Stagflationary Stock Returns *

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Abstract

We study investors' perceptions of how inflation affects firms through the lens of a high-frequency event study, documenting they have a stagflationary view of the world. Stock prices decline in response to higher-than-expected inflation, as investors expect nominal earnings to remain stagnant and discount rates to increase. Both the equity risk premium and nominal risk-free yields rise. However, longer-term real yields remain unchanged and policy-sensitive real yields even *decline*, with increases in nominal yields offset by inflation expectations. Consistent with a stagflationary view in which investors interpret inflation as a marginal cost shock, investors expect firms with low market power to suffer larger declines in earnings. Earnings expectations of equity investors are aligned with those of professional analysts, both in the time series and across the market power distribution.

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1 Introduction

The recent inflationary episode has renewed interest in understanding how inflation affects firms. As it is challenging to study this question with aggregate macroeconomic data, we instead utilize financial market data to study the impact of inflation surprises across various asset classes, at high-frequency, and in the cross-section of firms' stock prices. Combining these elements allows us to draw conclusions about investors' earnings expectations for firms, and the outlook for the economy more broadly, in response to inflation.[1]

Using a high-frequency identification approach, we show that stock prices decline in response to inflation news as investors expect nominal cashflows to remain stagnant while inflation expectations and the equity risk premium increase. Nominal yields also increase, albeit modestly, and are driven by inflation compensation rather than real yields. In fact, real yields at policy-sensitive maturities *decline* as investors seemingly reject a Taylor rule response to inflation news. Taken together, these findings are consistent with investors having a stagflationary view of the world, associating inflation with lower real growth just like households and firms (Candia, Coibion and Gorodnichenko, 2023).

One way to rationalize stagflationary stock returns is that investors interpret inflation news as supply shocks that increase marginal costs. In canonical models of imperfect competition, a key prediction is that firms with high market power would be expected to generate a relative increase in their nominal cashflows in response to inflationary pressures driven by marginal costs. We provide empirical evidence consistent with this cost shock hypothesis prediction: market power shields firms from stagflationary stock returns, with investors expecting these firms to generate a relative increase in their cashflows.

We first document that the overall stock market is adversely affected by inflationary news and that negative returns following inflation shocks persist for multiple days. Under the present value formula of the equity price, unexpected stock returns must be due to changes in investors' expectations of future dividends (cashflow news) or future returns (discount rate news). Nominal interest rates increase with expected inflation (Fisher, 1930), but if stocks' cashflows are real assets, as conventional wisdom suggests, then nominal expected cashflows should also increase with inflation. The negative stock returns in response to inflation news must therefore stem from a combination of declining expectations of future real cashflows and increases in real discount rates, where the latter can occur via increases in investor expectations of future real risk-free rates, or because of an increase in the equity risk premium.

To disentangle these three — cashflow, yield curve, and risk premium — stock return components, we build on Knox and Vissing-Jorgensen (2022) who argue that in modern financial markets, rich information about the yield curve and the equity risk premium (via equity option prices) are observable, decomposing stock returns using the price changes of other financial instruments. The benefit of this observables-based stock decomposition approach is that the discount rate inputs are

[1] We use earnings, cashflows, and dividends interchangeably throughout the paper.

forward-looking and also available in real-time and at a high frequency. These latter properties make the approach particularly well suited for implementation in an event-study setting such as ours, as compared to traditional VAR-based return decomposition methodologies (Campbell, 1991).

Before turning to the full return decomposition results, we study how observable discount rates and direct measures of investor cashflow expectations each respond to inflation news. In their own right, these variables shed light on investors' perception of the economic implications of inflation. Moreover, they qualitatively inform us about the drivers of stock returns, which we will later quantify.

We start by studying how yields across the term structure respond to inflation news. We find, unsurprisingly, that nominal interest rates increase in response to inflationary news. However, when decomposing nominal interest rates into real interest rates and inflation compensation, we attribute the entire rise in nominal yields to inflation compensation rather than to an increase in real interest rates. This result is in stark contrast to monetary policy days when real yields instead drive nominal yields (Hanson and Stein, 2015; Nakamura and Steinsson, 2018). In fact, at policy-sensitive maturities such as the 2-year, real yields even *decline* in response to inflation news. This can be rationalized by investors expecting inflation to be supply-driven and to contract output. In response to a supply-driven increase in inflation, investors may expect the central bank to look through the rise in prices, as it can only control demand. Importantly, these yield curve findings challenge the notion that inflation news days are proxy monetary policy days for financial markets, with asset markets driven solely by the expected response of monetary policy to inflation news. Instead, we find strong evidence from the yield curve that inflation news days are distinct to monetary days and that factors beyond just monetary policy drive asset markets.

Next, we study equity risk premium around inflation news using the Martin (2017) equity risk premium that is calculated from S&P 500 option prices at the daily level. With this measure, we find evidence that equity risk premium strongly increases following inflation news.[2] The effect of inflationary news on the equity risk premium is ambiguous ex-ante, as it depends on the correlation between inflation with economic activity and the asset's cashflows. If inflation (deflation) is associated with bad states of the world, assets that have low real payouts in inflationary (deflationary) times are relatively undesirable and command higher risk premiums. This intuition is embedded in many asset pricing models that explicitly consider the implications of inflation for time-varying risk premiums, such as those with time-varying disaster risk (Gabaix, 2008), long-run risk (Bansal and Shaliastovich, 2013) or risk aversion (Campbell et al., 2020). Through the lens of this broad range of models, rising equity risk premium with inflationary news is therefore indicative of investors' believing that the real cashflows of equities are lower in inflationary times. Investors do generally

[2]While the Martin measure of equity risk premium is theoretically a lower bound, Martin (2017) and Knox and Vissing-Jorgensen (2022) provide empirical evidence that the bound is approximately tight. Knox and Vissing-Jorgensen (2022) also provide theoretical evidence that *changes* in the observed equity risk premium will likely be a lower bound on changes in the true equity risk premium. To the extent the lower bound is not exact, our approach will therefore understate the already large risk premium increases observed with inflation news.

not seem to view high inflation as the result of strong economic activity when real cashflows would be high.

Lastly, we aim to study the role of the expected cashflows for stock returns around inflationary news, but data limitations make the cashflow component the most difficult to study. Dividend futures provide a direct measure of investors' risk-neutral expectations of cashflows on the aggregate stock market (Gormsen and Koijen, 2020), but are only available on a short sample since 2016. As an alternative, we also use earnings expectations of professional forecasters (Bordalo et al., 2023), which are available at lower frequencies. With either measure of cashflow expectations, we find *no* evidence that higher than expected inflation is associated with an expectation of higher *nominal* earnings. Taken at face value, these non-results imply that real earnings expectations have decreased due to the higher price level and increases in inflation expectations.

To address the challenge of obtaining the cashflow component over a longer time series and at a daily frequency, we formally decompose stock returns into a yield curve, a risk premium, and a cashflow return component. This also allows us to quantify the impact of each return component specifically. The yield curve component of stock returns is defined as the weighted average of changes in interest rates across yield curve maturities, where the weights are the discounted value of dividend payments on the stock market for each corresponding maturity. Intuitively, later dividend payments have smaller weights in the stock market as they are discounted more heavily, and therefore changes in discount rates at these maturities matter less for the stock market valuation. Nevertheless, as stock market cashflows are paid to perpetuity, the stock market is a long-duration asset and its price is highly sensitive to changes in long-maturity yields (van Binsbergen, 2020).

We next compute the risk premium and cashflow return component from a two-stage approach. First, we adjust returns for the observed yield curve return, and second, we regress the yield-adjusted return component on changes in the observed equity risk premium. The regression-fitted value provides our risk premium return component. By the definition of the present value formula, once the discount rate component of stock returns is accounted for, the remainder is attributed to the cashflow return component. This component captures stock returns due to changes in investors' expectations of future cashflows. Those can be nominal or real cashflow expectations, depending on whether we implement the yield curve return component using nominal or real yields.

With three stock return components available, we then regress each return component on inflation news separately. Following a one percentage point inflation shock, we observe a 2.8 percent 5-day negative nominal return on the stock market, of which we attribute 78 percent to increasing equity risk premium, 18 percent to increasing nominal yields, and a small 4 percent to even decreasing nominal cashflows. Real returns decline even more. Adjusting for the higher price level, the stock market declines by 3.8 percent in real terms, of which we attribute 2 percentage points of the decline to increasing equity risk premium, and 2.5 percent to declining *real* cashflow expectations. As real yields decline slightly, they even contribute a positive 0.7 percent to returns.

The results from the return decomposition analysis confirm the key takeaway from the dividend futures and earnings expectations data: nominal cashflow expectations are unchanged following inflation news, with real cashflow expectations declining significantly. In a validation exercise, we show our cashflow estimates from the decomposition approach are strongly correlated with the more direct data from dividend futures and analysts' earnings expectations.

Before moving to the cross-section of firms, we highlight two important co-movements of aggregate stock prices with the yield curve in response to inflation news, which both hold across different states of the economy. The first is the negative correlation between stock prices and *nominal* yields. This stock-bond correlation is often associated with supply shock news (Cieslak and Pflueger, 2023), and the observed correlation is therefore further support for the conclusion that investors interpret inflation as stagflationary. The second correlation is the unchanged (or even increasing) *real* yields with inflation news while equity prices decline. This implies that the negative stock returns must come from either (or both) declining real cashflow expectations and increasing equity risk premium. While our decomposition quantifies the relative importance of each of these factors, even without the decomposition's quantification, unchanged real yields and declining stock prices reveal a negative interpretation of inflation for the marginal equity investor.

One potential explanation for why the marginal investor adopts this stagflationary view could come from the belief that an inflation surprise is seen as a marginal cost shock. In standard industrial organizations models with imperfect competition (Tirole, 1989), we show that increases in marginal costs are associated with a decline in firm profits and, crucially, the key determinant of changes in firms' profits depends on firms' demand elasticity, i.e. their market power. Firms with more market power, and lower demand elasticity, see their profitability decline less in response to a percentage increase in marginal costs.

We test this simple model hypothesis, leveraging cross-sectional variation in stock prices and earnings expectations across firms' market power distribution. Market power mitigates the negative cashflow expectations of investors in response to inflationary shocks. This test further isolates the impact through cashflow expectations and sheds light on the channel behind the negative stock returns around inflation surprises. Leveraging cross-sectional heterogeneity across firms also allows us to control for various time-varying factors that could be correlated with confounding factors in the time series.

Our measure of market power is based on estimating their markup using a production approach following De Loecker and Warzynski (2012) and De Loecker, Eeckhout and Unger (2020). Market power is defined as firms' ability to set their product price above marginal costs and hence face a less elastic demand curve (Syverson, 2019), as in the simple model. We estimate these firm-level markups using Compustat data with a production function approach, under which the markup of a firm can be defined as sales over the cost of goods sold multiplied by the output elasticity of inputs.

Equipped with our measure of market power, we study the asset pricing implications in response to inflationary news across the firm distribution. We start by splitting firms into high vs. low market power firms, based on whether they have above the 75th percentile or below the 25th percentile of markups in the previous year in the cross-section of firms, and inspect their stock price response to inflationary news. Consistent with our simple framework in which inflationary news are seen as a marginal cost shock, firms with low markups see a decline in their stock price of around 3.9% in response to one percentage point inflationary news, as firms at the upper quarter of the markup distribution see a statistically insignificant decline of 1.2% decline of their stock price in response to a one percentage point inflationary news.

Motivated by this evidence, we estimate the differential response of firms with more market power. We use an empirical specification allowing us to control for observed and unobserved time-variant factors across firms, including firm balance sheet characteristics, exposure to asset pricing factors, and time-variant industry effects. We first show firms with a differential degree of market power exhibit statistically indistinguishable stock returns, and hence no differential pre-trend in returns before the announcement of inflation. Once higher-than-expected inflation is released, firms with a larger degree of market power statistically and economically outperform those with higher demand elasticity, as predicted by the model. Economically, a one standard deviation larger degree of market power increases the stock return by 0.2 percentage points in response to a one percentage point inflationary shock.

The relatively better performance of firms with market power could again be attributed to their differential sensitivities with respect to changes in interest rates or the risk premium. For instance, if interest rates rise in response to higher inflation and firms with market power are less sensitive to increases in interest rates, e.g., because their cashflows are nearer in the future than those with less market power and hence discounted less strongly, their stock response may be weaker. Moreover, firms across the market power (Liu et al., 2022; Kroen et al., 2021), leverage (Ottonello and Winberry, 2020), or tangibility (Döttling and Ratnovski, 2023) distribution may exhibit differential sensitivities of cashflows themselves to the interest rate environment other than through a cashflow discounting channel. The differential response of firm returns to inflation shocks may therefore be mediated through an increase in nominal interest rates, potentially due to changes in monetary policy expectations, rather than real cashflow expectations directly related to the effect of inflation and market power.

To test which component of stock returns is responsible for the differential response of stock returns around inflationary news, we propose a new firm-level stock return decomposition, in a similar spirit as for aggregate stock returns in Knox and Vissing-Jorgensen (2022). This allows us to extract the cashflow component of variation in the cross-section of stock returns. This time, we interact firm characteristics, such as markups, leverage, and tangibility, with changes in the observable discount rate and extract a residual of firm-stock returns that we again interpret as a real cashflow component of stock returns. This approach allows us not only to control for differential sensitivities of firm stock returns to interest rates due to cashflow discounting but also for many other economic mechanisms through which changes in discount rates impact firms' cashflows. Hence, we can isolate the direct effect of inflation news on expected cashflows across the markup distribution. Consistent with a stagflationary view of the world, we find that real cashflow expectations are declining notably after inflationary news for firms without substantial market power. In sharp contrast, when focusing only on firms at the top quartile of the market power distribution, we do not find that investors expect declining real cashflows for those firms.

We corroborate our findings by studying firm-level analyst earnings expectations around CPI announcements. On average, analysts expect nominal earnings to remain stagnant to inflationary news, implying expectations of real declining cashflows with higher-than-expected inflation. When differentiating between firms with varying degrees of market power, consistently with the stock price responses, we find that analysts expect firms with more market power to increase their earnings more with inflationary news than their counterparts.

The rest of the paper is organized as follows. In section 2 we discuss the related literature. In section 3 we present the data. In section 4 we lay out the methodology for the stock return decomposition. In section 5 we describe the empirical strategy. In section 6 we present the results. In section 7 we conclude.

2 Literature

Our paper links to the literature on how different economic agents view the economic implications of inflation. A large literature studies how inflation expectations affects household choices (D'Acunto et al., 2023; Bachmann et al., 2015; Andre et al., 2022; Coibion et al., 2022, 2023, 2024), their trading behavior (Schnorpfeil et al., 2024), and firm decisions (Coibion et al., 2018, 2020) and suggests that both households and firms often associate higher inflation with worse economic outcomes (Candia et al., 2023).[3] Instead, in this paper we aim to infer the perception of inflationary news for the marginal investor by measuring the high-frequency market responses across several asset classes and analysts expectations to news about inflation.

A related strand of literature studies the consequences of higher inflation for the real economy. Brunnermeier et al. (2023) show that the German hyperinflation of 1919-1923 led to a large reduction in real debt burdens and bankruptcies. Agarwal and Baron (2024) rationalize stagflationary effects through a disintermediation channel by showing that banks, that were more exposed to inflation, reduced lending more during the 1977 inflation shock.[4] Instead, we show that the marginal stock market investor has a stagflationary view, as they see inflation as a supply-driven cost shock, that reduces firms' profits. Instead of exploring the heterogeneity across firms in terms of their debt (as in Brunnermeier et al. (2023) and Bhamra et al. (2023)), we explore firms' outcomes across the market power distribution to directly test the supply-driven cost channel of inflation.

A long literature studies the negative correlation between inflation and equity prices (Lintner,

[3]See Weber et al. (2022) (p. 177-180) for a review of the literature.

[4]Corhay and Tong (2021) study the asset pricing effects of inflation and the role of the financial intermediation sector.

1975; Fama and Schwert, 1977; Firth, 1979; Pearce and Roley, 1988; Boudoukh et al., 1994; Sharpe, 2002; Bekaert and Engstrom, 2010; Gourio and Ngo, 2020). To explain the negative correlation, Modigliani and Cohn (1979) and Summers (1980) argue that investors may suffer from money illusion as real cash flows are incorrectly discounted with nominal discount rates, with Cohen et al. (2005) and Campbell and Vuolteenaho (2004) providing empirical evidence supporting this argument. Our explanation, in contrast, does not require a behavioral explanation and instead can be rationalized in a simple model in which firms face a marginal cost shock. Katz et al. (2017) find evidence consistent with sticky discount rates, with investors slowly adjusting nominal discount rates in response to inflation shocks. A separate hypothesis, first developed by Fama (1981) and Geske and Roll (1983), argues that the correlation between stock returns and expected inflation is due to stock returns anticipating future economic activity, with inflation acting as a proxy for expected real activity and, in particular, that a rise in inflation is associated with a decline in real activity. Our results indicate that investors have a stagflationary view of the world, associating inflation with a cost shock.

Piazzesi and Schneider (2006) argue that this negative correlation between economic growth and inflation leads to an inflation risk premium on nominal bonds, compensating investors for the risk of higher inflation and thus delivering an upward-sloping nominal yield curve. Fang et al. (2022) show cross asset-class evidence that only core inflation, which strips out the contribution of energy to headline inflation, carries a negative risk premium. A more recent literature has since observed that the correlation between inflation and real activity is time-varying, with several papers exploring the connection between a shift in the stock-bond correlation since the late 1990s and a shift in the correlation between inflation and real activity to be more positive (Campbell et al., 2017; Boons et al., 2020; Campbell et al., 2020; Cieslak and Pflueger, 2023; Pflueger, 2023; Seo, 2023). We provide evidence that even post-1999, when the stock-bond correlation switched and inflation has been likely demand-driven, inflationary news are associated with negative stock returns. There are several explanations why inflationary shocks are consistently associated with negative stock returns. For instance, it could be rationalized in models in which firms' prices drift away from optimal prices with higher inflation, leading to potential output losses (Baqaee et al., 2023). However, it is also possible that investors may learn about a demand-driven origin of the inflation shock only later, e.g. when economic activity surprises to the upside.

In terms of cross-sectional asset pricing, Bhamra et al. (2023) show that the negative impact of higher expected inflation on equity values is stronger for low leverage firms. Weber (2015) and Gorodnichenko and Weber (2016) study the impact of nominal rigidities on stock prices. Rubio Cruz et al. (2023) study the role of inflation in the cross-section of equity returns more broadly. Relative to the above literature, we focus on the role of market power, as a canonical model would predict that firms with higher market power are shielded from stagflationary stock returns. By decomposing daily stock returns, we can quantify the contribution of cashflow, risk-free rate, and discount rate expectations. We show that inflationary news indeed are associated with lower cash flow expectations, especially for firms with a high demand elasticity, as our model predicts. Our identification is based on stock returns around inflation data releases, which relates our paper to a broader literature studying asset price responses to macroeconomic announcements more broadly (Beechey and Wright, 2009; Gürkaynak et al., 2010a; Bauer, 2015; Gilbert et al., 2017; Law et al., 2018; Gurkaynak et al., 2020; Boehm and Kroner, 2023; Kroner, 2023).

The macroeconomic implications of market power have recently attracted a lot of interest (De Loecker et al., 2020, 2021; Peters, 2020; De Loecker and Eeckhout, 2018), as recent advances in the estimation of market power through markups (De Loecker et al., 2020; Syverson, 2019), as discussed in section 3, led to many empirical applications. However, the literature on the asset pricing implications of market power is more limited. Notable exceptions are Corhay et al. (2020) and Corhay et al. (2022) who study the implications of market power and markup shocks for stock prices.[5] However, to the best of our knowledge, we are the first to study the interaction between inflation, market power, and asset prices.

