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Inflation illusion and stock returns

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ABSTRACT

A large sensitivity of stocks' earnings yield to inflation suggests that the value of these stocks is highly influenced by inflation illusion. We construct an inflation illusion factor by buying stocks with large earnings yield sensitivities on inflation and selling stocks with small earnings yield sensitivities on inflation. This factor has a return of approximately 5% per year and is priced in the cross sectional asset returns. Low asset growth stocks have greater exposure to the inflation illusion factor than their counterparts, and they are also underpriced at times of high inflation. Our results are robust for a number of controls.

1. Introduction

The money illusion hypothesis, first proposed by Modigliani and Cohn (1979), has intrigued researchers and invoked controversy since its inception. The main idea of the hypothesis is that, when inflation rises, irrational investors, who use a present-value formula (e.g., Gordon, 1963) to estimate the fair values of stocks, fail to raise the nominal growth rate of dividend as they raise the nominal discount rate. Consequently, from the perspective of rational investors, these irrational investors underestimate the fair values of stocks, and this undervaluation is reflected in a positive relation between dividend yield and current inflation. Campbell and Vuolteenaho (2004) find that, at the market level, dividend yield is positively related to future inflation, and inflation explains 80% of the mispricing component in the S&P 500 dividend yield. In their study, rational explanations of the positive relation between dividend yield and inflation require a negative relation between real dividend growth and inflation or a positive relation between subjective expected risk premium and inflation. They show that neither of these two relations holds in the data and, therefore, the positive relation between dividend yield and inflation is taken as evidence supporting the Modigliani–Cohn hypothesis, suggesting that some investors are confounded by inflation.[3]

This paper extends one of the main implications of the Modigliani–Cohn hypothesis, regarding the positive relation between dividend yield and inflation, into the cross-sectional asset pricing. The idea is straightforward; Campbell and Vuolteenaho (2004) assert that, when the dividend yield of the market is regressed on the current inflation, the positive coefficient suggests that stocks are underpriced at times of high inflation and overpriced at times of low inflation. This coefficient captures the magnitude of

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[3] Additional empirical evidence for the money illusion in the stock market is provided by Fama and William Schwert (1977), Fama (1981), Ritter and Warr (2002), Chordia and Shivakumar (2005), and Basu et al. (2010). Brunnermeier and Julliard (2008) argue that a similar form of money illusion led to the recent housing bubble. Shafir et al. (1997) present a theory of the psychological underpinnings of the money illusion.

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mispricing in the overall market. As the two channels of rational explanations are ruled out at the market level, it must be true that, on average, these rational explanations do not hold when averaging across individual stocks. In our study, we estimate such coefficients at the individual stock level over time, create an inflation illusion factor by buying stocks that are more sensitive to inflation illusion and shorting stocks that are less sensitive to inflation illusion, and test its asset pricing implications.

Indeed, in our baseline analysis, we proceed with earnings yield, as half of the firms do not pay dividends and almost all firms report earnings. The practitioner version of the inflation illusion, the so-called "Fed-model", actually relates yield on stocks (as measured by either earnings yield or dividend yield) to the yield on the nominal Treasury bond, in which inflation is a main component. As inflation rises, yield on bond rises, and yield on stocks must also rise to maintain the attractiveness of stocks. The implication is that, earnings yield is positively related to inflation, which is also documented in Asness (2000), Sharpe (2002), and Campbell and Vuolteenaho (2004), with aggregate data. We also present the results from using dividend yield as a robustness check.

Our results are summarized as follows. At the end of each month, we regress the earnings yield on inflation using the past 60 months of data for each stock, and we use the regression coefficient as the individual stock's sensitivity to inflation illusion. We assign all stocks into 10 portfolios based on their sensitivity coefficients and follow their excess returns in the next month. Our results show that the portfolio that has the largest inflation illusion sensitivity has an equal-weighted average excess return of 1.33% per month (t-value = 3.87); the portfolio that has the smallest inflation illusion sensitivity has an excess return of 0.90% per month (t-value = 2.99) in equal-weighted returns. The return increases monotonically as inflation illusion sensitivity increases. The return of the long-minus-short portfolio is 0.43% per month (t-value = 2.73). Adjusting the risk exposure using the CAPM in the long-minus-short return leaves an alpha of 0.39% per month (t-value = 2.45). Furthermore, we form 25 portfolios by intersecting quintile portfolios formed on inflation illusion sensitivity and quintile portfolios formed on the book-to-market ratio, the asset growth and the operating profitability. We find that the return spreads between low and high inflation sensitivity stocks and their CAPM alphas remain sizable. This suggests that the information in the inflation illusion sensitivity is not subsumed by that in the book-to-market, asset growth, or operating profitability measures.

