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The Impact of Inflation on the U.S. Stock Market After the COVID-19 Pandemic※

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Abstract

Inflation remained quiescent for several decades and then surged in 2021 and 2022. Inflation subsequently fell in 2023 and 2024. This paper investigates how the rise and fall of inflation after 2019 affected the U.S. stock market. To do this, it estimates a fully specified multi-factor model that measures the exposure of 54 assets to inflation, monetary policy, and other macroeconomic variables over the 1994 to 2019 period. The paper then uses the inflation betas to investigate how investors' perceptions of inflation changed between 2020 and 2024. The results indicate that concerns about inflation roiled the stock market over this period. The Fed's anti-inflationary policies whipsawed markets even more. These findings highlight the dangers that arise when monetary policy allows inflation to accelerate.

Keywords: Inflation, Risk premia, Stock returns

JEL classification: E31, E50

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1. Introduction

U.S. inflation in 2022 reached its highest level in more than 40 years (see Figure 1). While it has since fallen, tariffs, tax cuts, and other policies advocated by the Trump administration could cause inflation to re-accelerate (Smith, 2024). How does inflation impact financial markets and how should policymakers respond?

In theory inflation impacts assets such as Treasury bonds whose payoff is fixed in nominal terms.[1] Assuming the real log of the stochastic discount factor (SDF) is conditionally normal and the SDF and inflation are jointly log-normal, Cieslak and Pflueger (2023) showed that the nominal interest rate on a two period default-free bond depends positively on the covariance between the SDF and expected inflation. When there is a negative covariance, states when the SDF is high are associated with lower expected inflation. Investors value payoffs more when the SDF is high. Lower expected inflation in these states raises long-term bond prices. In this case nominal bonds are a hedge against inflation, and investors are willing to accept a negative risk premium to hold them.

On the other hand, when there is a positive covariance between the SDF and expected inflation, states when the SDF is high are associated with higher inflation. Higher expected inflation in these states lowers long-term bond prices. In this case investors will require a positive risk premium to hold bonds. Cieslak and Pflueger (2023) label the case where there is a negative covariance between inflation and the SDF good inflation and the case when there is a positive covariance bad inflation.

[1] This paragraph and the next two draw on the excellent article by Cieslak and Pflueger (2023).

Good inflation in New Keynesian models is driven by demand shocks. These will cause inflation to decrease when output and consumption decrease. Thus bond prices will be higher when consumption is lower. Bad inflation is caused by supply shocks. These will cause inflation to increase when output and consumption decrease. Thus bond prices will be lower when consumption is lower.

Unlike for bonds, the relationship between inflation and stock prices is ambiguous. In theory stock prices equal the expected present value of future cash flows. Since nominal cash flows should increase with inflation, one might expect stock prices to increase with inflation. Nevertheless many researchers have found a negative correlation between stock prices and inflation.

Bekaert and Wang (2010) have discussed several explanations for this finding. As Fama (1981) argued, it could be that inflation occurs when economic activity is low, as in Cieslak and Pflueger's (2023) bad inflation state. In this case inflation is just a proxy for lower economic activity. Bekaert and Engstrom (2010) reported that risk premia are higher in recessions, so when there is stagflation lower stock prices may be associated with higher inflation. Lin (2009) has focused on the negative relationship between inflation uncertainty and stock prices. Doepke and Schneider (2009) have examined how unexpected inflation, by redistributing wealth from lenders to borrowers, can increase saving, decrease labor supply, and thus decrease output. Bekaert and Wang observed that inflation may be correlated with stock prices because inflation is correlated with economic activity.

Controlling for economic activity, returns on different stocks will have different covariances with inflation and thus may have different required returns. To investigate this issue, this paper estimates a multi-factor model including returns on several assets. The model includes measures of both economic activity and inflation. The results confirm that inflation exposures and inflation risk premia differ across assets.

Inflation may have roiled markets after the COVID-19 pandemic began. During this time, multiple shocks impacted inflation and financial markets. In the 2020 lockdowns, fears of catching COVID-19, rising unemployment, and other factors suppressed consumption. These negative demand shocks reduced inflation.

Several factors soon revived inflation. The availability of COVID-19 vaccines in December 2020 and massive vaccination over the next several months increased consumer confidence and contributed to the easing of lockdowns. President Biden signed the American Rescue Plan Act (ARPA) in March 2021, providing $1.9 trillion of fiscal stimulus. Consumer spending soared beginning in the first quarter of 2021. Increased demand interacted with supply constraints arising from supply chain bottlenecks to raise inflation. Then in February 2022 Russia invaded Ukraine, raising prices for energy, food, and other commodities. Inflation rose, with the year-on-year change in the consumer price index in June 2022 reaching its highest level in more than 40 years.

When the economy was on the cusp of reflating, the Federal Reserve in August 2020 announced a new monetary policy framework called Flexible Average Inflation Targeting (FAIT). As Boocker and Wessel (2024) discussed, FAIT implies that the Fed will react more aggressively when inflation falls below the 2% target than when it rises above target. The new framework also indicates that the Fed will react more aggressively to labor market shortfalls than to excess demand in the labor market. Employing a New Keynesian model and the Fed's FRB/US model to investigate alternative strategies, Kiley (2024) showed that these asymmetric responses produce an inflationary bias. Using narrative evidence, Eggertsson and Kohn (2023) reported that the new framework contributed to inflation by causing the Fed to delay tightening as inflation emerged in 2021.

Summers (2021) warned of the inflationary risks of the ARPA. He said the package could produce inflationary pressures of a kind not seen for a generation. He also stated that obtaining legislative support for spending reductions or tax increases could be difficult. As a result, he highlighted the risk of inflation expectations rising sharply. Blanchard, Domash, and Summers (2022) observed that unemployment in early 2022 was exceptionally low and job vacancies exceptionally high. They argued that this combination multiplied inflationary risks.

Gomez-Cram et al. (2024) examined the relationship between fiscal debt regimes, bond yields, and inflation. Under a regime of fiscal dominance, surprise spending increases are not offset by future tax increases. Instead, in their framework, unfunded fiscal expansions lead to inflation. They collected a sample of days between 2020 and 2023 when news indicated that fiscal policy was expansionary. They reported that Treasury yield hikes were concentrated on these days with news of higher deficits. They interpreted their findings as implying that investors began pricing Treasury bonds as if the U.S. had entered a risky fiscal regime.