3 Data

3.1 Inflation News

Our inflation analysis is based on Consumer Price Index (CPI) releases which are published by the Bureau of Labor Statistics. We focus on month-on-month headline CPI. Releases are usually published on the second week of the month for the CPI values of the previous month. We construct a measure of inflation news with each inflation release by subtracting inflation expectations for the release from the actual inflation release data:

$$\text{Inflationary News}_t = \pi_t - E_{t'}\left[\pi_t | \mathcal{I}_{t'}\right] \tag{1}$$

where π_t is the release value of the headline month-on-month CPI, and $E_{t'}\left[.|\mathcal{I}_{t'}\right]$ is the conditional expectation just prior to the release based on available information $\mathcal{I}_{t'}$ at $t' < t$. To measure conditional expectations, we use Bloomberg median forecasts for each inflation release, which are available from 1997, and supplement this with the median from Haver Analytics's Money Market Services (MMS) survey, which extends the sample back to 1977.

Figure A1 plots the inflationary news in red. The surprise series does not exhibit a particular trend, which is reassuring from a statistical perspective, and suggests that the data is stationary. However, there are periods when the surprises were larger in absolute values. For instance, in the early 1990s, inflation first surprised to the upside and later to the downside. During and shortly after the global financial crisis, the inflationary news was also larger, potentially because the global financial crisis and the accompanying monetary policy actions increased uncertainty

[5] Cho et al. (2023) distinguish between realized and expected markups to study long-term trends in stock prices.

about the effects of inflation. Since the COVID-19 pandemic, as is well known, inflation surprised persistently to the upside. Table A1 provides summary statistics.[6]

3.2 Asset Prices

Stock Prices. We obtain U.S. firm-level stock returns from CRSP (Center for Research in Security Prices). We follow standard procedures and use ordinary shares traded on the NYSE, AMEX, and NASDAQ exchanges. We also adjust returns for splits, mergers, or other corporate actions, and trim at the top and bottom 0.5% to mitigate the effects of outliers on our results.

Discount rates. For the risk-free rate component of the discount rates, we obtain real Treasury yields from the from the Federal Reserve website which provides real yields for 2-year through to 20-year maturity that are estimated from Treasury inflation-protected securities (TIPS) yields (Gürkaynak et al., 2010b).[7] The data also provides nominal interest rates and implied breakeven inflation, which is the difference between real yields and nominal yields for a given maturity, as well as instantaneous forward rates. The sample begins in 1999, 2-years after the first TIPS was issued by the U.S. Treasury. We supplement the TIPS yields data with the real yields computed from fixed interest rate swaps and inflation swaps as robustness. This data is taken from Bloomberg and begins in July 2004. For equity risk premium data, we use the Martin (2017) lower bound of 1-year equity risk premium. The equity risk premium is calculated from option prices obtained from OptionMetrics, the sample of which begins in 1996.

Dividend futures. We obtain data on dividend futures, which are claims to dividends on the aggregate stock market in a particular year, from Bloomberg. S&P500 dividend futures for claims on dividends 5 calendar years ahead begin in 2016, and in 2017 the maturity was then extended to claims on dividends in the 10 calendar years ahead. From 2017, each year on the third Thursday of December, a new dividend future is issued that is a claim on dividends in the calendar year 10-years from that year, so that the maximum maturity is always approximately 10-years. As is standard in the literature, we linearly interpolate across calendar year future prices every day to generate a time series of constant-maturity dividend futures prices.[8] Dividend futures can be used

[6]Unexpected innovations to inflation are traditionally not considered primitive exogenous forces in macroeconomic models, unlike technology, monetary policy, and fiscal policy shocks (Ramey, 2016). On way one can think of an inflation shock in the spirit of Gomes et al. (2016) and Corhay and Tong (2021) as an exogenous unexpected increase in the rate of inflation that permanently increases the price level in an unanticipated manner. Alternatively, in a standard New Keynesian model an inflation shock can be supply or demand-driven. In our baseline empirical specification, we consider all inflation surprises and test how investors perceive this general inflation surprise.

[7]https://www.federalreserve.gov/data/tips-yield-curve-and-inflation-compensation.htm

[8]Dividend strip values can also be inferred from option data in the absence of arbitrage opportunities using the put-call parity relationship (van Binsbergen (2020)). We extend our sample of 1-year dividend strips back to 1996 using this method and OptionMetrics equity option data.

to compute dividend strip weights - which we define as the present value of the expected dividend on the aggregate stock market relative to the overall stock market value - by adjusting for the risk-free rate and dividing by the value of the stock market. Dividend futures are also risk-neutral expectations of dividends and therefore can be used to extract investors' stock market cashflow expectations. We adjust for risk premia following (Knox and Vissing-Jorgensen, 2022) to compute estimates of investors' real-world dividend expectations. In some specifications, we also adjust for expected inflation - using inflation swap rates of the same maturity as the dividend futures - to move from *nominal* expected dividends to *real* expected dividends.

3.3 Market Power

In microeconomic textbooks, product market power is defined as firms' abilities to influence the price at which they sell their products and use this ability to hold prices over marginal cost, as they do not face perfectly elastic residual demand curves (Pindyck and Rubinfeld, 2014; Goolsbee et al., 2012). The price-marginal-cost gap at the firm's profit-maximizing output level is typically called the markup (Syverson, 2019).

We estimate markups using the so-called production approach, which was invented with industry-level data by Hall (1988, 2018) and advanced with firm-level data by De Loecker and Warzynski (2012) and De Loecker et al. (2020). Under an assumption of cost minimization, the firms' markup is defined as the product of the revenue to expenditure share of a given variable input times the output elasticity of that variable input.[9]

From the cost minimization problem,

$$\theta^{\nu}_{i,t} = \frac{1}{\lambda_{i,t}} \frac{P^{V}_{i,t} V_{i,t}}{Q_{i,t}} \tag{2}$$

where $\theta^{\nu}_{i,t}$ is the output elasticity of input $V_{i,t}$, λ the Lagrange multiplier from the cost minimization which measures the marginal costs, $P^{V}_{i,t}$ is the price of the variable input, and $Q_{i,t}$ is the output.

The markup can be defined as

$$\mu_{i,t} = \frac{P_{i,t}}{\lambda_{i,t}} \tag{3}$$

where $P_{i,t}$ is the output price. Hence, the markup is equal to the output elasticity times the inverse of the variable input's revenue share:

$$\mu_{i,t} = \theta_{i,t} \frac{(P_{i,t} Q_{i,t})}{(P^{V}_{i,t} V_{i,t})} \tag{4}$$

[9]Alternative approaches are the accounting approach and the demand system estimation approach. The problem with the accounting approach is the difficulty of measuring marginal costs, while the demand estimation approach requires data on prices, which we do not have available.

Following De Loecker et al. (2021) we calculate markups using firm-level data from Compustat North American fundamentals, a dataset of firm-level financial statements for North American publicly traded companies. The data allows us to implement the production approach for estimating markups. We use the cost of goods sold (COGS) as our measure for variable inputs, ($P^V_{i,t}V_{i,t}$) and sales for revenues $P_{i,t}Q_{i,t}$. This leaves us with estimating a measure of output elasticities. As in De Loecker et al. (2021) output elasticities are estimated on the (2-digit) sector level using a parametric production function estimation, with a variable input bundle and capital as inputs.

There is a large discussion around the validity of estimating markups using the production approach (Raval, 2020; Bond et al., 2021; Basu, 2019; Berry et al., 2019; Syverson, 2019; Doraszelski and Jaumandreu, 2021). For instance, De Ridder et al. (2021) use firm-level administrative production and pricing data and show that the level of markup estimates from revenue data is biased in the time series, but estimates do correlate highly with true markups in the cross-section. As we do not attempt to either contribute to the markup estimation literature or evaluate the level of markups in the economy, but instead study the consequences of markups across firms in an asset pricing setting, the production function estimation approach is to the best of our knowledge the most appropriate and feasible way to do so.

3.4 Other Firm-Level Financial Data

We obtain firm-level financial data from Compustat for controls in the analysis. We use firm size (log of total assets (AT)), the book equity (CEQ) to market equity (PRCC*CSHO/1000) ratio,[10] tangibility (the ratio of tangible assets (PPENT) to total assets) and leverage (the ratio of current debt (DLC) and the long-term debt (DLTT) to total assets).

Motivated by the cross-sectional asset pricing literature, we control for firm-level exposures to factor portfolio returns. We use the Fama and French (1993) 3-factor portfolios, Fama and French (2015) 5-factor portfolios, and the Carhart (1997) momentum factor. We obtain these asset pricing factors from Kenneth French's website. We implement factor controls using a Fama-Macbeth approach. In the first step, we compute rolling 5-year betas of each stock in the sample with respect to the factor portfolios. We then include the estimated rolling betas, lagged one period, as control variables in the main regression specifications.

3.5 IBES Earnings Expectations

To complement our analysis of cashflow expectations derived from dividend futures, we obtain earnings expectations from the Thomson Reuters IBES Estimates Database following Bordalo et al. (2023) and De La O and Myers (2021).[11] IBES is a comprehensive forecast database containing

[10]The market equity is obtained from CRSP variables. We merge year-end values with the Compustat book equity

[11]We follow the literature and select only S&P 500 firms because analysts forecasts for these larger firms are likely more robust with more analysts tracking these firms.

analyst earnings per share estimates since 1976. Thomson Reuters compiles its forecasts from a large number of brokerage and independent analysts dedicated to tracking companies as part of their investment research efforts. Each forecast comes with the identifier of the respective analyst or brokerage firm. Given that these forecasts are not anonymous, analysts are incentivized to provide accurate reports of their expectations.

We obtain individual company earnings forecasts for S&P500 firms at the analyst level by multiplying the earnings per share. For every individual company earnings forecast, we have a date (d) on which the forecast is reported by each analyst (a). We match earnings forecasts to the closest CPI release date (t) by the date the forecasts were reported (d) by the analyst and compute the distance between the forecast date and the CPI release date ($d - t$). Hence, $Earnings_{i,a,d,t}$ Is the earnings forecast made by analyst a for company i at date d for the closest CPI release t. If the forecast is made before the closest CPI release, $d - t$ is negative. We drop observations in which the forecast is not made within 15 days before or after the CPI announcement, $|d-t|>15$. We then average earnings forecasts across analysts before and after the CPI release date:

$$Earnings\ Expectation^{pre}_{i,t} = \frac{1}{N_{i,t}} \sum_{d,a} Earnings\ Expectation_{i,a,t,d} \qquad \forall d - t < 0$$

$$Earnings\ Expectation^{post}_{i,t} = \frac{1}{N_{i,t}} \sum_{d,a} Earnings\ Expectation_{i,a,t,d} \qquad \forall d - t \geq 0$$

where $N_{i,t}$ is the number of analysts for CPI date t.

Using the average pre and post-earnings expectations variables, we then compute the percentage change in the forecast around each CPI release date:

$$\Delta EarningsExpectation_{i,t} = Log(Earnings\ Expectation^{post}_{i,t}) - Log(Earnings\ Expectation^{pre}_{i,t}) \quad (5)$$

by taking the log difference between earnings expectations.

Given that we have firm-level estimates of earnings expectations, we can also merge our measure of market power to the earnings expectations dataset, and we can estimate whether not only average earnings expectations are affected by inflationary surprises but earnings expectations are affected differently across the market power distribution.[12] To obtain a time-series measure of earnings expectations, we take the asset-weighted average firm-level change in earnings expectations to obtain $\Delta EarningsExpectation_t$.

[12]Summary statistics are provided in Table A2. On average, around 3 analysts cover the average firm both before and after the CPI release. Across all firms, there are on average between 587 (before) and 711 (after) analysts for a given CPI release.

4 Stock Return Decomposition

In this section, we propose a stock return decomposition around inflationary news based on the methodology developed by Knox and Vissing-Jorgensen (2022). We first lay out how, in theory, realized stock returns can be decomposed into a risk-free rate, an equity risk premia, and a cashflow component. Then, we use observable data on risk-free rates and the equity risk premium to obtain the realized stock return components.

4.1 Background

Under the present value formula of the stock market, which states that the price of the stock market is the discounted sum of all future expected cashflows, an unexpected return on the aggregate stock market must result from changes in expected future real (nominal) cashflows or changes in future real (nominal) required returns (discount rates), or both. Changes in discount rates can then be split into changes in the risk-free rate component of the discount rate and changes in the excess return component of the discount rate, i.e. the equity risk premium component. Knox and Vissing-Jorgensen (2022) formalize this present value intuition with a decomposition of realized stock market returns into a yield curve return component, risk premium return component, and a cashflow return component, which reflect changes in investors' expectations of those components.

Knox and Vissing-Jorgensen (2022) show that a one-period capital gain on the stock market can be estimated as:

$$\frac{P_{t+1}}{P_t} \approx 1 + \underbrace{\left[\sum_{n=1}^{\infty} w_t^{(n)} G_{n,t+1}^{D} - 1\right]}_{\text{Cashflow return}_{t+1}} + \underbrace{\left[\sum_{n=1}^{\infty} w_t^{(n)} \frac{1}{\prod_{j=1}^{n} G_{j,t+1}^{YC}} - 1\right]}_{\text{Yield curve return }_{t+1}} + \underbrace{\left[\sum_{n=1}^{\infty} w_t^{(n)} \frac{1}{\prod_{j=1}^{n} G_{j,t+1}^{RP}} - 1\right]}_{\text{Risk premia return}_{t+1}} \quad (6)$$

where P_t is price of stock market index at time t, $w_t^{(n)}$ is the price of the expected dividend payment on the aggregate stock market in n periods time as a fraction of the overall price of stock market index, (i.e. the weight, in present value terms, that a cashflow in period n contributes to the stock market), and $G_{n,t+1}^{X}$ for $X = \{D, YC, RP\}$ is the cashflow, risk-free rate and risk premia growth factors for $n = 1, 2, ...$

$$G_{n,t+1}^{D} = \frac{E_{t+1}\left[D_{t+n+1}\right]}{E_t\left[D_{t+n}\right]}, \qquad G_{n,t+1}^{YC} = \frac{E_{t+1}\left[R_{t+n+1}^{F}\right]}{E_t\left[R_{t+n}^{F}\right]}, \qquad G_{n,t+1}^{RP} = \frac{E_{t+1}\left[R_{t+n+1}^{RP}\right]}{E_t\left[R_{t+n}^{RP}\right]} \quad (7)$$

where D_{t+n} is the dividend in n-periods time and R_{t+n}^{F} and R_{t+n}^{RP} are the risk-free rate and risk premia components of the one-period stock market return in n-periods time.

The decomposition in Equation 6 shows how growth in dividend expectations generates positive stock market returns through $G_{n,t+1}^{D} > 1$, while growth in risk-free rates and risk premia generate negative returns through $\frac{1}{G^F_{n,t+1}} < 1$ or, $\frac{1}{G^{RP}_{n,t+1}} < 1$ respectively. The decomposition also highlights the importance of dividend strip weights, which themselves tell us the relative importance in growth rates of dividends and discount rates of various n maturities. Intuitively, the more a future expected dividend contributes to the stock market in present value terms, the more changes in expectations of that divided, or its discount rate matter for the overall price level of the market.

A key insight of Knox and Vissing-Jorgensen (2022) is that a lot of information about the aggregate stock market discount rates and, to some extent, cashflow expectations, are available in modern financial markets. Furthermore, dividend strip prices (and thus dividend strip weights) can be calculated from dividend futures prices. This observable data means that one can go a long way to decomposing aggregate stock returns as set out in Equation 6 using the prices of other asset prices. These asset prices are available at a daily frequency and are therefore well suited for implementation in a daily return event study setting. We describe the specific data for the return decomposition used in this paper's implementation in subsection 3.2 and set out details on the implementation in the subsection below.

4.2 Implementation

4.2.1 Yield Curve Return Component

When estimating the return components of the aggregate stock market return, we start with the yield curve return component, utilizing the availability of a rich-term structure of both nominal and real risk-free interest rates out to 20-year maturity (Gürkaynak et al., 2010b) to compute:

$$Return_t^{k,YC} = \sum_{n=1}^{\infty} w_t^{(n)} \frac{1}{\prod_{j=1}^{n} G^{YC}_{j,t+k}} - 1 \tag{8}$$

using the definitions in Equation 6 and Equation 7. As forward rates are available for up to 20 years, we need to make an assumption about the changes in forward rates beyond 20 years. We follow Knox and Vissing-Jorgensen (2022) and set $G^{YC}_{n,t+1} = 1$ for $n > 20$. Economically, the assumption is that monetary policy 20 years out is unaffected by a CPI release today. To the extent that forward risk-free rates beyond the 20-year maturity move in response to inflation news, our results will understate the role of the yield curve return component in aggregate returns. However, as we discuss later, we find forward rates beyond the 10-year maturity are unchanged following inflation news.

4.2.2 Risk Premium Return Component

As with the yield curve component, one can utilize observable discount rate data and the definitions in Equation 6 and Equation 7 to compute the risk premium return component:

$$Return_t^{k,RP} = \sum_{n=1}^{\infty} w_t^{(n)} \frac{1}{\prod_{j=1}^{n} G_{j,t+k}^{RP}} - 1 \tag{9}$$

where $G_{n,t+1}^{RP} = 1$ by assumption for growth rates in equity risk premium beyond the observed maturity. Using the Martin (2017) lower bound of the equity risk premium as our measure of observable risk premium, we do not observe equity risk premium beyond $n = 2$ years.[13] The observable term structure of forward rates for risk premium is therefore less rich as compared to the observable term structure of forward rates for risk-free rates.

As we will see later, risk premium changes in response to inflation news are large, and the risk premium component is an important factor in stock returns around inflation news. To capture potential movements in risk premium beyond the observed maturities, we therefore implement a two-step regression approach to estimate the total risk premium return component of stock returns. First, we compute the k-day aggregate return that is *not* due to the observed yield curve return component on each CPI date,

$$Return_t^{k,Adj} = Return_t^{k} - Return_t^{k,YC},$$

and second estimate the following regression for all $k \in [-5, 10]$ across CPI dates:

$$Return_t^{k,Adj} = \left(\mathbf{G_{n,t+k}^{RP}}\right)' \Theta^k + \epsilon_t^{k,Adj} \tag{10}$$

where $\mathbf{G_{n,t+k}^{RP}}$ is a vector of k-day growth rates in observed equity risk premium of various n maturities. From these estimations, we then define the risk premium component of the k-day aggregate return as the predicted component of the estimation:

$$Return_t^{k,RP} = \left(\mathbf{G_{n,t+k}^{RP}}\right)' \hat{\Theta}^k. \tag{11}$$

This regression approach assigns all yield-curve adjusted stock returns that are correlated with equity risk premium at observable maturities to the risk premium return component. To the extent that changes in unobserved longer-dated equity risk premiums are correlated with changes in observed shorter-dated equity risk premiums, the method therefore captures movements in stock prices that are due to changes in unobserved equity risk premiums. This is a useful feature of

[13] Equity risk premium is computed from the prices of S&P500 equity options where the maturity of the equity risk premium estimate is the same as the maturity of the option's expiration date. Since 2022, equity options have been available up to five years ahead, but for the majority of our sample equity options have been available up to 2-years ahead.

the approach given the data limitation that long-dated maturities of equity risk premiums are unobserved in daily data.

Moreover, Knox and Vissing-Jorgensen (2022) show that changes in the wedge between true risk premium and the observed Martin (2017) lower bound of risk premium are positively correlated with changes in the lower bound itself. The regression approach therefore also captures changes in risk premium due to the unobserved changes in the wedge that are correlated with the observed risk premium changes.

4.2.3 Cashflow Component

The final return component of the return decomposition is the cashflow return component, which is due to changes in investors' expectations of future dividend payments. In our baseline results, we define the cashflow component of the k-day aggregate return as the residual component of the estimation of Equation 10:

$$Return_t^{k,CF} = \epsilon_t^{k,Adj} \tag{12}$$

as this part of the stock returns has removed all variation that are due to observable changes in discount rates.

It should be noted that one potential confounding factor in the estimation of Equation 10 are changes in investors' expectations of cashflows themselves. Said otherwise, our method will attribute stock returns due to changes in investors' cashflow expectations that are correlated with risk premium to the risk premium return component. Given the cashflow return component and risk premium return component are likely positively correlated, this means we are understating the role of the cashflow return component. As we discuss later, given the changes in stock prices and discount rates around inflation news that we observe in practice, this means the main findings on cashflows would only be stronger if the confounding factor was controlled for.

