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Decoding Equity Market Reactions to Macroeconomic News

Michele Modugno* Berardino Palazzo†‡

Abstract

The equity market's reaction to macroeconomic news is consistent with the propagation of news into the real economy. We embody all the macro news in an activity news index and a price news index that together explain 34% of the quarterly stock price returns variation. When those indexes capture a stream of favorable macroeconomic surprises, publicly traded firms experience increases in revenues, profitability, financing, and investment activities. The firm-level results lead up to an expansion of the real side of the whole U.S. economy. Our findings, taken together, show that stock prices' reactions to macro news have a strong association with firm-level and economy-wide growth.

Keywords: Macroeconomic News, Equity Markets, Real Activity

JEL Classification: E44, E47, G14

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1 Introduction

Information about the state of the economy, as summarized in macroeconomic data, is released on a daily basis. When these data differ from market participants' expectations, they reveal new facets about the health of the economy and can change participants' perspectives on its current and future state. Based on these new perspectives, market participants adjust their investment strategies, generating variations in asset prices.

In this paper, we show that the reaction of market participants is consistent with the evidence that streams of favorable macro news are followed by increases in revenues, profitability, financing, and investment activities of firms.[1] We also show that these firm-level reactions are mirrored by broad macro responses. Indeed, streams of favorable macro news are followed not only by expansion in macro aggregates of production factors, such as hours worked and capacity utilization, but also by investment and gross domestic product (GDP) growth, as well as labor market improvements via a reduction in the unemployment rate.

We obtain this evidence by analyzing the relation of macroeconomic and firm-level data with two indexes through which we aggregate all the available macro news: the activity and the price news indexes. These two indexes have a strong explanatory power for stock price returns. At daily frequencies, stock prices display a significant positive reaction to our activity index. When we abstract from the daily noise and shift our focus to low frequency fluctuations, we find that quarterly stock returns display significant reactions to both our indexes- positive to the activity index and negative to the price index. Crucially, taken together, our indexes are able to explain one-third of the quarterly stock price return fluctuations in our sample.

While the empirical evidence about a strong linear association between government bond prices and macroeconomic surprises is overwhelming (see, among others Gürkaynak, Sack and Swanson, 2005; Andersen et al., 2007; and Altavilla, Giannone and Modugno, 2017), the existence of a strong and significant linear relation between macroeconomic surprises and stock prices has been deemed as controversial. A common feature of the studies published in the past 30 years-including Elenev et al. (2024); Andersen et al. (2007); Boyd, Hu and Jagannathan (2005); and McQueen and Roley (1993)-is the state dependency of their analysis. The size and the sign of the reaction of stock prices to *specific* macroeconomic data releases depend on the current macroeconomics conditions. Those papers argue that ignoring the state dependency would deliver weaker or insignificant estimates of the stock price reaction to macro news due to the varying strength of the cash-flow, the risk premium, and the interest rate channels at different stages of the business cycle. Indeed, earlier papers, e.g., Cutler, Poterba and Summers (1988), Hardouvelis (1987), and Pearce and Roley

[1] "Macro news" is defined as the difference between the actual release of a macro variable and the market expectations for that same release. In this paper, we will also use the term of "macro surprise" to indicate macro news.

(1985), which did not account for state dependency, found mostly insignificant reactions of stock prices to non-monetary macro surprises.

The first contribution of this paper is to show that the reaction of stock prices to macro surprises is strong and significantly so across different stages of the business cycle. Specifically, we show that activity-related macro surprises have, on average, a significant positive effect on daily returns of the S&P 500. The main difference between our analysis and those listed above is that we do not consider one single data release at a time. Instead, we analyze the effect of the entire universe of macrodata for which surveys are available, aggregating them in an activity and price index where each surprise is weighted according to the relative attention that market participants pay to the respective release. Considering all available macro surprises is key for understanding the full information set to which market participants react. First of all, statistical reports usually contain releases about several data series, not only one.[2] Focusing on only one data release, while neglecting the others, may provide a partial and incorrect view of why the market reacts to a macro news.[3] In addition, different statistical reports are frequently released at the same time or during the same day. If these sets of data surprise market participants in different directions, focusing on only one of them per time may not help to shed light on why the stock market displays a given reaction. Finally, especially when trying to understand the reaction of a broad index like the S&P 500, we are interested in extracting the market participant surprise about the overall health of the economy rather than a specific facet like the one captured by, for example, industrial production or durable goods orders.

When we overcome the interference of the daily noise and analyze the relation between the quarterly returns of the S&P 500 with the stream of macro surprises released over the quarter, we find that macro surprises explain up to 34% of the S&P 500 return variation in our sample. Altavilla, Giannone and Modugno (2017) first showed the importance of focusing on the low frequency fluctuations in order to understand the relation between macro surprises and asset prices. However, while the authors presented results qualitatively similar to ours for Treasury bond yields, they found a weaker relation for stock prices (a quarterly adjusted r-square of 8%). More recently, Boehm and Kroner (2023), using the methodology of Altavilla, Giannone and Modugno (2017) and a sample comparable to the one in our paper to study the propagation of US macroeconomic news in global financial markets, find an explanatory power for headline macro surprises for quarterly changes in U.S. stock prices of about 15%.[4]

[2]For example, when the Bureau of Labor Statistics issues the employment report, it releases new figures for a total of 72 data series (e.g., see https://www.bls.gov/news.release/pdf/empsit.pdf)

[3]For instance, with the release of the employment report, the unemployment rate can be lower than expected due higher-than-expected labor participation, but nonfarm payrolls is slightly below expectations. Focusing only on either unemployment or non-farms payrolls will not capture the complexity of the information available to market participants.

[4]Boehm and Kroner (2023) obtain a quarterly r-square of about 25% when they also include a latent factor capturing the effect of non-headline news.

The stark difference with the explanatory power found in this paper is due to the way in which we construct our indexes –i.e., leveraging on the importance of the release for market participants when we aggregate the data, and, more importantly, separating activity- and price-related data in two distinct indexes. Indeed, when we focus on the quarterly frequencies, the price index has a significant *negative* relation with the stock returns, while the activity index continues to display a significant *positive* relation. Importantly, we do not find that the strong and significant response of stock prices to macro news is affected by the business cycle or the monetary policy stance. When we proxy the state of the business cycle with the output gap or the unemployment gap, or when we proxy the monetary policy stance with the level of the one-year yield, and we interact these variables with our news indexes, we find that the reaction of stock prices to activity-related surprises does not depend on where those variable are with respect to their historical distribution.

Our second contribution shows that favorable streams of macroeconomic news are followed by a strengthening of the health of U.S. publicly traded firms in several dimensions, from their profitability to their investments. An important corollary of this finding is that market participants are rational; their reaction to macroeconomic news is effectively associated with the relation between news and corporate outcomes. To our knowledge, this paper is one of the few that looks directly at firm behavior in order to understand why stock markets react to macro news. Previous studies have tried to answer this question by decomposing the reaction of stocks prices in the risk premium, the cash-flow, and the interest rate channel through the use of proxies like in Boyd, Hu and Jagannathan (2005) or Boehm and Kroner (2023). Turning to firm-level data, we find that the literature has mostly focused on their reaction to monetary policy shocks, e.g., Ottonello and Winberry (2020). To our knowledge, this is also one of the first study that analyzes the relation between aggregate macro surprises and firm behavior.