De Soyres et al. (2022) investigated the relationship between fiscal stimulus and excess inflation during the Covid-19 pandemic. They documented that U.S. fiscal spending in 2020 was almost 20% more than was predicted before the pandemic. They then projected quarterly real consumption and production growth based on mobility during the pandemic and country-specific fiscal support. They reported that, for the U.S., fiscal stimuli raised inflation by 2.5 percentage points.

Di Giovanni et al (2023) examined the impact of the fiscal spending in the U.S. on inflation over the December 2019-June 2022 period. They employed a multisector macroeconomic network model with 66 sectors and both Ricardian and hand-to-mouth consumers. They reported that aggregate demand shocks caused two-thirds of the U.S. inflation in their model and that half or more of the aggregate demand shocks were due to the fiscal stimulus.

This paper investigates when investors priced inflationary anticipations into asset prices and whether fiscal policy news influenced inflationary expectations. If they perceived that inflation would rise, they would seek to sell assets that are harmed by inflation and purchase assets that benefit from inflation. This would lower the prices of assets that are harmed by inflation and raise the prices of assets that benefit from inflation.

Results using monthly data indicate that investors did not begin bidding down the prices of assets exposed to inflation until April 2021, when the consumer price index (CPI) inflation rate exceeded 4%. Results using daily data point also indicate that the daily response only became strong at this time. Findings using Gomez-Cram et al.'s (2024) daily fiscal news series point to a tenuous response of inflationary expectations to news of expansionary fiscal policy. The results also indicate that there was little expectation that the Fed would tighten policy until November 2021, as the CPI inflation rate approached 7%. Over the next year and a half, however, changing perceptions of monetary policy whipsawed markets, causing major price swings across most of the assets investigated. These results highlight the hard-learned lessons of the 1970s and 1980s that it is dangerous for monetary policy to allow inflation to accelerate.

The next section presents the data and methodology. Section 3 presents the results. Section 4 concludes.

2. Data and Methodology

In a multi-factor asset pricing framework, the return on asset *i* is given by:

$$R_i = E_i + \sum_{j=1}^{K} \beta_{ij} f_j + \varepsilon_i , \qquad (1)$$

where R_i is the *ex-post* realized return, E_i is the *ex-ante* required return, β_{ij} is the beta or factor loading of asset *i* to macroeconomic factor *j*, f_j represents innovations in macroeconomic factor *j* and ε_i is a mean-zero error term capturing the effect of idiosyncratic news on asset *i*. Ross (2001) assumed that the effect of idiosyncratic risk can be ignored in large portfolios and showed that arbitrage profits will exist unless there is a linear relationship between the required return and the betas. Required returns can thus be written as:

$$E_i = \lambda_0 + \sum_{j=1}^{K} \beta_{ij} \lambda_j , \qquad (2)$$

where λ_0 is the return on the risk-free asset and λ_j is the risk price associated with factor j.

McElroy and Burmeister (1988) employed an iterated nonlinear seemingly unrelated regression (INLSUR) technique to simultaneously estimate the factor loadings and the risk prices. They combined equations (1) and (2) to yield:

$$R_i = \lambda_0 + \sum_{j=1}^{K} \beta_{ij} \lambda_j + \sum_{j=1}^{K} \beta_{ij} f_j + \varepsilon_i , \qquad (3)$$

They then estimated a system of equations by stacking equation (3) across all the assets. This approach increases efficiency by permitting the imposition of the cross-equation restrictions that the risk prices (the λ_j's) are common across assets.

The system they estimated can be represented as:

$$\begin{bmatrix} R_1 - \lambda_0 \\ R_2 - \lambda_0 \\ . \\ . \\ . \\ R_n - \lambda_0 \end{bmatrix} = \begin{bmatrix} X(\lambda, f) & 0 & . & . & . & 0 \\ 0 & X(\lambda, f) & . & . & . & 0 \\ 0 & 0 & . & . & . & 0 \\ 0 & 0 & . & . & . & 0 \\ 0 & 0 & . & . & . & 0 \\ 0 & 0 & . & . & . & X(\lambda, f) \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ . \\ . \\ . \\ \beta_n \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ . \\ . \\ . \\ \varepsilon_n \end{bmatrix} . \qquad (4)$$

$R_i - \lambda_0$ is a *1*x*T* vector whose element at time t equals $R_{i,t} - \lambda_{0,t}$, where R_i represents the *ex-post* return on asset *i* and λ_0 is the return on the risk-free asset. $X(\lambda,f)$ is a *T*x*k* matrix whose *ti*th element equals $f_{it} + \lambda_i$. f_{it} represents news about macroeconomic factor i and λ_i is the risk price associated with factor i. β_i is a 1xk vector containing asset i's betas to the systematic factors. ε_i is an ixT vector. It is assumed that $E(\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_n) = 0_{nT}$, $E(\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_n)'(\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_n) = \sum \otimes I_T$, and $\sum_{i,j} = cov((\varepsilon_{i,t}, \varepsilon_{j,t})$. INLSUR estimation is used to estimate the system (4).

This paper follows Chen et al. (1986) in using, not latent variables from a dynamic factor model but actual macroeconomic data to measure the factors in equation (3). The factors they employed were the horizon premium (the difference between returns on 20-year and one-month Treasury securities), the default premium (the difference between returns on 20-year corporate bonds and 20-year Treasury bonds), the monthly growth rate in industrial production, unexpected inflation, and the change in expected inflation. Because each of these series is either the difference between asset returns or very noisy, Chen et al. treated them as innovations. Since Thorbecke (2018) reported that the default premium was not a priced factor, a monetary policy factor is used in this paper in place of the default premium.

To measure unexpected U.S. monetary policy, data from Bauer and Swanson (B&S) (2022) are used. They calculated monetary policy surprises by examining changes in the first four Eurodollar futures contracts over a 30-minute period surrounding Federal Open Market Committee (FOMC) news. They used the first principal component of the changes in the Eurodollar contracts to measure monetary policy. They constructed this variable so that an increase represents a contractionary monetary policy surprise. Their sample period extends from January 1988 to December 2019. The model estimated here thus uses this sample period.