The main identifying assumption of the analysis instead is that the discount rate variables used in Equation 10 capture all discount rate changes that impact aggregate stock returns in our event-window estimations. The assumption is analogous to a variance decomposition of stock returns (Campbell, 1991), where the choice of variables included in the VAR determines how the model apportions returns between the discount rate and cashflows news (Campbell, Polk and Vuolteenaho, 2010; Engsted, Pedersen and Tanggaard, 2012). Note also that the predictor variables typically used in variance decomposition of stock returns are not commonly available in high-frequency. Our approach, by utilizing observed changes in discount rates that are available contemporaneously, therefore allows us to maintain the identification benefits of an event-study estimation while decomposing the drivers of stock returns.

5 Empirical Strategy

Our empirical strategy relies on an event-study approach that examines the financial market variables around the announcement of a CPI release. To causally isolate the effect of inflation, studying unexpected realizations of inflation relative to expectations is crucial. Higher inflation and expectations thereof can be correlated with positive macroeconomic environments, which could bias a time series regression of financial market outcomes on realized inflation. Instead, while inflation surprises can be interpreted through different lenses (e.g. supply or demand), they are unlikely to be correlated with other non-inflation news.

5.1 Time Series Analysis

The time series analysis uses event-study local projections (Jordà, 2005) and estimates the following sequence of regressions for all $k \in [-5, 10]$ across CPI dates:

$$y_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k \tag{13}$$

where y_t^k change in an asset price from the close of business the day before the date t inflation release to k days after inflation release and β^k is the effect of inflationary news on the k-day change in the y asset price.

We estimate Equation 13 through the sequence of k days separately using a variety of different asset types for y. To start, y_t is defined as the cumulative stock return between the day before the announcement and k days after the announcement, $Return_t^k$, where we use the equal-weighted average across all firms in our sample. We then study changes in observable discount rate around inflation news where $y_t^k = y_{t+k} - y_{t-1}$ is the k-day change in the equity risk premium, nominal risk-free rates or real risk-free rates of various maturities.

Finally, we compute the yield curve return component, risk premium return component, and cashflow return component of aggregate stock market returns as defined in Equation 8, Equation 11 and Equation 12 respectively. We then define y_t as a cumulative stock return component between the day before the announcement and k days after the announcement, $Return_t^{k,c}$ for $c = \{YC, RP, CF\}$, and study how each of these return components responds to inflation news.

5.2 Cross-Sectional Analysis

The estimations in Equation 13 ignore cross-sectional dimensions of returns across firms. To test for the cross-sectional heterogeneity across firms with differential degrees of market power, we estimate the following regressions for all $k \in [-5, 10]$ across CPI dates:

$$Return_{i,t}^k = \alpha^k + \beta_1^k \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i^k + \alpha_t^k + \mathbf{X}_{i,t}' \gamma^k + \epsilon_{i,t}^k \tag{14}$$

where $Return^k_{i,t}$ is the firm-level stock return of firm i. We interact the inflationary news with our measure of markups, as defined in section 3, over the year, $y(t)$, before the inflation release, $y(t)-1$. The interact coefficient indicates whether, in response to inflationary news, firms with higher (one-year lagged) markups respond differentially compared to their counterparts. A positive coefficient is associated with an over-performance of firms with higher markups in response to inflationary news. The specification in which we exploit cross-sectional heterogeneity across firms allows us to include time-fixed effects in our regression equation. Time-fixed effects (denoted by α^k_t) control for all unobserved and observed heterogeneity at a given point in time, such as changes in the monetary policy stance, volatility, economic news, or other factors such as sentiment, which are econometrically harder to observe. If these factors were to be correlated with the interaction term $\textit{Inflationary News}_t * Markup_{i,y(t)-1}$, the exclusion of time fixed could bias the coefficient of interest β^k_1 of equation Equation 14. Moreover, we include firm fixed effect in the regression specification (α^k_i), which control for time-invariant characteristics of the firm.

We also include various other characteristics $\mathbf{X}_{i,t}$ as control variables. One potential threat for identification is if firm characteristics are correlated with markups and also react differentially with respect to inflationary news. For instance, if firms with smaller sizes are less responsive to inflationary news than large firms, and firm size is correlated with markups, our coefficient of interest could be biased. To control for the differential impact of various firm-level characteristics on inflationary news we interact various firm-level characteristics, such as log assets, tangibility, leverage, and market-to-book value with inflation news. Given our dependent variable is stock returns, we can also control for firm characteristics by capturing firm stock return's risk exposure to asset pricing factor models.[14] Using a Fama-Macbeth approach, we first compute rolling 5-year stock beta's to the portfolio factors, and then include the estimated firm-level betas in the control vectors and, as with firm characteristics, interact with the inflationary news variable.

One limitation of the interacted firm-control approach is that unobservable time-varying factors cannot be controlled for. If $firm \times time$ fixed effects were to be included in the regression equation, they would be collinear with the *markup* $\times$ *inflationary news* term. However, we can make some progress toward controlling for a certain degree of time-variant variation that differs across firms to compare firms within each industry by including $industry \times time$ fixed effects.

A further benefit of estimating a regression equation with $industry \times time$ fixed effect is that it alleviates a potential concern with the markup estimation by De Loecker et al. (2020). The estimation of industry-level output elasticities can produce inconsistent estimates of the output elasticity and the disturbance, and therefore can generate biased markups (Doraszelski and Jaumandreu, 2021). By controlling for $industry * time$ fixed effects, we partially out the sector-specific output elasticities and solely compare firms with differential markups within an industry.

Note that in contrast to standard local projections (LP), we also consider $k < 0$ in the spirit

[14]In the baseline we use the Fama and French (1993) asset pricing model, but results are also robust to using Fama and French (1993) plus Carhart (1997), or to using the Fama and French (2015).

of an LP-difference-in-differences (DID) proposed by Dube et al. (2023). One difference between the LP-DID and the standard DID is that a sequence of regressions is estimated for each k. This has the advantage that β^k is unaffected by the choice of the number of lags and leads included. Moreover, the LP-DID avoids several other problems compared to estimating a DID specification with two-way fixed effects, see e.g. Callaway and Sant'Anna (2021); Goodman-Bacon (2021) among many others.

For the DID estimator to be unbiased, we require the parallel trend assumption to be satisfied—that is, absent a shock, treated and control firms would have evolved the same way. While it is not possible to test this assumption, as the counterfactual post-CPI release behavior without the shock is unobservable, we can test for whether there are differential pre-trends before the shock. Estimating β^k for $k < 0$ allows us to test whether there is a violation of the parallel trend assumption.

Recent literature has argued that DID designs are likely to be biased in the presence of a staggered DID approach, as already treated units can act as effective comparison units (Baker et al., 2022). Note that this is not a concern in our setting as we set $k = \in [-5, 10]$, covering only a window of 15 days, which prevents overlapping observations and staggered treatment, as CPI releases only occur once a month. The concern would be that firms with higher markups are treated for one CPI release but not for the next, but still being treated as comparison units for the next one.

6 Results

6.1 Aggregate Stock Returns

Figure 1 plots the regression coefficient β^k of Equation 13 from $k = -5$ to $k = 10$. The coefficient for k=0 represents the effect of inflationary news on the one-day return of the average stock on the day of the CPI announcement, whereas the one-day return is defined as the difference between the close price of the day of the announcement and the close price of the day before the announcement. Note that the CPI is usually released at 8:30 am, when the market is still closed. For robustness, we also test for the difference between close and open prices, and all results are unchanged.

The negative coefficient, represented by the square at day=0, of 0.8 shows that in response to a one percentage point inflationary news, stock prices fall by around 0.8%. The shaded area in blue reflects the 95% confidence interval around the point estimate, ranging from around 0.1% to 1.6%, indicating statistical significance at conventional levels. Moving to the next day ($k = 1$), we see that the negative effect of inflationary news on the stock market increases. The coefficient indicates that stock prices fall by around 0.9% between the day before the announcement of the CPI and two days after. The effect after the second day remains persistent, and if anything strengthens over a period of 10 days.

Importantly, before the announcement of inflationary news, stock returns do not exhibit a trend, as shown by the statistically insignificant coefficient for $k = -2$ to $k = -5$. This absence of a pre-trend suggests that the parallel trend assumption is likely to hold, which refers to the idea that in a DID analysis, the trend in stock prices would have been the same in the absence of inflationary news.

Figure A1 plots the one-day stock return of the average firm on days of inflation announcements together with the inflationary news. Similar to the inflationary news, the one-day stock returns do not exhibit a particular pattern and while a negative correlation between the two series is not immediately obvious, a simple univariate regression of the average stock return on the inflationary news returns a coefficient of -0.22 and a standard error of 0.08 rendering the relationship between inflationary news and stock returns statistically significant at conventional levels. Economically, a one percentage point inflationary news is associated with a 0.22 % decline in the stock price of the average firm. Figure A2 also confirms the relationship in a binscatterplot.

The results for the (absence of a) pre-trend, the contemporaneous effect, and the lagged effect are also summarized in the binscatter plots of Figure A2 in which the x-axis is the inflationary news. The left panel shows a binscatterplot where the y-axis is the contemporaneous (one-day) stock return, the middle panel shows the return over a period of five days, and the right panel shows the one-day return the day before the inflation announcement. The left and middle panels both show a strong negative relationship between the inflation surprise and the return over one and five days, respectively. Consistent with the results above, the relationship becomes stronger (more negative) over five days compared to when only one day's return is considered. The right panel can be seen as a placebo test. If the inflationary news was to be expected, one would potentially already see that stock returns are negative before the announcement. However, the absence of a relationship between inflationary news and stock returns the day before suggests that what we call inflationary news is indeed news and is not yet expected by the market.

In a standard macro model, a negative supply shock reduces output and increases prices, while a positive demand shock increases output and prices, potentially inducing significant state-dependence to our results. In Appendix A, using several measures of supply-driven inflation, including the often cited stock-bond correlation, we do not find evidence that our results are dependent on times when inflation is measured to be more supply-driven; even during demand-driven times, such as the post-global financial crisis era, inflationary shocks are associated with declining stock returns, increasing risk premia, and unchanged real yields. We discuss those results in more detail in subsubsection 6.2.3.

6.2 Discount Rates

In this subsection, we first present results showing how yields and equity risk premium respond to inflation news. We then discuss the economic implications of the main findings.

6.2.1 The Yield Curve

Figure 2 presents results for the nominal Treasury yield, the breakeven inflation rate, and the real Treasury yield, presenting regression coefficients β^k of Equation 13 from $k = -5$ to $k = 10$. The estimation period is 1999-2022, reflecting the sample period where inflation-linked Treasury yields are available (Gürkaynak et al., 2010b). The first column shows results for the two-year maturity and the second column shows results for the 10-year maturity. In terms of the stock return decomposition, longer-maturity discount rates are more pertinent for understanding the impact of yields on stock market returns, given the duration of the stock market is very long (van Binsbergen, 2020; Knox and Vissing-Jorgensen, 2022). However, the shorter maturity yields provide additional information and are particularly interesting as they are more sensitive to the near-term economic outlook and expected path of monetary policy than longer-dated yields.

The first row of Figure 2 presents nominal yield responses to inflation news. Policy-rate sensitive yields are expected to increase with higher-than-expected inflation. Indeed and unsurprisingly, the positive coefficients of 0.11 for 2-year nominal Treasuries shows that in response to a one percentage point inflationary news, the 2-year yields rise by 11 basis points. In the second column, we see spillovers from policy-sensitive to longer maturities of the yield curve. The 10-year nominal Treasury yield rises by around 8 basis points following a one percent point inflation news.

The middle row of Figure 2 presents the breakeven inflation response to inflation news. The coefficient of 0.35 at day 0 for 2-year breakeven inflation shows that in response to a one percentage point inflationary news, the 2-year inflation expectations rise by 35 basis points on that day. The notable response of inflation compensation to CPI news is consistent with prior evidence in Bauer (2015) as well as the response of household expectations and professional forecasters (Skaperdas, 2023). As with nominal yields, longer-maturity inflation expectations increase with their shorter-maturity counterparts. At the 10-year maturity, the breakeven inflation rises 7 basis points following a one percent point inflation news.

The bottom row of Figure 2 presents the response of real yields to inflation news. By definition, real yield changes are the difference between the previously described nominal yield changes and breakeven inflation changes. At the 2-year maturity, we see the real yield decline as the dramatic increase in short-term inflation expectations outweighs the relatively modest increase in nominal yields. In particular, the negative coefficient of 0.24 shows that the 2-year real Treasury yields decline 24 basis points in response to a one percentage point inflation news. At the 10-year maturity, the change in nominal Treasuries and breakeven inflation are approximately the same, each rising 7 basis points following a one percent point inflation news, and thus longer-dated real yields are unchanged.

Table A3 presents analogous results using interest rate and inflation swaps to compute and decompose real yields. TIPS are less liquid than Treasuries (Fleckenstein et al., 2014), and thus one concern could therefore be that time-variation in the TIPS liquidity premium around inflation announcements is driving results. However, we do not find support for this channel, with the results consistent across estimations using swap prices rather than bond prices.[15]

6.2.2 Equity Risk Premium

We now consider the equity risk premium response to inflation news. Figure 3 plots the full set of regression coefficient β_k of Equation 13 from $k = -5$ through to $k = 10$ using the Martin (2017) lower bound of the 1-year equity risk premium. Equity risk premium is estimated to increase by 30 basis points in response to a 100 basis point inflation shock the day after the shock, with the response increasing to statistically significant 70 basis points by day 5. The positive coefficients illustrate increasing equity risk premium in response to inflation news (Bekaert and Engstrom, 2010), and therefore provide evidence that equity risk premium news at least partially contributes to the equity price declines observed in response to inflation news.

6.2.3 Discussion of Findings

The movements in discount rates around inflation news, and their co-movement with stock returns, shed light on investors' perceptions of the economic implications of inflation. Below, we discuss five key observations of our findings.

Policy-sensitive yields and the implied Taylor rule. The Taylor principle states that the nominal interest rate should be raised more than point-for-point when inflation rises so that the real interest rate increases (Taylor, 1993, 1999). By studying policy-sensitive 2-year yields we can estimate investor perceptions of the Taylor rule in response to changes in inflation expectations over time.[16] Under a Taylor rule, the response of monetary policy - and therefore short-dated nominal interest rates - should exceed the change in inflation expectations. However, in the data, we find that real yields at policy-sensitive maturities decline as the increase in breakeven inflation is larger than that of nominal treasury yields, which is inconsistent with the Taylor rule hypothesis. This can be rationalized by investors expecting inflation to be supply-driven, contracting output without requiring a strong increase in the nominal monetary policy rate.

Inflation compensation driven long-maturity nominal yields. At longer maturities, we find that real yields are unresponsive to inflation news. This result is in stark contrast to the large and positive response of long-dated real yields to monetary policy shocks (Nakamura and Steinsson,

[15] One further concern in interpreting the above findings is that illiquidity issues in either market might bias the results. The period when the inflation-linked market was first developing (1999-2003) and also the global financial crisis (2008-2009) are both known to be periods of high illiquidity in these markets. However, in unreported results, we find consistent results when we remove these two periods. In general, the negative response of real yields to inflation news is remarkably robust throughout the subsamples of our full sample period (1999-2022).

[16] The exercise is therefore similar in spirit to recent work that studies professional forecasters' perceptions of the Taylor rule from surveys (Bauer et al., 2022).

2018; Hanson and Stein, 2015). In Appendix B, we explore these distinctive effects of monetary policy news and inflation news on the long end of the real yield curve using the Hanson and Stein (2015) empirical setting. We first replicate the Hanson and Stein (2015) result that in response to monetary policy news on FOMC days, nominal and real yield long-dated forwards move in lockstep. However, once we zero into CPI days, the large response of long-dated nominal forward rates to policy sensitive nominal rates is driven mostly by the breakeven inflation.

The inflation news results are consistent with a model in which long-run inflation expectations are not well anchored and revised in light of incoming inflationary news (Gürkaynak et al., 2005). Importantly, for the context of our analysis, the unresponsiveness of real yields to higher nominal yields on inflation news opposes the notion that inflation news days are simply proxy monetary policy days, with asset markets driven solely by the expected response of monetary policy to inflation news. Instead, we find very clear evidence that inflation news days are distinct with other factors, beyond monetary policy, driving asset markets.

Increasing equity risk premium with inflation news. Ex-ante, the effect of inflationary news on the equity risk premium is ambiguous. The correlation between inflation with economic activity and the asset's cashflows should be fundamental to the determination of the risk premium to inflation news. If inflation (deflation) is associated with bad states of the world, assets that have low real payouts in high inflation (deflationary) times are relatively undesirable and command higher risk premiums. This intuition is embedded in many asset pricing models that explicitly consider the implications of inflation for time-varying risk premiums, such as those with time-varying disaster risk (Gabaix, 2008), long-run risk (Bansal and Shaliastovich, 2013) or risk aversion (Campbell et al., 2020). Indeed, the risk premium is typically an amplification of the effect of inflation on the assets' cashflows. Through the lens of a broad range of models, rising equity risk premium with inflationary news is therefore indicative of investors' believing that the real cashflows of equities are lower in inflationary times.

Positive stock-bond return correlation. In response to inflation news, we find a positive stock-bond return correlation as stock prices decline and nominal yields rise. In a New Keynesian model, a positive stock-bond correlation is indicative of the economy being hit by demand shocks and a negative stock-bond correlation suggests the economy being hit by demand shocks (Cieslak and Pflueger, 2023). Under similar intuition, a positive (negative) stock-bond correlation can also be interpreted as growth (monetary) news (Cieslak and Pang, 2021). Taken at face value, the correlation we observe on inflation news suggests investors interpret inflation as supply shocks or monetary news. However, the positive correlation between nominal yields and inflation expectations is inconsistent with a monetary policy interpretation and therefore the evidence points to supply shock news. In fact, this correlation even occurs in periods where the stock-bond return correlation on other days is negative (see Appendix A). These results raise the question of why the stock-bond return correlation has, on average, been negative since the 2000s, if it is not driven by inflation news. One explanation could be that investors misperceive inflation news as supply shock-driven, but then learn on other days in the post-2000 period that the economy was demand-driven. However, there are also alternative explanations of the stock-bond correlation that do not require inflation news and are instead driven by other factors such as precautionary saving motives (Laarits, 2022) or changes in the persistence of consumption shocks hitting the economy (Chernov et al., 2023).

Negative correlation between inflation expectations and stock returns. We find a strong negative correlation between stock returns and inflation expectations in their respective responses of to inflation news. Interestingly, inflation compensation and stock returns are unconditionally positively correlated in daily data, with this result even holding on days with inflation news (Chaudhary and Marrow, 2024). In Table A4, we show that once changes in inflation expectation are instrumented with inflation news, the effect of inflation expectation on stock returns is negative on CPI days. This highlights the importance of studying unexpected realizations of inflation in an event-study setting, instead of studying correlations that will be confounded with other factors. For example, returning to a New Keynesian framework, demand shocks increase both output (and therefore stock market cashflows) and, via the Phillips curve, inflation (and therefore inflation expectations). New Keynesian demand shocks would therefore lead to a positive correlation between stock returns and inflation expectations. However, we show that the positive correlation between stock returns and inflation expectations is not driven by inflation news itself. In fact, the negative effect of inflation news driven inflation expectations on stock prices provides more evidence that investors interpret news about inflation as a cost-push supply shock.

The results presented above show that inflation news increases investors' inflation expectations and yet is bad news for stock prices, with several findings suggesting that investors have a stagflationary view of the world. The most direct, but also challenging, test of this hypothesis is to measure how investors' cashflow expectations change with inflation news. The stagflationary view should lead to stagnant (unchanged) nominal cashflow expectations and thus declining real cashflow expectations. We tackle this question in the next subsection.