In particular, we find that a sequence of favorable news is followed by firm-level responses that are not only mechanically linked to a better than expected economic outlook, but also are discretionary in nature, like financing and investment, hinting at a causal relation between macro surprises and firms' behavior. Indeed, a quarter of positive news about the real economy is associated with higher sales, liquidity (especially cash holdings and receivables), and profitability, as well as book equity (driven by an increase in cumulative retained earnings) up to four quarters ahead. Moreover, at the one year horizon, we find that total payouts increase and physical investment accelerates following positive developments in the real economy. Consistent with a negative correlation with stock valuations, price news are negatively associated with the firm-level economic outlook, mostly at the one year ahead horizon. A sequence of positive price news over a quarter induces lower sales, lower profits, lower payouts, and a deceleration in physical investment one year down the road. Other studies may provide some support as to the existence of a causal relation between macro news and firms' behavior. Tanaka et al. (2020) show that firms' GDP forecasts are associated with their employment, investment, and output growth in the subsequent year, justifying

our finding that a change in the perceived economic outlook generates a change in firms' strategies. Moreover, Tanaka et al. (2020) also show that larger and more cyclical firms make forecasts closer to professionals forecasters, providing relief on our underlying assumption that market participants expectations may proxy firm's expectations. More recently, Yotzov et al. (2024), using a survey of UK firms, show that firms respond to positive inflation news by revising downward their expected real sales and revising upward their expected unit production costs.

Our third contribution is to show that the firm-level results described above are consistent with the reaction of the economy as a whole. Through the use of local projections, we show that following a quarter of overall positive activity-related macro news, the aggregate economy responds not only by increasing the utilization of its two most important production factors (labor and capital), but also by expanding its productive capacity in terms of lower unemployment and higher investments. In turn, this improvement of the economy percolates in a significant increase in real GDP. As it is the case at the firm-level, positive price-related macro news have a negative effect on the overall health of the economy and generate significant and opposite responses to what activity-related macro news deliver.

The three contributions are covered in detail in Sections 3 through 5. Section 2 describes the data, while Section 6 concludes.

2 Data

We use data from several different sources. In the following section, where we show the importance of macroeconomic news in explaining fluctuations of daily and quarterly stock returns respectively, we rely on four data sources. The S&P 500 has been downloaded from the Center for Research in Security Prices (CRSP). The macroeconomic news are from Bloomberg Economic Calendar (ECO), which reports both the actual released value and the median market expectation for several data series. In particular, we focus on 64 activity-related and 22 price-related series of surprises, all series for which we have at least 10 years of data. Those data are reported in Appendix A, Tables A.1 and A.2, where we also report the dates of their first available observation, the number of observations, the frequency of the data release, and the relevance index. The relevance index is the percentage of Bloomberg users that set up an automatic alert to be notified when a given macroeconomic data series has been released. This index is particularly important for our study, given that we use it to weigh the series of news before summing them up to create our indexes.

The bulk of our analysis focuses mainly on the sample starting in 2003 given that about 40% of macro news become available after that year, as shown in Tables A.1 and A.2, increasing the

information content of our indexes. Each set of results presented below is obtained by controlling for the monetary policy shocks of Bu, Rogers and Wu (2021), available on the website of one of the authors.[5] To check whether non-linearities are important, we interact our indexes with the one-year bond yield, as a proxy of the monetary policy stance, the output gap (obtained as the difference between actual real GDP and potential real GDP expressed as a percentage of the potential real GDP), and the unemployment gap (obtained as the difference between the actual unemployment rate and potential unemployment). Those five series have been downloaded from FRED, the data repository of the Federal Reserve Bank of St. Louis, and are described in Table A.4.

In Section 4, where we analyze the relation between our indexes and the performance of publicly traded firms, we use quarterly data from Compustat. Specifically, we drop firm-quarter observations with missing sales (Compustat item $SALEQ$), firms non incorporated in the USA (Foreign Incorporation Code (FIC) code different from USA), financial firms (Standard Industrial Classification (SIC) code between 6000 and 7000) and firms with missing SIC code or SIC code larger than 9000. We also eliminate from the sample firms not traded in major US stock exchanges ($EXCHG$ code different from 11, 12, or 14).

In our firm-level analysis, we study the response of a wide array of variables. First, we look at firm-level changes in revenues and profitability. We measure the former using total sales (Compustat item $SALEQ$), while we use two different measures for the latter. The first one is the ratio of income before extraordinary items (IBQ) over lagged total assets (ATQ). The second one is the gross margin, defined as total sales net of cost of goods sold ($COGSQ$) and selling, general, and administrative expenses ($XSGAQ$) divided by total sales. We also include the firm-level value of market equity, measured as the end-of-the-quarter share price ($PRCCQ$) times the end-of-the-quarter number of common shares outstanding ($CSHOQ$). Then we look at changes in key balance sheet items. Specifically, we study how current assets, book equity, and total liabilities (LTQ) change following macro economic news. We separate current assets in three components: cash holdings ($CHEQ$), receivables ($RECTQ$), and inventories ($INVTQ$). Book equity is simply defined as the difference between total assets and total liabilities. Finally, we examine the response of financing and investment activities. We look at the quarterly values of sale of common and preferred stocks ($SSTKY$), net debt issuance (item $DLTISY$ net of item $DLTRY$), and total equity payout. We follow Begenau and Salomao (2019) and define "total equity payout" as quarterly cash dividends (DVY) plus quarterly equity repurchases ($PRSTKCY$) less any decrease in preferred stocks ($PSTKQ$). To capture changes in investment activities, we look at research and development expenditures ($XRDQ$) and quarterly capital expenditures ($CAPXY$).[6]

[5] The data are available on the website of Wenbin Wu; see https://sites.google.com/view/wenbinwu-ucsd/home. We aggregate the available surprise at the quarterly level by taking the quarterly average.

[6] $CAPXY$ report investment expenditures on a cumulative basis over a fiscal year. We obtain quarterly values by taking the difference between two consecutive quarters.

In Section 5, we use local projections to analyze the relation between our news indexes and some macro variables. In particular, we look at the relation with average weekly hours worked, industrial production, real gross investment, real GDP, total capacity utilization, and the unemployment rate. Together with the left-hand-side macro variables, we have also right-hand-side macro variables that we use as controls in our local projections. Specifically, we use the one-year bond yield, as a proxy of the monetary policy stance, the consumer price index (CPI), an index of commodity prices, industrial production, and the unemployment rate. Those series are reported in Table A.4. Among the controls for the local projections, we also have the quarterly aggregation of the monetary policy shock of Bu, Rogers and Wu (2021), described above.