To calculate unexpected inflation, the monthly CPI inflation rate is regressed on current and lagged one-month Treasury bill returns and on lagged values of the CPI inflation rate. This approach was used by Boudoukh, Richardson, and Whitelaw (1994). This framework is also used to calculate the change in expected inflation. Data to calculate unexpected inflation, the change in expected inflation, the growth rate of industrial production, and the horizon premium come from the Federal Reserve Bank of St. Louis FRED database and from Kroll (2023).

For the variable R_i in equations (1) through (3), the returns on 54 portfolios are used. These include the returns on sectoral stock returns and on assets related to gold and silver. Bekaert et al. (2010) noted that many stocks are harmed by inflation and Bampinas and Panagiotidis (2015), Hoang et al. (2016), Sharma (2016), and others reported that assets related to gold and silver benefit from inflation. Including both sectoral stock returns and returns related to precious metals increases the cross-sectional variation in assets' responses to inflation. Data on returns come from the Datastream database.[2] For the variable λ_0 in equations (2) and (3) the return on one-month Treasury bills are used. Data on the return on one-month Treasury bills come from Kroll (2023).

If investors expect inflation to rise, they will seek to purchase assets such as gold and silver that hedge against inflation and to sell assets such as stocks that are harmed by inflation. This will raise the prices of inflation hedges and lower the prices of assets hurt by inflation. Assets that hedge against inflation have positive inflation betas and assets that suffer from inflation have negative inflation betas. There should thus be a positive relationship between assets' returns and their inflation betas when investors expect higher inflation and a negative relationship when they expect lower inflation. For each month from August 2020 to September 2024, returns on the 54 assets are thus regressed on their inflation betas estimated over the 1988-2019 period.

[2] The data used in Thorbecke (2018) are employed up to December 2015 and extended for this study up to December 2019.

If investors expect contractionary monetary policy, they will seek to purchase assets that hedge against contractionary policy and to sell assets that are harmed by contractionary policy. This will raise the prices of assets that hedge against tighter policy and lower the prices of assets hurt by tighter policy. Assets that hedge against contractionary policy have positive B&S monetary policy betas and assets that suffer from contractionary policy have negative B&S monetary policy betas. There should thus be a positive relationship between assets' returns and their monetary policy betas when investors expect tighter policy and a negative relationship when they expect easier policy. For each month from August 2020 to September 2024, returns on the 54 assets are thus regressed on their monetary policy betas estimated over the 1988-2019 period.

3. Results

Table 1 presents assets' exposures to inflation and Table 2 their exposures to monetary policy. Forty assets in Table 1 exhibit negative inflation betas, implying that they are harmed by news of inflation. Nine of these are significant at at least the 10% level. Fourteen assets exhibit positive inflation betas. Four of these are significant at at least the ten percent level. Fifty assets in Table 2 exhibit negative monetary policy betas, implying that they are harmed by contractionary monetary policy. Thirty-eight of these are significant at at least the 10% level. Four assets have positive monetary policy betas, though none are statistically significant.

Table 3 presents the risk prices associated with the macroeconomic variables. The value for unexpected inflation is -0.0046. For the three assets in Table 1 most harmed by unexpected inflation, the beta values average -2.70. The risk premium associated with inflation for these assets averages 0.0124 (equals -0.0046 times -2.70). This indicates that these assets must on average pay a premium of 1.24 percent per month to compensate for their exposure to inflation. These assets thus behave like bonds do in Cieslak and Pflueger's (2023) bad inflation case.

For the three assets in Table 1 that benefit the most from unexpected inflation, the beta values average 2.69. The risk premium associated with inflation for these assets averages -0.0124 (equals -0.0046 times 2.69). This implies that the return required to hold these assets decreases by 1.24% per month because these assets do well when inflation increases.

To understand how investors' perceptions of inflation changed after the pandemic began, Figure 2 plots the CPI inflation rate and all of the months between August 2020 and September 2024 when there is a statistically significant relationship at at least the 10% level between the returns on the 54 assets and their inflation betas. To facilitate interpretation, the regression coefficients are multiplied by the average of the betas of the three assets in Table 1 most harmed by inflation. Since the average of these three beta coefficients is negative, the product of this average and the regression coefficient is positive when investors expect lower inflation and negative when they foresee higher inflation policy. The coefficients in Figure 2 show how investors' responses to inflation news affected assets that are exposed to inflation.

Figure 2 also plots all of the months when there is a statistically significant relationship at at least the 10% level between the returns on the 54 assets and their monetary policy betas. These regression coefficients are multiplied by the average of the three assets in Table 2 most harmed by contractionary monetary policy. Since the average of these three betas is negative, the product of this average and the regression coefficient is positive when investors expect policy to become easier and negative when they foresee tighter policy.

Figure 2 shows that investors did not price higher inflation into monthly returns until April 2021. They even priced in lower inflation in February 2021. Thus as increased mobility and the passage of ARPA contributed to soaring consumer spending in the first quarter of 2021, investors remained complacent about the risks of inflation.

As inflation rose from 1.7% in February 2021 to 4.1% in April 2021 to 6.6% in November 2021, they priced higher inflation into the monthly data in April, May, July, October, and November. They also priced higher inflation in in February 2022. February was the month when Russia invaded Ukraine on the 22nd, raising prices for energy, food, and other commodities. Examining daily data indicates that much of the response in February 2022 was concentrated around the days when Russia invaded Ukraine.

Figure 3 plots the daily responses between 1 February 2021 and 30 April 2021. In February, investors foresaw lower inflation on eight days and higher inflation on only two days. In March, they expected lower inflation on six days and higher inflation of six days. In April, however, they perceived lower inflation on four days and higher inflation on eight days. These results confirm the findings in Figure 2 indicating that investors foresaw lower inflation in February 2021 and only bid up the prices of assets that benefit from inflation and bid down the prices of assets that are harmed by inflation starting in April 2021.

How did news of expansionary fiscal policy affect inflation perceptions? This can be investigated using days when Bloomberg articles indicated that fiscal policy would be more expansionary. Gomez-Cram et al. (2024) collected a sample of stories from Bloomberg that contained news directly related to fiscal spending and specified the total amount. They only included dates that did not coincide with releases of any of the top 50 macroeconomic announcements as calculated by Bloomberg.

