# Stocks as a Hedge against Inflation: Does Corporate Profitability Keep Up with Inflation?

**by**

**Sangkyun Park***

**Abstract**

Fundamentally, stocks are a good hedge against inflation if corporate profitability keeps up with inflation. Using monthly stock-market data covering over 151 years from 1871 to 2022, this paper analyzes the relationship between inflation and corporate profitability, measured by dividend-equivalent earnings discounted at the risk-free rate. The relation between corporate profitability and inflation varies across sample periods, time horizons, and ranges of inflation. Corporate profitability tends to be positively related with demand-pull inflation, and negatively related with cost-push inflation. More interestingly, corporate profitability is the highest when inflation is modest (0-4 percent), and it is very low when inflation is very low (deflation) or very high (over 10 percent). Based on this finding, what really matters for corporate profitability seems to be long-term economic stability, as opposed to a temporary setback. High inflation itself may not lower corporate profitability, although it can signal lower corporate profitability. Negative stock market reactions to high inflation itself may create buying opportunities.

**Key words**: inflation hedge, stock returns, corporate profitability, corporate earnings, stock-market overreaction.

**JEL Classification**: G11; G12; E31; E52

Address: 18500 New Hampshire Avenue, Ashton, MD 20861

E-Mail: sangkyun99@gmail.com

*The author is a retired economist. He has served as an economist at the U.S. Office of Management and Budget and Federal Reserve Banks (New York and Saint Louis).

## 1. Introduction

Investors need to hedge against inflation which erodes fixed incomes. Normally, real assets should generate incomes that keep up with inflation. Since stocks are the ownership of real assets, they should be a good hedge against inflation. Findings of academic research, however, are mixed at best; some findings contradict this assumption, while some others weakly support it.

Many studies looking at a few post-war decades (largely 50s, 60s, and 70s) document an inverse relation between short-term stock returns and inflation (e.g., Fama (1981), Feldstein (1980), and Modigliani and Cohn (1979)). Later studies suggest that the relation between inflation and stock returns may vary across sample periods and time horizons. Boudoukh and Richardson (1993) using data covering 200 years find a positive relation between inflation and 5-year stock returns. Schotman and Schweitzer (2000) also show that stocks have a better potential as a hedge against inflation at long horizons.

There are many possible explanations for a negative relation between inflation and stock returns, which will be discussed in the next section. Those explanations are intertwined, and each has some empirical support. Thus, it is hard to pinpoint a dominant factor that explains why and when stock returns fail to keep up with inflation. Pinpointing the factor would substantially clarify the relation between inflation and stock returns. Settling the matter through this channel, however, seems very challenging.

Another issue is that high volatility of stock prices lowers the confidence in the estimated relation between inflation and stock returns. Stock returns are largely determined by changes in stock prices, and studies looking at the relation between inflation and stock returns implicitly assume that stocks are fairly priced at all times. Stocks can be mispriced sometimes, however. Shiller (1981) shows that major movements of stock prices can hardly be justified by subsequent changes in dividends. Summers (1986) argues that stock prices deviate widely and frequently from rational valuations and questions the power of statistical tests that support market efficiency. Shiller (2015) also suggests that mispricing can last for a considerable period of time. It could be mispricing of stocks that drove a negative relation between inflation and stock returns. Park (2022) shows that stock prices overreact to recessions fairly consistently. Provided that high inflation signals the peak of a business cycle, a negative relationship between inflation and stock returns can be a byproduct of stock market overreaction to recessions.

To avoid the complexities discussed above, I focus on a straightforward question. Does corporate profitability keep up with inflation? If it does, stocks should be a good hedge against inflation. In this paper, I define corporate profitability as dividend-equivalent earnings (DEEs) discounted at the risk-free interest rate (3-month Treasury rate). DEEs are hypothetical earnings that would result if all earnings were paid out as dividends. The risk-free interest rate reflects the rate of inflation, intertemporal preferences of consumers and investors, and monetary policy. The discounted value of DEEs (DEE-DV) is intended to capture the intrinsic value cashflows from stocks which should be proportional to the fair value of stocks. It accommodates key market fundamentals. A main concern about inflation is that it may prompt the central bank to raise interest rates, which may in turn lead to higher real interest rates and lower aggregate demand. Higher real interest rates negatively affect DEE-DV by raising the discount rate, and lower aggregate demand negatively affects DEE-DV by reducing DEEs. DEE-DV fully reflects these possibilities. If both DEEs and the discount rate fully reflect inflation, the rate of change in DEE-DV (DEE-DV-C) should be unrelated with inflation; the inflation's effect on cashflows is offset by its effect on the discount rate. I also look at the relation between inflation and DEEs adjusted for the consumer price index (DEE-R) to infer the relative effects of inflation on cashflows and the discount rate.

Using monthly data from January 1871 and March 2022, I estimate the relation between the rate of inflation and DEE-DV-C for various sample periods and time horizons. This analysis has several advantages over previous studies looking at the relationship between inflation and stock returns. With the data covering a long period, I examine the consistency of results across sample periods and time horizons. It is much easier whether stocks are a good hedge against inflation because DEE-DV more reliably reflects market fundamentals than stock prices. In addition to mispricing, some ad hoc factors, such as short-term changes in the equity premium, can significantly affect stock prices. Short-term movements of stock prices minimally affect DEE-DV.

This paper finds that the relation between corporate profitability and inflation varies across sample periods, time horizons, and ranges of inflation. The complex relations offer the following implications. Corporate profitability is positively related with inflation resulting from increasing aggregate demand (demand-pull inflation), while it is negatively related with inflation resulting from upward pressure on production costs (cost-push inflation). Corporate profitability is the highest when economic stability produces modest inflation, while it is very low when economic instability produces deflation or very high inflation. Based on these results, inflation seems to matter for corporate profitability basically to the extent that it reflects the condition of the real economy.

The rest of the paper is organized as follows. The next section reviews the literature on the relation between inflation and stock returns. Section 3 elaborates on DDE-DV as a measure of corporate profitability. Section 4 estimates the relation between inflation and DEE-DV. Section 5 discusses the rationality of stock market reactions to inflation. Section 6 concludes.

**2. Relation between Inflation and Stock Returns**

After enjoying price stability and rapidly rising stock prices in much of the 1950s and the 1960s, the U.S. economy experienced high inflation and poor stock returns between the late 1960s and the early 1980s. In the 19 years from December 1949 to December 1968, inflation averaged 2.2 percent, and the stock price increased at an annual rate of 10.3 percent (geometric averages). In the following 14 years from December 1968 to December 1982, while inflation jumped to 7.5 percent, the rate of increase in the stock price plummeted to 1.9 percent. Normally, the price of a real asset should keep up with inflation. Thus, the inverse movements of inflation and the stock price puzzled the finance profession and spurred researchers to seek explanations.

The explanations include correlation between inflation and real economic activity (proxy hypothesis), failure to recognize the co-movement of inflation and corporate earnings (money illusion hypothesis), increased tax burdens (tax hypothesis), and increased real discount rates (discount rate hypothesis).

Under the proxy hypothesis, high inflation proxies unfavorable real variables. According to Fama (1981), the negative stock return-inflation relations are induced by negative relations between inflation and real activity. To support this hypothesis, he shows that stock return-inflation relations largely disappear when the estimation controls for the effects of real variables.

Modigliani and Cohn (1979) propose the money illusion hypothesis. They argue that inflation causes investors to make two major errors: discounting real earnings with the nominal interest rate and failing to allow for the gain to shareholders accruing from depreciation in the real value of nominal corporate liabilities. Because of these mistakes, the increase in the discount rate is disproportionately larger than the increase in estimated cashflows, making the stock price lower. Cohen, Polk, and Vuolteenaho (2005) presents an empirical finding that is consistent with money Illusion. In their cross-sectional estimation, inflation similarly affects returns on safe stocks and risky stocks. Without money illusion, they argue, the change in stock returns should be proportional to the stock's risk.

Feldstein (1980), who proposes the tax hypothesis, explains how inflation decreases the real after-tax return on stocks. The depreciation allowance is based on the historic cost. Thus, in real terms, inflation decreases the depreciation allowance, increases taxable profits, and decreases after-tax

earnings. Inflation also increases the real value of personal income tax on dividends and capital gains because those incomes are not indexed to inflation. When both the corporate income tax and the personal income tax are considered, inflation can increase the effective tax rate more for stock returns than for interest income.

The discount rate hypothesis concerns various ways in which inflation can affect the real discount rate. High inflation may trigger counter-cyclical monetary policy, which can increase the real risk-free rate. High inflation may also increase the equity premium by increasing uncertainty. Ball (1990) argues that high inflation increases uncertainty about future inflation; monetary policy is less predictable when the monetary authority needs to strike a balance between price stability and recession risk. When monetary policy is less predictable, output growth may also be less predictable. Increased uncertainty about inflation and output growth may result in increased uncertainty about stock returns and a higher equity premium. Brandt and Wang (2003) using a consumption-based model also show that unexpected inflation is positively related with aggregate risk aversion.