3 Stock Prices' Reaction to Macro News

Macro news are usually defined as the difference between the actual release at time t of a macro variable i ($A_{i,t}$) and the market expectations for that same release ($M_{i,t}$). We capture market expectations with the median of the forecasts that Bloomberg collects from a panel of market participants. In order to have comparable news, we standardize them using their historical standard deviation:

$$s_{i,t} = \frac{(A_{i,t} - M_{i,t})}{std(A_{i,t} - M_{i,t})}. \tag{1}$$

In contrast to previous studies, we do not focus on macro news in isolation. Instead, we aggregate news relative to real activity and news relative to prices in two separate indexes, the activity news index (ani) and the price news index (pni). The aggregation is the weighted sum of the cross section of news, in which the weights are determined by their own relevance index:

$$ani_t = \sum_{i=1}^{n_a} s_{i,t} w_i, \quad pni_t = \sum_{i=1}^{n_p} s_{i,t} w_i,$$

where n_a and n_p are the number of activity- and price-related releases, respectively, and

$$w_i = \frac{W_i}{\sum_{i=1}^{n_j} W_i}, \quad where \quad j = a, p;$$

where W_i is the relevance index provided by Bloomberg. As explained above, this index is the percentage of Bloomberg users that set up an automatic alert to be notified of the availability of each release. In practice, it captures the degree of importance of a macroeconomic release for market participants. This way of constructing the weights adds a very important ingredient to our index –i.e., the news are weighted for the attention that the market, as a whole, pays to a given

macro release.[7] Our estimates are obtained from the sample 2003 to 2019 due to the fact that, as explained above, about 40% of macro news become available after 2003 and the fiscal policies implemented during the COVID-19 period had long lasting effects on firms' balance sheets.[8]

3.1 Stock Prices' and Macro News at a Daily Frequency

We first focus on the ability of our indexes to explain a daily return defined as

$$rx_t = (log(S\&P500_t) - log(S\&P500_{t-1})) * 100.$$

In particular, we estimate the parameters of the model described in Equation 2, in which we regress the daily returns of the S&P 500 over *ani* and *pni*, controlling for the monetary policy shock (mps_t) of Bu, Rogers and Wu (2021), and the previous day S&P 500 return rx_{t-1}:

$$rx_t = \alpha + \beta ani_t + \gamma pni_t + \delta mps_t + \phi rx_{t-1} + u_t. \tag{2}$$

Table 1 reports the estimates of the coefficients, their relative t-statistics, the associated R^2 and R^2_{adj} for the full models as described in Equation 2, and two alternative models: a first one in which we exclude *pni*, and a second in which we exclude *ani*.

Table 1 shows us that the activity index is statistically significant in explaining daily fluctuations in stock price returns, both when we estimate the full model, and when we do not consider *pni*. This result is in stark contrast with previous studies like Boyd, Hu and Jagannathan (2005), Cutler, Poterba and Summers (1988), Hardouvelis (1987), and Pearce and Roley (1985), which either find a negative or a statistically insignificant relation between macro releases and changes in stock prices. As highlighted in the Introduction, those studies have been making inferences on one macro news per time losing sight of the multidimensional nature of the information available to market participants.

By contrast, the price index seems to not contribute to explain those fluctuations given the low t-statistic, and this inability of explaining stock returns is not confounded by the presence of *ani*, as we can see from the results of the estimates of the model without the activity index.[9] However, as reported in the next section, when we abstract from the daily noise, the price index also becomes an important explanatory variable for explaining the fluctuations of the stock returns. Lastly,

[7] We have already been using those indexes in McCoy et al. (2020) to understand how much of the S&P 500 fluctuation over the Federal Open Market Committee cycle is due to macro news.

[8] However, in Appendix B we report the results for the 1998-2023 sample , and we highlight the observations relative to the COVID period that distort some of our results.

[9] A corollary of the results reported in Table 1 is that the two indexes are completely uncorrelated. Indeed, the regression coefficients, and their relative t-statistics are very similar across the different models' estimation results.

Table 1: Daily Regression Results, 2003-19

ani_t	pni_t	mps_t	rx_{t-1}	R^2	R^2_{adj}
0.07	0.01	-0.06	-0.10	2%	1%
3.71	*0.54*	*-2.35*	*-4.21*		
0.07		-0.06	-0.10	2%	1%
3.70		*-2.34*	*-4.26*		
	0.01	-0.06	-0.10	1%	1%
	0.57	*-2.27*	*-4.29*		

Notes: The first four columns of the table reports estimates of the coefficients described in equation 2 where we regress the daily returns of the S&P 500, rx_t, on the activity news index, ani_t and the price news index, pni_t, together (first row), or separately (second and third row). In each regressions we control for the monetary policy shock, mps_t, of Bu, Rogers and Wu (2021), and a lag of the returns. In italic we report the relative t-stat corrected for heteroscedasticity and autocorrelation. The last two columns report the relative R^2s and their adjusted version R^2_{adj}.

although the activity index has a statistically significant coefficient, the portion of daily fluctuation explained by these models is very small, as shown by the extremely low values for R^2 and R^2_{adj}.

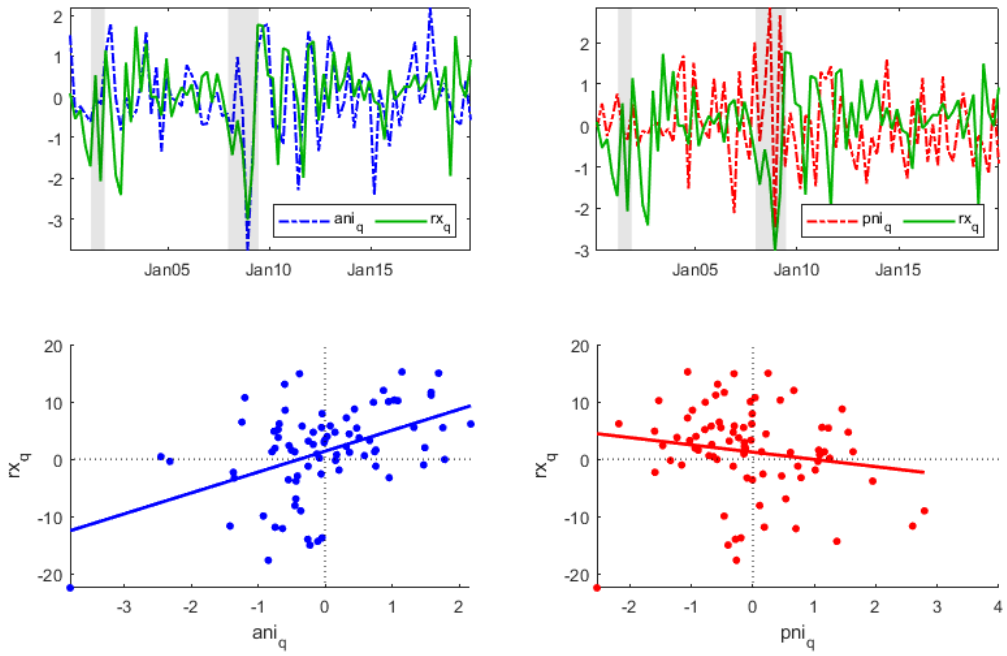
3.2 Stock Prices' and Macro News at a Quarterly Frequency

