively high value premium. If excessively high value premiums were the real economic factor driving excess returns for the value portfolio, we would see these positive intercepts more than in just one period.
5 Discussion

I could not find strong evidence advocating that value stocks are better investments than other stocks when interest rates are rising in the economy. Although the equally weighed portfolio had the best return performance on both contractionary monetary policy periods this was not the case with the value weighed portfolio. As the results change depending on portfolio weighing one cannot draw strong conclusions about value factor being the sole driver of value stocks’ superior return performance. Seems that the size factor (Fama & French, 1993) also has a significant effect on the outcome, even though not controlled for in this research. This is due to larger firms having much higher weights than smaller firms when constructing value weighed portfolios. Size effect could explain much of the differences in portfolio returns as well as alpha figures when comparing equally weighed and value weighed portfolios.

(Assefa et al., 2017) found that rising interest rates have a negative effect on stocks returns in developed countries, including US. He did not distinguish interest rate effects on value stocks or growth stocks separately but to whole stock market in general. My research took this finding one step further, assuming that contractionary monetary policy has more pronounced negative effect on growth stocks than value stocks via the cashflow effect and the discount rate effect, as discussed in the introduction. However, research by (Black, 2002) found that value stock returns are actually on average 2 per cent lower relative to growth stocks when there is restrictive monetary policy regime in the US. One explanation behind this could be explained by (Chen & Zhang, 1998) who concluded that the higher returns of value stocks are due to fact that value companies are likely to be in distress, have high financial leverage and face high uncertainty regarding future earnings. It could be that contractionary monetary policy periods represent the realization of these risks. For instance, a distressed company having a lot of floating rate debt in their balance sheet would suffer from rising interest rates, making their stock perform worse than its peer group companies (e.g. growth stocks) with less leverage and distress. This kind of economic backstory would explain the empirical results of (Black, 2002).

However there is also contradicting academic literature to the arguments that superior return performance of value stocks is caused by higher risk. (Chan & Lakonishok, 2004) argue that value premium is caused by behavioral biases and agency costs of delegated investment management. To back their argument, they found that value stocks actually performed better than
growth stocks during periods when stock market or overall economy did poorly. (Yeh & Hsu, 2014) found that value stocks exhibit strong overreaction to extraordinary market information supporting the argument that behavioral biases most likely play a factor behind higher returns of value stocks. My results are mixed with the observations described above. Regardless of portfolio weighing there was 2 periods during which all of my portfolios had negative average monthly returns, meaning stock market did quite poorly on those periods. On the latest contractionary period my results are in line with those of (Chan & Lakonishok, 2004). Value stocks performed best when the stock market was performing poorly. However, the value portfolio was the worst performer on the expansionary period when stock market was also doing poorly in general. Based on my results I am more inclined to believe the risk-argument of (Chen & Zhang, 1998) behind the superior returns of value stocks.

To this point the discussion has mainly focused on finding reasons behind superior performance of value stocks. Superior performance of value stocks seems to be the result in most of academic papers but contradicting results can also be found. (Beneda, 2002) found that returns on growth stocks are actually higher than on value stocks when comparing the performance over longer periods, up to 18 years. If value stocks indeed are not riskier than other stocks (Chan & Lakonishok, 2004) this finding would support the efficient market hypothesis (Fama, 1970) where higher valuations of growth stocks actually reflect investor expectations about future growth opportunities of these companies. It could be that prices of growth stocks are just slower to adjust to their correct levels when the growth of these companies realizes more slowly in the future. This raises a question that should there even be differences in returns between different groups of stocks, regardless of monetary policy stance, if there is no clear conclusion about the risk or the returns these assets generate to investors.
This study found that value stocks can have superior return performance during periods when contractionary monetary policy is exercised over the economy. However more research needs to be done with a larger sample of monetary policy periods in order to find out whether these results extend outside these two specific time periods. Thus, the connection between monetary policy regime and stock returns remains unclear. Moreover, the neutral and negative intercepts from 3 factor model show that superior returns of value stocks found in this study are most likely due to inherent risk of these assets rather than any other factor.
References


Appendix 1: Definitions for variables in Datastream

Total assets (WC0299):

All Industries: Total assets represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.

Banks: Total Assets represent the sum of cash & due from banks, total investments, net loans, customer liability on acceptances (if included in total assets), investment in unconsolidated subsidiaries, real estate assets, net property, plant and equipment and other assets.

Insurance Companies: Total Assets represent the sum of cash, total investments, premium balance receivables, investments in unconsolidated subsidiaries, net property, plant and equipment and other assets.

Other Financial Companies: Total Assets represent the sum of cash & equivalents, receivables, securities inventory, custody securities, total investments, net loans, net property, plant and equipment, investments in unconsolidated subsidiaries and other assets.

Market value (MV):
Market value is the share price multiplied by the number of ordinary shares in issue. The amount in issue is updated whenever new tranches of stock are issued or after a capital change. For companies with more than one class of equity capital, the market value is expressed according to the individual issue.

Total return index (RI):
This shows a theoretical growth in value of a share holding over a specified period, assuming that dividends are re-invested to purchase additional units of an equity or unit trust at the closing price applicable on the ex-dividend date.