6.3 Cashflow Expectations

To study investors' cashflow expectations, we implement the stock return decomposition methodology described in section 4. This method allows us to quantify the impact of changing discount rates on the overall stock market return, and extract a residual, which by definition is due to changes in investors' expectations of future cashflows. Whether these are real or nominal cashflow expectations depends on whether we quantify the impact of real risk-free rates or nominal risk-free rates when calculating the yield curve return component of the aggregate stock return. Either way, realized returns of the stock market are the sum of the yield curve return component, the risk premium return component, and the cashflow return component. This means that the beta of the k-day stock market return on inflation news, β_r^k, is by definition equal to the sum of the beta of k-day return components on inflation news

$$\beta_r^k = \sum_c \beta_c^k \tag{15}$$

where β_r^k and the β_c^k's are all estimated separately from Equation 13. The return decomposition methodology therefore allows us to quantify the relative importance of the various return components to aggregate stock market returns in response to inflation.

6.3.1 Nominal Cashflows and Stock Return Decomposition

Panel A of Table 1 presents a decomposition of realized nominal stock returns into return components around inflation surprises. The first four columns show the stock return components on the day of the CPI release. Columns (5)-(8) show the components 5 days after the release. The first column shows that in response to a one percent inflation shock, stock prices overall decline by 1.42%.[17] The next three columns decompose this number into the three return components in Equation 6.

Focusing first on the contribution of the nominal yield curve return component, we see that the increases in nominal risk-free rates documented in Figure 2 unsurprisingly lead to a negative yield curve return component. This shows that following inflation news, investors revise up nominal interest rate expectations, and thus the stock market's future cashflows are discounted by more and the present value falls. However, quantitatively, the yield curve return component is only 0.61 percent on the first day and a cumulative negative 0.45 percent over 5 days, and so the yield curve return component can not explain the full decline in the stock market following inflation news.[18]

We next turn to the risk premium return component of the aggregate stock return. Consistent with the large increase in equity risk premium following inflation news documented in Figure 2, we estimate that increasing equity risk premium contributes a significant fraction of the negative stock returns. For the one-day return, risk premium contributes 1.03 percentage points to the negative 1.42 percent points return of the stock market, and over a 5-day period risk premium contributes 2.2 percentage points to the 2.8 percentage points cumulative negative return on the stock market.

[17] The aggregate stock return is more negative than shown in Figure 1 because in this post-1999 sample (where discount rate data is available) the stock returns are more negative in response to inflation news. For example, the 1-day return for $k = 0$ is -0.8% in the full sample and the cumulative return for $k = 5$ is -1.8%.

[18] As discussed in section 4, our methodology will understate the role of yield curve news if forward nominal yields move beyond the maximum observed maturity of 20 years. However, in Figure A3 we see that we can empirically reject this, with observed forward yields not moving beyond the 10-year horizon. This tells us that the changes in long-term nominal yields observed in response to inflation news are predominately driven by changes in forward yields at short-term maturities. Nagel and Xu (2024) observe similar dynamics of long-term forward rates in response to monetary policy news.

The equity risk premium therefore accounts for 70-80 percent of the negative stock returns following inflation news.

Finally, we look at the contribution of investors' expectations of future nominal cashflows. After accounting for the increases in discount rates following inflation news, we find that the residual impact assigned to changing investor expectations of cashflows is small and insignificant. After 1 day the contribution is positive 0.23 percentage points and after 5 days the cumulative contribution is negative 0.14 percentage points, but neither of these coefficients are statistically significant. To show in more detail, the top panel of Figure 4 plots the regression coefficient β^k_{CF} of Equation 13 for all days from $k = -5$ to $k = 10$ with the cumulative nominal cashflow return component used as the dependent variable. For all days, the nominal cashflow component is statistically indistinguishable from zero, and is consistent with investors' having stagnant nominal cashflow expectations following inflation news. Inflation expectations increase following higher than expected inflation, yet nominal cashflow expectations are unchanged.

We conclude this subsection by discussing the implications of the regression approach for estimating the risk premium and cashflow return components. The advantage of the approach is that the coefficient on the 1-year equity risk premium in Equation 10 not only captures the impact of changes in the observed 1-year equity risk premium on the stock market price but also the changes in unobserved longer maturity equity risk premium changes (providing that the longer maturity equity risk premium are correlated with 1-year equity risk premium). Indeed, for, $k = 0$ we estimate a regression coefficient of -2.4 on 1-year equity risk premium in Equation 10. If unobserved forward equity risk premium beyond the 1-year maturity were unchanged following inflation news, the coefficient would only be -1, and thus the regression coefficient less than minus one shows that our estimation captures a significant contribution from implied changes in unobserved equity risk premium beyond the 1-year maturity.

However, as discussed in section 4, the drawback of the regression approach is that it has a confounding bias. The impact of changes in cashflow expectations on the stock price that are correlated with risk premium will be incorrectly assigned to the risk premium return component rather than the cashflow return component. However, given that the risk premium and cashflow return components are likely positively correlated, the key conclusion that nominal cashflows are stagnant is not invalidated by the confounding factor, and in fact, could be even more striking than we document here.

6.3.2 Real Cashflows and Stock Return Decomposition

We next turn to a decomposition of real stock returns and extracting investor expectations of future real cashflows following inflation news. Before presenting the results, we make two observations. First, even without implementing the real return decomposition, the observed changes in real yields are already a powerful result consistent with the stagflationary view hypothesis. The fact that real yields do not rise following inflation shocks means that real yield curve news is not the driver of negative stock returns in response to inflation news. Instead, the negative stock returns must thus be due to one or both of: (a) increases in equity risk premium, (b) decreasing (stagnant) expectations of future real (nominal) cashflows. As discussed in subsection 6.2, it is unlikely to get an increase in equity risk premium without a decline in real cashflow expectations, and thus, while our decomposition quantifies the relative importance of each factor, with real yields alone we can conclude that inflation is considered stagflationary. In this light, the increasing equity risk premium we observe is a complimentary finding to the unchanged real yields.

Second, we note that inflationary news (see Equation 1) results in an instantaneous increase in the level of the consumer price index. This instantaneous increase becomes a permanent increase if the price index is not expected to decrease following the news. As shown in Figure 2, inflation expectations are increasing (not decreasing) with inflationary news, and therefore inflation news are expected to be associated with a permanent increase in the consumer price index. This increase in the price level means the nominal stock returns shown in Figure 1 are even more negative when considered on a real basis. For instance, if inflation is 1 percentage point higher than was expected, this can be thought of as an instantaneous increase in the price level of 1 percent and implies that the real stock price is lower by the same amount at the time of the inflation release. We therefore calculate real returns around inflationary news by simply subtracting the inflationary shock from the nominal stock return,

$$\widetilde{Return}^{k}_{i,t} = Return^{k}_{i,t} - \text{Inflationary news}_{t},$$

for all days since the inflationary news (i.e. for all $k \geq 0$). If investors viewed the stock market as a real asset, in the sense that the cashflows generated by the asset increase with the price level in the economy, then nominal expectations of all future cashflows should increase with the instantaneous level-shift in the consumer price index that is associated with the inflation news. Thus, even holding fixed investors' discount rates and investors' expectations for future cashflow *growth*, this price-level adjustment to expected nominal cashflows means an inflation shock would lead to a nominal stock market return equal to the size of the inflation news itself following inflation news. Subtracting the realized inflation news from the nominal stock returns thus removes this potential impact of changes in perceptions of the price level on expected nominal cashflows.

Panel B of Table 1 now presents a decomposition of realized real stock returns into return components around inflation surprises. The first four columns show the stock return components on the day of the CPI release. Columns (5)-(8) show the components 5 days after the release. The first column shows that in response to a one percent inflation shock, stock prices overall decline in real terms by 2.42%. The next three columns decompose this number into three components.

Focusing first on the real yield curve return component, we see that the small changes in real risk-free rate documented in Figure 2 unsurprisingly lead to a small contribution from risk-free rates on aggregate stock returns. The real yield contributions are less negative relative to the nominal yield contributions because the rise in inflation expectations offset the rise in nominal yields. In fact, on net, real yields slightly *decrease*, and this means we observe a positive impact from the real yield curve component on stock returns following inflation news. For $k = 0$, decreases in real yields mean that the real yield curve return component contributes positive 0.15 percentage points to the -2.42 percentage points negative stock return, and for $k = 5$ the positive contribution of 0.66 percentage points.

Turing next to the risk premium contribution, we estimate that, consistent with the nominal return decomposition, increasing equity risk premium contributes 0.75 percentage points to one-day equity declines and around 1.96 percentage points to cumulative 5-day stock returns. In total, equity risk premium accounts for 30 percent of the negative stock return on the day of an inflation announcement and up to 52 percent of the cumulative return through to $k = 5$.

Finally, we look at the contribution of investors' expectations of future real cashflows to negative stock returns following inflation news. Even after accounting for the large move in equity risk premium around inflation news, and the smaller moves in real risk-free rates, we find there is a large contribution of the real cashflow return component. In particular, the decline in investor expectations of real cashflows contribute -1.82 percentage points to the -2.42 percentage point return on day $k = 0$, and contribute -2.45 percentage points to the -3.75 percentage point cumulative return on day $k = 5$. We therefore estimate that changes in investors' expectations of future real cashflows account for 75 percent of the negative stock return on the day of an inflation announcement, and 65 percent of the cumulative return through to $k = 5$.

The bottom panel of Figure 4 plots the regression coefficient β^k of Equation 13 for all days from $k = -5$ to $k = 10$ with the cumulative real cashflow return component used as the dependent variable. We see that for most days, the real cashflow return component is statistically negative, with the negative coefficient on cumulative returns showing a persistence level of just below -2 percent points.

Figure 5 presents a decomposition of realized real stock returns into return components around inflation surprises. The figure stacks the return contribution of real cashflows, real risk-free rates, and equity risk premium on the aggregate stock return, as well as presenting the aggregate real stock return with the black line. Formally, the bars plot the full set of estimated regression coefficients $\beta^{k,c}$ of Equation 13 from $k = -5$ through to $k = 10$ and for $c = \{\widetilde{CF}, ERP, \widetilde{RF}\}$ where the coefficients for each k are stacked across c. The return components are the returns generated from changes in real cashflow expectations, $\widetilde{CF}$, changes in equity risk premium, ERP, and changes in real risk-free rates, $\widetilde{RF}$. Because k-day return components sum to the k-day aggregate return, the sum of the regression coefficients of return components on inflation news equals the regression coefficient of aggregate stock returns on inflation news by definition.

6.3.3 Validation of Cashflow Component

The decomposition of stock returns, introduced in section 4, uses observable data on risk-free interest rates and the equity risk premium, to obtain the total discount-rate component of stock returns around CPI news. The remaining part, which cannot be explained by discount rates, is assigned to the cashflow component, according to the present value formula of stock returns.

Assigning the residual to the cashflow component of stock returns may raise the concern that the cashflow component does not actually measure what it is intended to, but instead other unobserved factors, which are not included in the decomposition approach. To validate that our cashflow component of stock returns indeed measures news about cashflows, rather than unobserved factors, we compare the cashflow component to other measures of cashflows which are more directly observable.

As described in subsection 3.5, we can use data on analyst earnings expectations to understand how analysts view about companies earnings change around CPI announcements and compare those earnings expectations to our estimated cashflow component.

While earnings expectations are not confounded with market-based components, such as liquidity and risk premium, that could bias the measure, analysts only update their estimates infrequently, which prevents us from using earnings expectations at the high-frequency. We aggregate changes in earnings expectations in the 2 weeks before and after the CPI release to obtain a lower-frequency estimate of how earnings are expected to change. We aggregate the change in earnings expectations across all firms for a given CPI date, as defined in Equation 5, by using an (asset) weighted average. We then compare our estimated nominal cashflow component to the change in earnings expectations of analysts. The upper left panel of Figure 6 shows a strong correlation between the same day change in the estimated cashflow component of the stock return and the change in earnings expectations. The lower left panel confirms this strong correlation for the 5-day change in the estimated cashflow component and the same earnings expectations.

An alternative approach to confirming the validity of the estimated cashflow component is to compare it to dividend future prices. Dividend future prices carry important information about the expectations of investors about cashflows in different horizons, providing a more direct measure of investors' expectations of cashflows on the aggregate stock market. For example, Gormsen and Koijen (2020) show how dividend futures prices fell significantly during the onset of the Covid crisis as investors revised down their growth expectations. There are, however, some caveats when using dividend futures. First, dividend futures were only introduced in 2016 and therefore prevent us from studying a longer times series and analyzing them at earlier periods. Second, although volume has increased over time, the liquidity is not as rich as for other financial markets. Third, dividend futures prices contain a risk premium. That being said, we do adjust dividend futures prices for observed Martin (2017) equity risk premium of the same maturity as the dividend futures following Knox and Vissing-Jorgensen (2022).

For the sample period in which dividend futures are available, we can construct the percentage change in dividend future prices around CPI print releases and compare them to our cashflow component. The dividend future price change and the estimated cashflow component from our decomposition, in principle, should measure similar objects, with the difference that our decomposition approach measures all future cashflows, while the dividend futures only measure dividends at a certain point in time. As most dividends are expected to be paid out in later periods, we use the data on 2 year dividend futures instead of the 1 year dividend futures, which only measures short-term expectations of cashflows. The middle panel of Figure 6 shows the same cashflow component of stock returns as in the left panel, but plots it against the same k-period change in 2 year dividend future prices (adjusted for risk premium), as defined in subsection 3.2. As for analyst earnings expectations the correlation between the two different measures of expected cashflows by market participants is very strong.

In the right panel of Figure 6, we move from nominal cashflows to real cashflows, based on both our decomposition approach and the dividend futures. To obtain real cashflows from our decomposition approach, instead of using nominal discount rates, we use real discount rates, and subtract the inflation shock itself, see subsubsection 6.3.2 for details. For dividend futures, we also adjust the dividend future price by the CPI shock, as explained in subsection 3.2. As for the nominal cashflow component and nominal dividend future prices, the real parts of the cashflow component and the dividend futures are also strongly related to each other.[19]

Overall, the results presented in this section, suggest that our estimated nominal cashflow component from our newly introduced decomposition carries important information on how market participants and analysts view the cashflow outlook, and verifies the validity of our approach.

6.4 Market Power

One potential reason for why the marginal investor has a stagflationary view of the world, expecting nominal growth and dividends to remain stagnant for the average firm, could be that the inflation surprise is interpreted by investors to be a shock to marginal costs. To understand the implications of such a view, we consider a canonical model of imperfect competition, where firms set prices that are the product of markup and marginal cost (Tirole, 1989). The prediction about a marginal cost shock for from firm profitability follows from this model simple setup (all proofs in Appendix D).

Hypothesis 1 (firm profitability and marginal costs) *In simple models of imperfect competition, firm profitability declines following an increase in marginal costs.*

Consistent with the empirical evidence presented thus far on aggregate asset prices, the cost-shock hypothesis does indeed predict that investors should expect firm profitability to decline with inflation. Crucially, we also show that in the textbook model of imperfect competition, the key parameter for how much firm profits decline with marginal costs is a firms' market power.

Hypothesis 2 (market power, firm profitability and marginal costs) *The extent to which firm profitability declines with marginal costs is determined by a firms' market power. In particular,*

[19] In Appendix C we also directly explore the relationship between dividend futures price changes in response to inflation news in the later sample (2016-2022) and confirm the previous analysis that nominal cashflow expectations are stagnant and real cashflow expectations are declining.

firms with more market power see a smaller decline in profitability following an increase in marginal costs.

This second hypothesis motivates to study the cross-section of firms to help understand the economic drivers of stagflationary stock returns. In particular, we can exploit cross-sectional heterogeneity in firms' market power to ask whether firms with higher market power are expected to suffer lower profitability declines following inflation news, as the theory predicts. Cross-sectional empirical analysis will also allow us to estimate specifications controlling for unobserved and observed time-varying factors affecting average stock returns, and also to further narrow down the cashflow channel of stock returns.

In the results below, we first study the cross-section of stock returns in response to inflation news, before we then turn to investors' casfhflow expectations. We initially extract cashflow expectations from observable discount rates and the return decomposition methodology. We then look at earnings expectations directly.

6.4.1 Stock Returns

We start with stock returns. We split the sample of firms into those that have high and low markups. High markup firms are those that have at any given point in time markups above the 75th percentile of the markup distribution, while those with low markups are those with markups below the 25th percentile of the distribution. We estimate the following equation:

$$\begin{aligned} Return^k_{i,t} =& \alpha + \beta_1 \text{Inflationary News}_t * \text{Low Markup}_{i,y(t)-1} \\ &+ \beta_2 \text{Inflationary News}_t * \text{High Markup}_{i,y(t)-1} + \beta_3 \text{Low Markup}_{i,y(t)-1} + \epsilon_{i,t} \end{aligned} \tag{16}$$

Figure 7 plots β_1 & β_2 for different ks. In the upper panel, which plots β_1, the effect of inflationary news for low markup firms resembles qualitatively Figure 1, but the magnitudes are larger in absolute values. In particular, firms with low markups see their stock prices decline by around 3.8% in five days after a one percentage point inflationary news shock (compared to 1.9 for the average firm), with the 95th % confidence interval ranging between 1.2 and 5.8. In contrast, firms with high markups see their stock prices declining only modestly in response to inflationary news. Five days after the inflationary news shock, stock prices are down only 0.9% with the 95th % confidence interval touching zero. For firms with high markups, we can therefore reject the null hypothesis that inflationary news leads to declines in stock prices after five days.

We test more formally the difference between firms with differential degrees of market power by estimating Equation 14. Figure 8 plots the interaction coefficient between the inflationary news shock and markups. The interaction coefficient tests whether firms with higher markups exhibit differential stock returns around the announcement of inflationary news.

The results for $k <= 0$ help shed light on whether there is a pre-trend in the data. If firms with higher markups already before the CPI announcement had rising stock prices relative to those with lower markups, this would likely lead to a violation of the parallel trend assumption which implies that both types of firms would have experienced the same return dynamic around the event, had the announcement not been an inflationary news shock.

The close-to-zero and statistically insignificant coefficient that does not exhibit a trend before the CPI announcement, suggests that there is no pre-trend in the data. If there was a preexisting trend, it could be more difficult to determine whether the trend in the returns for the high markup group would have been the same as the trend in the returns for the firms with low markup in the absence of inflationary news, which could lead to biased estimates of the treatment effect.

A positive coefficient on the interaction for $k >= 0$ indicates that firms with higher markups earn higher returns after inflationary news. Since markups are standardized with a mean of zero and a standard deviation of one, the coefficient can be interpreted as the differential impact of inflationary news on firms with a one standard deviation higher markup. The coefficient rises from around 0.18 to 0.31 from the day of the event to five days after the event. Hence, a firm with a one standard deviation higher markup has a 0.31 percentage point higher stock price compared to another firm five days after the event in response to a one percentage point inflationary news shock. Note that the average firm suffers a decline of around 1.9% in response to a one percentage point inflationary news shock so that the interaction coefficient is around 16% of the base coefficient. A firm that has one standard deviation higher markup suffers a decline in the stock price of 1.59% (1.9-0.31) in response to a one percentage point inflationary news shock, a difference of 16% (1-1.59/1.9).

The result is also illustrated in Table 2 for $k = 5$. Column (1) displays the regression result without time-fixed effects, which allows us to estimate the coefficient for the inflationary news on its own. Similarly to Figure 1, the inflation surprise coefficient is -1.456 and the main coefficient of interest, the interaction between markups and the inflation surprise is 0.286. Column (2) introduces time fixed effect in the regression equation. The inclusion of time-fixed effects introduces collinearity with the inflation surprise so that the effect of inflationary news cannot be interpreted anymore. However, the advantage of the inclusion of time-fixed effects is that through its inclusion we control for all unobservable and observable time-variant factors that could bias the result that firms with higher markups earn higher returns than their counterparts in response to inflationary news. Through the inclusion of time-fixed effects we control for the average effect of being in a particular time period, and it allows us to make a within-time period comparison. For instance, we can control for any underlying trends in monetary policy, and uncertainty and instead isolate the effect of inflationary news on firms with differential degrees of market power. The coefficient on the interaction between market power and inflationary news remains virtually the same, indicating that time-variant factors that are correlated with the interaction of inflationary news and markup are not driving the results.

Column (3) introduces industry*time fixed effects to not only control for unit-invariant time specific factors, but also for industry-specific time-variation that is both observable and unobservable. While the coefficient shrinks slightly in absolute terms, it is still statistically significant.