Following Altavilla, Giannone and Modugno (2017), we study the relation between macro news and quarterly changes in equity prices. As shown by the above mentioned paper, the explanatory power of macro news for daily fluctuations of bond yields is very low because is confounded by the noise of other events that make us underestimate their importance. In contrast, macro news explanatory power improves substantially for longer-horizon changes, given that macro news exerts persistent effects on bond yields, while the less persistent impact of residual factors averages out at longer-horizons.[10] In this section, we test if the same result holds in the relation between macro news and equity prices.[11] Moreover, the aim of our paper is to understand why stock prices react to macro surprises, and in particular if this phenomenon can be explained by the relation between firms' behavior, captured by firm-specific accounting data only available at a quarterly frequency,

[10] The importance of macro surprises for explaining low frequency fluctuations of asset prices has been confirmed by other studies, among them Xing et al. (2024), Boehm and Kroner (2023), Rincón-Torres (2023), and Stavrakeva and Tang (2020).

[11] Altavilla, Giannone and Modugno (2017) also studied the explanatory power of macro news for equity prices at quarterly frequency, but they did not find quantitative results comparable to the ones for bond yields. On the contrary, in the rest of this section, we show that this relation can be unfolded once activity news are separated from price news, and those news are weighted for the relevance index.

Figure 1: News Indexes and S&P 500 Returns



Notes: The figure compares the z-score of the quarterly returns of the S&P 500 (rx_q) with the z-score of the activity news index (ani_q), left-hand side, and the z-score price news index (pni_q), right-hand side. The upper charts reports the plots. The lower charts report their scatter plots.

and macro news. This is a further reason that emphasizes the importance of understanding the relation between our indexes and stock price returns at a quarterly frequency. To do so, we sum over the quarter the daily values of our indexes as described in Equation 5:

$$ani_q = \sum_{t=T_{q-1}+1}^{T_q} \sum_{i=1}^{n_a} s_{i,t} w_i \qquad \text{and} \qquad pni_q = \sum_{t=T_{q-1}+1}^{T_q} \sum_{i=1}^{n_p} s_{i,t} w_i \tag{3}$$

where T_q is the last day in quarter q. Before focusing on firm-specific data, we first want to be sure that our quarterly index can also explain quarterly fluctuations in stock price returns, defined as

$$rx_q = (log(S\&P500_{T_q}) - log(S\&P500_{T_{q-1}})) * 100.$$

In Figure 1, we compare the z-score of the time series of the quarterly returns of the S&P 500 with the activity news index and the price news index, and we report the related scatterplots.

Table 2: Quarterly Regression Results, 2003-19

ani_q	pni_q	mps_q	rx_{q-1}	R^2	R^2_{adj}
3.97	-2.05	-0.79	-0.06	34%	30%
3.36	*-3.38*	*-0.76*	*-0.50*		
3.61		-0.86	-0.03	26%	23%
3.60		*-0.81*	*-0.22*		
	-1.38	-1.06	0.06	6%	2%
	-1.16	*-0.85*	*0.35*		

Notes: The table reports estimates of the coefficients described in equation 4 where we regress the quarterly returns of the S&P 500, rx_q, on the quarterly activity news index, ani_q, and price news index, pni_q, together (first row), or separately (second and third row). In each regressions we control for the quarterly aggregation of the monetary policy shock, mps_q, of Bu, Rogers and Wu (2021), and a lag of the quarterly returns. In italic we report the relative t-stat corrected for heteroscedasticity and autocorrelation. The last two columns report the relative R^2s and their adjusted version R^2_{adj}.

As we can see, in the top-left panel our activity index tracks quite accurately the stock returns. Indeed, the scatterplot in the bottom-left panel clearly indicates a positive relation between ani_q and rx_q. By contrast, pni_q is negatively correlated with rx_q, as we can infer from the bottom-right scatterplot, and the relation looks less strong than the one between ani and rx_q.

Similarly to Equation 2, we estimate the parameters of the regression model in Equation 4 where our variable of interest, the quarterly return on the S&P 500, is regressed on the quarterly aggregations of activity news index and the price news index, controlling for the quarterly aggregation of the monetary policy shock of Bu, Rogers and Wu (2021), mps_q, and a lag of the quarterly returns:

$$rx_q = \alpha + \beta ani_q + \gamma pni_q + \delta mps_q + \phi rx_{q-1} + u_q. \tag{4}$$

The estimated coefficients, together with their t-statistics (in italics), are reported in Table 2.

Looking at Table 2 we learn three important lessons. First, the activity index explains the lion's share of equity returns' variation, a result that is confirmed once we estimate a model without the price index (second row). Second, unexpected news about prices have, on average, a negative effect on stock returns. Indeed, *pni* is associated with a negative statistically significant coefficient, which explains a residual component of stock price fluctuation when compared to *ani*. Third, and most importantly, when we focus on quarterly frequencies, our indexes are able to explain a large share of stock price returns (34%). This R^2 should be considered as a lower bound of the share of stock price fluctuations that can be explained by macro news. Indeed, first we are considering only

macro-data for which Bloomberg collects surveys for, at least, the past ten years. Second, we do not include macro news relative to other countries, which may be important given the global nature of some of the companies listed in the S&P 500. Third, we do not account for the non-headline news that Gurkaynak, Kisacikoglu and Wright (2020) have shown has a strong explanatory power for bonds. Moreover, this finding is in stark contrast with the finding of Altavilla, Giannone and Modugno (2017), who show that macro surprises can explain only 8% of the stock price fluctuations at quarterly frequencies. The main drivers of these differences are how we compute the weights used to aggregate the news and the fact that we distinguish between activity- and price-related surprises.

It is worth stressing that our approach is different from studies that use future production growth rates to explain variation in equity returns due to expected cash flows; see, e.g., the influential studies of Fama (1990) and Schwert (1990). In their studies, the endogeneity issue reveals to be pretty severe because past stock prices have a sizable and positive association with future production growth rates. In our case, past stock prices have no explanatory power vis-a-vis aggregate macroeconomic surprises (not shown here), thus validating our view that macro surprises represent new information not previously incorporated in the investors' information set.