We construct an inflation illusion factor as the returns from buying the stocks that have large inflation illusion sensitivities and selling the stocks that have small inflation illusion sensitivities. We test to determine if this factor is priced using 25 portfolios formed on size and asset growth and 25 portfolios formed on size and operating profitability. We choose these two sets of portfolios because, as shown in Hou et al. (2015) and Fama and French (2015), the newly proposed asset growth factor and profitability factor can explain a large collection of asset return anomalies, and the presence of the asset growth factor make the famous value factor of Fama and French (1996) redundant in cross-sectional pricing. We provide the pricing results of other portfolios in the robustness checks.

Our results show that low asset growth portfolios have greater exposure to the inflation illusion factor. The inflation illusion betas of low asset growth portfolios are 0.48, 0.39, 0.41, 0.24, and 0.11 for each size quintile, respectively. In contrast, these betas are 0.30, 0.25, 0.19, 0.11, and 0.05 for the high-asset growth portfolios. On average, the betas across the low and high asset growth stocks differ by 0.12. Together with an estimated factor premium of 2% per month (t-value = 2.37), we infer that the return difference associated with inflation illusion between low and high asset growth stock is 0.24% per month or 2.88% per year. With portfolios formed on operating profitability as testing assets, we find that stocks with high operating profits have lower inflation illusion betas. Based on Fama and French (1995), Novy-Marx (2013), and Fama and French (2015), it is expected that value stocks or low asset growth stocks tend to be less profitable and that growth stocks or high asset growth stocks tend to be more profitable. Therefore, when the inflation illusion factor effectively explains the asset growth anomaly, it does not explain the profitability anomalies.

The positive relation between earnings yield and inflation implies that future return is also positively related to inflation. To this end, we partition the inflation into three zones. The high inflation regime is defined as the current inflation being above the 80th percentile, the low inflation regime is defined as the current inflation being below the 20th percentile, and the medium inflation regime is defined as those with current inflation being between the 20th and 80th percentiles. We follow the cumulative abnormal returns of asset growth portfolios and profitability portfolios in the next year. Our results indicate that inflation illusion exists on both the long leg and the short leg of asset growth portfolios. The low asset growth stocks (the long leg) earn abnormal excess returns of 1.58% per month at times of high inflation and 0.83% per month at times of low inflation. The high asset growth stocks (the short leg) earn abnormal returns of 0.46% per month in times of high inflation and −0.51% per month in times of low inflation. As shown earlier, inflation illusion contributes around 3% to the return spread among low and high asset growth stocks; this means that there are other factors that contribute to the asset growth anomaly. Therefore, even though low asset growth stocks have large inflation illusion betas and hence demonstrate large inflation illusion-related mispricing, they are still underpriced (0.59% per month) at times of low inflation.

A univariate regression of the unconditional CAPM alpha of the asset growth portfolios on their inflation illusion beta has a coefficient of 0.0013 (t-value = 2.59) with an adjusted R-squared to 39%. This suggests that exposure to inflation illusion at least partially explains the mispricing of the stocks. This regression coefficient is negative for operating profitability portfolios, and again it is because low asset growth firms tend to be less profitable and have greater exposure to the inflation illusion.

We provide robustness checks in several ways. First, we show pricing holds using alternative testing assets such as the book-to-market and investment portfolios. Second, we show that replacing earnings yield with dividend yield produces similar inflation illusion premiums. Third, we show that using value-weighted return in portfolios formed on earning yield sensitivity to inflation has similar pricing results.

We differ from Cohen et al. (2005) in that we find that, as inflation rises, expected returns rise by different amounts among different risky assets. Cohen et al. (2005) assume the expected returns on safe stocks and risky stocks should rise by the same