Columns (4) and (5) introduce interacted firm-level controls to control for potential confounding firm-level characteristics. In column (4) we first rely on balance sheet characteristics from Compustat, Tobin's Q, log assets, leverage, and tangibility, and in column (5) we use firms' conditional beta to the three Fama French factors that are estimated using lagged rolling 5-year regressions. Through the inclusion of the interacted firm-level characteristics, we control for the heterogeneous impact of inflation across the leverage distribution (Bhamra et al., 2023).

Given that increasing equity risk premium is a driver of negative stock returns in the aggregate, the risk-factor betas are important to rule out a potential explanation of the results that is that firms with lower markups are riskier and therefore load more on increasing equity risk premium in response to inflation news. However, the coefficient on the interaction between inflationary news and markup remains stable with these additional controls, indicating neither alternate firm characteristics nor firm's risk exposures are confounding factors.

In sum, we find strong evidence that inflationary news reduces stock prices for a firm that has a limited degree of market power, but firms with market power are less severely hit and those that have a substantial degree do not suffer from inflationary news. The stark difference suggests that stock market investors see the impact of inflation on future discounted cashflows of high market power firms more benignly than that of firms that do not have market power. These findings can be rationalized in a model in which inflation is seen as a marginal cost shock rather than a demand shock, as shown in Appendix D.

6.4.2 Real Cashflows Component

In subsubsection 6.3.2 we have shown that declining real cashflow news around inflationary news are an important driver of the decline in stock prices. In this section, we test whether real cashflows expectations are also the driver behind the differences in stock returns across firms with differential degree of market power in response to inflation news. Given that changes in discount rate affect the present value of discounted cashflows, differences in the cashflow duration of firms across the market power distribution would mechanically lead to heterogeneous returns in response to discount rate changes that occur with inflation news. This variation in realized returns, which is purely due to discounting, would occur even if there was no change in expected cashflows across firms in the market power distribution.

To extract the cashflow component of variation in the cross-section of stock returns, we therefore follow a similar two-stage strategy as in subsubsection 6.3.2. In the first stage, we estimate the following series of regressions for all $k \in [-5, 10]$ across CPI dates:

$$\widetilde{Return}_{i,t}^{k} = \alpha_i^k + (\Delta_k \widetilde{\mathbf{DCR}}_t' \times Markup_{i,y(t)-1})\Theta^k + \Gamma_{i,t}\Psi^k + \widetilde{\epsilon_{i,t}^k} \tag{17}$$

where $\widetilde{Return}_{i,t}^{k}$ is the real stock return around the CPI release and firm-level markups, $Markup_{i,y(t)-1}$, are interacted with a vector of discount rates, $\widetilde{\mathbf{DCR}}_t = \left[\widetilde{\mathbf{RF}}_t, ERP_t\right]$, that includes real risk-free rates yields across various maturities, $\widetilde{\mathbf{RF}}_t$, and the Martin (2017) equity risk premium, ERP_t. The regression also includes a control vector, $\Gamma_{i,t}$, that includes firm-level markups, $Markup_{i,t}$, the discount rate vector, $\widetilde{\mathbf{DCR}}_t$, other firm-level characteristics, $\mathbf{X}_{i,t}$: log assets, tangibility, leverage, market-to-book value, rolling betas to Fama and French (1993) asset pricing factors market beta, size, and value. The control vector $\Gamma_{i,t}$ additionally includes interactions between discount rates and firm-level characteristics.

As discussed in section 4 for the time-series, by absorbing variation in returns related to changes in discount rates, we can then define the real cashflow component of firm-level stock returns around CPI releases as:

$$\widetilde{\epsilon_{i,t}^{k}} = \widehat{Return}_{i,t}^{k,\widetilde{CF}}$$

and, because Equation 17 does not include the inflation shock itself in the equation, we can now test how this real cashflow component of stock returns respond differentially to inflationary news depending on the degree of market power firms have. To do to so, we estimate in a second stage the following sequence of regressions for all $k \in [-5, 10]$ across CPI dates:

$$\begin{aligned}\widehat{Return}_{i,t}^{k,\widetilde{CF}} =& \alpha + \beta_1 \text{Inflationary News}_t * \text{Low Markup}_{i,y(t)-1} \\ &+ \beta_2 \text{Inflationary News}_t * \text{High Markup}_{i,y(t)-1} + \beta_3 \text{Low Markup}_{i,y(t)-1} + \epsilon_{i,t}\end{aligned} \tag{18}$$

where $\widehat{Return}_{i,t}^{k,\widetilde{CF}}$ is the predicted real cashflow component of the k-day stocks returns. High markup firms are those firms that have at any given point in time markups above the 75th percentile of the markup distribution while those with low markups are those with markups below the 25th percentile of the distribution.

Note that firms across the leverage (Ottonello and Winberry, 2020), markup (Duval et al., 2021; Liu et al., 2022; Duval et al., 2023), or tangibility (Döttling and Ratnovski, 2023) distribution may exhibit differential sensitivity with respect to changes in the interest rate relative to their counterparts. The differential response of firm returns to inflation shocks may therefore be mediated through an increase in nominal interest rates (see Figure 2), potentially due to changes in monetary policy expectations, rather than real cashflow expectations directly related to the effect of inflation. It is therefore important that the interaction of firm-level markups (and other firm characteristics) with discount rates in Equation 17 controls not only for the differential impact of changes in discount rates on firm returns through a cashflow discounting channel, but also controls for the potentially differential impact of changes in discount rates on firm returns due to different sensitivities of firm cashflows themselves to the interest rate environment. The response of $\widehat{Return}_{i,t}^{k,\widetilde{CF}}$ to inflation news estimated in Equation 18 should therefore be interpreted as the component of stock returns that are due to changing investor expectations of future real cashflows that, importantly, are *not* changes in cashflow expectations that are due to changes in the interest rate environment that comes with inflation news.

Figure 9 plots β_1 & β_2 for different ks. The left panel plots β_1 the effect of inflationary news on the predicted real cashflow component of stock returns for high markup firms. The coefficient is negative but not statistically significant for most of the horizon, indicating that investors do not expect real flows to decline with inflationary news for firms that do have market power. This result is consistent with the main model prediction that that investors expect firms with market power to see nominal revenue decline less with inflation for firms with high market power if the inflation shock is considered a cost shock. In contrast, for firms with a small degree of market power, investors expect real cashflows to decline significantly (right panel). With higher inflation, firms without market power see a stronger decline in profits

These results confirm the hypothesis that the differential stock price response for firms across the market power distribution is to a large part driven by cashflow expectations directly in response to higher inflation, rather than through differential effects of changes in discount rates, as predicted in Appendix D.

6.4.3 Earnings Expectations

Given we find a real cashflow channel for the response of equity prices to inflation news, a natural question is whether we observe a change in investors expectations of company earnings. To tackle this question, we obtain changes in firm-level earnings expectations ($\Delta EarningsExpectation_{i,t}$) around CPI news, as described in subsection 3.5. This variable allows us to test whether higher inflation surprises are associated with different changes in earnings expectations across firms. To do so we estimate the following empirical specification that is equivalent to Equation 14 but replaces the firm-level return with the change in the firm-level earnings expectations on the left-hand side:

$$\Delta EarningsExpectation_{i,t} = \alpha + \beta_1 \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t} \quad (19)$$

where, as previously, Inflationary News$_t$ is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. Markup$_{i,y(t)-1}$ is the estimated markup from De Loecker et al. (2020) and standardized to have mean zero and a standard deviation of one. α_i is a firm fixed effect. α_t is a date fixed effect. $\mathbf{X}$ are controls and fixed effects, depending on the specification.

Table 3 show the results. In column (1) the coefficient on inflationary news shows the effect of the average firm, as markups are demeaned and standardized. Counter to the idea that nominal earnings should increase with higher than expected inflation, we do not find evidence for the hypothesis that nominal earnings move higher with inflation. Instead, if anything, nominal earnings are expected to fall instead of increase after inflationary news, see also Figure 10. This result suggests that also earnings analysts do not see the inflationary surprise as a shock to demand, but rather a supply shock, which reduces earnings. The interaction coefficient between inflationary news and market power is positive and statistically significant, indicating that firms with market power are expected to lose fewer earnings than their counterparts. This result is consistent with the previous evidence that firms with market power earn higher stock returns, due to higher expected earnings by the marginal stock market investor.

Columns (2)-(4) confirm the result when time fixed effects and other firm-level controls are included in the regression specification. Despite a substantial increase in the R-squared, the coefficient estimate remains relatively stable, suggesting that market power, and not other firm characteristics that are in the control vector, are responsible for the differential response in earnings expectations around inflationary surprises.

Figure 11 further illustrates the cross-sectional results. We split firms into those that have market power defined as a dummy being one if the firm is in the 75th percentile of the distribution of markups and zero otherwise, and we estimate the relationship between inflationary news and the change in earnings expectations separately for the two samples of firms. For firms without market power higher inflationary news, as shown on the x-axis, are associated with lower earnings expectations, while for firms with market power, higher inflationary news are associated with higher earnings expectations.

7 Conclusion

In this paper, we have studied the inflation implication across firms. As identifying the causal impact of inflation on firms' performance is difficult through aggregate, lower frequency data, we have analyzed firms' performance through the lens of their high-frequency stock price reaction to surprises in inflation. We have shown that inflation is expected to decrease firms' real cashflows, consistent with interpreting inflation as stagflationary. These findings can be rationalized in a model in which inflation is seen as a shock to marginal costs, instead of a demand shock. Another main prediction from this model is that market power shields firms' earnings decline. When exploiting heterogeneity across firms, we have indeed found consistent evidence that stock prices, driven by differential earnings expectations, decline less for firms with more market power.

Overall, these results indicate that investors consider inflation bad news for the economy. Assuming investors are rational, and the lower real cashflows for firms are accurate, one may want to conclude that surprise inflation does not only lead to stagflationary stock returns but also to stagflation in the macroeconomy.

In fact, our approach has several advantages from an identification perspective to potentially draw this conclusion. As we study financial market outcomes around CPI release, defined as the difference between the CPI data release and consensus expectation, we can more directly point to inflation as the cause of the movement compared to studying stock returns in response to realized inflation or from a VAR. The availability of high-frequency financial market data then allows us to measure the response at the high frequency, compared to outcomes only available at lower frequencies. As market prices are forward-looking and therefore respond quicker as they incorporate expected future economic outcomes that would not appear in contemporaneous balance sheet measures. Studying actual firm-level outcomes is further complicated as it requires inflation surprises to be aggregated, inducing inconsistent estimates of aggregate impulse responses due to an aggregation bias (Ramey, 2016; Anderson and Cesa-Bianchi, 2023; Rodnyansky et al., 2023).

However, drawing implications from the movement in cashflow *expectations* for the actual implications of inflation should be done with extreme caution. While stock returns may have real effects themselves (Bond et al., 2012), investors expectations may contain systematic errors and their expectations are not in line with realized future economic outcomes (Bordalo et al., 2023).

Hence, our results raise important further questions, which we leave for further research. Is investors' perception that inflation surprises are stagflationary accurate? Or does Wall Street have a biased "stagflationary" view of the world, as they incorrectly interpret inflation surprises as supply shocks that drive up marginal costs? Does higher inflation lead to an increasing market share of firms with already high market power, potentially leading to higher prices in aggregate? What are the implications of monetary policy if an initial increase in inflation leads to more inflation due to an aggregate increase in market power?

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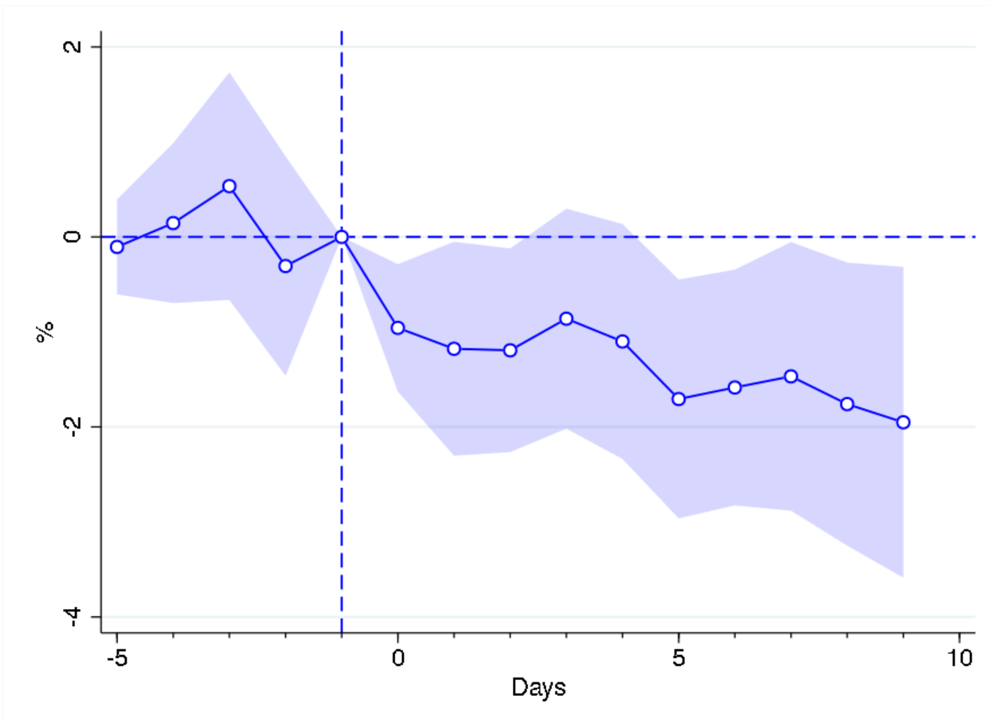
Figures

Figure 1: Stock Returns around Inflation Surprises

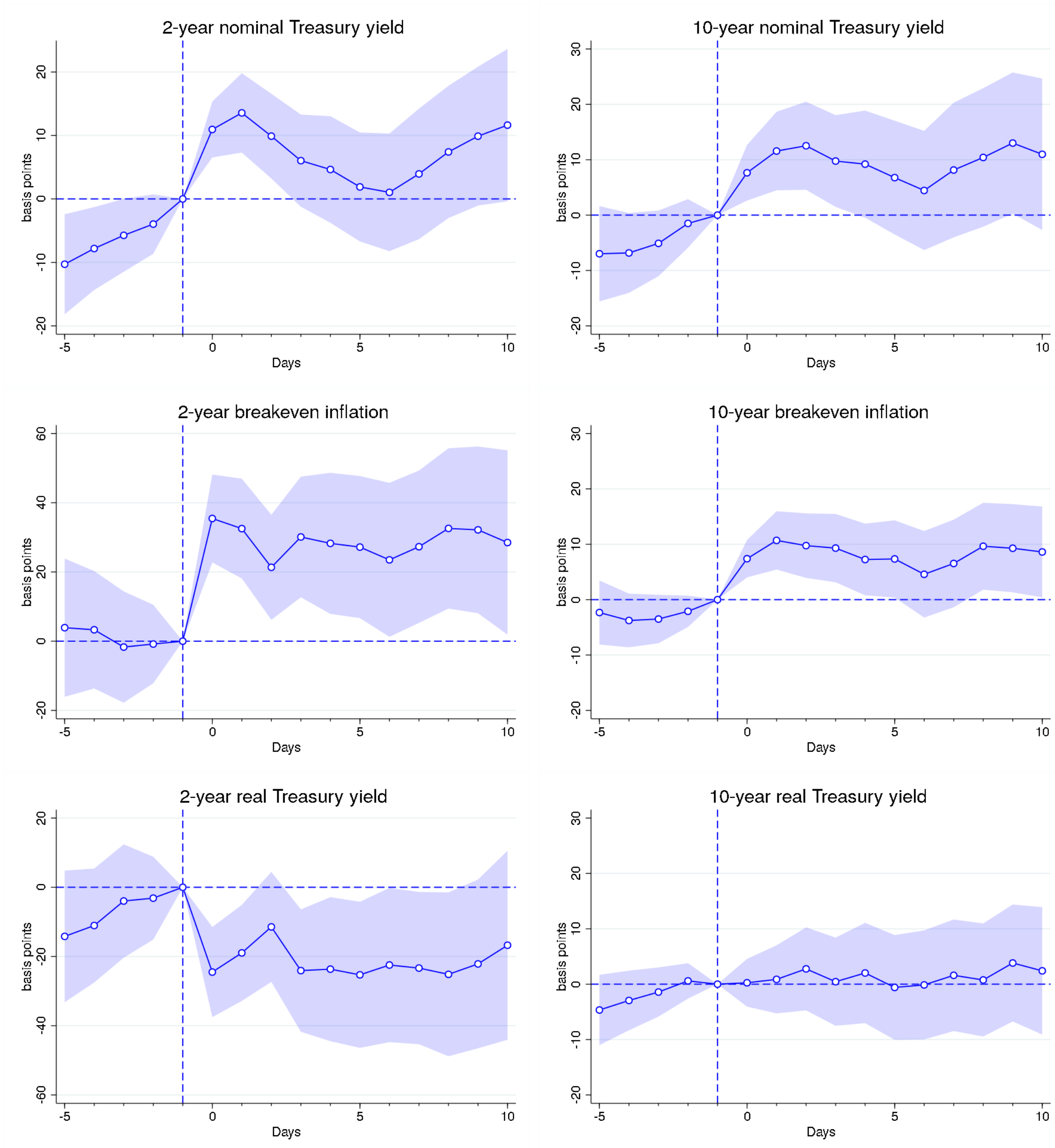


This figure plots the estimated coefficient of Equation 13:

$$y_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

where y_t^k is the cumulative return between the day before the CPI announcement on date t and k days after. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. Standard errors are clustered at the date level. All figures are based on the sample period 1977-2022. The shaded area reflects the 90% confidence interval.

Figure 2: The Yield Curve and Inflation Surprises

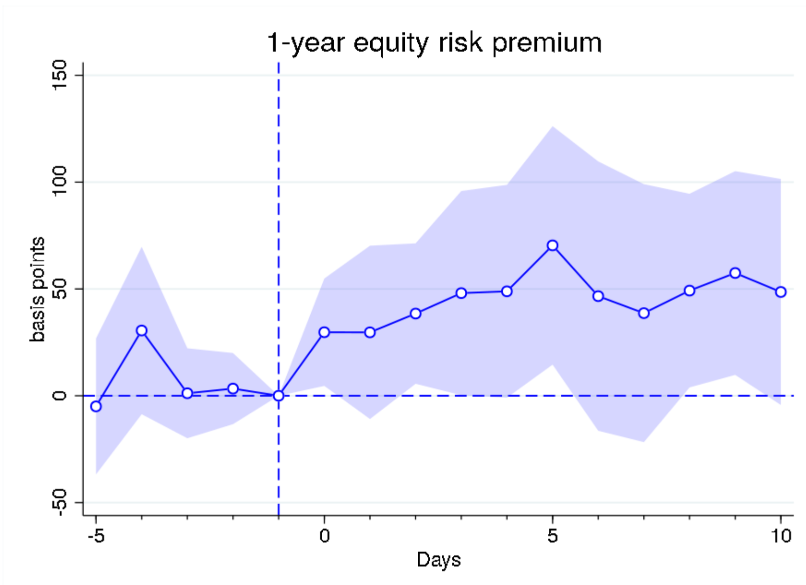


This figure plots the estimated coefficient of Equation 13:

$$y_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

where y_t^k is the change in nominal yields, real yields, and breakeven inflation from the day before the CPI announcement on date t to k days after after the announcement. Inflationary News$_t$ is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. The left column shows changes in the 2-year nominal Treasury yield, the 2-year breakeven inflation rate, and the 2-year real Treasury yield through rows 1 to 3 respectively. The right column shows changes in the 10-year nominal Treasury yield, the 10-year breakeven inflation rate, and the 10-year real Treasury yield through rows 1 to 3 respectively. Data for the real yield curve is taken from Gürkaynak et al. (2010b). All figures are based on the sample period 1999-2022. The shaded area reflects the 90% confidence interval.