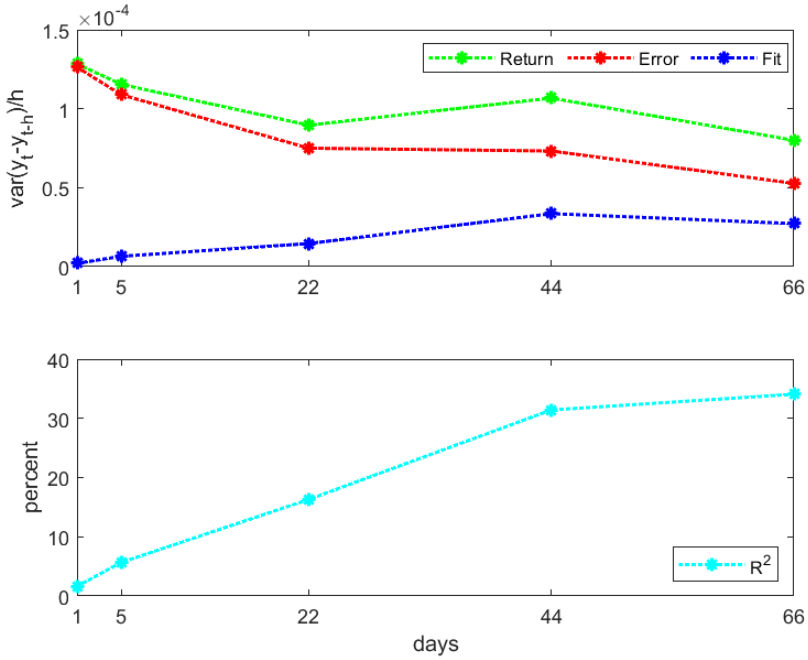
As mentioned above, our hypothesis is that macro news exerts persistent effects on equity prices, while the less persistent impact of residual factors averages out at longer-horizons.[12] To check that this is the case, we follow Cochrane (1988) who shows that the persistency of a series, such as y_t, can be gauged by considering $1/h$ times the variance in the h-period change –i.e., $var(y_t - y_{t-h})/h$– as a function of h. If all the shocks to y_t tend to be immediately and permanently incorporated, then the series comprises a random walk component and $var(y_t - y_{t-h})/h$ is constant with respect to h. However, if the effect of shocks on y_t is partially reversed after some time, the reversion will be reflected in the decline of $var(y_t - y_{t-h})/h$ from a given horizon onward. In particular, let us define $rx_{t-h,t} = (log(S\&P500_t) - log(S\&P500_{t-h})) * 100$, and $x_{t-h,t} = \sum_{j=t-h}^{t} x_t$, where x_t will be ani_t, pni_t and mps_t. We estimate the parameters of the following models for h equal to one, five (a week), 22 (the average number of working days per month), 44 (two months), and 66 (a quarter):

$$rx_{t-h,t} = \alpha^{(h)} + \beta^{(h)} ani_{t-h,t} + \gamma^{(h)} pni_{t-h,t} + \delta^{(h)} mps_{t-h,t} + \gamma^{(h)} rx_{t-2h,t-h} + \epsilon_{t-h,t} \tag{5}$$

In Figure 2, we plot the $1/h$ times the variance of the returns $rx_{t-h,t}$, the fit $\widehat{rx}_{t-h,t} = \widehat{\alpha}^{(h)} + \widehat{\beta}^{(h)} ani_{t-h,t} + \widehat{\gamma}^{(h)} pni_{t-h,t} + \widehat{\delta}^{(h)} mps_{t-h,t} + \widehat{\gamma}^{(h)} rx_{t-2h,t-h}$, and the residual $\widehat{\epsilon}_{t-h,t}$.

[12] Let $y_t = log(S\&P500_t)$. Simplifying our regression model, we can write $y_{t+1} - y_t = news_{t+1} + noise_{t+1}$. Therefore, $y_{t+2} - y_t = y_{t+2} - y_{t+1} + y_{t+1} - y_t = news_{t+2} + noise_{t+2} + news_{t+1} + noise_{t+1}$. We can then generalize to $\frac{1}{h}(y_{t+h} - y_t) = \frac{1}{h}\left(\sum_h y_{t+h} - y_{t+h-1}\right) = \frac{1}{h}\sum_h news_{t+h} + \frac{1}{h}\sum_h noise_{t+h}$. Our hypothesis is that while $\frac{1}{h}\sum_h news_{t+h}$ is persistent, $\frac{1}{h}\sum_h noise_{t+h} \xrightarrow{h} 0$.

Figure 2: Persistency



Notes: The upper panel compares the $1/h$ times the variance of the returns $rx_{t-h,t}$, the fit $\hat{\alpha}^{(h)} + \hat{\beta}^{(h)} ani_{t-h,t} + \hat{\gamma}^{(h)} pni_{t-h,t} + \widehat{\delta}^{(h)} mps_{t-h,t} + \widehat{\gamma}^{(h)} rx_{t-2h,t-h}$, and the residual $\hat{\epsilon}_{t-h,t}$ for h equal to one, five, 22, 44, and 66. The lower panel shows the R^2 of the regression model in equation 5 for h equal to one, five, 22, 44, and 66.

As we can see from the upper panel of Figure 2, the $1/h$ times the variance of the return declines as h increases, indicating that returns are not persistent. This decline is mainly driven by the decrease of the $1/h$ times the variance of the error, making the case that the error averages to zero and therefore contains mainly noisy that tends to vanish with time. By contrast, the $1/h$ times the variance of the fit tends to be quite stable with h, indicating that the effect of the news on the stock price tends to be persistent. Finally, the fact that the R^2 increases so drastically, bottom panel of Figure 2, is directly related to the behavior of those ratios. Since the R^2 for different horizons can be written as:

$$R^2(h) := \frac{1/h \text{ var}\left(\widehat{\text{rx}}_{\text{t-h,t}}\right)}{1/h \text{ var}\left(\widehat{\text{rx}}_{\text{t-h,t}}\right) + 1/\text{h var}\left(\text{rx}_{\text{t-h,t}} - \widehat{\text{rx}}_{\text{t-h,t}}\right)},$$

it follows that the increased importance of macroeconomic news for changes in stock prices over longer horizons can be explained by their relative persistence.

Table 3: Quarterly Regression with Interactions

	Unemp. gap	Output gap	1-year yield
ani_q	3.33	2.99	3.74
	2.75	*3.44*	*2.72*
$ani_q * x_q$	0.33	-0.49	0.38
	0.85	*-1.29*	*0.63*
$\beta + \tilde{\beta} * x_q$			
low	3.24	4.35	3.84
medium	3.49	3.59	4.14
high	4.29	2.81	4.60
pni_q	-2.13	-1.94	-1.34
	-3.48	*-3.09*	*-1.22*
$pni_q * x_q$	0.18	-0.23	-0.50
	0.45	*-0.62*	*-1.40*
$\gamma + \tilde{\gamma} * x_q$			
low	-2.18	-1.31	-1.46
medium	-2.05	-1.66	-1.86
high	-1.62	-2.02	-2.46

Notes: The table reports estimates of the coefficients for the quarterly activity news index ani_q, the quarterly price news index, pni_q and their interactions with x_q, that can be, in turn, the unemployment gap, the output gap, or the one-year Treasury bond yield. The full model is described in equation 6. In italics we report the relative t-statistics corrected for heteroscedasticity and autocorrelation. Low, medium, and high are the value $\beta + \tilde{\beta} * x_q$ and $\gamma + \tilde{\gamma} * x_q$ when x_q is equal to the 25^{th}, the 50^{th}, and the percentile of its historical distribution.