Table 4 reports the change in returns associated with inflation on the days between 1 August 2020 and 30 November 2021 that are included in Gomez-Cram et al.'s (2024) sample.

There are six cases when news of expansionary fiscal policy increased (at the 10% level) returns on assets exposed to inflation and five cases when it lowered (at the 10% level) returns on assets exposed to inflation. There is thus no compelling evidence in the table that news of expansionary fiscal policy lowered returns on assets exposed to inflation. Rather, investors only began pricing in higher inflation starting in April 2021 when inflation began accelerating. They also began pricing in lower inflation in April, July, and October 2022 and in February 2023 as inflation was actually declining.

Greenspan noted that when fiscal and monetary policy turned inflationary in the 1960s and 1970s, investors initially reacted little (see, e.g., Greenspan, 1994, and Woodward, 2001). They trusted U.S. institutions to keep inflation under control. Then as inflation accelerated they demanded high risk premia in stocks and bonds to compensate for the risk of inflation (i.e., they viewed stocks and bonds as responding to what Cieslak and Pflueger, 2023, called bad inflation). The evidence in Figure 2 is consistent with what happened in the 1970s and 1980s when, after a long period of quiescent inflation, investors initially reacted little to news of expansionary policy.

While De Soyres et al. (2022), Di Giovanni et al (2023), and other reported that fiscal policy during the pandemic stoked inflation, Eggertsson and Kohn (2023) found that the monetary policy framework that the Federal Reserve adopted in 2020 also contributed to inflation by causing the Fed to delay tightening as inflation emerged in 2021. Then after inflation reached its highest level in more than 40 years, the Fed began what Eggertsson and Kohn called unprecedented federal funds rate hikes. Starting in March 2022, it raised the funds rate by 5 percentage points in 15 months.

Figure 2 and Tables 1 and 2 indicate that the damage to stocks caused by inflation pales in comparison to the damage caused by this monetary policy tightening. Beginning on April 2021 for inflation and November 2021 for monetary policy there are five months when negative news led to stock price declines in Figure 2. For inflation the average effect over these five months equaled 3.4% per month while for monetary policy the average effect equaled 9.2% per month. In addition, Table 1 indicates that 13 of the 54 assets are exposed to inflation at at least the 10% level while Table 2 indicates that 38 of the 54 assets are exposed to monetary policy. In Table 1 some assets gain and some lose from inflation while in Table 2 almost all the assets lose from contractionary monetary policy. Figure 2 also makes clear that changing perceptions about monetary policy contributed to massive swings in stock prices after June 2022. Thus contractionary monetary policy inflicted greater damage and uncertainty across a wide cross section of assets than higher inflation did.

As Figure 1 indicates, the economy in 2020 had experienced several decades of low inflation. This influenced the Fed to adopt a policy framework that overemphasized fighting unemployment as compared to fighting inflation. Experience from the 1970s and 1980s highlights the fact that high inflation necessitates contractionary monetary policy that damages both the stock market and the real economy. The Fed should not forget these lessons.

4. Conclusion

The COVID-19 pandemic initially restricted the supply of labor in the U.S. At the same time, U.S. fiscal spending increases of 20% in 2020 and the 1.9 trillion dollar ARPA stimulus in 2021 stoked demand. The Fed also implemented a new policy framework in 2020 that implied it would react more forcefully to low inflation than to high inflation. Inflation then accelerated in 2021 and reached the highest level in more than 40 years in 2022.

Evidence presented here indicates that investors did not price inflation into asset prices until inflation began accelerating. The Fed also did not respond to inflation until it had reached historic highs, and then responded with unprecedented tightening. Evidence presented here indicates that this aggressive response roiled financial markets.

While investors and policymakers active in the 1970s and 1980s remember the devastation that inflation and disinflationary monetary policy can cause, most of those who are active now were lulled into complacency by decades of quiescent inflation. The Fed, rather than adopting an asymmetric framework that downplays inflation, should respond to both incipient inflation and to labor market shortfalls. This is all the more important as the incoming Trump administration adopts expansionary fiscal policies, tariffs, the repatriation of illegal immigrants, and other policies that can stoke inflation.

Table 1. Iterated Nonlinear Seemingly Unrelated Regression Estimates of Assets' Sensitivities to Unexpected Inflation

(1)	(2)	(3)
Asset	Inflation Beta	Standard Error
Aerospace/Defense	-0.696	0.806
Aerospace	-1.154	0.896
Airlines	-3.658***	1.301
Aluminum	-0.095	1.513
Apparel Retail	0.012	1.187
Auto & Parts	-0.359	1.113
Auto Parts	-0.647	0.968
Automobiles	0.226	1.383
Basic Materials	-0.614	0.877
Basic Resources	0.366	1.114
Beverages	-1.174*	0.704
Broadcast & Entertainment	-0.472	1.117
Brewers	-1.111	0.851
Building Materials/Fixtures	-0.081	0.949
Business Supply Services	-0.943	0.789
Chemicals	-1.162	0.816
Clothing & Accessories	-0.120	1.080
Commercial Vehicles/Trucks	-1.348	1.108
Computer Hardware	-0.552	1.141
Computer Services	0.429	0.819
Construction & Materials	-0.285	0.933
Consumer Discretionary	-0.806	0.725
Consumer Finance	-0.485	1.002
Consumer Goods	-1.306*	0.730
Consumer Staples	-1.054*	0.578
Consumer Services	-0.742	0.727
Container & Packaging	-1.935**	0.873
Conventional Electricity	-1.197*	0.614
Defense	0.609	0.858
Distillers & Vintners	-0.196	0.898
Diversified Industrials	-0.591	0.843
Drug Retailers	0.458	0.926