These hypotheses are all relevant and interrelated. High inflation may signal that the business cycle is peaking and that economic output and corporate earnings are about to decline. Contractionary monetary policy to fight high inflation may increase real interest rates. Increased uncertainty and complexity of tax effects may exacerbate money illusion. Increased tax burdens may affect investment decisions and corporate earnings. All in all, the relation between inflation and stock returns is convoluted, and it is difficult to separate out the effects of all relevant factors.

One way to determine whether stocks provide a good hedge against inflation is to analyze factors that may hinder stock returns from keeping up with inflation. Those factors may be ad hoc and short-lived, or inherent and persistent. Stocks may be a good hedge in the former case, while not a good hedge in the latter case. As discussed above, however, estimating the effects of all relevant factors is very difficult.

**3. Dividend-Equivalent Earnings**

Fundamentally, it is corporate profitability that determines cashflows from stocks. I use DEE-DV (dividend-equivalent earnings discounted at the risk-free rate) as a measure of corporate profitability. DEEs (dividend equivalent earnings) are hypothetical earnings that would result if all earnings were paid out as dividends. Earnings per share change for two main reasons: changes in profitability and changes in the amount of capital per share resulting from reinvestment and stock buybacks. To measure profitability, therefore, one should adjust earnings for reinvestment and stock buybacks occurred in

previous periods. If earnings per unit of capital keep up with inflation, stocks should be a good hedge against inflation.

Companies use earnings for dividend payouts, reinvestment, and stock buybacks. Reinvestment increases the total amount of capital, while holding the number of shares constant. Stock buybacks reduce the number of outstanding shares, while holding the total amount of capital constant. Thus, both reinvestment and stock buybacks increase the amount of capital per share.

When the stock of a company is fairly valued, its price is the economic value of capital per share. Let's assume the following. Last year, the number of the company's shares was 100, the total amount of capital was \$100, and earnings were \$10 (\$0.1 per share). If the corporation used \$10 for dividend payouts (dividend case), the share price would be \$1 (\$100/100), the dividend would be \$0.1 (\$10/100), and the shareholders' wealth would be \$1.1 (\$1+\$0.1) per share. If the corporation reinvested \$10 (reinvestment case), the share price would be \$1.1 ((\$100+\$10)/100), and the shareholders' wealth would be \$1.1 per share. If the corporation wanted to buy back shares (buyback case), the buyback price should be the one at which shareholders were indifferent between holding and selling. The buyback price would be \$1.1. With \$10, the corporation could buy back 9.09 (10/1.1) shares. With the buyback, the number of outstanding shares would decrease to 90.91 (100-9.09). The share price would remain at \$1.1 (\$100/90.91), and the shareholders' wealth would be \$1.1 per share. Capital per share would be \$1 (\$100/100) with dividend payouts, \$1.1 (\$110/100) with reinvestment, and \$1.1 (\$100/90.91) with buybacks.

Now suppose that earnings per share are \$0.11 (a 10-percent increase) this year. In the dividend case, all of \$0.11 are dividend-equivalent earnings and attributable to profitability because capital per share did not change. In the reinvestment and buyback cases, \$0.1 (\$0.11×(10/11)) of \$0.11 is attributable to profitability, and \$0.01 (\$0.11×(1/11)) is attributable to the increase in capital per share from \$1 to \$1.1. If the company used all of the last year's earnings for dividend payouts, earnings would have been \$0.1 per share. Thus, dividend-equivalent earnings are \$0.1. If the corporation used \$5 for dividend payouts and \$5 for reinvestment or buybacks, the adjustment factor would be (10/10.5), and dividend-equivalent earnings would be \$0.105 per share.

Let *PRICE* be the stock price, *EARN* be earnings per share, *DVND* be dividends per share, *earn* be *EARN*/*PRICE*, *dvnd* be *DVND*/*PRICE*. In year *t*, earnings used for reinvestment and/or buybacks are $EARN_t$ minus $DVND_t$, and the rate of increase in capital is $earn_t$ minus $dvnd_t$. Dividend-equivalent earnings per share in year *t*.

$$DEE_t = \frac{EARN_t}{\prod_{i=1}^{t-1} CPTL_i}\ ,\ \ where\ \ CPTL_i = 1 + earn_i - dvnd_i\ . \qquad (1)$$

In words, DEEs in year t are year t earnings adjusted for the cumulative increase in capital per share from year 1 to year t-1.

For the purpose of measuring the performance of the corporate sector, DEE-DV is a good alternative to stock returns. Aside from the possibility of stock mispricing, stock returns are much less predictable than earnings at any given time. Stock returns are largely determined by stock prices at the end of the holding period, which depend on a much farther future (future from the end of the holding period).

To a certain extent, DEEs are affected by stock price movements. If stocks were undervalued, the rate of increase in capital per share would be overstated, the adjustment factor would be unduly large, and DEEs would be unduly small. The opposite would be true if stocks were overpriced. To avoid this problem, I use a hypothetical price for the purpose of calculating the adjustment factor. The hypothetical price is the price that would make the cyclically adjusted P-E ratio (CAPE) its historical average, which is the actual price times the ratio of the historical CAPE to the current CAPE. Park (2021) finds that CAPE is a better valuation measure than the conventional P-E ratio.

While minimally reflecting market sentiment, DEE-DV combines fundamental factors determining stock returns. It reflects earnings, dividends, buybacks, and risk-free interest rates. One thing that is missing is the equity premium. The equity premium demanded by investors is unobservable, and short-term movements of the equity premium can hardly be distinguished from unjustifiable market sentiment. In the short run, inflation can increase the equity premium by increasing uncertainty. In the long run, however, the equity premium should be determined by market fundamentals. Thus, the equity premium should not affect the stock's potential as a long-term hedge against inflation.

**4. Inflation and Corporate Profitability**

This section estimates the relation between inflation and DEE-DV-C. The measure of inflation is the rate of change in consumer price index (CPI) between year t-1 and t. I measure DEE-DV-C for various time horizons to examine both the short-term and the long-term effect of inflation.[1] For each time horizon, I use the yearly average DEE-DV to facilitate the interpretation of results. The rate of change

[1] For the base year of calculation, DEEs are the same as regular earnings. I reset the base year for each calculation period. Thus, for year t-1, DEEs are regular earnings.

for the first 5 years, for example, is the rate of change between DEEs in year t-1 and the average DEE-DV for years t to t+4. If nominal DEEs proportionately change with CPI, inflation should have no effect on DEE-R (real value of DEEs deflated by CPI). The one-for-one relation between inflation and DEEs, however, does not necessarily mean that inflation should have no effect on real stock returns. If inflation significantly affects real interest rates, it significantly affects real stock returns too. DEEs do not have to keep up with inflation fully to make stock returns keep up with inflation fully. Stock returns can keep up with or even outpace inflation if the positive effect of inflation is even weaker on interest rates than on DEEs. In the opposite case, inflation may lower real stock returns regardless of the rate of increase in DEE-R (DEE-R-C). Thus, a truly relevant variable is DEE-DV-C. A non-negative relation between inflation and DEE-DV-C should make stocks an excellent hedge against inflation.

*4.a. Data*

I use monthly stock market data covering over 151 years from January 1871 to March 2022. The data are from multpl.com, which posts the data used by Shiller (2015) and updates those data. The Shiller data has the 10-year Treasury rate, but not the 3-month Treasury rate, which I use as a measure of the risk-free rate. I obtained the 3-month rate from the Federal Reserve Bank of Saint Louis website (Federal Reserve Economic Data or FRED). The 3-month rate starts from January 1934. For earlier years, I estimated the 3-month rate based on the commercial paper rate published in Gordon (1986). I have proportionately adjusted the commercial paper rate for those years such that the difference between the average 10-year Treasury rate and the average 3-month Treasury rate is the same for years 1871 – 1933 as that for years 1934 – 2021.[2]

*4.b. Long-Run Relation*

To begin with a big picture, I estimate the following regression.

$$DEE\text{-}X\text{-}C1 = a_1 + a_2 \cdot INFLATION + \varepsilon, \qquad (2)$$

[2]For years 1934 – 2021, the averages of the 10-year Treasury rate and the 3-month Treasury rate are 4.94% and 3.39% respectively. The difference is 1.55%. For years 1871 – 1933, the average 10-year Treasury rate is 3.89%, and the average 3-month Treasury rate is assumed to be 2.34% (3.89% minus 1.55%). The average commercial paper rate for years 1871 – 1933 is 5.75%. For any given month in years 1871 – 1933, the estimated 3-month Treasury rate is the commercial paper rate times 2.34/5.75. Although the downward adjustment is large, high demand for risk-free assets might have made the 3-month Treasury rate even lower. Treasury bills did not exist. Bank deposits were not safe because bank runs were frequent. Deflation was common.

where *DEE-X-C1* is the 1-year rate of change in nominal *DEEs* (*DEE-N-C1*), that in real DEEs (*DEE-R-C1*), or that in the discounted value of DEEs (*DEE-DV-C1*), *INFLATION* is the 1-year rate of change in CPI, $\varepsilon$, is the error term, and $a_i$'s are the coefficients to be estimated.