3.3 The Lack of State Dependency at a Quarterly Frequency

In this part of our analysis, we investigate whether state dependency may affect our results at a quarterly frequency. In particular, we expand Equation 4 with two interaction terms, $ani_q * x_q$ and $pni_q * x_q$, and control for x_q, resulting in the regression model described in Equation 6. The interacting variable, x_q, is in turn the unemployment gap, the output gap, or the one-year Treasury yield, as a proxy of the monetary policy stance:

$$rx_q = \alpha + \beta ani_q + \tilde{\beta} ani_q * x_q + \gamma pni_q + \tilde{\gamma} pni_q * x_q + \delta mps_q + \theta x_q + \phi rx_{q-1} + u_q. \quad (6)$$

In Table 3, we report the estimates of the parameter for ani_q, $ani_q * x_q$, pni_q, and $pni_q * x_q$, with the relative t-statistics in italics. We also report the total effect of ani_q and pni_q on the quarterly

return–$\beta + \tilde{\beta} * x_q$ and $\gamma + \tilde{\gamma} * x_q$, respectively–evaluated when the x_q is equal to the $25th$ (low), the $50th$ (medium), and the $75th$ (high) percentiles of its historical distribution. From those estimates, we learn that the direction of the stock prices' reaction to activity and price surprises does not depend on the business cycle or the monetary policy stance. In particular, when we measure the state of the business cycle with either the output or the unemployment gap, or when we consider the stance of monetary policy, the reaction of stock prices does not change. Indeed, the coefficient of the interaction terms, for both ani_q and pni_q, are not statistically significant, and when we consider the total effect of our indexes, its variation due to the different percentiles of the historical distribution of this variable is negligible. This result is in sharp contrast with previous studies like McQueen and Roley (1993), Boyd, Hu and Jagannathan (2005), and Elenev et al. (2024), which found that the sign, or the existence, of the reaction of stock prices to activity news depends on the stage of the business cycle.

4 Firms' Reaction to Macro News

The analysis conducted so far clearly shows that macroeconomic news make market participants change, on average, their valuations of companies whose stocks are publicly traded. In this section, we verify that those price changes are indeed associated with changes in firms' behavior. To this end, we study how macroeconomic news affect the wide array of firm-level variables described in Section 2.

We quantify the effect of changes in our surprise index on those firm specific variables through local panel projections as in Ottonello and Winberry (2020):

$$y_{i,q+h} - y_{i,q} = \alpha_{i,h} + \beta_h ani_q + \gamma_h pni_q + \phi_h mps_q + \Phi'_{1,h} Z_{i,q-1} + \Phi'_{2,h} W_{tq-1} + \varepsilon_{i,q+h}, \tag{7}$$

where $y_{i,q}$ is the variable of interest in quarter q. For the majority of our firm-level variables, $y_{i,q}$ represents the natural logarithm of the variable, while for a subset of variables it is the level of the variable divided by the total book value of assets at time $q-1$.[13] All accounting variables are winsorized at the top and bottom 1% percent to mitigate the influence of outliers.

In Equation 7, $\alpha_{i,h}$ is a firm fixed effect; $Z_{i,q-1}$ includes leverage, log size, current assets, as in Ottonello and Winberry (2020), and $y_{i,q} - y_{i,q-1}$; and W_{q-1} consists of four lags of real GDP growth, the inflation rate (measured using the CPI), and the unemployment rate. We also include the monetary policy shock calculated by Bu, Rogers and Wu (2021) and aggregated at a quarterly

[13] For example, the change in profitability between quarter q and $q+h$ is defined as $\frac{IBQ_{q+h} - IBQ_q}{ATQ_{q-1}}$. We use this definition for changes in net debt issuance, total equity payout, R&D expenditures, and quarterly capital expenditures. The only exception is for the calculation of changes in gross margin, which are defined as $\frac{SALEQ_{q+h} - COGSQ_{q+h} - XSGAQ_{q+h}}{SALEQ_{q+h}} - \frac{SALEQ_q - COGSQ_q - XSGAQ_q}{SALEQ_q}$.

Table 4: Revenues and Profitability

	(1) MKT	(2) Sales	(3) Income	(4) Gross Margin
Panel A: Same quarter				
ani	7.531***	1.263***	0.240***	0.455***
	(3.228)	(3.925)	(2.751)	(3.287)
pni	-4.362***	0.379	-0.025	-0.163
	(-2.762)	(1.119)	(-0.627)	(-1.619)
mps	-1.183	0.653***	0.048	0.101
	(-0.943)	(3.393)	(1.322)	(1.249)
Obs	172,965	173,528	177,510	151,136
R^2	0.091	0.082	0.154	0.083
Panel B: One quarter ahead				
ani	10.891***	2.677***	0.111	0.585*
	(2.928)	(3.203)	(1.372)	(1.974)
pni	-7.990***	-0.202	-0.132	-0.363*
	(-2.959)	(-0.248)	(-1.373)	(-1.697)
mps	-0.650	0.607	-0.038	0.008
	(-0.355)	(1.456)	(-0.721)	(0.051)
Obs	170,272	170,696	174,824	148,642
R^2	0.149	0.152	0.151	0.113
Panel C: Four quarter ahead				
ani	10.516***	3.313***	0.165	0.249
	(2.898)	(2.944)	(1.201)	(0.805)
pni	-12.360***	-2.034**	-0.291*	-0.607***
	(-3.153)	(-2.053)	(-1.737)	(-2.673)
mps	-1.643	-0.065	-0.039	-0.224
	(-0.558)	(-0.084)	(-0.656)	(-1.062)
Obs	162,412	162,664	166,919	141,420
R^2	0.226	0.187	0.157	0.158
Firm-Level Controls	Yes	Yes	Yes	Yes
Macro-Level Controls	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes

Notes: The table reports estimates of the coefficients described in equation 7. Columns (1) to (4) report the effect of a one standard deviation change in macro news and monetary policy shock on market capitalization, revenues, income-to-asset, and gross margin, respectively. The sample goes from 2003q4 to 2019q4. In parenthesis, we report the relative t statistics calculated using standard errors clustered at the firm and time level.*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Table 5: Balance Sheet