Durable Household Products	-2.504**	1.190
Electronic Components & Equipment	-0.694	0.945
Electricity	-1.192*	0.613
Electronic & Electrical Equipment	-0.652	0.956
Food & Drug Retail	-0.385	0.693
Food Producers	-0.434	0.587
Food Retailers & Wholesalers	-0.950	0.772
Financial Services	-0.221	0.901
Financials	-0.308	0.827
Gold Bullion	1.590	1.162
Gold Mining (Americas)	2.646*	1.494
Gold Mining (Australasia)	2.967*	1.709
Gold Mining (World)	3.095**	1.436
Health Care	-0.586	0.613
Oil & Gas	0.647	0.784
Pharmaceuticals & Biochemical Products	-0.836	0.693
Real Estate Investment Trusts	0.699	0.858
Silver (S&P GSCI)	2.321**	1.162
S&P 500	-0.705	0.631
Technology	0.031	1.052
Telecom	-1.260	0.797
Utilities	-0.990*	0.600

Note: The table presents iterated nonlinear seemingly unrelated regression estimates of assets' betas to unexpected inflation from a multi-factor model that includes returns on the 54 assets listed in column (1) (minus the return on one-month Treasury bills) on the left-hand side and the difference between returns on 20-year and one-month Treasury securities, the Bauer and Swanson (B&S) (2022) measure of monetary policy, the monthly growth rate in industrial production, unexpected inflation, and the change in expected inflation on the right-hand side. Unexpected inflation is calculated as the residuals from a regression of the consumer price index inflation rate on lagged inflation and current and lagged Treasury bill returns. The change in expected inflation is also calculated from this model. The sample extends from January 1988 to December 2019.
***(**)[*] denotes significance at the 1% (5%)[10%] level.

Table 2. Iterated Nonlinear Seemingly Unrelated Regression Estimates of Assets' Sensitivities to Bauer and Swanson (2022) Fed Policy Surprises

(1)	(2)	(3)
Asset	Monetary Policy Beta	Standard Error
Aerospace/Defense	-0.161***	0.047
Aerospace	-0.165***	0.052
Airlines	-0.218***	0.076
Aluminum	-0.259***	0.089
Apparel Retail	0.012	1.187
Auto & Parts	-0.167**	0.066
Auto Parts	-0.159***	0.058
Automobiles	-0.152*	0.083
Basic Materials	-0.182***	0.052
Basic Resources	-0.227***	0.065
Beverages	-0.048	0.042
Broadcast & Entertainment	-0.159**	0.066
Brewers	-0.074	0.050
Building Materials/Fixtures	-0.101*	0.056
Business Supply Services	-0.206***	0.045
Chemicals	-0.164***	0.048
Clothing & Accessories	-0.227***	0.063
Commercial Vehicles/Trucks	-0.216***	0.065
Computer Hardware	-0.173**	0.068
Computer Services	-0.162***	0.048
Construction & Materials	-0.128**	0.055
Consumer Discretionary	-0.173***	0.042
Consumer Finance	-0.111*	0.059
Consumer Goods	-0.159***	0.043
Consumer Staples	-0.063*	0.034
Consumer Services	-0.187***	0.04
Container & Packaging	-0.216***	0.051
Conventional Electricity	0.012	0.036
Defense	-0.151***	0.051
Distillers & Vintners	-0.013	0.054
Diversified Industrials	-0.124**	0.050

Drug Retailers	-0.066	0.055
Durable Household Products	-0.163**	0.071
Electronic Components & Equipment	-0.216***	0.055
Electricity	0.012	0.036
Electronic & Electrical Equipment	-0.231***	0.055
Food & Drug Retail	-0.098**	0.041
Food Producers	-0.043	0.036
Food Retailers & Wholesalers	-0.075	0.046
Financial Services	-0.129**	0.053
Financials	-0.105**	0.049
Gold Bullion	-0.025	0.038
Gold Mining (Americas)	-0.140	0.087
Gold Mining (Australasia)	-0.325***	0.097
Gold Mining (World)	-0.182**	0.082
Health Care	-0.073**	0.035
Oil & Gas	-0.065	0.047
Pharmaceuticals & Biochemical Products	-0.059	0.041
Real Estate Investment Trusts	-0.068	0.051
Silver (S&P GSCI)	-0.081	0.069
S&P 500	-0.118***	0.037
Technology	-0.183***	0.062
Telecom	-0.098**	0.047
Utilities	0.019	0.036

Note: The table presents iterated nonlinear seemingly unrelated regression estimates of assets' betas to the Bauer and Swanson (B&S) (2022) measure of Fed policy surprises from a multi-factor model that includes returns on the 54 assets listed in column (1) (minus the return on one-month Treasury bills) on the left-hand side and the difference between returns on 20-year and one-month Treasury securities, the B&S measure, the monthly growth rate in industrial production, unexpected inflation, and the change in expected inflation on the right-hand side. The B&S measure is constructed so that an increase represents a contractionary monetary policy surprise. Unexpected inflation is calculated as the residuals from a regression of the consumer price index inflation rate on lagged inflation and current and lagged Treasury bill returns. The change in expected inflation is also calculated from this model. The sample extends from January 1988 to December 2019.
***(**)[*] denotes significance at the 1% (5%)[10%] level.

Table 3. Iterated Nonlinear Seemingly Unrelated Regression Estimates of the Risk Prices Associated with the Macroeconomic Factors

(1)	(2)
Macroeconomic Factor	Risk Price
Unexpected Inflation	-0.0046** (0.0020)
Horizon Premium	-0.0275** (0.0109)
Industrial Production Growth	-0.0133*** (0.0046)
Change in Expected Inflation	-0.0151* (0.0008)
Monetary Policy	0.0455 (0.0291)

Note: The table presents iterated nonlinear seemingly unrelated regression estimates of risk prices from a multi-factor model including returns on 54 assets (minus the return on one-month Treasury bills) on the left-hand side and the difference between returns on 20-year and one-month Treasury securities, the Bauer and Swanson (B&S) (2022) measure of Fed policy surprises, the monthly growth rate in industrial production, unexpected inflation, and the change in expected inflation on the right-hand side. The B&S measure is constructed so that an increase represents a contractionary monetary policy surprise. Unexpected inflation is calculated as the residuals from a regression of the consumer price index inflation rate on lagged inflation and current and lagged Treasury bill returns. The change in expected inflation is also calculated from this model. The sample extends from January 1988 to December 2019. *** (*) denotes significance at the 1% (10%) level.