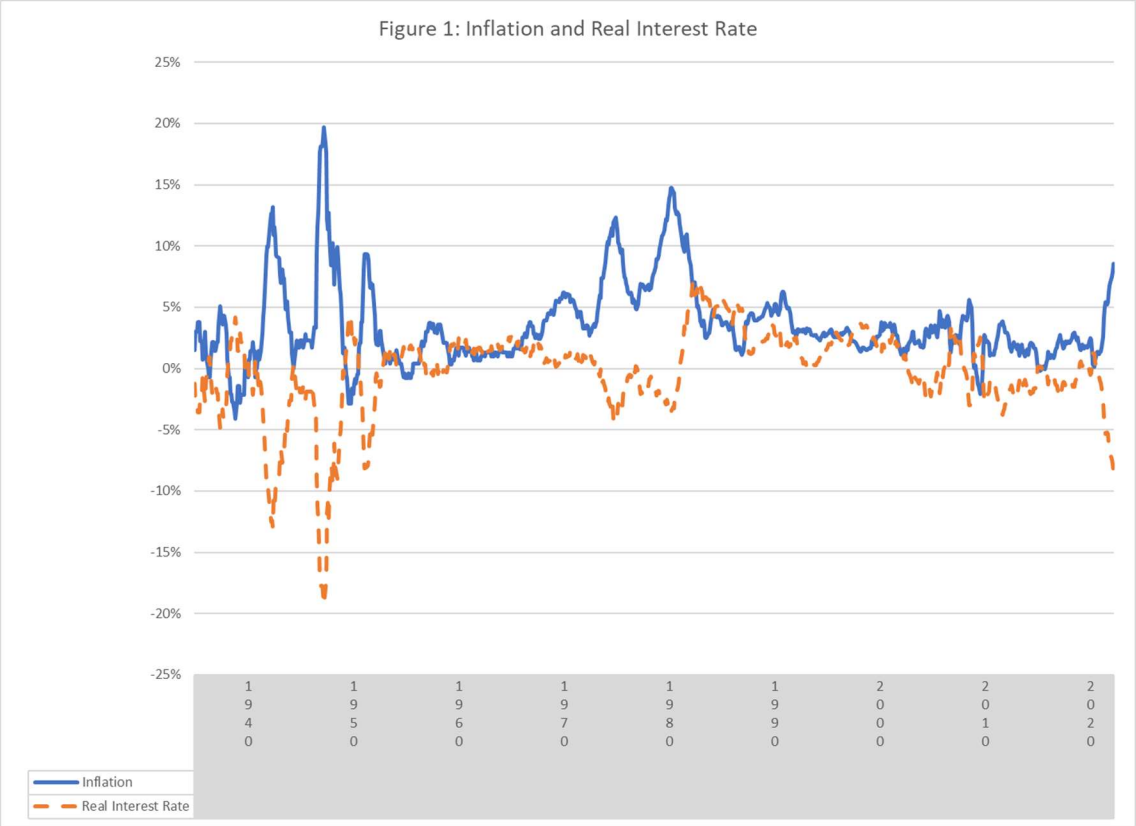
The estimation excludes the period of 1871-1880 because of the lack of CAPE needed for the calculation of DEEs and the period of 2014-2022 to keep the sample size the same as that of later analyses looking at long-term changes.

Table 1 presents the regression results. The coefficient of *INFLATION* is close to 1 for *DEE-N-C1* and close to 0 for *DEE-R-C1*, suggesting that real DEEs are unaffected by inflation. It is not surprising that corporate cashflows keep up with inflation over a very long run. A more interesting result is a significantly positive coefficient of *INFLATION* in the *DEE-DV-C1* regression. This result implies that inflation lowers the real interest rate. Provided that nominal DEEs increase proportionately with inflation, the nominal interest rate must increase less than inflation to make the relation between *INFLATION* and *DEE-DV-C1* positive.

Table 1: Long-Run Relation

| | Dependent Variable | | |
|---|---|---|---|
| | *DEE-N-C1* | *DEE-R-C1* | *DEE-DV-C1* |
| *INTERCEPT* | 0.0700 | 0.0661 | 0.0423 |
| t Stat | 4.68 | 4.50 | 2.82 |
| | | | |
| *INFLATION* | 1.0214 | 0.0919 | 0.8969 |
| t Stat | 4.24 | 0.39 | 3.72 |
| | | | |
| Adj. R Sqr. | 0.0106 | -0.0005 | 0.0080 |
| No. of Obs. | 1,587 | 1,587 | 1,587 |

Figure 1 plots the 12-month moving average of the real 3-month Treasury rate and the change in CPI during the same 12-month period. The sample period is from January 1934 to March 2022 because reliable data for 3-month Treasury rates became available in 1934. A negative relation between the two variables is easily noticeable. The correlation coefficient is −0.59.




Based on these results, inflation should increase stock returns in real terms. This finding, however, is far from convincing because the regressions show very poor fits. Adjusted $R^2$ is close to zero for all three regressions. A more reasonable takeaway may be that inflation plays a very minor and unsteady role in determining corporate profitability in the long run.

*4.c. Relation by Sample Periods and Time Horizons*

Since extant studies find that the relation between inflation and stock returns varies across sample periods and investment horizons, I look at various sample periods and time horizons. I divide the sample into 6 distinct periods: 1881 period (1881-1913), 1914 period (1914-1929), 1930 period (1930-1945), 1946 period (1946-1968), 1969 period (1969-1982), and 1983 period (1983-2013). In the 1881 period, inflation and deflation alternated, and the price hardly changed on net; CPI was 9.51 in December 1880 and 10.00 in December 1913. There was no central bank. The 1914 period is characterized by the launch of the Federal Reserve System in 1914 and wild swings of inflation during and after World War I. The 1930 period was a turbulent one. The Great Depression just began. The Banking Act of 1933 formalized counter-cyclical monetary policy. The economy had to endure World

War II. The 1946 period was prosperous with moderate inflation overall. In the 1969 period, inflation picked up and persisted. In the 1983 period, inflation was moderate and steady.

To affect stock returns significantly, inflation should have lasting effects on DEE-DV. Inflation can change the course of the economy and/or consumer behavior, which may affect DEE-DV for many years. Thus, it is important to examine DEE-DV for subsequent years. In addition to DEE-DV-C in the concurrent year (*DEE-DV-C1*), I look at the rate of change in the average DEE-DV for the first 3 years (*DEE-DV-C3*), the first 5 years (DEE-DV-C5F), the second 5 years (DEE-DV-C5S), and the first 10 years (DEE-DV-C10). To understand the relative importance of the cashflow channel and the discount rate channel, I also look at the effect of inflation on DEE-R.

I continue to use 1-year inflation as the sole explanatory variable to view the relation from the investors' perspective. When inflation picks up, investors may wonder whether they are safe with stocks. Fundamentally, they should be safe if inflation does not negatively affect long-horizon DEE-DV.

To examine whether the effect of inflation varies across sample periods, I use dummy variables for both the intercept term (intercept dummy) and inflation (slope dummy). Adding dummy variables for all explanatory variables is equivalent to estimating a separate equation for each subsample. The economic and statistical significance of dummy variables makes it easier to infer whether coefficients differ across subsamples.

The regression is specified as:

$$\begin{aligned} DEE\text{-}DV\text{-}C0 = {} & b_1 + b_2 \cdot INTD1914 + b_3 \cdot INTD1930 + b_4 \cdot INTD1946 + b_5 \cdot INTD1969 + b_6 \cdot INTD1983 \\ & + b_7 \cdot INFLATION + b_8 \cdot IFND1914 + b_9 \cdot IFND1930 + b_{10} \cdot IFND1946 + b_{11} \cdot IFND1969 \\ & + b_{12} \cdot IFND1983 + \varepsilon, \end{aligned} \tag{3}$$

where *DEE-DV-C0* is *DEE-DV-C1*, *DEE-DV-C3*, *DEE-DV-C5F*, *DEE-DV-C5S*, or *DEE-DV-C10*; *INTD9999* is 1 if the sample period is 9999 and 0 otherwise; *IFND9999* is *INFLATION* if the sample period is 9999 and 0 otherwise; and $b_i$'s are coefficients to be estimated.

The base period is the 1881 period. For the base period, the coefficients of the intercept term (*INTERCEPT*) and *INFLATION* in a separate regression for the period would the same as those in this regression ($b_1$ and $b_7$). For other periods, the coefficients in the separate regression would respectively be the coefficient of INTERCEPT plus the coefficient of INTD9999 (Base+Dum) and the coefficient of INFLATION plus the coefficient of IFND9999.