	(1) Cash	(2) Rec.	(3) Invt.	(4) Book Equity	(5) Liabilities
Panel A: Same quarter					
ani	1.215**	1.305***	0.179	1.152**	0.143
	(2.644)	(3.334)	(1.106)	(2.525)	(0.667)
pni	-0.222	-0.062	0.460***	0.034	0.112
	(-0.486)	(-0.153)	(2.807)	(0.091)	(0.616)
mps	-0.234	0.529***	0.155	-0.044	0.016
	(-0.733)	(2.679)	(1.211)	(-0.209)	(0.143)
Obs	175,961	168,339	129,963	165,841	177,343
R^2	0.075	0.068	0.043	0.064	0.041
Panel B: One quarter ahead					
ani	1.925***	2.537***	0.657	1.820**	0.496
	(3.277)	(3.023)	(1.557)	(2.386)	(1.150)
pni	-1.827***	-0.400	0.496	-0.717	-0.021
	(-3.682)	(-0.519)	(1.281)	(-1.285)	(-0.071)
mps	-0.449	0.734	0.483*	-0.083	0.258
	(-1.070)	(1.664)	(1.724)	(-0.197)	(1.040)
Obs	173,242	165,540	127,811	162,719	174,622
R^2	0.108	0.125	0.095	0.128	0.100
Panel C: Four quarter ahead					
ani	1.637*	3.668***	2.032**	2.729***	1.460*
	(1.911)	(3.220)	(2.157)	(3.181)	(1.801)
pni	-2.045**	-2.415**	-0.659	-2.192***	-1.365**
	(-2.546)	(-2.222)	(-0.709)	(-2.953)	(-2.073)
mps	-0.151	-0.041	0.130	-0.333	-0.235
	(-0.290)	(-0.049)	(0.213)	(-0.530)	(-0.472)
Obs	165,301	157,562	121,702	154,096	166,681
R^2	0.167	0.177	0.189	0.272	0.234
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes
Macro-Level Controls	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes

Notes: The table reports estimates of the coefficients described in equation 7. Columns (1) to (5) report the effect of a one standard deviation change in macro news and monetary policy shock on cash holdings, receivables, inventories, book equity, and total liabilities, respectively. The sample goes from 2003q4 to 2019q4. In parenthesis, we report the relative t statistics calculated using standard errors clustered at the firm and time level.*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Table 6: Financing and Investment

	(1) SSTK	(2) Net Debt Iss.	(3) Total P.O.	(4) R&D	(5) CAPX
Panel A: Same quarter					
ani	0.113	0.022	0.006	-0.026	0.023***
	(0.910)	(0.689)	(0.237)	(-1.495)	(3.806)
pni	-0.166	-0.022	-0.007	0.024	0.008
	(-1.278)	(-0.616)	(-0.379)	(1.538)	(1.222)
mps	-0.143	0.027	0.008	0.000	0.007
	(-1.550)	(0.969)	(0.615)	(0.042)	(1.501)
Obs	170,460	160,458	154,571	89,631	174,742
R^2	0.265	0.247	0.195	0.067	0.126
Panel B: One quarter ahead					
ani	0.246***	0.067*	0.040	0.022	0.048***
	(2.856)	(1.779)	(1.636)	(0.716)	(3.473)
pni	-0.327***	-0.046	-0.011	0.021	-0.002
	(-4.224)	(-1.218)	(-0.520)	(0.895)	(-0.178)
mps	-0.077	0.035	0.011	-0.009	0.020**
	(-1.214)	(1.367)	(0.663)	(-0.589)	(2.214)
Obs	167,369	156,659	150,902	87,954	171,955
R^2	0.266	0.231	0.213	0.075	0.130
Panel C: Four quarter ahead					
ani	0.093	0.149***	0.112***	0.045	0.101***
	(0.913)	(3.156)	(2.813)	(1.101)	(3.162)
pni	-0.228**	-0.129***	-0.092**	-0.048	-0.058*
	(-2.255)	(-2.839)	(-2.568)	(-1.224)	(-1.932)
mps	0.031	-0.001	-0.019	-0.018	0.002
	(0.387)	(-0.017)	(-0.614)	(-0.620)	(0.097)
Obs	159,171	148,373	142,721	83,202	164,026
R^2	0.283	0.214	0.196	0.192	0.174
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes
Macro-Level Controls	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes

Notes: The table reports estimates of the coefficients described in equation 7. Columns (1) to (5) report the effect of a one standard deviation change in macro news and monetary policy shock on stock issuance, net debt issuance, total payout, R&D expenditures, and capital expenditures, respectively. The sample goes from 2003q4 to 2019q4. In parenthesis, we report the relative t statistics calculated using standard errors clustered at the firm and time level.*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

level. In the empirical analysis, ani_q, pni_q, and mps_q are divided by their standard deviation, so β_h, γ_h, and ϕ_h are the average (cumulative) changes over horizon h due to a one standard deviation change in ani_q, pni_q, and mps_q, respectively. Standard errors are clustered at the firm and time level.[14]

Tables 4 to 6 report the results. For the average response of market capitalization, firms in our sample display a contemporaneous quarterly 7.5% increase (4.4% decrease) in equity value following a one standard deviation change in the activity (price) news index (column 1 in Panel A of Table 4). These average equity price changes are large and significant and in line with the results in Section 3.1. Of note, the aggregate quarterly monetary policy shock elicits a response in equity prices that is negative but not significantly different from zero. Again, this result is in line with the findings in Section 3.1. The effect of macroeconomic news on firm-level equity prices is persistent, as the results in Panels B and C show. After one year, equity prices increase by 10.5% (decrease by 12.4%) following a one standard deviation change in the activity (price) news index.

As expected, contemporaneous sales and profitability both significantly increase following positive real economic activity news. Sales increase by roughly 1.3% on a quarterly basis (column 2 in Panel A of Table 4), while the income-to-assets ratio increases by 0.24% relative to the previous quarter total assets. The increase in gross margin is also significantly positive and equal to about $\frac{1}{2}$ percentage point. In contrast to the two profitability measures, the change in sales is persistent and still significant both at the one-quarter-ahead and at one-year-ahead horizons: Sales increase by 2.7% on a quarterly basis and 3.3% on an annual basis. Price news do not affect sales and profitability contemporaneously, but have a negative and significant effect at the one year horizon. For example, a one standard deviation increase in the price news index is associated with an annual decline in sales of about 2% and a decrease in profitability of 0.3% if we consider income over assets and of 0.6% if we consider gross margins. These findings are consistent with recent evidence suggesting that both investors (e.g., Knox and Timmer, 2023) and firms (e.g., Yotzov et al., 2024) might perceive inflation revisions as a cost shock leading to higher input costs and lower sales volume growth.

Moving to balance sheet items (Table 5), we immediately see that the reaction of sales to macroeconomic news produces expected changes in the firm's liquidity position. First, following positive real economic news, both cash holdings and receivables increase and significantly so at all horizons (columns 1 and 2). Inventories, the other important component of a firm's current assets, increase significantly only a the one year horizon. At the same time, book equity also increases significantly. A large driver of such an increase is the positive change in cumulative retained earnings, which is consistent with an increase in the firm's internal cash liquidity.[15] Column (5)

[14] Consistent with the previous section, our firm-level analysis covers the 2003-19 period. Appendix C reports the results using the full sample and highlights some issues that arise when including the COVID-19 period.

[15] We do not report the effects of *ani* and *pni* on cumulative retained earnings because we already use an alternative

shows that the effect of real economic news on liabilities is negligible.