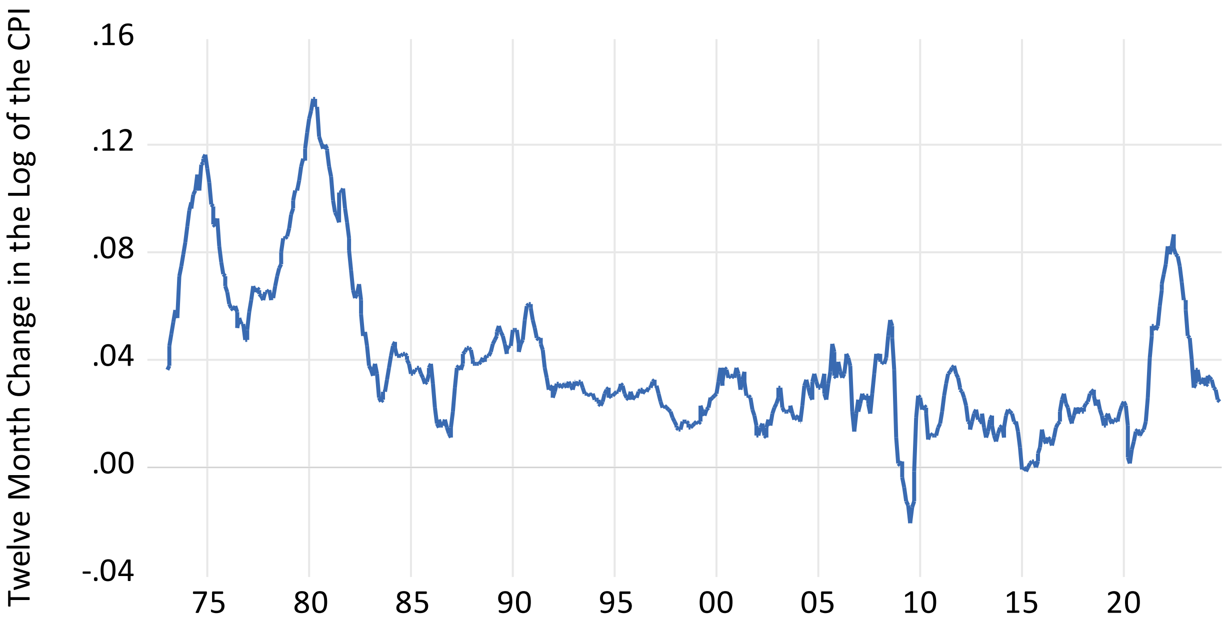
Table 4. Changes in Returns for Assets Exposed to Inflation on Days When Fiscal Policy News was Expansionary.

Date	News Item	Change in Returns for Assets Exposed to Inflation
2020-08-19	Trump Team Sees Path to Pared-Down $500 Billion Stimulus Deal; White House Open to $25 Billion for Postal Service, McEnany Says; White House Open to $25 Billion for USPS.	0.0144***
2020-09-28	Colleges Battling Covid Upsurge Seek $120 Billion as Costs Mount.	0.0049*
2020-10-09	White House Preparing New $1.8 Trillion Stimulus Proposal.	-0.0142**
2020-10-21	U.S. Sees Spending $10 Billion on Missile Defense Through 2025; Democrats Block a $500 Billion 'Skinny' Coronavirus Aid Bill Identical to Another that Republicans Unveiled a Month Ago.	-0.0080***
2020-12-01	Bipartisan Group of Senators Prepares $908 Billion Stimulus Plan, Aiming to Break Partisan Logjam; Mitch McConnell Rejects Bipartisan Proposal by Senate Moderates for $900 Billion COVID Relief Package; U.S. Bipartisan Lawmakers Propose $908 Billion COVID-19 Relief Bill; Bipartisan Senate Group Pitching $908 Billion Stimulus Plan; Mnuchin Says Congress Must Redirect $455 Billion, Not Biden; Senate GOP Relief Package Includes $332.7 Billion for PPP Plan.	-0.0149***
2021-01-13	Schumer Asks Biden to Seek More Than $1.3 Trillion in Relief; Stocks Gain, Schumer Wants Stimulus North of $1.3Trillion.	0.0009
2021-02-16	Focus on Capitol Hill Turns to Passing Biden's $1.9 Trillion Coronavirus Relief Bill; Focus on Capitol Hill Turns to Passing Biden's $1.9 Trillion Covid Relief Bill; Biden's $1.9 Trillion Stimulus Plan is Popular with Voters, but It's Crashing into Strong Republican Resistance in Congress.	0.0075**
2021-02-22	Most US Stocks Fall While Copper Hits Decade High; $1.9 Trillion Stimulus to Reach House of Representatives Shortly; Biden Stimulus Dash; $1.9T Plan a 'Bailout for Lockdowns'; Biden's $1.9 Trillion Stimulus Plan Enters 3-Week Congress Dash.	-0.0161*
2021-05-19	The Senate is weighing a bill that would invest $120 billion in technology research to counter China; Senate Weighs Investing $120 Billion in Science to Counter China; Senate China Bill to Add $52 Billion for U.S. Chip Making; Senate Democrat proposes $52 billion for U.S. chips production,; GOP's $400 Billion Highway Bill Focuses on 'Core Infrastructure.'	0.0054*
2021-05-26	Bipartisan $304b Highway Bill Advanced by Senate Panel; Biden's American Jobs Plan Will Include $318 Billion for Housing.	-0.0004
2021-06-22	Biden's $6.5 Billion Biomedical Agency Backed in Bipartisan Bill; Warren Leads Letter Seeking $700B for Child-Care Infrastructure.	0.0010
2021-07-12	Biden's $579 Billion Plan Is a Tiny Step in the Right Direction.	-0.0003
2021-08-09	Democrats Unveil $3.5 Trillion Budget Plan.	0.0139**
2021-08-10	Sweeping $550 Billion Infrastructure Bill Passes U.S. Senate; Senate Poised to Pass $550 Billion Infrastructure Bill; Senate Passes $550 Billion Infrastructure Plan in Win for Biden; U.S. Senate Passes $550 Billion Infrastructure Bill that Could Unleash Biggest Burst of Spending in Decades; Senate Approves Bipartisan, $1 Trillion Infrastructure Bill, Bringing Major Biden Goal One Step Closer; Treasury yields end higher as Senate passes $1 trillion bipartisan infrastructure bill; Senate Passes $550 Billion Infrastructure Bill.	0.0109***
2021-08-30	Top Defense Republican to Propose $25 Billion Pentagon Boost Democrats Pressured to Add $10 Billion to Transit in Budget Bill;	-0.0046