Table 2 presents the results of regressions. It is hard to generalize the relation between inflation and DEE-DV-C. In all 5 regressions, the slope coefficient (Base+Dum for INFLATION) varies widely across sample periods. Even the sign flips back and forth. Many slope dummies are statistically significant at

the 5-percent level or at the 1-percent level, indicating that the difference in the slope coefficient is significant. Notably, in all 5 regressions, the slope coefficient is significantly positive for the 1930 period and the 1946 period, while significantly negative for the 1983 period. The 1960 period substantially overlaps with the sample periods of some previous studies that found a negative relation between inflation and stock returns. For this period, the slope coefficient is close to 0 in the *DEE-DV-C1* regression, but it is significantly negative at longer horizons (DEE-DV-C5F, DEE-DV-C5S, and DEE-DV-C10 regressions). The negative relation between inflation and long-term DEE-DV-C is consistent with the negative relation between inflation and stock returns.

| Table 2: Inflation and DEE-DV-C by Sample Periods | | | | | |
|---|---|---|---|---|---|
| | Dependent Variable | | | | |
| | *DEE-DV-C1* | *DEE-DV-C3* | *DEE-DV-C5F* | *DEE-DV-C5S* | *DEE-DV-C10* |
| *INTERCEPT* | -0.0010 | -0.0214 | -0.0230 | -0.0458 | -0.0344 |
| t Stat | -0.04 | -0.67 | -0.69 | -1.34 | -1.04 |
| *ITPD1914* | 0.0792 | 0.2072 | 0.1945 | -0.0755 | 0.0595 |
| t Stat | 1.58 | 3.50 | 3.14 | -1.19 | 0.96 |
| Base+Dum | 0.0782 | 0.1858 | 0.1715 | -0.1213 | 0.0251 |
| *ITPD1930* | -0.0030 | 0.0458 | 0.0935 | 0.4040 | 0.2488 |
| t Stat | -0.06 | 0.81 | 1.57 | 6.62 | 4.19 |
| Base+Dum | -0.0041 | 0.0244 | 0.0706 | 0.3582 | 0.2144 |
| *ITPD1946* | 0.0193 | 0.0111 | -0.0028 | -0.0514 | -0.0271 |
| t Stat | 0.40 | 0.20 | -0.05 | -0.84 | -0.46 |
| Base+Dum | 0.0182 | -0.0103 | -0.0257 | -0.0972 | -0.0615 |
| *ITPD1960* | -0.0056 | 0.1404 | 0.1790 | 0.1754 | 0.1772 |
| t Stat | -0.05 | 1.04 | 1.27 | 1.21 | 1.26 |
| Base+Dum | -0.0067 | 0.1190 | 0.1560 | 0.1296 | 0.1428 |
| *ITPD1983* | 0.4007 | 0.8334 | 0.9168 | 0.8398 | 0.8783 |
| t Stat | 5.30 | 9.34 | 9.84 | 8.78 | 9.45 |
| Base+Dum | 0.3997 | 0.8120 | 0.8938 | 0.7940 | 0.8439 |
| *INFLATION* | 1.2336 | 1.0660 | 1.1742 | 0.6971 | 0.9357 |
| t Stat | 2.95 | 2.16 | 2.28 | 1.32 | 1.82 |
| *IFND1914* | -1.0928 | -2.6229 | -3.2944 | -1.9912 | -2.6428 |
| t Stat | -1.78 | -3.63 | -4.36 | -2.57 | -3.51 |
| Base+Dum | 0.1408 | -1.5569 | -2.1202 | -1.2942 | -1.7072 |
| *IFND1930* | 1.4500 | 1.7433 | 0.9963 | 3.2805 | 2.1384 |
| t Stat | 1.78 | 1.82 | 0.99 | 3.19 | 2.14 |
| Base+Dum | 2.6836 | 2.8093 | 2.1705 | 3.9775 | 3.0740 |
| *IFND1946* | 0.3755 | 2.7998 | 3.8288 | 5.4305 | 4.6297 |
| t Stat | 0.41 | 2.57 | 3.36 | 4.65 | 4.08 |
| Base+Dum | 1.6090 | 3.8658 | 5.0031 | 6.1276 | 5.5653 |
| *IFND1960* | -1.1258 | -3.0287 | -4.0050 | -5.4266 | -4.7158 |
| t Stat | -0.79 | -1.80 | -2.28 | -3.01 | -2.69 |
| Base+Dum | 0.1078 | -1.9627 | -2.8308 | -4.7295 | -3.7802 |
| *IFND1983* | -8.6012 | -20.7530 | -23.5331 | -21.4964 | -22.5148 |
| t Stat | -3.82 | -7.81 | -8.48 | -7.55 | -8.13 |
| Base+Dum | -7.3676 | -19.6870 | -22.3589 | -20.7993 | -21.5791 |
| Adj. R Sqr. | 0.0339 | 0.0742 | 0.0855 | 0.1247 | 0.0984 |
| No. of Obs. | 1,587 | 1,587 | 1,587 | 1,587 | 1,587 |

The economic and statistical significance of the slope coefficient varies also across time horizons without a clear pattern. A smaller (larger) effect of inflation in the second half of the 10-year period

(*DEE-DV-C5S*) than in the first half (*DEE-DV-C5F*) would mean that the initial effect of inflation tapers off (amplifies) over time. The effect of short-lived inflation should taper off over time. However, the effect of inflation may amplify if inflation persists and its effect cumulates over time. For the 1881 period, the 1914 period, and 1983 period. the magnitude of the slope coefficient is larger in the *DEE-DV-C5F* regression than in the *DEE-DV-C5S* regression. The opposite is the case for the other three periods. In addition, adjusted $R^2$ is low for all 5 regressions (ranges from 0.0339 percent in the *DEE-DV-C1* regression to 0.1247 in the *DEE-DV-C5S* regression), confirming a very limited role of inflation in determining corporate profitability.

Regressions using DDE-R-C as the dependent variable replace DEE-DV-C in equation (3) with DEE-R-C of corresponding time horizons: DEE-R-C1 (first year), DEE-R-C3 (first 3-year average), DEE-R-C5F (first 5-year average), DEE-R-C5S (second 5-year average), and DEE-R-C10 (first 10-year average). The results are similar (Table 3). The slope coefficient varies across sample periods and time horizons, and the sign of the coefficient is mostly the same as that in DEE-DV-C regressions. In some cases, however, the magnitude of the coefficient is substantially different. For the 1930 sample and the 1946 sample, for example, it is much smaller than that in the DEE-DV-C regressions. These results suggest that both the discount rate and cashflows matter and that the discount rate effect is not large enough to completely offset or reverse the cashflows effect.

| Table 3: Inflation and DEE-R-C by Sample Periods | | | | | |
|---|---|---|---|---|---|
| | Dependent Variable | | | | |
| | *DEE-R-C1* | *DEE-R-C3* | *DEE-R-C5F* | *DEE-R-C5S* | *DEE-R-C10* |
| *INTERCEPT* | 0.0220 | 0.0189 | 0.0288 | 0.0287 | 0.0288 |
| t Stat | 0.83 | 0.63 | 0.94 | 0.96 | 0.97 |
| *ITPD1914* | 0.0722 | 0.1852 | 0.1652 | -0.0165 | 0.0743 |
| t Stat | 1.47 | 3.31 | 2.90 | -0.30 | 1.34 |
| Base+Dum | 0.0942 | 0.2041 | 0.1939 | 0.0122 | 0.1031 |
| *ITPD1930* | -0.0281 | -0.0138 | -0.0036 | 0.0805 | 0.0385 |
| t Stat | -0.59 | -0.26 | -0.07 | 1.51 | 0.72 |
| Base+Dum | -0.0061 | 0.0051 | 0.0251 | 0.1093 | 0.0672 |
| *ITPD1946* | 0.0244 | 0.0093 | -0.0114 | -0.0511 | -0.0312 |
| t Stat | 0.52 | 0.17 | -0.21 | -0.96 | -0.59 |
| Base+Dum | 0.0464 | 0.0282 | 0.0173 | -0.0223 | -0.0025 |
| *ITPD1960* | -0.0016 | 0.1081 | 0.1059 | -0.0055 | 0.0502 |
| t Stat | -0.01 | 0.85 | 0.81 | -0.04 | 0.40 |
| Base+Dum | 0.0204 | 0.1270 | 0.1346 | 0.0232 | 0.0789 |
| *ITPD1983* | 0.3759 | 0.7637 | 0.8178 | 0.6382 | 0.7280 |
| t Stat | 5.07 | 9.07 | 9.52 | 7.63 | 8.74 |
| Base+Dum | 0.3979 | 0.7826 | 0.8465 | 0.6669 | 0.7567 |
| *INFLATION* | 0.2343 | 0.1882 | 0.2297 | -0.5837 | -0.1770 |
| t Stat | 0.57 | 0.40 | 0.48 | -1.26 | -0.38 |
| *IFND1914* | -0.8923 | -2.7233 | -3.2922 | -1.9538 | -2.6230 |
| t Stat | -1.49 | -3.99 | -4.73 | -2.88 | -3.89 |
| Base+Dum | -0.6580 | -2.5351 | -3.0625 | -2.5376 | -2.8000 |
| *IFND1930* | 1.5921 | 1.5302 | 0.6559 | 1.0568 | 0.8564 |
| t Stat | 2.00 | 1.69 | 0.71 | 1.17 | 0.96 |
| Base+Dum | 1.8263 | 1.7184 | 0.8856 | 0.4731 | 0.6793 |
| *IFND1946* | 0.1323 | 1.6982 | 2.4249 | 3.6530 | 3.0390 |
| t Stat | 0.15 | 1.65 | 2.31 | 3.57 | 2.99 |
| Base+Dum | 0.3665 | 1.8864 | 2.6546 | 3.0693 | 2.8620 |
| *IFND1960* | -0.5231 | -2.3135 | -2.8159 | -2.3352 | -2.5755 |
| t Stat | -0.37 | -1.46 | -1.74 | -1.48 | -1.64 |
| Base+Dum | -0.2888 | -2.1252 | -2.5862 | -2.9189 | -2.7526 |
| *IFND1983* | -7.2007 | -18.4423 | -20.4190 | -14.9169 | -17.6680 |
| t Stat | -3.26 | -7.36 | -7.99 | -5.99 | -7.12 |
| Base+Dum | -6.9665 | -18.2540 | -20.1893 | -15.5007 | -17.8450 |
| Adj. R Sqr. | 0.0241 | 0.0718 | 0.0840 | 0.0823 | 0.0820 |
| No. of Obs. | 1,587 | 1,587 | 1,587 | 1,587 | 1,587 |