Figure 3: Equity Risk Premium and Inflation Surprises

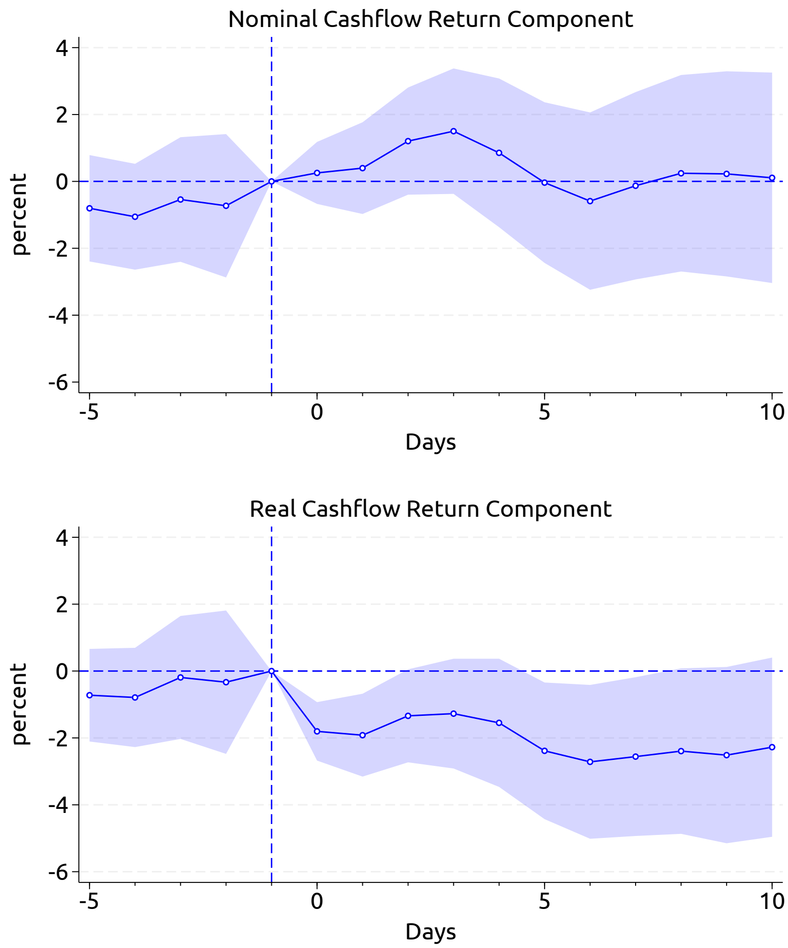


This figure plots the estimated coefficient of Equation 13:

$$y_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

where $y_t^k = erp_{t+k} - erp_{t-1}$ is the change in the Martin (2017) lower bound of the 1-year equity risk premium from the day before the CPI announcement on date t to k days after after the announcement, and Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. The estimation period is 1999-2022. The shaded area reflects the 90% confidence interval.

Figure 4: Cashflow Component of Stock Returns and Inflation Surprises

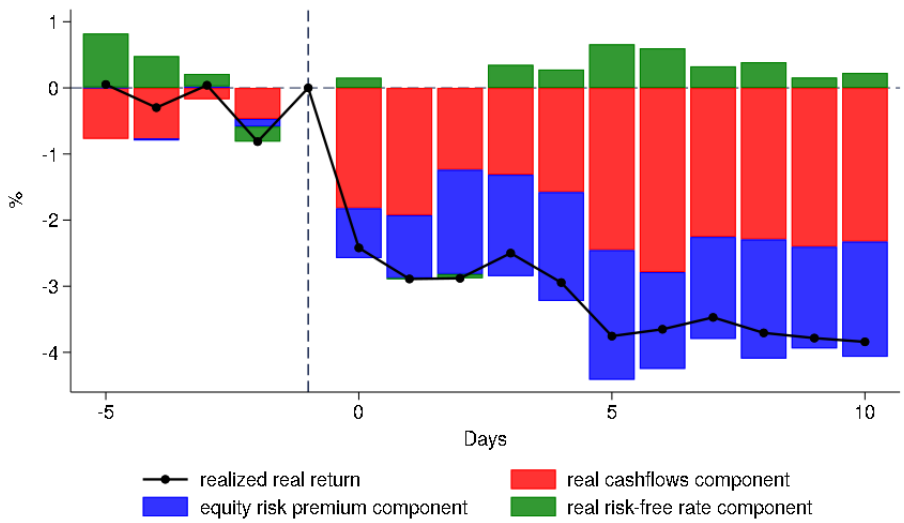


These figure plots the estimated coefficient of Equation 13:

$$y_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

where y_t^k is the nominal and real cashflow return component, as defined in section 4. from the day before the CPI announcement on date t to k days after after the announcement, and Inflationary News$_t$ is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. The estimation period is 1999-2022. The shaded area reflects the 90% confidence interval.

Figure 5: Decomposition of Real Stock Returns around Inflation Surprises

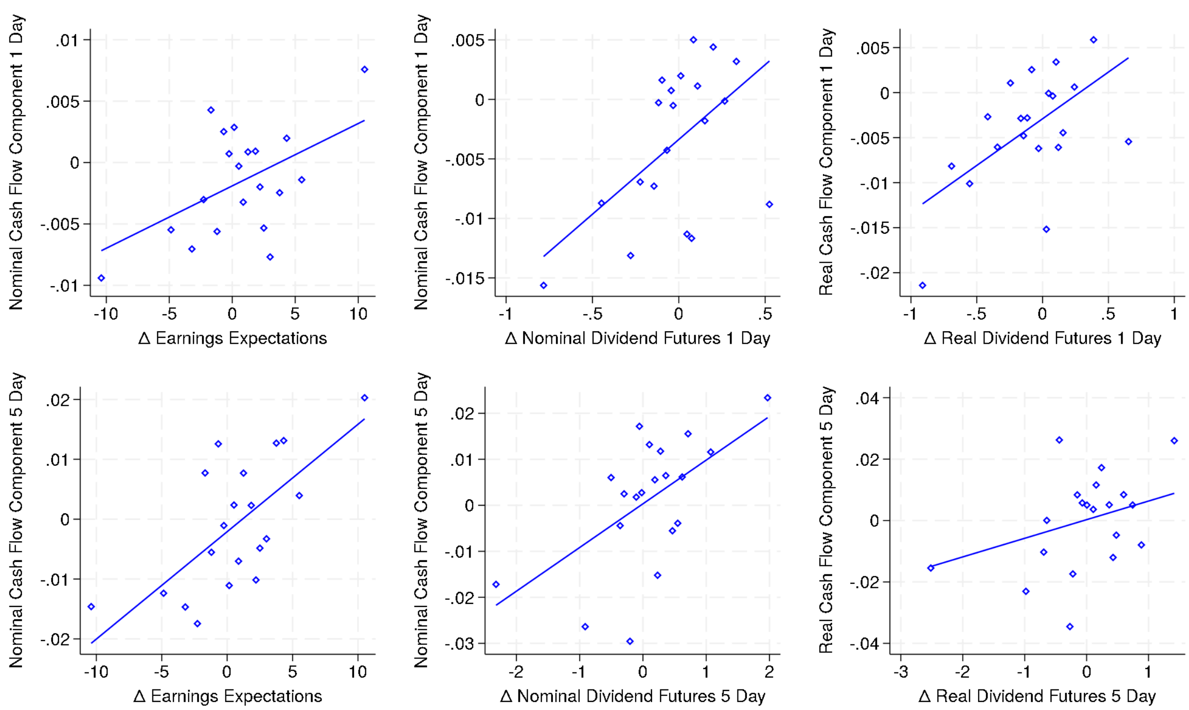


This figure stacks the estimated coefficient of Equation 13:

$$y_t^{k,c} = \alpha^{k,c} + \beta^{k,c}\text{Inflationary News}_t + \epsilon_t^{k,c}$$

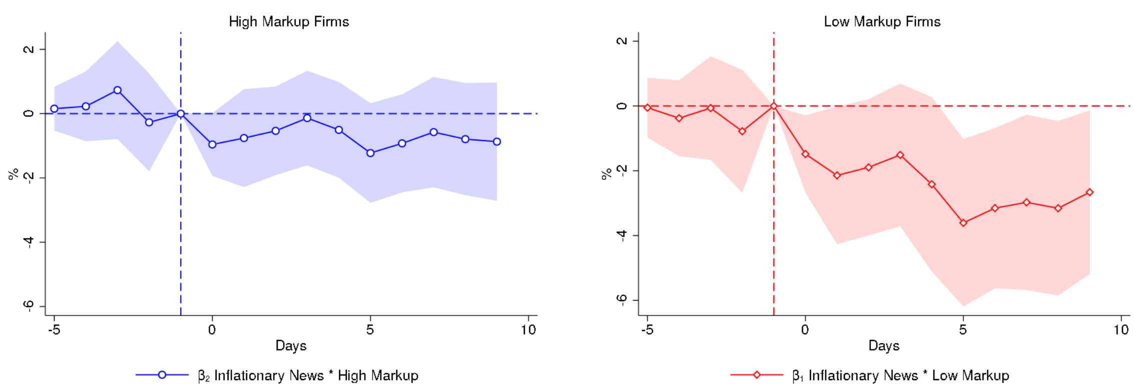
where $y_t^{k,c}$ is the predicted $c = \{\widetilde{CF}, ERP, \widetilde{RF}\}$ component of the cumulative real return between the day before the CPI announcement on date t and k days after. The return components are the returns generated from changes in real cashflow expectations, $\widetilde{CF}$, changes in equity risk premium, ERP, and changes in real risk-free rates, $\widetilde{RF}$. The black line in the figure plots the coefficients of real realized return regressed on inflation news for $k = -5$ through to $k = 10$, which is by definition the sum of the stacked coefficients on the return components. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. The estimation period is 1999-2022.

Figure 6: Validation of Cash Flow Component



This figure combines binscatterplots between the 1 (5) day extracted cash flow component of stock returns, as defined in section 4, on the y-axis on the upper (lower) panel against alternative measure of cash flow expectations In the we plot nominal extracted earnings expectations against $\Delta Earnings\ Expectation_t$ (left panel) and $\Delta_k ln(Div.Futures_t^2)$ (middle panel) on the x-axis. The right panel plots the real cash flow component of stock returns and real dividend futures on the x-axis. $\Delta Earnings\ Expectation_t$ is the (asset) weighted average change in earnings expectations around CPI dates, as defined in subsubsection 6.4.3. $\Delta_k ln(Div.Futures_t^2)$ are risk premium adjusted log changes in the 2 year ahead dividend future price over period k, as defined in subsection 3.2.

Figure 7: Stock Returns around Inflationary News by Market Power

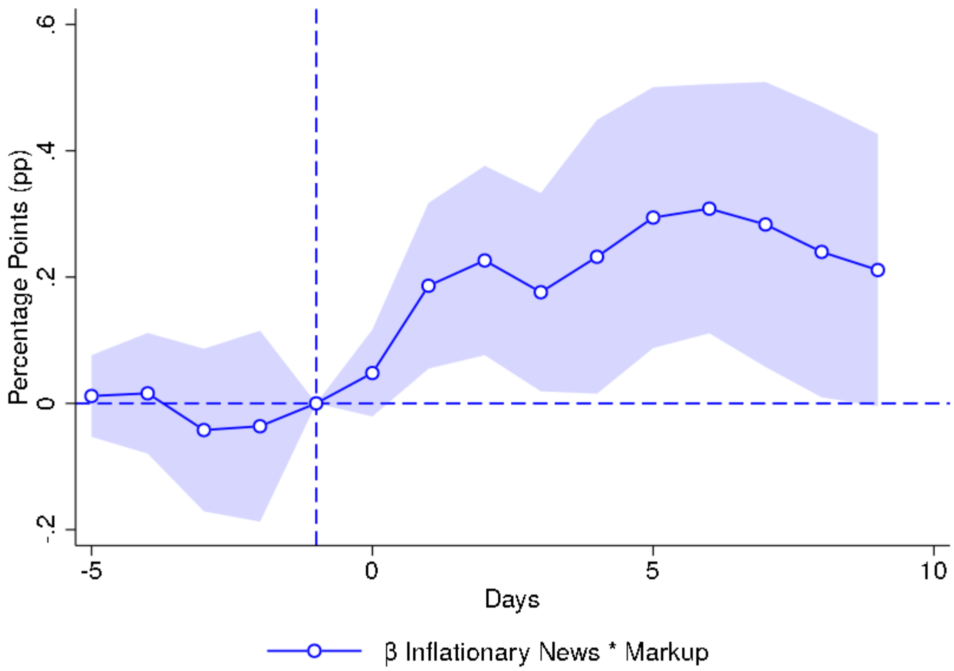


This figure plots the estimated coefficient of Equation 16:

$$
\begin{aligned}
Return^k_{i,t} =& \alpha + \beta_1 \text{Inflationary News}_t * \text{Low Markup}_{i,y(t)-1} \\
& + \beta_2 \text{Inflationary News}_t * \text{High Markup}_{i,y(t)-1} + \beta_3 \text{Low Markup}_{i,y(t)-1} + \epsilon_{i,t}
\end{aligned}
$$

where $Return^k_{i,t}$ is the cumulative return between the day before the CPI announcement on date t and k days after for stock i. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. High $\text{Markup}_{i,y(t)-1}$ is a dummy that is equal to one if the firm has a markup above the 75th% percentile of the distribution and zero otherwise. Low $\text{Markup}_{i,y(t)-1}$ is a dummy that is equal to one if the firm has a markup below the 25th% percentile of the distribution and zero otherwise. Markup is defined as the estimated markup from De Loecker et al. (2020). Standard errors are double clustered at the firm and date level. The shaded area reflects the 90% confidence interval.

Figure 8: The Role of Market Power for Stock Returns around Inflationary News

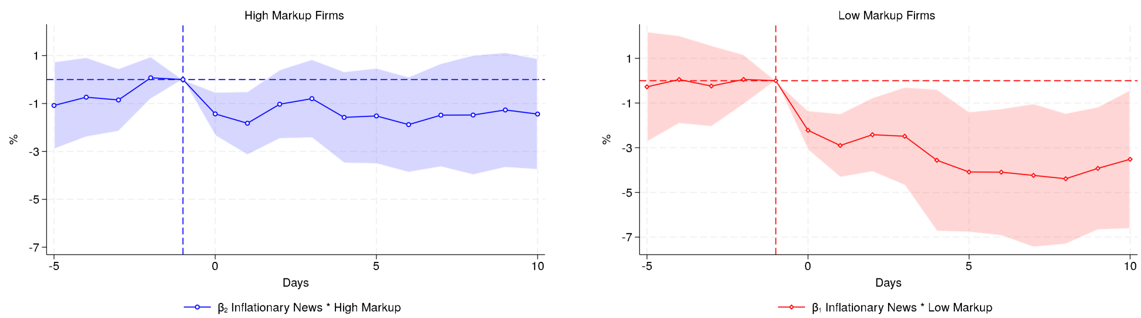


This figure plots the estimated coefficient of Equation 14:

$$Return_{i,t}^{k} = \alpha + \beta_1 \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}$$

where $Return_{i,t}^{k}$ is the cumulative return between the day before the CPI announcement on date t and k days after for stock i. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. $\text{Markup}_{i,y(t)-1}$ is the estimated markup from De Loecker et al. (2020) and standardized to have mean zero and a standard deviation of one. α_i is a firm fixed effect. α_t is a date fixed effect. $\mathbf{X}$ are controls. Low $\text{Markup}_{i,y(t)-1}$ is a dummy that is equal to one if the firm has a markup below the 25th% percentile of the distribution and zero otherwise. Standard errors are double clustered at the firm and date level. The shaded area reflects the 90% confidence interval.

Figure 9: Real Estimated Cash Flows around Inflationary News by Market Power

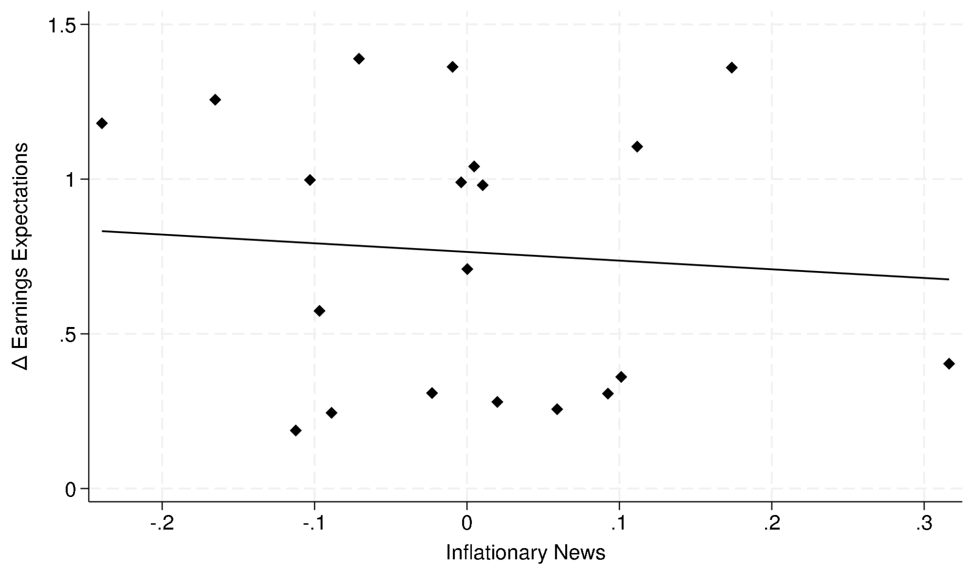


This figure plots the estimated coefficient of Equation 18:

$$\widehat{Return}_{i,t}^{k,\widetilde{CF}} = \alpha + \beta_1 \text{Inflationary News}_t * \text{Low Markup}_{i,y(t)-1} + \beta_2 \text{Inflationary News}_t * \text{High Markup}_{i,y(t)-1} + \beta_3 \text{Low Markup}_{i,y(t)-1} + \epsilon_{i,t}$$

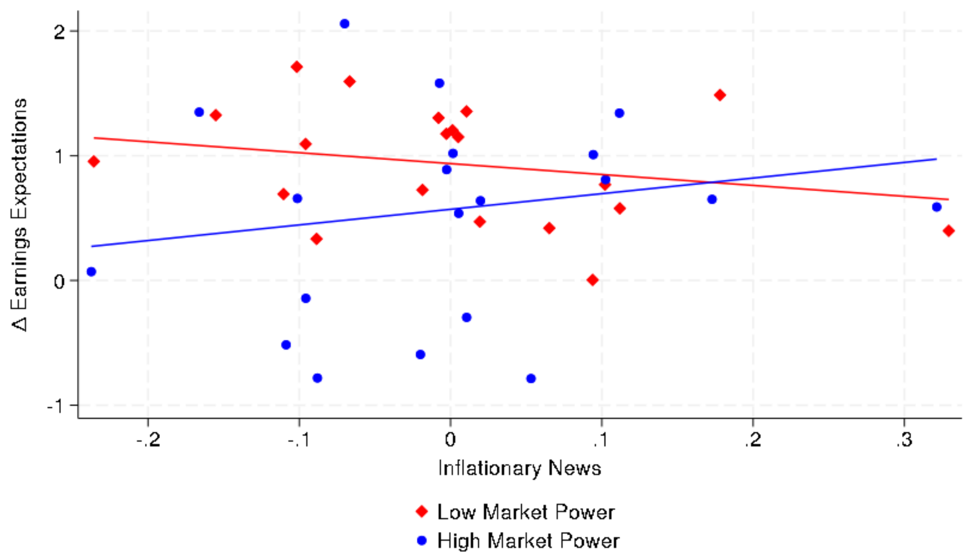
where $\widehat{Return}_{i,t}^{k,\widetilde{CF}}$ is the estimated real cash flow component of stock returns between the day before the CPI announcement on date t and k days after for stock i. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. High $\text{Markup}_{i,y(t)-1}$ is a dummy that is equal to one if the firm has a markup above the 75th% percentile of the distribution and zero otherwise. Low $\text{Markup}_{i,y(t)-1}$ is a dummy that is equal to one if the firm has a markup below the 25th% percentile of the distribution and zero otherwise. Markup is defined as the estimated markup from De Loecker et al. (2020). Standard errors are double clustered at the firm and date level. The shaded area reflects the 90% confidence interval.