	Groups, Mayors Urge U.S. Congress to Back $10 billion in New Public Transit Funding; Modeling Impact of $4 Trillion Fiscal Stimulus on U.S. Outlook.	
2021-09-10	Senators Push for $6 Billion Bailout for Private Bus Industry; House Panel Readies $150B Clean Energy Plan; Extra $28 Billion to Appease Farms Promised in Full Budget Bill.	0.0033
2021-10-27	Democrats Near Deal on $500 Billion to Fight Climate Change.	-0.0044*
2021-11-09	BI's Companies to Watch in Biden's $1.2T Infrastructure Bill.	-0.0022

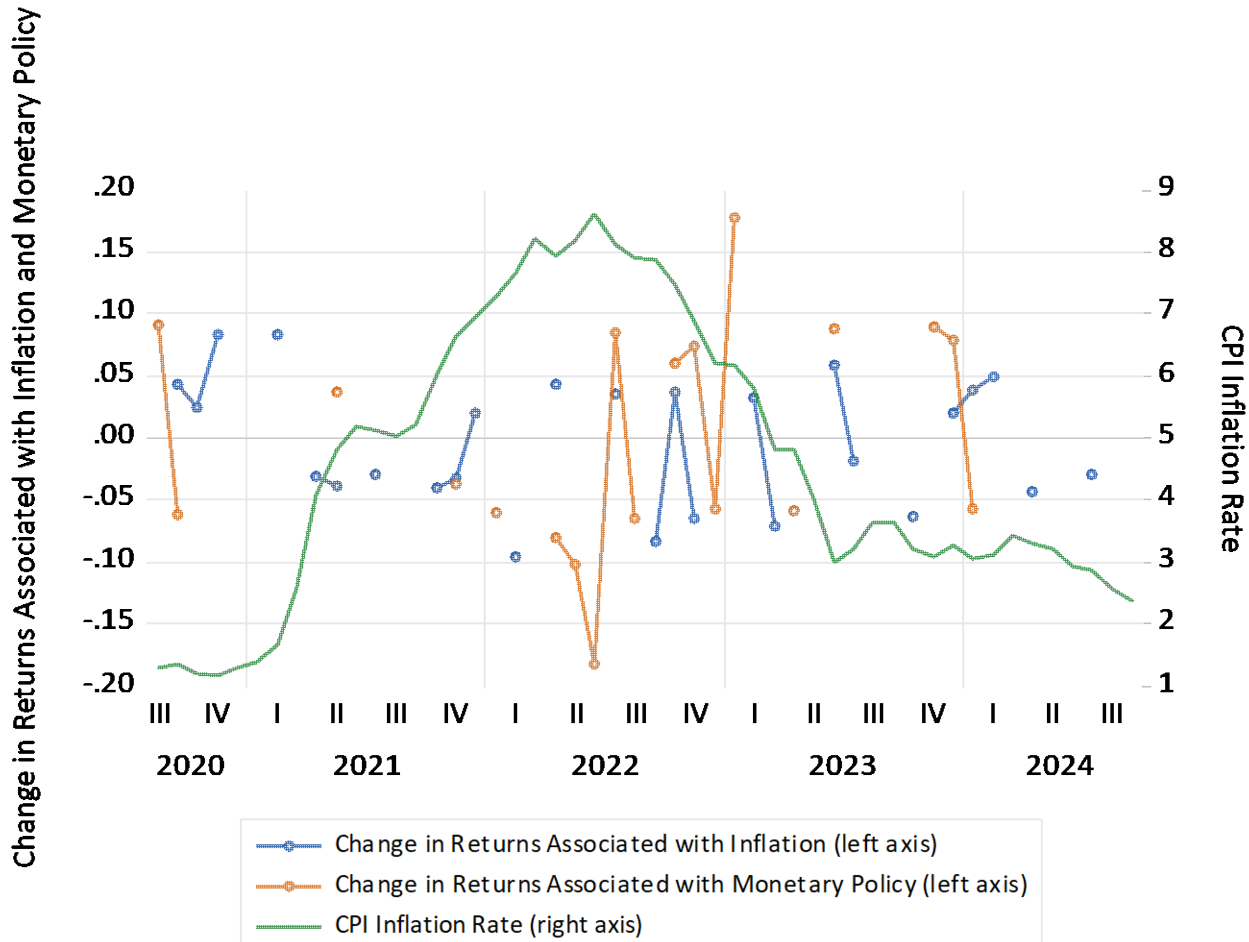
Source: Gomez-Cram et al. (2024) and calculations by the author.

Figure 1. The U.S. Consumer Price Index Inflation Rate.