Varying economic fundamentals across sample period may largely be responsible for the varying relation between inflation and corporate profitability. The 1930 period was a period when aggregate

demand was depressed. In the depressionary period, higher inflation might be associated with a recovery of demand and hence improving economic conditions. In the 1946 period, explosive demand after World War II caused inflation. Explosive demand should be good for corporate profitability. In the 1960 period, a main cause of inflation was oil shocks, which raised production costs. High production costs are bad for corporate profitability.

For the 1983 sample, the negative relation between inflation and DEE-DV-C is consistent with declining inflation followed by fast economic growth in the 1980s and the 1990s. The negative relation, however, is unreasonably strong. The magnitude of the intercept term is also very large. A main reason for the anomaly is the outliers generated by rollercoaster earnings around the Great Recession of 2007-2009. For some observations, DEE-DV is over 900 percent. To reduce the effect of outliers, I censor DEE-DV-C at 60 percent (60 if it is greater than 60) which is around the 90$^{th}$ percentile and -60 percent (-60 if it is less than -60). In the censored regressions, the magnitude of coefficients for the 1980 period is dramatically smaller, although still large (Table 4). The censoring does not eliminate the effect of earnings volatility. For the other sample periods, the censoring changes the coefficients only moderately, suggesting that the overall results are fairly robust.

| Table 4: Censored Regressions | | | | | |
|---|---|---|---|---|---|
| | Dependent Variable | | | | |
| | *DEE-DV-C1* | *DEE-DV-C3* | *DEE-DV-C5F* | *DEE-DV-C5S* | *DEE-DV-C10* |
| *INTERCEPT* | -0.0010 | -0.0217 | -0.0253 | -0.0655 | -0.0431 |
| t Stat | -0.10 | -1.77 | -1.96 | -4.80 | -3.44 |
| *ITPD1914* | 0.0559 | 0.1407 | 0.1258 | -0.0993 | 0.0155 |
| t Stat | 2.85 | 6.15 | 5.22 | -3.91 | 0.66 |
| Base+Dum | 0.0549 | 0.1190 | 0.1004 | -0.1647 | -0.0276 |
| *ITPD1930* | -0.0053 | 0.0221 | 0.0687 | 0.3316 | 0.2155 |
| t Stat | -0.28 | 1.00 | 2.97 | 13.58 | 9.62 |
| Base+Dum | -0.0064 | 0.0004 | 0.0434 | 0.2661 | 0.1724 |
| *ITPD1946* | 0.0212 | 0.0326 | 0.0357 | -0.0172 | 0.0086 |
| t Stat | 1.13 | 1.49 | 1.55 | -0.71 | 0.38 |
| Base+Dum | 0.0202 | 0.0109 | 0.0104 | -0.0827 | -0.0345 |
| *ITPD1960* | -0.0056 | 0.1407 | 0.1813 | 0.1951 | 0.1859 |
| t Stat | -0.13 | 2.69 | 3.29 | 3.36 | 3.49 |
| Base+Dum | -0.0067 | 0.1190 | 0.1560 | 0.1296 | 0.1428 |
| *ITPD1983* | -0.0235 | 0.2453 | 0.2875 | 0.2642 | 0.2864 |
| t Stat | -0.80 | 7.13 | 7.92 | 6.90 | 8.15 |
| Base+Dum | -0.0245 | 0.2236 | 0.2622 | 0.1987 | 0.2433 |
| *INFLATION* | 1.2336 | 1.0657 | 1.1646 | 0.6763 | 0.9145 |
| t Stat | 7.54 | 5.59 | 5.79 | 3.19 | 4.70 |
| *IFND1914* | -1.0331 | -2.3395 | -2.9101 | -1.6986 | -2.3087 |
| t Stat | -4.31 | -8.38 | -9.89 | -5.48 | -8.11 |
| Base+Dum | 0.2005 | -1.2738 | -1.7455 | -1.0224 | -1.3942 |
| *IFND1930* | 1.4323 | 1.5822 | 0.7591 | 2.5458 | 1.8413 |
| t Stat | 4.50 | 4.27 | 1.94 | 6.18 | 4.87 |
| Base+Dum | 2.6659 | 2.6479 | 1.9237 | 3.2221 | 2.7558 |
| *IFND1946* | 0.2471 | 1.5053 | 1.5920 | 2.8798 | 2.2352 |
| t Stat | 0.68 | 3.58 | 3.59 | 6.16 | 5.21 |
| Base+Dum | 1.4807 | 2.5710 | 2.7566 | 3.5561 | 3.1496 |
| *IFND1960* | -1.1258 | -3.0284 | -3.9954 | -5.4057 | -4.6946 |
| t Stat | -2.02 | -4.67 | -5.84 | -7.50 | -7.09 |
| Base+Dum | 0.1078 | -1.9627 | -2.8308 | -4.7295 | -3.7802 |
| *IFND1983* | 0.8845 | -7.3819 | -9.2163 | -7.8485 | -8.8050 |
| t Stat | 1.00 | -7.20 | -8.52 | -6.89 | -8.42 |
| Base+Dum | 2.1181 | -6.3162 | -8.0517 | -7.1722 | -7.8905 |
| Adj. R Sqr. | 0.1097 | 0.1469 | 0.1582 | 0.3009 | 0.2364 |
| No. of Obs. | 1,587 | 1,587 | 1,587 | 1,587 | 1,587 |

*4.d. Monotonicity of the Relation between Inflation and Corporate Profitability*

The sign reversals of the inflation coefficient across sample periods indicate that the relation between inflation and corporate profitability is complex and unlikely to be monotonic. To examine the monotonicity of the relation, I divide the sample by the range of inflation: less than 0 percent (LT0 range), greater than or equal to 0 percent and less than 4 percent (1-4 range), greater than or equal to 4 percent and less than 7 percent (4-7 range), greater than or equal to 7 percent and less than 10 percent (7-10 range), and greater than or equal to 10 percent (GE10 range).