Figure 10: Inflationary News and Earnings Expectations



This figure is a binscatterplot between $\Delta \textit{Earnings Expectation}_{i,t}$ on the y-axis and the Inflationary News_t on the x-axis. $\Delta \textit{Earnings Expectation}_{i,t}$ is the log change in earnings expectations between 15 days after and before the CPI release. The black line plots the linear fit across all firms. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement.

Figure 11: Inflationary News, Earnings Expectations, and Market Power



This figure is a binscatterplot between $\Delta Earnings\ Expectation_{i,t}$ on the y-axis and the Inflationary News_t on the x-axis. $\Delta Earnings\ Expectation_{i,t}$ is the log change in earnings expectations between 15 days after and before the CPI release. The blue line plots the linear fit for firms at the top 25th percentile of markups. The red line plots the linear fit for firms below the top 25th percentile of markups. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement.

Tables

Table 1: Stock Return Decomposition around Inflation Surprises

Panel A: Nominal return decomposition

	1-day decomposition				5-day decomposition			
	return	yield curve	erp	cashflow	return	yield curve	erp	cashflow
Inflationary News	-1.42**	-0.61	-1.03**	0.23	-2.75*	-0.45	-2.17**	-0.14
	(0.58)	(0.40)	(0.48)	(0.58)	(1.42)	(0.91)	(0.91)	(1.46)
R-squared	0.021	0.008	0.016	0.001	0.013	0.001	0.020	0.000
N	283	283	283	283	283	283	283	283

Panel B: Real return decomposition

	1-day decomposition				5-day decomposition			
	return	yield curve	erp	cashflow	return	yield curve	erp	cashflow
Inflationary News	-2.42***	0.15	-0.75**	-1.82***	-3.75***	0.66	-1.96**	-2.45**
	(0.58)	(0.37)	(0.35)	(0.54)	(1.42)	(0.80)	(0.82)	(1.24)
R-squared	0.059	0.001	0.016	0.039	0.024	0.002	0.020	0.014
N	283	283	283	283	283	283	283	283

The table presents the coefficients from:

$$Return_t^k = \alpha^k + \beta_r^k \text{Inflationary News}_t + \epsilon_{t,r}^k$$

and also presents the coefficients across $c = \{\text{yield curve, equity risk premium, cashflow}\}$

$$Return_t^{k,c} = \alpha^{k,c} + \beta_c^{k,c} \text{Inflationary News}_t + \epsilon_{i,t}^{k,c}$$

where $Return_t^k = \sum_{c=1}^{3} Return_t^{k,c}$ is the k-day cumulative return on the stock market and is the sum of three return components: the k-day cumulative yield curve return component, the k-day cumulative equity risk premium return component, and the k-day cumulative cashflow return component. Panel A decomposes nominal realized returns into a nominal yield curve return component, an equity risk premium component and a nominal cashflow return component. Panel B decomposes real realized returns into a real yield curve return component, an equity risk premium component and a real cashflow return component. Each panel shows coefficient estimates on $k = 1$ and $k = 5$ cumulative returns. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. Robust standard errors are in parenthesis.

Table 2: Inflationary News, Market Power, and Stock Returns

	Dependent Variable: $Returns^5_{i,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Inflationary News	-1.446					
	(1.006)					
Markup	0.00479	0.00805	-0.00564	0.00326	-0.00495	0.00335
	(0.0159)	(0.0158)	(0.0103)	(0.0104)	(0.0103)	(0.0104)
Inflationary News × Markup	0.286**	0.294**	0.185**	0.192**	0.191**	0.192**
	(0.121)	(0.125)	(0.0889)	(0.0806)	(0.0881)	(0.0801)
R-squared	0.015	0.130	0.158	0.158	0.158	0.159
N	1,947,431	1,947,429	1,943,129	1,894,237	1,920,435	1,883,037
Firm FE	✓	✓	✓	✓	✓	✓
Time FE		✓	-	-	-	-
Industry-Time FE			✓	✓	✓	✓
Firm Characteristics Controls				✓		✓
Factor Exposure Controls					✓	✓

This table shows results from Equation 14:

$$Return^5_{i,t} = \alpha + \beta_1 \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}$$

where $Return^5_{i,t}$ is the cumulative stock returns calculated from day t-1, before CPI release, to day t+5, after the CPI release. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. $\text{Markup}_{i,y(t)-1}$ is the estimated markup from De Loecker et al. (2020) and standardized to have mean zero and a standard deviation of one. α_i is a firm fixed effect. α_t is a date fixed effect. $\mathbf{X}$ are controls. *Int. Firm Controls* includes firm characteristics controls: log assets, tangibility, leverage, and market-to- book value, interacted with Inflationary News. *Int. Factor Controls* includes firm-level rolling-betas to the Fama and French (1993) asset pricing factors: market beta, size, and value, each interacted with Inflationary News. Standard errors (in parentheses) are double clustered at the firm and date level.

Table 3: Inflationary News, Market Power, and Earnings Expectations

	Dependent Variable: $\Delta EarningsExpectation_{i,t}$			
	(1)	(2)	(3)	(4)
Inflationary News	-0.313	-0.330		
	(0.828)	(0.834)		
Markup	0.019	-0.108	-0.075	-0.054
	(0.052)	(0.096)	(0.096)	(0.099)
Inflationary News × Markup	0.842*	0.910*	1.140**	1.182**
	(0.471)	(0.475)	(0.480)	(0.489)
R-squared	0.000	0.026	0.054	0.054
N	44,627	44,603	44,602	42,898
Firm FE		✓	✓	✓
Time FE			✓	✓
Int. Firm Controls				✓

This table shows results from Equation 19:

$$\Delta EarningsExpectation_{i,t} = \alpha + \beta_1 \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}$$

where $\Delta EarningsExpectation_{i,t}$ is the log difference in earnings expectations for firm between the 15 days after and the 15 days before the CPI announcement at date t. Inflationary News$_t$ is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. Markup$_{i,y(t)-1}$ is the estimated markup from De Loecker et al. (2020) and standardized to have mean zero and a standard deviation of one. α_i is a firm fixed effect. α_t is a date fixed effect. $\mathbf{X}$ are controls. *Int. Firm Controls* includes firm characteristics controls: log assets, tangibility, leverage, and market-to- book value, interacted with Inflationary News. Standard errors (in parentheses) are double clustered at the firm and date level.

Appendix to "Stagflationary Stock Returns"

This Appendix provides additional descriptive and empirical evidence to supplement the analyses provided in the main text. It is also provides a simple model that motivates the cross sectional empirical analysis. Below, we list the content.

1. Table A1 reports summary statistics of the variables used in the main empirical analysis.
2. Table A2 reports summary statistics for earnings expectations.
3. Table A3 reports the response of interest rate swaps and inflation swaps to inflation news.
4. Table A4 reports the interaction between inflation expectations and stock returns in response to inflation news.
5. Figure A1 reports the timeseries of measured inflation news and daily stock returns.
6. Figure A2 presented binscatterplots of stock returns with inflation news.
7. Figure A3 reports the response of forward nominal yields to inflation news.
8. Appendix A studies how the response of the stock market to inflation news depends on measures supply or demand driven shocks.
9. Appendix B studies the interaction of long-dated interest rates with short-dated nominal rates around inflation news using the empirical setting of Hanson and Stein (2015).
10. Appendix C reports the response of dividend futures to inflation news.
11. Appendix D presents a simple model with imperfect competition and studies the impact of changing marginal costs for firm profitability in this setting.

Table A1: Summary Statistics

Panel A: Cross section variables

	N	Mean	SD	p10	p25	p50	p75	p90
1-day stock return (perc.)	1,979,624	0.04	4.89	-3.71	-1.45	0.00	1.35	3.70
5-day stock return (perc.)	1,979,487	0.34	9.91	-8.33	-3.42	0.07	3.59	8.79
Markup	1,979,738	1.77	1.81	0.92	1.06	1.30	1.82	2.89
Size: ln(assets)	1,979,637	5.66	2.35	2.64	3.94	5.60	7.27	8.75
Book-to-market ratio	1,953,731	0.66	3.18	0.13	0.28	0.53	0.88	1.37
Leverage	1,971,299	0.22	0.25	0.00	0.04	0.17	0.35	0.51
Asset tangibility	1,963,400	0.24	0.24	0.01	0.05	0.16	0.37	0.65
Stock market beta	1,968,316	0.99	7.95	0.08	0.50	0.95	1.44	2.06
HML risk factor beta	1,962,378	0.83	4.30	-0.43	0.11	0.67	1.41	2.38
SMB risk factor beta	1,955,720	0.18	5.75	-1.46	-0.48	0.24	0.89	1.67

Panel B: Time series variables (percentages)

	N	Mean	SD	p10	p25	p50	p75	p90
Inflation surprises	529	-0.00	0.14	-0.20	-0.10	0.00	0.10	0.20
1-day return (CRSP equal-weighted portfolio)	529	0.06	1.12	-1.06	-0.43	0.11	0.57	1.15
1-year equity risk premium (lower bound)	432	4.03	2.06	2.17	2.67	3.57	4.86	6.17
2-year nominal Treasury yield	529	4.91	3.74	0.39	1.51	4.73	7.48	10.08
10-year nominal Treasury yield	529	5.99	3.24	2.02	3.10	5.58	8.25	10.73
2-year real Treasury yield	279	0.32	1.68	-1.53	-0.84	0.05	1.26	3.03
10-year real Treasury yield	279	1.36	1.39	-0.56	0.36	1.17	2.30	3.46
2-year Treasury breakeven inflation	279	1.77	0.98	0.90	1.41	1.78	2.32	2.75
10-year Treasury breakeven inflation	279	2.12	0.42	1.57	1.85	2.20	2.44	2.61

This table presents summary statistics of the variables used in the empirical analysis. Panel A shows panel variables that are available in the cross section of firms and Panel B shows time series variables. The full sample is 1977-2022 with 12 observations per calendar year that correspond to the monthly Consumer Price Index (CPI) releases as published by the Bureau of Labor Statistics. Inflation surprises are measured as the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. For full information on data sources and variable construction refer to section 3.

Table A2: Summary Statistics Earnings Expectations

	N	Mean	SD	p10	p25	p50	p75	p90
# Analysts for Firm before News	381	3.39	1.78	1.57	2.04	3.03	4.02	6.15
# Analysts for Firm after News	381	3.50	2.56	1.48	1.87	2.40	3.96	8.10
# Analysts total after News	381	711.15	861.02	100	190	344	668	2177
# Analysts total before News	381	586.67	485.98	113	234	417	849	1337
$\Delta AverageEarningsExpectation$	381	0.31	4.36	-4.08	-1.80	0.13	2.62	4.85

This table presents summary statistics for the earnings expectations analysis.

Table A3: The Yield Curve and Inflation Surprises (evidence from swap rates)

	2-year maturity			10-year maturity		
	nominal	inflation	real	nominal	inflation	real
Inflationary News	0.13***	0.27***	-0.14**	0.10**	0.09***	0.01
	(0.04)	(0.05)	(0.07)	(0.04)	(0.03)	(0.05)
R-squared	0.071	0.176	0.040	0.039	0.074	0.000
N	220	220	220	220	220	220

This table shows coefficient estimates from regression Equation 13:

$$y_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

where $y_t^k = y_t^k - y_{t-1}^k$ is the k-day change in the 2-year or 10-year yield from the day before the CPI announcement on date t. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. The table shows results for 2-year and 10-year yields on interest rate swaps (nominal), inflation swap rates (inflation), and the swap-implied real yield (the interest rate swap yield minus the inflation swap yield). Swap data is taken from Bloomberg and the sample period is 2004-2022. Robust standard errors are in parenthesis.

Table A4: Stock Returns, Inflationary Expectations and Inflation news

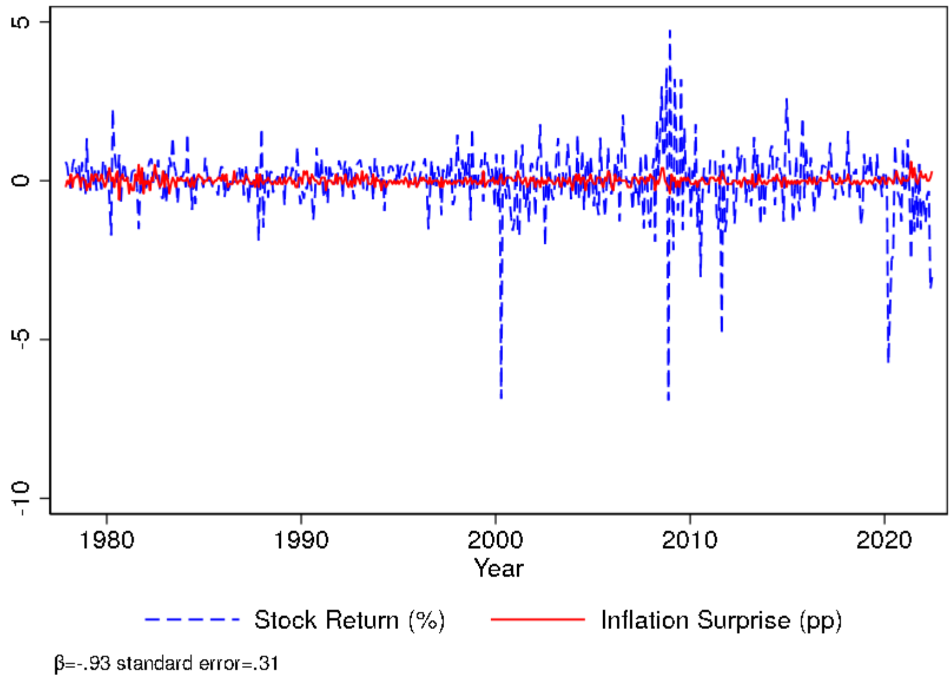
	(1) Infation Expectations	(2) SP500 return	(3) SP500 return	(4) SP500 return
Inflation News	0.074***	-0.014*		
	(0.025)	(0.008)		
Infation Expectations			0.070**	
			(0.029)	
Infation Expectations (Predicted)				-0.193
				(0.150)
Constant	-0.000	-0.000	-0.000	-0.000
	(0.003)	(0.001)	(0.001)	(0.001)
R-squared	0.041	0.017	0.058	.
First-stage F-statistic				8.653
N	285	285	285	285

This table shows results from Equation 14:

$$Return^5_{i,t} = \alpha + \beta_1 \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}$$

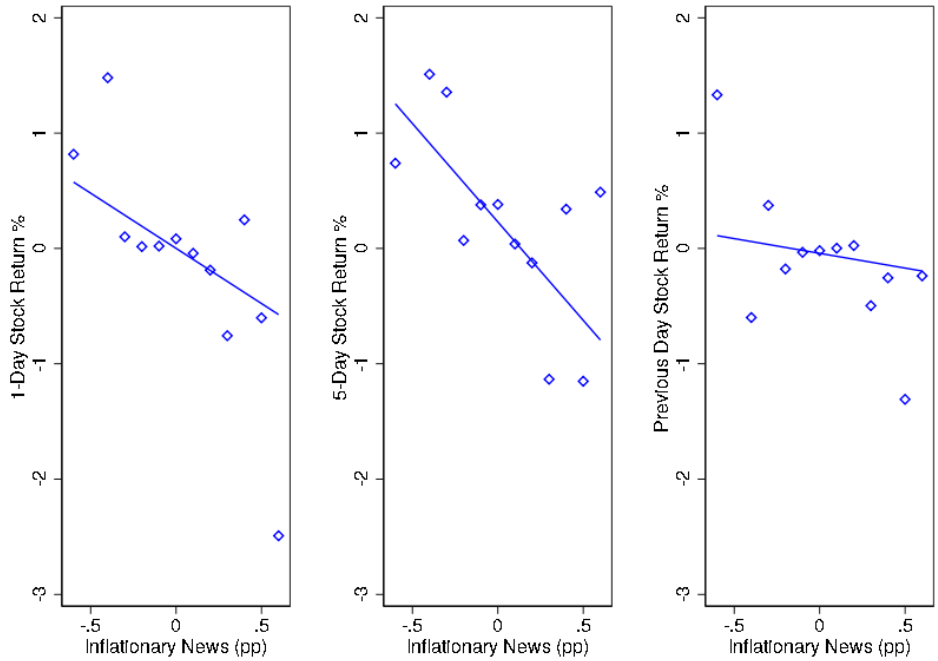
where $Return^5_{i,t}$ is the cumulative stock returns calculated from day t-1, before CPI release, to day t+5, after the CPI release. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. $\text{Markup}_{i,y(t)-1}$ is the estimated markup from De Loecker et al. (2020) and standardized to have mean zero and a standard deviation of one. α_i is a firm fixed effect. α_t is a date fixed effect. $\mathbf{X}$ are controls. *Int. Firm Controls* includes firm characteristics controls: log assets, tangibility, leverage, and market-to- book value, interacted with Inflationary News. *Int. Factor Controls* includes firm-level rolling-betas to the Fama and French (1993) asset pricing factors: market beta, size, and value, each interacted with Inflationary News. Standard errors (in parentheses) are double clustered at the firm and date level.

Figure A1: Inflationary News and Stock Returns



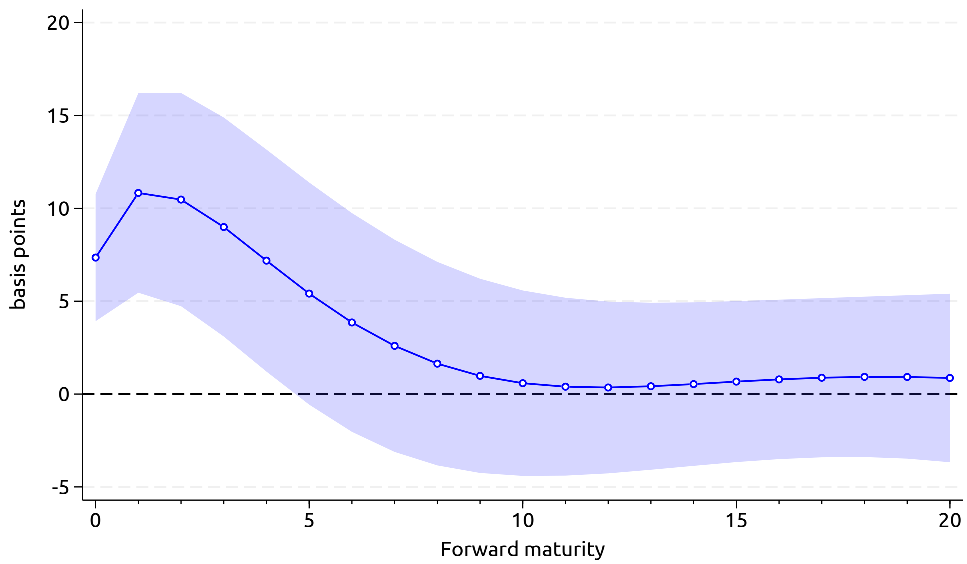
This figure plots the inflationary news as defined section 3 in solid red and the stock return at the day of the CPI announcement in dashed blue. β reports the coefficient of the univariate regression of the stock returns on the inflation surprise and *standard error* reports the standard error of the coefficient.

Figure A2: Inflationary news coefficient for different return horizons



This figure combines binscatterplot between $Return^0_{i,t}$ (left panel), $Return^5_{i,t}$ (middle panel), and $Return^{-1}_{i,t}$ (right panel) on the y-axis and the Inflationary News$_t$ on the x-axis. $Return^k_{i,t}$ is the cumulative return between the day before the CPI announcement on date t and k days after for stock i. Inflationary News$_t$ is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement.

Figure A3: Forward Nominal Yields and Inflation Surprises



This figure plots the estimated coefficient of the regression specification:

$$\Delta f_t^{(j)} = \alpha^j + \beta^j \text{Inflation News}_t + \epsilon_t^j$$

where $\Delta f_t^{(j)} = f_t^{(j)} - f_{t-1}^{(j)}$ is the 1-day change in the j-year forward 1-year nominal yield. The x-axis label denotes the number of years ahead the 1-year forward rate refers to. For $j = 0$, we use the raw 1-year nominal yield, while for all other $j > 0$ we use the 1-year yield in j years time. The figures is based on the sample period 1999-2022 and the shaded area reflects the 90% confidence interval.