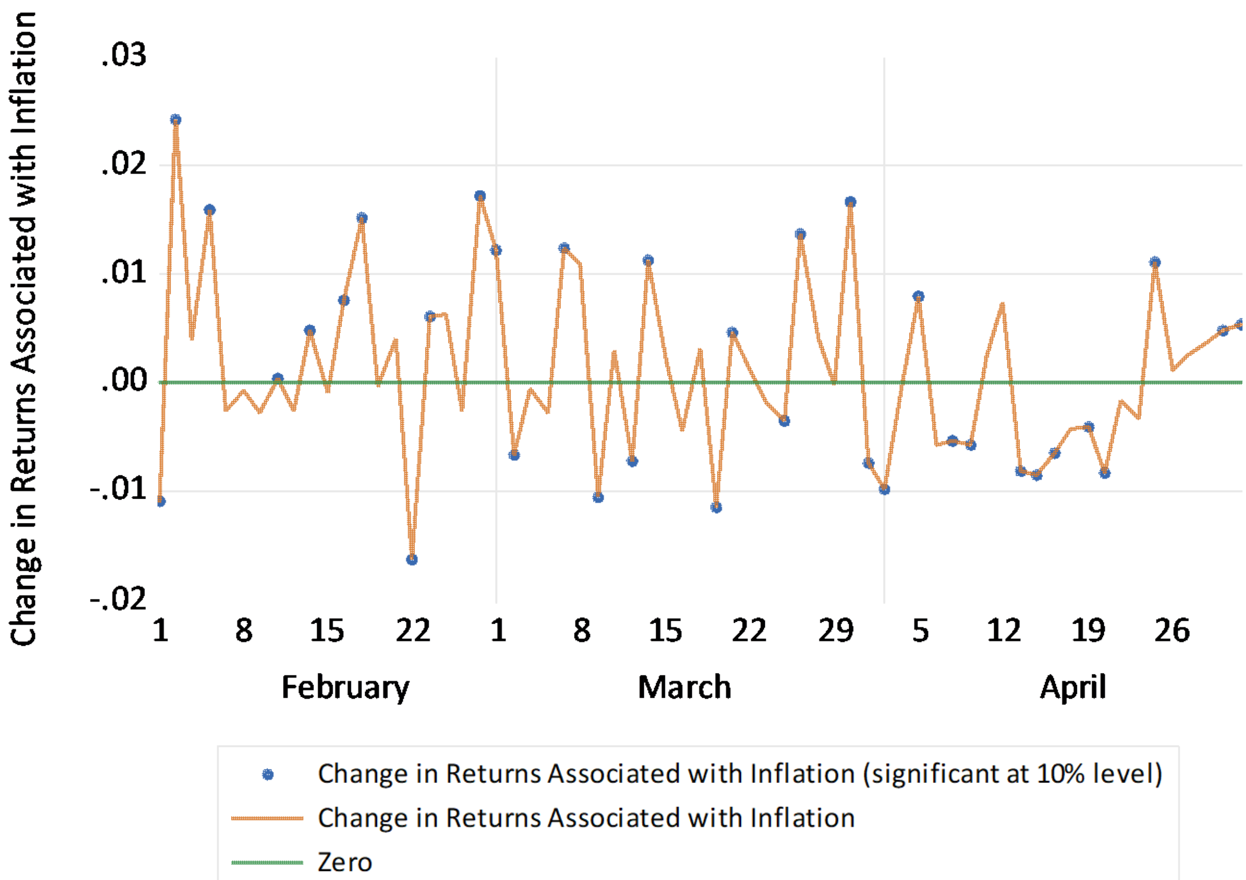
Source: U.S. Bureau of Labor Statistics

Figure 2. The Consumer Price Index (CPI) Inflation Rate and the Monthly Changes in Returns for Assets Exposed to Monetary Policy and Inflation from August 2020 to September 2024



Note: The figure presents the consumer price index (CPI) inflation rate and the change in returns associated with monetary policy and inflation. To calculate the change in returns associated with monetary policy, assets' monetary policy betas are estimated. The betas are obtained from an iterated nonlinear seemingly unrelated regression (INLSUR) of returns on 54 assets (minus the return on one-month Treasury bills) on the Bauer and Swanson (B&S) (2022) measure of Fed policy surprises, the difference in returns between 20-year and one-month Treasury securities, the monthly growth rate in industrial production, unexpected inflation, and the change in expected inflation. The B&S measure is constructed so that an increase represents a contractionary monetary policy surprise. If investors believe that monetary policy will tighten, they will purchase assets that benefit from contractionary monetary policy (those with larger betas to the B&S variable) and sell assets that are harmed by contractionary monetary policy (those with smaller betas to the B&S variable). There should thus be a positive relationship between asset returns and assets' B&S betas on months when investors foresee monetary policy tightening. For each month between August 2020 and September 2024, returns on the 54 assets are thus regressed on the assets' monetary policy betas. To facilitate interpretation, the resulting regression coefficient is multiplied by the beta coefficient for the 3 assets from the INLSUR regression that are harmed the most by contractionary monetary policy. The change in returns associated with monetary policy in the figure thus represents the average change for the three assets that are most exposed to contractionary monetary policy. Since the average B&S beta coefficient for these three assets is negative, positive values in Figure 2 indicate that investors expect easier policy and negative values that they foresee tighter policy. The figure only reports months when there is a statistically significant relationship (at at least the 10 percent level) between returns on the 54 assets and the assets' monetary policy betas. Unexpected inflation is calculated as the residuals from a regression of the consumer price index inflation rate on lagged inflation and current and lagged Treasury bill returns. The change in returns for assets exposed to unexpected inflation is calculated using the same method employed to calculate the change in returns for assets exposed to monetary policy. Positive values for the change in returns associated with inflation in Figure 2 thus imply that investors expect lower inflation and negative values that they foresee higher inflation.

Figure 3. The Daily Changes in Returns for Assets Exposed to Inflation from 1 February 2021 to 30 April 2021



Note: The figure presents the change in returns associated with inflation. To calculate the change in returns associated with inflation, assets' inflation betas are estimated. The betas are obtained from an iterated nonlinear seemingly unrelated regression (INLSUR) of returns on 54 assets (minus the return on one-month Treasury bills) on the Bauer and Swanson (B&S) (2022) measure of Fed policy surprises, the difference in returns between 20-year and one-month Treasury securities, the monthly growth rate in industrial production, unexpected inflation, and the change in expected inflation. The B&S measure is constructed so that an increase represents a contractionary monetary policy surprise. Unexpected inflation is calculated as the residuals from a regression of the consumer price index inflation rate on lagged inflation and current and lagged Treasury bill returns. If investors believe that inflation will rise, they will purchase assets that benefit from inflation (those with larger inflation betas) and sell assets that are harmed by inflation (those with smaller inflation betas). There should thus be a positive relationship between asset returns and assets' inflation betas on months when investors foresee higher inflation. For each month between August 2020 and September 2024, returns on the 54 assets are thus regressed on the assets' inflation betas. To facilitate interpretation, the resulting regression coefficient is multiplied by the beta coefficient for the three assets from the INLSUR regression that are harmed the most by unexpected inflation. The change in returns associated with inflation in the figure thus represents the average change for the three assets that are most exposed to higher inflation. Since the average inflation beta for these three assets is negative, positive values in Figure 3 indicate that investors expect lower inflation and negative values that they foresee higher inflation. The dots represent months when there is a statistically significant relationship (at at least the 10 percent level) between returns on the 54 assets and the assets' inflation betas and the lines represent all the values.

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