The regression is specified as:

$$DEE\text{-}DV\text{-}C0 = c_1 + c_2 \cdot INTDLT0 + c_3 \cdot INTD1T4 + c_4 \cdot INTD4T7 + c_5 \cdot INTD7T10 + c_6 \cdot INFLATION$$

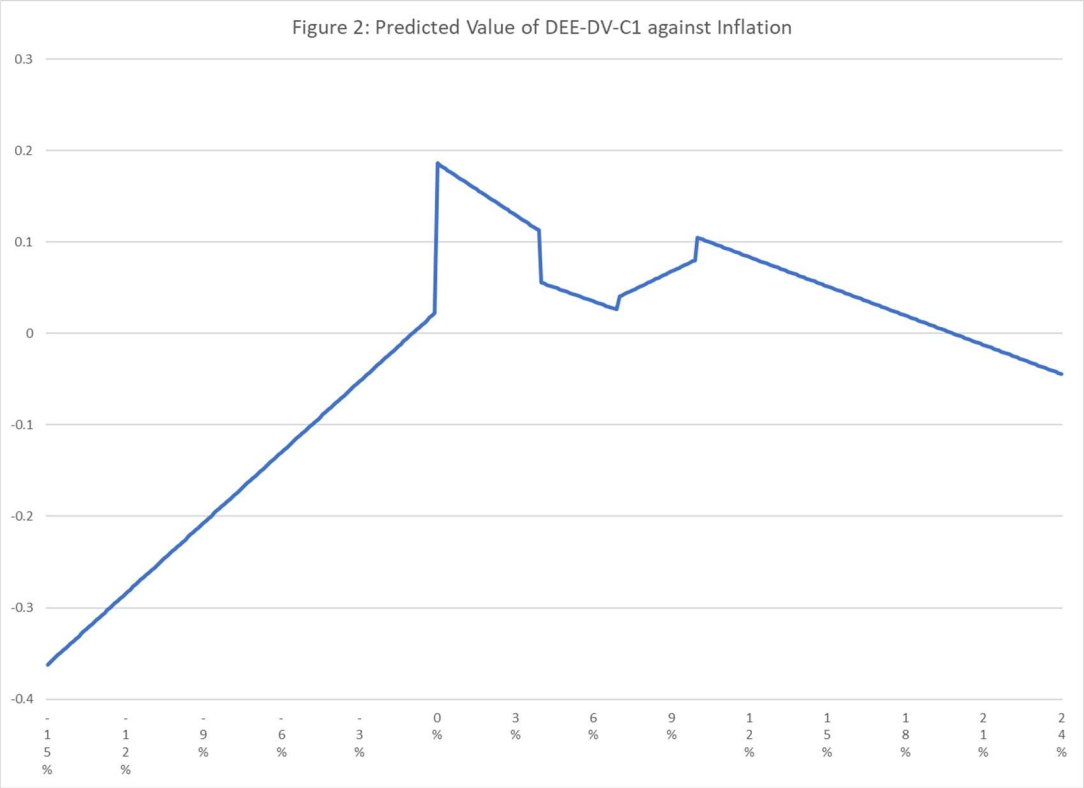
$$+ c_7 \cdot IFNDLT0 + c_8 \cdot IFND1T4 + c_9 \cdot IFND4T7 + c_{10} \cdot IFND7T10 + \varepsilon, \qquad (4)$$

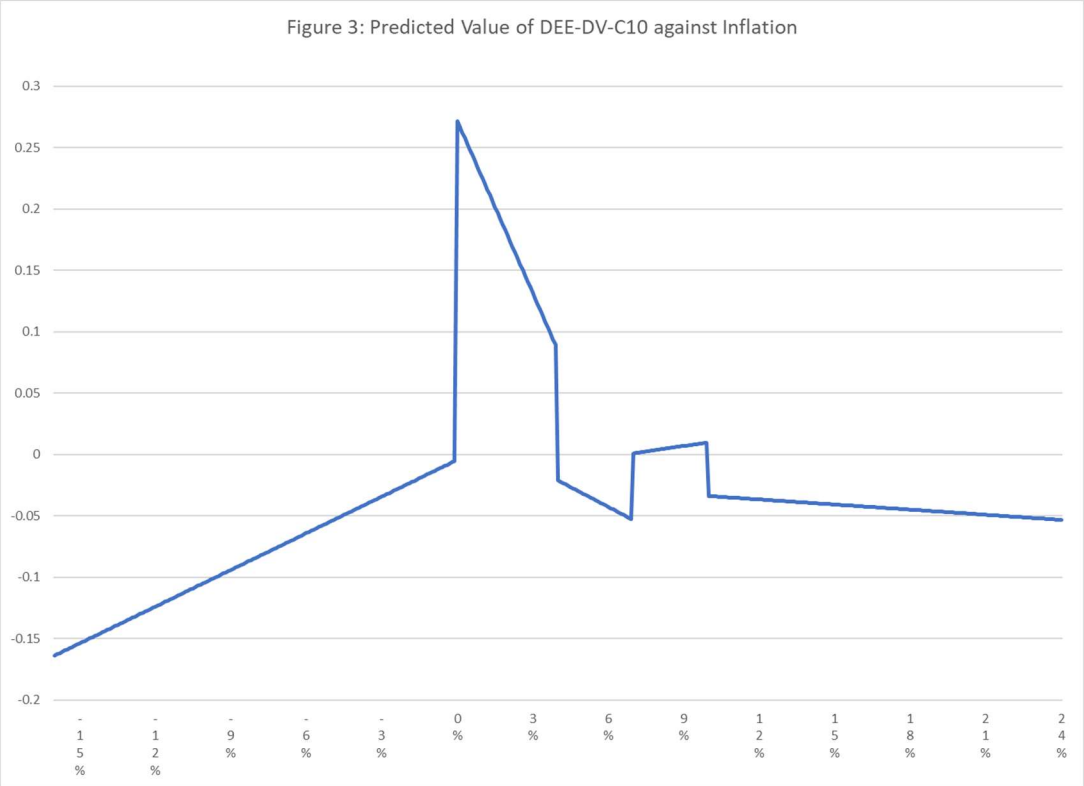
where INTDXXXX = 1 if the inflation range is XXXX and 0 otherwise; IFNDXXXX = INFLATION if the inflation range is XXXX and 0 otherwise; and $c_i$'s are coefficients to be estimated.

In Table 5, the coefficients of both INTERCEPT and INFLATION vary across inflation ranges and time horizons without a clear pattern, and most of those variables fail to be significant at the 5-percent level. Adjusted $R^2$ ranges from 0.0136 to 0.0371, which are all very low.

| Table 5: Inflation and DDE-DV-C by Inflation Ranges | | | | | |
|---|---|---|---|---|---|
| | Dependent Variable | | | | |
| | *DEE-DV-C1* | *DEE-DV-C3* | *DEE-DV-C5F* | *DEE-DV-C5S* | *DEE-DV-C10* |
| *INTERCEPT* | 0.2117 | 0.1278 | 0.0609 | -0.1009 | -0.0200 |
| t Stat | 1.10 | 0.55 | 0.25 | -0.39 | -0.08 |
| *ITPDLT0* | -0.1869 | -0.0049 | 0.0174 | 0.0138 | 0.0156 |
| t Stat | -0.94 | -0.02 | 0.07 | 0.05 | 0.06 |
| Base+Dum | 0.0248 | 0.1229 | 0.0783 | -0.0871 | -0.0044 |
| *ITPD0T4* | -0.0256 | 0.1633 | 0.2511 | 0.3326 | 0.2919 |
| t Stat | -0.13 | 0.69 | 1.01 | 1.26 | 1.16 |
| Base+Dum | 0.1861 | 0.2912 | 0.3120 | 0.2317 | 0.2719 |
| *ITPD4T7* | -0.1154 | -0.2196 | -0.1907 | 0.2750 | 0.0421 |
| t Stat | -0.40 | -0.63 | -0.52 | 0.71 | 0.11 |
| Base+Dum | 0.0963 | -0.0918 | -0.1298 | 0.1740 | 0.0221 |
| *ITPD7T10* | -0.2674 | -0.2903 | -0.0962 | 0.0955 | -0.0003 |
| t Stat | -0.49 | -0.44 | -0.14 | 0.13 | 0.00 |
| Base+Dum | -0.0557 | -0.1625 | -0.0353 | -0.0054 | -0.0204 |
| *INFLATION* | -1.0664 | -0.9592 | -0.7187 | 0.4412 | -0.1388 |
| t Stat | -0.80 | -0.60 | -0.42 | 0.25 | -0.08 |
| *IFNDLT0* | 3.6463 | 4.6165 | 3.3864 | -1.1155 | 1.1354 |
| t Stat | 2.36 | 2.49 | 1.73 | -0.54 | 0.57 |
| Base+Dum | 2.5799 | 3.6573 | 2.6677 | -0.6743 | 0.9967 |
| *IFND0T4* | -0.8126 | -3.4039 | -4.1116 | -4.9621 | -4.5369 |
| t Stat | -0.37 | -1.29 | -1.48 | -1.68 | -1.61 |
| Base+Dum | -1.8790 | -4.3631 | -4.8303 | -4.5209 | -4.6756 |
| *IFND4T7* | 0.0512 | 2.6106 | 2.9401 | -4.8230 | -0.9415 |
| t Stat | 0.01 | 0.52 | 0.55 | -0.86 | -0.17 |
| Base+Dum | -1.0152 | 1.6514 | 2.2214 | -4.3818 | -1.0802 |
| *IFND7T10* | 2.4397 | 2.9756 | 1.1025 | -0.2182 | 0.4421 |
| t Stat | 0.40 | 0.40 | 0.14 | -0.03 | 0.06 |
| Base+Dum | 1.3732 | 2.0165 | 0.3838 | 0.2230 | 0.3034 |
| Adj. R Sqr. | 0.0335 | 0.0371 | 0.0338 | 0.0136 | 0.0216 |
| No. of Obs. | 1,587 | 1,587 | 1,587 | 1,587 | 1,587 |

To detect some patterns, I plot the predicted value of DEE-DV-C1 (Figure 2) and that of DEE-DV-C10 (Figure 3). The predicted values look very irregular. Noticeable results are high DEE-DV for the 1-4 inflation range, low DEE-DV-C for the LT0 inflation range and the GE10 inflation range, a positive relation between inflation and DEE-DV-C in the LT0 inflation range, and a negative relation between inflation and DEE-DV-C in the GE10 inflation range. Regressions using DEE-R-C produce similar results. Since the additional regressions are not informative, I do not present the results.