A State-dependence

Thus far we have not allowed the coefficients of interest to vary over time or across states of the economy. In a standard macro model a negative supply shock reduces output and increases prices, while a positive demand shock increases output and prices. In this section, we test whether the marginal stock market investor prices the market differentially depending on the state of the economy, with a focus on whether current economic situation is dominated by supply or demand driven shocks. To test for state-dependence we adjust Equation 13 with an additional interaction term between inflationary news and the state of the economy:

$$Return_{i,t} = \alpha + \beta_1 \text{Inflationary News}_t + \beta_2 \text{State}_t + \beta_3 \text{Inflationary News}_t \times \text{State}_t + \epsilon_{i,t} \quad (20)$$

our coefficient of interest is β_3 which captures the marginal stock market effect of being in a particular state of the economy with respect to an inflationary shock. We use several variables to define the state of the economy, as described below, and present results from Equation 20 across all measures of $State_t$ in Table A5. In summary, we do not find evidence that state-dependence.[20]

First, we compute the correlation between stock and bond daily returns using an exponentially weighted moving average with 75% of weight distributed over the most recent 22 days. When inflation is demand-driven, interest rates rise, lowering bond prices just as the output gap and stock prices rise, inducing a negative correlation between bond and stock returns (Pflueger, 2023). Instead, supply-driven inflation induces a positive correlation between bond returns and stock returns, as the negative supply shock reduces the output gap and stock returns, but at the same lower bond prices, due to higher interest rates and/or inflation expectations.

The interaction coefficient β_3 tests whether the effect of inflationary news on negative stock returns is stronger when the stock-bond correlation is one standard deviation above its mean, i.e. inflation may be more supply-driven. The interaction between inflationary news and the stock bond correlation, presented in column (2) of Table A5, is statistically insignificant and economically small, suggesting that in times of a higher stock-bond correlation, the effect of inflationary news on the stock market is not different than in times when the stock and bond market go in opposite direction.

Next, we use the inflation risk premium derived from a no-arbitrage term structure model of (d'Amico et al., 2018) to measure the premium investors require for the possibility that inflation may rise or fall more than they expect over the period in which they hold a bond. A positive

[20]This is not to say there is no time series variation in the effect of inflationary news on the stock market. There are situations in which movements in real yields are responsible for change in the stock returns. For instance, in June 2022 inflation surprised to the upside and real yields increased significantly, and our decomposition approach accounts for an important part of the decline in the stock market around that particular CPI release through the yield curve component. This section instead tests whether observable states of the economy are systematically correlated with the responsiveness of the stock market to inflationary surprises, for which we find little evidence of.

inflation risk premium indicates that investors require compensation for taking inflation risk, as their utility is negative correlated with inflation. Instead, a negative inflation risk premium implies that a pickup in inflation and the resulting losses to nominal bondholders are likely to coincide with a higher a marginal utility of wealth, as good states of the world are positively correlated with inflation. For instance, in the 1970s and early 1980s inflation was countercyclical. This period was generally characterized by supply-driven inflation shocks, which generated a positive inflation risk premium (d'Amico et al., 2018). Conversely, the period since the global financial crisis was characterized by a persistently low inflation environment that was often associated with insufficient demand and an inflation risk premium that was very low or even negative. Using the inflation risk premium as a proxy for more supply-driven inflation, one could expect that a higher inflation risk premium is increasing the negative stock returns with respect to inflationary news. Empirically, however, a positive inflation risk premium, if anything, exacerbates the effect of inflationary news on negative stock returns, with the β_3 coefficient positive and only marginally significant (see column (5) of Table A5).

We next use a measure that separates inflation by its supply and demand factors from the San Francisco Federal Reserve Bank. Proposed by Shapiro (2022), this measure seeks to separate the impact of supply and demand factors on monthly inflation. To do this, inflation rates are classified by spending category, then divide these categories into supply and demand-driven groups. Demand-driven categories take place when surprising price changes happen in the same direction as the unexpected change in quantity. Supply-driven categories take place when surprising price changes move in the opposite direction as the quantity changes.[21] When exploiting heterogeneity in the response of stock returns to inflation surprises as a function of the share of inflation that is supply-driven in the previous month, we do not find that more supply-driven inflation is associated with a stronger impact of inflation shocks on the stock market (see column (6) of Table A5).

We now shift focus away from whether the economy is demand or supply driven and consider other ways in which the economy could be state-dependent. First, the effects of inflation on the economy may not be linear (Fischer, 1993). When inflation is very low, higher inflation may be associated with better economic outcomes, e.g. in a secular stagnation environment, but when inflation exceeds a certain threshold the cost of inflation can become very large, as price dispersion increases rapidly with inflation. To test for the non-linear effects of inflationary news on the stock market we interact the inflation shock with the 3-month moving average inflation print. As for the previous tests for state-dependence, we do not find evidence that a higher inflation rate is associated with a stronger decline in the stock market to a surprise inflation shock than in a lower inflation environment.

Second, we test for the asymmetric effects of inflation. While more recently inflation has surprised to the upside, in the post-GFC period inflation has often surprised to the downside. To

[21]The measure is only available for a shorter time series which reduces the number of observations in our regression.

test for whether higher-than-expected inflation leads to stock market losses or lower-than-expected inflation leads to stock market gains, we define a dummy that is one for an inflationary shock and zero for a disinflationary shock, i.e. is one if the shock is positive and zero if it is negative. The result is presented in column (7) of Table A5. The estimated interaction coefficient between the upward surprise dummy and the inflation surprise is negative, indicating that the effect of inflationary shocks is stronger than the effect of disinflationary shocks, i.e. the losses of upward surprise are larger than the gains from downward surprises. However, even for downward surprises the sign is negative, confirming that lower than expected inflation is associated with an increase in the stock market.

Lastly, we test for whether variation in the state of the business cycle, measured by the unemployment gap, can explain time-varying effects of inflation on the stock market, but also here, we do not find evidence.

Overall, the results in this section show that the effect of inflationary news on stock returns does not seem to be dependent on the state of the economy.[22] The results suggest that the marginal stock market investor sees inflationary news more generally as reducing real earnings. One potential channel why this may be the case is the expectation that firms are unable to raise prices proportionately with inflation without seeing their demand declining, reducing real cash flows. If this underlying channel is the reason for our findings it lays ground for substantial heterogeneity across firms, which is what we analyze in the next section.

[22]In unreported robustness tests we use test for the state-dependence of the yield curve and the equity premium to inflationary news, and find little evidence. The results are available upon request and are not reported for brevity.

Table A5: State-Dependence

	Dependent Variable: $Return_t^5$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Inflationary News	-1.880**	-2.007**	-2.070**	-2.846*	-1.718**	-0.975	-1.706**
	(0.800)	(0.866)	(0.982)	(1.458)	(0.842)	(1.502)	(0.804)
State		0.00265	0.0781	-0.0700	0.0184	-0.112	-0.0395
		(0.115)	(0.127)	(0.189)	(0.112)	(0.431)	(0.111)
Inflationary News × State		0.266	2.008*	0.0345	-0.402	-1.166	0.653
		(0.636)	(1.036)	(1.765)	(0.643)	(2.630)	(0.879)
R-squared	0.010	0.011	0.018	0.015	0.011	0.011	0.009
N	529	504	467	279	528	529	528
State		Stock-Bond	Inflation RP	Supply	Inflation	Positive	U-gap

This table shows the coefficient estimates from regression Equation 20:

$$Return_{i,t} = \alpha + \beta_1 \text{Inflationary News}_t + \beta_2 \text{State}_t + \beta_3 \text{Inflationary News}_t \times \text{State}_t + \epsilon_{i,t}$$

where $Return_t^k$ is the cumulative average stock return between the day before the CPI announcement on date t and k days after for stock i. Inflationary News_t is the difference between the published month-on-month CPI inflation and the median forecast expectations ahead of the announcement. β_3 captures the marginal stock market effect of being in a particular state of the economy with respect to an inflationary shock. Robust standard errors in parenthesis. Stock-Bond is the standardized correlation between stock and bond returns. Inflation RP is a measure of the inflation risk premium from d'Amico et al. (2018). Supply is the standardized share of inflation that is supply-driven from Shapiro (2022). Inflation is the last inflation print. Positive is a dummy if the inflation surprise is positive. U-gap is the unemploymenr gap. Robust standard errors are in parenthesis.

B Hanson and Stein (2015)

The unresponsiveness of long-dated real yields to inflation news contrasts with large and positive response of long-dated real yields to monetary policy shocks (Hanson and Stein, 2015). To further explore these distinctive effects of monetary policy news and inflation news on the long end of the real yield curve, we estimate the Hanson and Stein (2015) main regression specification:

$$\Delta_1 f_t^{10,r} = \alpha_r + \beta_r \Delta_1 y_t^2 + \Delta_1 \epsilon_t^r \tag{21}$$

where $f_t^{10,r}$ is the 10-year $r = \{\text{nominal,real,breakeven inflation}\}$ instantaneous forward rate, y_t^2 is 2-year nominal Treasury yield, and $\Delta_1 x_t = x_{t+1} - y_{t-1}$ is the 2-day change in variable x around an inflation release on the morning of day t. Changes in 2-year nominal yields are used as a measure of monetary policy news that captures surprise changes in both the current federal funds rate and the expected path of the federal funds rate over the next several quarters.

Panel A of Table A6 presents the results from Equation 21 where columns 1-3 shows the estimation on FOMC days. Consistent with Hanson and Stein (2015), but on an extended sample through to 2022, we find a large impact of monetary policy news on long-dated nominal instantaneous forward rates, with this sensitivity driven by the real rate component of the nominal forward rates.[23] Columns 4-6 then shows estimation results on CPI release days. As with FOMC days, there is a large response in long-dated nominal instantaneous forward rates but, in contrast to FOMC days, this sensitivity is driven mostly by the breakeven inflation component of nominal forward rates. For a 100 basis point increase in the 2-year nominal Treasury yield in the 2-days following a CPI release, the nominal instantaneous forward rate increases by 56 basis points, with 40 basis points driven by breakeven inflation, and nominal forward rates only increasing 17 basis points. The dependent variable on CPI days can be interpreted as capturing the expected monetary policy response to inflation news on that day, and thus the results point to fundamental difference between news on CPI release days relative to monetary policy days. In particular, the results indicate that yield moves on CPI release days should not be considered just a monetary policy phenomena, i.e. nominal yields increase *only* because of the expected monetary policy response to higher inflation, and instead there are other forces at play driving changes in yields.

To further explore yield curve dynamics in response to various economic shocks, Table A6 Panel B first estimates Equation 21 on all other days in our sample, i.e. excluding FOMC and CPI release days, and shows that, consistent with Hanson et al. (2021), long-dated nominal instantaneous forward rates are typically highly responsive to moves in short-dated nominal rates, with the majority of the sensitivity driven by the real rate component of the nominal rate, but also a role for breakeven inflation component. More importantly, Columns 4-9 of Panel B Table A6 next

[23] Using different shocks for monetary policy, Nakamura and Steinsson (2018) do not find an impact of monetary policy shocks on 10-year real forward rates, but do find monetary policy effects 5-year forward rates and other shorter maturities of the real yield curve.

shows the results splitting other days into monetary policy news days and growth news days.[24] Strikingly, yield curve dynamics on monetary policy (but non-FOMC) days exhibit very similar behavior as on FOMC days themselves, with nominal forward rates purely driven by real rates. On growth news days, nominal forward rates are mostly driven by real rates, but there is a role for breakeven inflation too. Nevertheless, CPI releases standout, even relative to growth days, as days when the long-end of the nominal yield curve is particularly driven by inflation compensation changes. The results therefore indicate that particular economic channels are at play on CPI days and are consistent, for example, with a model in which long-run inflation expectations are not well anchored and revise in light of incoming inflationary news (Gürkaynak, Sack and Swanson, 2005).

[24]We split days into two groups conditional on the correlation of yields and stock returns on that day: days when stock returns and yields are positively correlated are labeled monetary policy news days, and days when stock returns and yields are negatively correlated are labeled growth dates. This split follows a recent literature (Cieslak and Schrimpf, 2019; Jarociński and Karadi, 2020; Cieslak and Pang, 2021; Hoek et al., 2022) that uses the intuition that days with a positive correlation between yields and stock returns must contain positive growth news. Increasing yields increase the discounting of expected cashflows and thus, for stock returns to be positive, there must also be positive news about expected cashflows.

Table A6: Ten-year Forward Yields, Monetary News, and Inflation News

Panel A: FOMC and CPI release days

	FOMC			CPI releases		
	nominal	real	inflation	nominal	real	inflation
2-year treasury	0.49***	0.50***	-0.01	0.56***	0.17**	0.40***
	(0.15)	(0.12)	(0.09)	(0.10)	(0.08)	(0.09)
R-squared	0.068	0.104	0.000	0.131	0.019	0.090
N	146	146	146	218	218	218

Panel B: All other days

	All other days			Monetary news days			Growth news days		
	nominal	real	inflation	nominal	real	inflation	nominal	real	inflation
2-year treasury	0.58***	0.45***	0.14***	0.46***	0.46***	0.01	0.63***	0.44***	0.19***
	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
R-squared	0.159	0.118	0.018	0.085	0.099	0.000	0.202	0.129	0.041
N	4,226	4,226	4,226	1,662	1,662	1,662	2,564	2,564	2,564

This table shows results from Equation 21:

$$\Delta_1 f_t^{10,r} = \alpha_r + \beta_r \Delta_1 y_t^2 + \epsilon_t^r$$

where $f_t^{10,r}$ is the 10-year $r = \{\text{nominal, real, breakeven inflation}\}$ instantaneous forward rate, y_t^2 is 2-year nominal Treasury yield, and $\Delta_1 x_t = x_{t+1} - x_{t-1}$ is the 2-day change in variable x_t. The regressions are estimated over the sample 2004-2022 and robust standard errors are in parentheses. Panel A shows estimation results on FOMC days and CPI release days separately. Panel B shows results on all other non-FOMC and non-CPI release days, before splitting all days into 'monetary news' days and 'growth news' days, where days are assigned conditional on the correlation between stock returns and nominal yields.

C Response of Dividend Future Prices

We explore further by considering how dividend futures respond to inflation shocks in the later sample (2016-2022). Table A7 Panel A presents log changes in the constant-maturity 1-year and 2-year dividend futures price around inflation news. It presents 1-day changes and 5-days following inflation announcements, and for each window presents both nominal and real changes. For real changes, dividend future prices are discounted by expected inflation of the same maturity (as measured from breakeven inflation rates) so that they adjusted from nominal to real quantities, and changes are adjusted for the inflation news that reflects an immediate change in the economy price-level. Table A7 Panel A shows that nominal dividend futures are close to unchanged following inflation news, while real cashflows exhibit a statistically significant declines. For example, following a 100 basis points inflation shock, the 1-year dividend future declines by 162 basis points that day on a real basis. The results from dividend futures are consistent with the previous analysis extracting cashflow news from the decomposition approach.

Dividend futures are in fact risk neutral expectations of cashflows on the stock market and thus the dividend futures price declines could partially reflect increases in risk premium following inflation news. Following Knox and Vissing-Jorgensen (2022), we therefore adjust dividend futures prices for the Martin (2017) lower bound of equity risk premium at the same maturity, which generates a lower bound of expected dividends. The results of regressing these adjusted dividend futures prices on inflation news are presented in Table A7 Panel B, with the key takeaways broadly the same as in Panel A: nominal cashflow expectations are unchanged following inflation news while real dividend expectations decline significantly.

Table A7: Dividend Futures, Expected Dividends, and Inflation News

Panel A: Dividend Futures

	1-day log change				5-day log change			
	1-yr nom	2-yr nom	1-yr real	2-yr real	1-yr nom	2-yr nom	1-yr real	2-yr real
Inflationary News	-0.09	-0.17	-1.62***	-1.85***	-0.70	-1.72	-2.09*	-3.10
	(0.14)	(0.32)	(0.15)	(0.31)	(1.17)	(2.44)	(1.11)	(2.35)
R-squared	0.003	0.004	0.511	0.312	0.002	0.002	0.016	0.008
N	77	77	77	75	76	76	75	74

Panel B: Lower Bound of Expected Dividend

	1-day log change				5-day log change			
	1-yr nom	2-yr nom	1-yr real	2-yr real	1-yr nom	2-yr nom	1-yr real	2-yr real
Inflationary News	0.15	0.06	-1.38***	-1.62***	0.16	-0.83	-1.25*	-2.21
	(0.17)	(0.21)	(0.20)	(0.25)	(0.76)	(1.94)	(0.73)	(1.86)
R-squared	0.010	0.001	0.440	0.354	0.000	0.001	0.014	0.007
N	77	77	77	75	76	76	75	74

This table shows estimation coefficients from the regression:

$$\Delta_k ln\left(x_t^n\right) = \alpha_k + \beta_k \text{Inflationary News}_t + \epsilon_t^k$$

where the dependent variable x_t^n is the $n = \{1, 2\}$-year dividend futures price (Panel A) or lower bound of the expected dividend (Panel B). The expected dividend is the dividend futures prices adjusted for risk premium (as measured by the Martin (2017) lower bound of the equity risk premium). Panel A and Panel B both present log changes in nominal and in real terms. The real versions adjusts nominal changes for changes in expected inflation (measured by inflation swap rates) and the surprise component of realized inflation over the change period Δ_k. The regressions are estimated over the sample 2016-2022 and robust standard errors are in parentheses.

D A Simple Model of a Firm facing a Cost Shock

In standard industrial organization models (Tirole, 1989), firm profit is

$$\Pi(p) = (p - c)\, Q(p) \tag{22}$$

where p is the product price, c is the marginal cost of production, and $Q(p)$ is the quantity produced. First order conditions with respect to the firm's pricing decision implies that the equilibrium price is

$$p = \frac{\epsilon}{\epsilon - 1} c \tag{23}$$

where $\epsilon = -\frac{\partial \ln Q(p)}{\partial \ln p} > 1$ is the elasticity of demand facing the firm.

Defining the markup $m = \frac{\epsilon}{\epsilon - 1} > 1$ and substituting the equilibrium price Equation 23 into Equation 22, firm profit in equilibrium is thus

$$\Pi^* = (m - 1) c q \tag{24}$$

where $q = Q(p^*)$ is the equilibrium quantity produced.

We now consider the impact of a change in marginal costs on firm profits. The first derivative of equilibrium firm profits with respect to the marginal cost is:

$$\begin{aligned}
\frac{\partial \Pi^*}{\partial c} &= (m-1)\left(q + \frac{\partial q}{\partial c} c\right) \\
&= (m-1)\left(q + \frac{\partial q}{\partial p}\frac{\partial p}{\partial c} c\right) \\
&= (m-1)\left(q - \epsilon \frac{q}{p} m c\right) \\
&= (m-1)(1-\epsilon)\, q
\end{aligned}$$

where the second line uses the chain rule and the third line uses that $\epsilon = -\frac{p}{Q(p)}\frac{\partial Q(p)}{\partial p} \implies \frac{\partial Q(p)}{\partial p} = -\epsilon \frac{Q(p)}{p}$ and that $p = mc \implies \frac{\partial p}{\partial c} = m$. The fourth line simplifies.

From this equation, multiply both sides through by $\frac{c}{\Pi}$ to derive the first key testable prediction:

$$\frac{\partial \Pi^* / \Pi^*}{\partial c / c} = 1 - \epsilon < 0 \tag{25}$$

which shows that, given $\epsilon > 1$, firm profits decline following an increase in marginal costs.

The second key testable prediction is then to show that a firm's sensitivity to cost shocks is directly related to the firm's market power by taking the second derivative with respect to the elasticity of demand

$$\frac{\partial^2 \Pi^* / \Pi^*}{(\partial c / c)\,(\partial \epsilon)} = -1. \tag{26}$$

We therefore see that firms with higher elasticity of demand, i.e. less market power, suffer more negative declines in profitability in response to marginal cost shocks as compared to firms with lower elasticity of demand.