Descriptive statistics can be more informative and easier to interpret. Table 6 presents the descriptive statistics for DEE-DV-C by the inflation range. At every time horizon, the mean of DEE-DV-C is the highest for the 0-4 inflation range, confirming the regression result. The range, however, contains outliers; the maximum is astonishingly high. With the outliers, the median may be more reliable than the mean. Although by substantially smaller margins, the median is still the highest for the 0-4 inflation range with an exception of DEE-DV-C5S; it is second to the 7-10 inflation range by a modest margin. Low DEE-DV-C for the LT0 inflation range and the GE10 inflation range are also notable. It is particularly low at short horizons for the LT0 range and at long horizons for the GE10 inflation range.

| Table 6: DEE-DV-C by the Range of Inflation | | | | | |
|---|---|---|---|---|---|
| | DEE-DV-C1 | | | | |
| INFLATION | Mean | Median | Std. Dvtn. | Maximum | Minimum |
| All | 0.0655 | 0.0259 | 0.5450 | 7.9353 | -0.8871 |
| < 0 | -0.1025 | -0.1033 | 0.2639 | 1.3343 | -0.8871 |
| 0 ≤ < 4% | 0.1469 | 0.0725 | 0.7342 | 7.9353 | -0.8493 |
| 4% ≤ < 7% | 0.0424 | 0.0328 | 0.1896 | 0.6999 | -0.4283 |
| 7% ≤ < 10% | 0.0606 | 0.0548 | 0.1835 | 0.7060 | -0.2122 |
| ≥ 10% | 0.0621 | -0.0157 | 0.2440 | 0.7331 | -0.2450 |
| | DEE-DV-C3 | | | | |
| All | 0.0840 | -0.0001 | 0.6570 | 9.5821 | -0.5961 |
| < 0 | -0.0575 | -0.0667 | 0.3115 | 1.8280 | -0.5961 |
| 0 ≤ < 4% | 0.2001 | 0.0573 | 0.8785 | 9.5821 | -0.5156 |
| 4% ≤ < 7% | -0.0042 | -0.0285 | 0.2466 | 0.9631 | -0.5242 |
| 7% ≤ < 10% | 0.0083 | -0.0190 | 0.2519 | 0.9281 | -0.3922 |
| ≥ 10% | -0.0067 | -0.0798 | 0.3716 | 1.1466 | -0.3856 |
| | DEE-DV-C5F | | | | |
| All | 0.0853 | -0.0278 | 0.6904 | 9.9196 | -0.6451 |
| < 0 | -0.0533 | -0.1345 | 0.3537 | 2.1748 | -0.6451 |
| 0 ≤ < 4% | 0.2112 | 0.0468 | 0.9143 | 9.9196 | -0.5198 |
| 4% ≤ < 7% | -0.0120 | -0.0532 | 0.2426 | 0.8617 | -0.3676 |
| 7% ≤ < 10% | -0.0028 | -0.0508 | 0.2799 | 1.0239 | -0.3602 |
| ≥ 10% | -0.0399 | -0.1544 | 0.4461 | 1.3300 | -0.4876 |
| | DEE-DV-C5S | | | | |
| All | 0.0436 | -0.0866 | 0.7243 | 10.0089 | -0.6538 |
| < 0 | -0.0538 | -0.0852 | 0.4213 | 1.9000 | -0.6538 |
| 0 ≤ < 4% | 0.1374 | -0.0724 | 0.9415 | 10.0089 | -0.5708 |
| 4% ≤ < 7% | -0.0583 | -0.1225 | 0.3185 | 1.0320 | -0.5487 |
| 7% ≤ < 10% | 0.0135 | -0.0560 | 0.4207 | 1.0103 | -0.5270 |
| ≥ 10% | -0.0390 | -0.2301 | 0.5198 | 1.3627 | -0.5121 |
| | DEE-DV-C10 | | | | |
| All | 0.0645 | -0.0564 | 0.6937 | 9.9642 | -0.5659 |
| < 0 | -0.0536 | -0.1220 | 0.3644 | 2.0374 | -0.5659 |
| 0 ≤ < 4% | 0.1743 | 0.0033 | 0.9181 | 9.9642 | -0.4946 |
| 4% ≤ < 7% | -0.0351 | -0.1122 | 0.2465 | 0.9419 | -0.3653 |
| 7% ≤ < 10% | 0.0053 | -0.0122 | 0.3154 | 1.0171 | -0.4212 |
| ≥ 10% | -0.0395 | -0.1862 | 0.4658 | 1.3463 | -0.4954 |

Based on the descriptive statistics for DEE-R-C, the outperformance of the 0-4 inflation range is even more clear-cut (Table 7). For the 0-4 inflation range, both the mean and the median of DEE-R-C is the highest at all time horizons. The underperformance of the GE10 inflation range is also notable. For the GE10 inflation range, the median of DEE-R-C is the lowest at all time horizons, and the mean is the lowest for all but DEE-R-C1, where it is the second lowest by a slight margin. On the other hand, the LT0 inflation range performs much better. At short horizons, the mean and the median of DEE-R-C are still

below those of the whole sample, but by smaller margins. At longer horizons, the mean and the median are close to those of the whole sample.

| Table 7: DEE-R-C by the Range of Inflation | | | | | |
|---|---|---|---|---|---|
| | DEE-DV-C1 | | | | |
| | Mean | Median | Std. Dvtn. | Maximum | Minimum |
| All | 0.0685 | 0.0316 | 0.5318 | 7.8464 | -0.8856 |
| < 0 | -0.0400 | -0.0357 | 0.2679 | 1.4343 | -0.8856 |
| 0 ≤ < 4% | 0.1522 | 0.0755 | 0.7191 | 7.8464 | -0.8479 |
| 4% ≤ < 7% | 0.0345 | 0.0230 | 0.1792 | 0.6379 | -0.4423 |
| 7% ≤ < 10% | 0.0101 | 0.0039 | 0.1641 | 0.6013 | -0.2770 |
| ≥ 10% | -0.0291 | -0.0668 | 0.2200 | 0.5658 | -0.3578 |
| | DEE-DV-C3 | | | | |
| All | 0.0872 | 0.0157 | 0.6192 | 9.0775 | -0.5295 |
| < 0 | 0.0168 | -0.0070 | 0.2979 | 1.9595 | -0.5234 |
| 0 ≤ < 4% | 0.2004 | 0.0710 | 0.8312 | 9.0775 | -0.5177 |
| 4% ≤ < 7% | -0.0092 | -0.0379 | 0.2131 | 0.6854 | -0.5295 |
| 7% ≤ < 10% | -0.0320 | -0.0751 | 0.2098 | 0.7580 | -0.3615 |
| ≥ 10% | -0.1085 | -0.1623 | 0.3077 | 0.8506 | -0.5013 |
| | DEE-DV-C5F | | | | |
| All | 0.0888 | -0.0079 | 0.6357 | 9.2082 | -0.6171 |
| < 0 | 0.0319 | -0.0308 | 0.3365 | 2.3315 | -0.5616 |
| 0 ≤ < 4% | 0.2063 | 0.0740 | 0.8457 | 9.2082 | -0.4399 |
| 4% ≤ < 7% | -0.0190 | -0.0509 | 0.1989 | 0.7097 | -0.3753 |
| 7% ≤ < 10% | -0.0412 | -0.0963 | 0.2210 | 0.8135 | -0.3439 |
| ≥ 10% | -0.1338 | -0.2107 | 0.3558 | 0.9473 | -0.6171 |
| | DEE-DV-C5S | | | | |
| All | 0.0489 | -0.0477 | 0.6189 | 8.7360 | -0.6048 |
| < 0 | 0.0704 | -0.0399 | 0.4133 | 2.4497 | -0.4903 |
| 0 ≤ < 4% | 0.1208 | -0.0210 | 0.8069 | 8.7360 | -0.5143 |
| 4% ≤ < 7% | -0.0599 | -0.1129 | 0.2416 | 0.7939 | -0.4662 |
| 7% ≤ < 10% | -0.0582 | -0.0919 | 0.2726 | 0.7605 | -0.4938 |
| ≥ 10% | -0.1251 | -0.2526 | 0.3590 | 0.8926 | -0.6048 |
| | DEE-DV-C10 | | | | |
| All | 0.0689 | -0.0397 | 0.6161 | 8.9721 | -0.6109 |
| < 0 | 0.0511 | -0.0371 | 0.3562 | 2.3906 | -0.4498 |
| 0 ≤ < 4% | 0.1635 | 0.0140 | 0.8181 | 8.9721 | -0.3769 |
| 4% ≤ < 7% | -0.0395 | -0.0968 | 0.1901 | 0.7351 | -0.3026 |
| 7% ≤ < 10% | -0.0497 | -0.0947 | 0.2209 | 0.7870 | -0.2820 |
| ≥ 10% | -0.1295 | -0.2056 | 0.3450 | 0.9199 | -0.6109 |

In sum, the relation between inflation and corporate profitability is not monotonic. DEE-DV-C and DEE-R-C are the highest when inflation is modest. When inflation is very high, DEE-DV-C is low, and DEE-R-C is even lower; cashflows fail to keep up with inflation, dragging down DEE-R-C, but the negative

effect of inflation on DEE-DV-C is smaller than that on DEE-R thanks to lower real interest rates. Deflation does not affect DEE-R-C much, but it lowers DEE-DV-C through higher real interest rates.

These results suggest that corporate profitability critically depends on economic stability, rather than inflation itself. Inflation is modest when economic conditions are stable. Deflation or very high inflation may be caused by some disruptions that make economic conditions unstable. Inflation may matter for corporate profitability basically to the extent that it reflects economic stability.

**5. Rationality of Stock Market Reaction to Inflation**

In the very long run, corporate profitability keeps up with inflation. In the 10-year time horizon studied in this paper, however, the relation between inflation and corporate profitability is irregular. Furthermore, corporate profitability is so volatile that inflation can at best explain a small fraction of changes in corporate profitability. Considering these factors, I would regard a knee-jerk reaction to inflation as irrational.

Under certain conditions, however, low corporate profitability follows high inflation, potentially justifying a negative stock market reaction to inflation. Depending on economic environments, an increase in the rate of inflation can be favorable or unfavorable for corporate profitability. For example, it is favorable when it reflects recovering demand and unfavorable when it reflects upward pressure on production costs. The latter is more likely when inflation is very high already. The analyses above show that corporate profitability is low when the rate of inflation is very high or very low. Typically, very high inflation or deflation occurs during a prolonged period of economic instability. Thus, it may be economic instability that lowers corporate profitability, rather than inflation itself. Although reacting to inflation itself may be irrational in most cases, a positive or a negative relation between inflation and stock returns may reflect a rational reaction by investors to economic fundamentals in some cases. To be specific, stock returns should be negatively related with inflation when inflation mainly reflects upward pressure on production costs and prolonged economic instability.

The popular press typically justifies a negative stock market reaction to higher inflation with an increased likelihood of tighter monetary policy, which entails a higher interest rate and a higher probability of a recession. This explanation is not on a strong footing. Assuming that cashflows from stocks keep up with inflation, high inflation and high nominal interests would have a net negative effect on the discounted value of cashflows if real interest rates increase. As shown above, however, real interest rates are inversely related with inflation. A recession would decrease aggregate demand and hence cashflows from stocks. A typical recession, however, is a temporary setback that should affect the present value of an infinite stream of cashflows only modestly. According to Park (2021) and Park

(2022), the stock market overreacts to recessions. Furthermore, tight monetary policy is intended to improve the long-term prospect of the economy. A tepid response to inflation may necessitate a deeper recession later and even harm economic fundamentals. Thus, tighter monetary policy can even be good for the stock market.

The stock market has been reacting sensitively to inflation lately. Inflation in July 2022 released on August 10 turned out to be lower than the forecast by 0.2 percentage points (a year-over-year rate of 8.5 percent actual compared with 8.7 percent forecast), while August inflation released on September 13 turned out to be higher than the forecast by 0.2 percentage points (8.3 percent actual compared with 8.1 percent forecast). The S&P 500 index went up 2.2 percent on August 10 and went down 4.3 percent on September 13. The stock market seems to have been overreacting to inflation data. Monthly inflation is volatile, and its small deviation from the forecast should not be a surprise that meaningfully changes the likelihood of prolonged economic instability.

Currently, the main sources of economic instability are the Russia-Ukraine war, supply chain disruptions, labor shortages, and a ballooning national debt. It is hard to assess geopolitical risks. The war can end soon or escalate. Should China invade Taiwan, its economic impact would be devastating. Supply chain disruptions and labor shortages have been raising production costs. Strong aggregate demand, however, has been enabling companies to pass on higher costs to consumers. The stock market expects that contractionary monetary policy will slow down the economy. The economic slowdown will weaken aggregate demand, but it will also ease cost pressure. Thus, the net effect on corporate profitability may turn out to be moderate. The ballooning national debt may be a fundamental problem that can cause prolonged and serious economic instability. Eventually, it can entail higher taxes, lower spendings, higher real interest rates, and/or runaway inflation. One can rationalize the large decrease in stock prices this year based on these factors. It is harder to rationalize dramatic reactions to monthly inflation data. Inflation is relevant to the extent that it is related with the severity of underlying factors. Reactions to inflation itself seem to be driven by market sentiment, which may create profit opportunities.

**6. Conclusion**

It is hard to find a robust relation between inflation and corporate profitability because it is so unstable. The relation varies across sample periods, time horizons, and inflation ranges. The relation can be positive or negative, depending on the cause of inflation. Corporate profitability tends to be positively related with demand-pull inflation, and negatively related with cost-push inflation. More interesting is corporate profitability by the range of inflation. Corporate profitability is the highest when

inflation is modest (0-4 percent), and it is very low when inflation is very low (deflation) or very high (over 10 percent). Based on this finding, what really matters for corporate profitability seems to be economic stability. Modest inflation may reflect stable economic conditions, while deflation or very high inflation may result from economic instability. This explanation is consistent with the proxy hypothesis.

Oftentimes, the stock market reacts strongly to inflation data for fear of tighter monetary policy, which results in higher interest rates and lower aggregate demand. Tighter monetary policy is a dubious justification for a strong negative reaction to inflation. The real interest rate is inversely related with inflation despite a higher nominal rate, and quickly restoring the economic equilibrium can improve, rather than harm, the long-term prospect of the economy.

Are stocks a good hedge against inflation? The real economy dictates corporate profitability, and inflation reflects the condition of the real economy to varying extents. Controlled for the condition of the real economy, corporate profitability seems to keep up with inflation. That makes stocks a conditionally good hedge against inflation. High inflation itself may not lower corporate profitability, but it can signal lower corporate profitability. For investment strategies, the key is whether the stock market is reacting to inflation itself or something behind it. Negative reactions to high inflation itself may create buying opportunities. If the stock market is reacting to persistent and serious economic instability signaled by high inflation, it may be a time to reevaluate stocks in comparison with other investment alternatives. Savvy investors should see through a bail named inflation.

**References**

Ball, Lawrence, 1990, “Why Does High Inflation Raise Inflation Uncertainty?” National Bureau of Economic Research Working Paper No. 3224.

Boudoukh, Jacob, M. Richardson, 1993, “Stock returns and inflation: A long horizon perspective,” *American Economic Review,* 83, 1346-1355.

Brandta, Michael W. and Wang, Kevin Q., 2003, “Time-varying risk aversion and unexpected inflation,” *Journal of Monetary Economics* 50, 1457–1498

Cohen, Randolph, Christopher Polk, and Tuomo Vuolteenaho, 2005, Money Illusion in the Stock Market: The Modigliani-Cohn Hypothesis, *Quarterly Journal of Economics* 120, 639-668.

Fama, Eugene F., 1981, Stock Returns, Real Activity, Inflation, and Money, *American Economic Review* 74, 545-565.

Feldstein, Martin, 1980, Inflation and the Stock Market, *American Economic Review* 70, 839-847.
Gordon, Robert J., 1986, *The American Business Cycle*, The University of Chicago Press, Chicago and London.

Modigliani, Franco and Richard Cohn, 1979, Inflation, rational valuation, and the market, *Financial Analysts Journal* 35(3), 24-44.

Park, Sangkyun, 2021, "The P-E Ratio, the Business Cycle, and Timing the Stock Market," *Journal of Portfolio Management*, 47 (8), 165-183.

Park, Sangkyun, 2022, "Stock Market Reaction to Recessions and Buying the Dips,” *The Journal of Investing* 31 (5), 105-117.

Schotman, Peter C. and Schweitzer, Mark, 2000, "Horizon sensitivity of the inflation hedge of stocks", Journal of Empirical Finance 7 (3-4), 301-315.

Shiller, Robert J., 1981, "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?", *American Economic Review*, 75(3), 421-36.

Shiller, Robert J., 2015, *Irrational Exuberance* (Third Edition), Princeton University Press, Princeton and Oxford.

Summers, Lawrence H., 1986, "Does the Stock Market Rationally Reflect Fundamental Values?" *Journal of Finance*, 41(3), 591-601.