Similar to the reaction of firm-level quantities in Table 4, inflation tends to affect balance sheet items with some delay.[16] Positive inflation news erode the value of nominal cash balances; for this reason, we see a large decrease in cash holdings of about 2% in the next quarter. This significant decline persists one year out (column 1). Receivables are also affected by price news, and they decline in a fashion similar to cash holdings at the one-year horizon. While inflation news do not affect the right-hand side of the balance sheet in the near term, they cause a significant decline in book equity and liabilities after one year.

We conclude our analysis of the firm-level reaction to macroeconomic news by looking at changes in financing and investment behavior. The robust finding that emerges from looking at Table 6 is the positive and significant increase in capital expenditures following positive news in real activity. The response of physical investment is already significant in quarter t=0, and it persists for the subsequent four quarters (column 5). This reaction is in stark contrast with the one of R&D expenditures, which are unaffected by economic news (column 4). The latter result is consistent with the view that R&D has high adjustment costs and thus is less responsive to transitory shocks (e.g., Brown and Petersen, 2011). The increase in physical investment is also paired with an increase in net debt issuance (column 2), as access to debt financing is less costly when financing tangible assets. Table 6 also makes clear that price news are only marginally relevant for firm-level investment decisions. However, things are different for financing and payout decisions. Focusing on the four-quarter-ahead results, we see that positive real activity news elicit an increase both in total payout and in overall financing activity (albeit the increase in equity issuance is not significant). Conversely, positive price news have the opposite effects: Debt and equity financing slow down and total payouts decrease, a result consistent with the reduction in equity valuation documented in Table 4.

It is important to note that, in contrast to macro news, monetary policy shocks rarely affect firm-level quantities in a significant way. This finding clearly points to monetary policy shocks being second order relative to macroeconomic news in driving firm-level outcomes. This conclusion is consistent with Sharpe and Suarez (2021), who document that most firms' investment plans are insensitive to changes in the interest rate.[17]

measure of changes in profitability in Table 5.

[16] The only exception is the significant contemporaneous increase in inventories which increase, on average, by $\frac{1}{2}$ a percentage point following a one standard deviation increase in the price news index.

[17] One might assume that the irrelevance of the monetary policy shock for firm-level outcomes might depend on the particular monetary policy shock measure we use. We obtain the same conclusion if we replace the monetary policy shocks of Bu, Rogers and Wu (2021) with the ones of Bauer and Swanson (2023), which are orthogonalized with respect to macroeconomic and financial data. The results using the monetary policy shocks of Bauer and Swanson (2023) are not reported, but are available upon request.

5 The Macro Consequences of Macro News

As the previous section documents, a quarter of macro news that surprise the market, on average, in the same direction is followed by significant firm-level changes. Not only do firms experience changes in their revenues and liquidity, which may be mechanically driven by a change in demand, but they also proactively adjust their financing and investment policies. These changes are broad based across firms; therefore, the natural follow-up question is whether macro news also have aggregate consequences, meaning that those broad-based firm-level reactions are consistently reflected in aggregate macrodata. In order to verify that this is indeed the case, we rely on the local projections of Jordà (2005) to generate impulse response functions:

$$y_{q+h} - y_q = \alpha_h + \beta_h ani_q + \gamma_h pni_q + \Phi_h' Z_q + \varepsilon_{q,h},$$

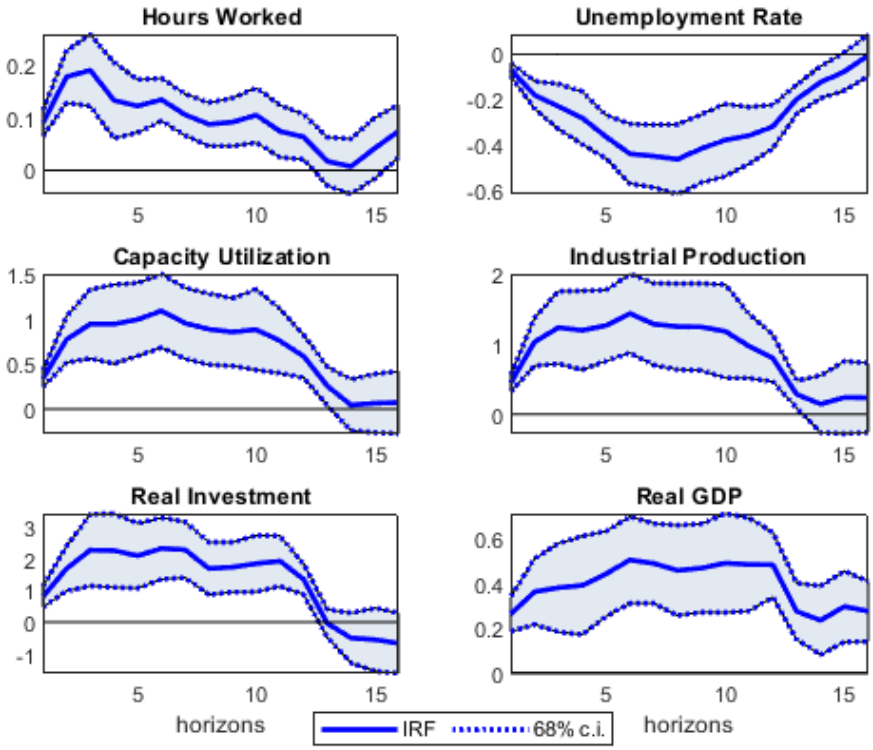
where y_q is the (log-) macro variable of interest, α_h is the constant, and β_h and γ_h are the average (cumulative) reaction of the variable of interest over horizon h due to a one standard deviation change in the activity and price index, respectively. Following Ramey (2016), we add Z_q, which includes some important controls: the Bu, Rogers and Wu (2021) monetary policy shock contemporaneous and lagged of one period, and the one-period lagged values of: the (log-)change of the macro variable on the left-hand-side; the log-changes of the industrial production index (when it is not the left-hand-side variable), of the producer price index and of the consumption price index; the levels of the unemployment rate and the one-year Treasury bond yield; and our activity and price indexes.

In particular, we analyze the relation between our news indexes on the following macro variables: hours worked (manufacturing), the unemployment rate, total capacity utilization, industrial production, real gross investment, and real GDP.[18] Figure 3 reports β_h, the average cumulative (log-)change over horizon h of the variable of interest to a one standard deviation change in the real activity index.

Figure 3 documents that the aggregate economy responds to a quarter of overall positive activity-related macro surprises in line with what the firm-level evidence implies. The top panels report the reaction of labor markets. Positive activity-related macro news are associated with positive developments in both hours worked (left panel) and unemployment (right panel). The former increases by 0.1% on impact, but this effect starts to revert in the first few quarters, while the latter decreases less in absolute value on impact but, differently from hours worked, displays a more protracted slump.

[18] All the variables are expressed in logarithmic terms with the exception of total capacity utilization and unemployment rate. Table A.4, in the appendix, reports the description of the macrodata with their sources and their transformations.

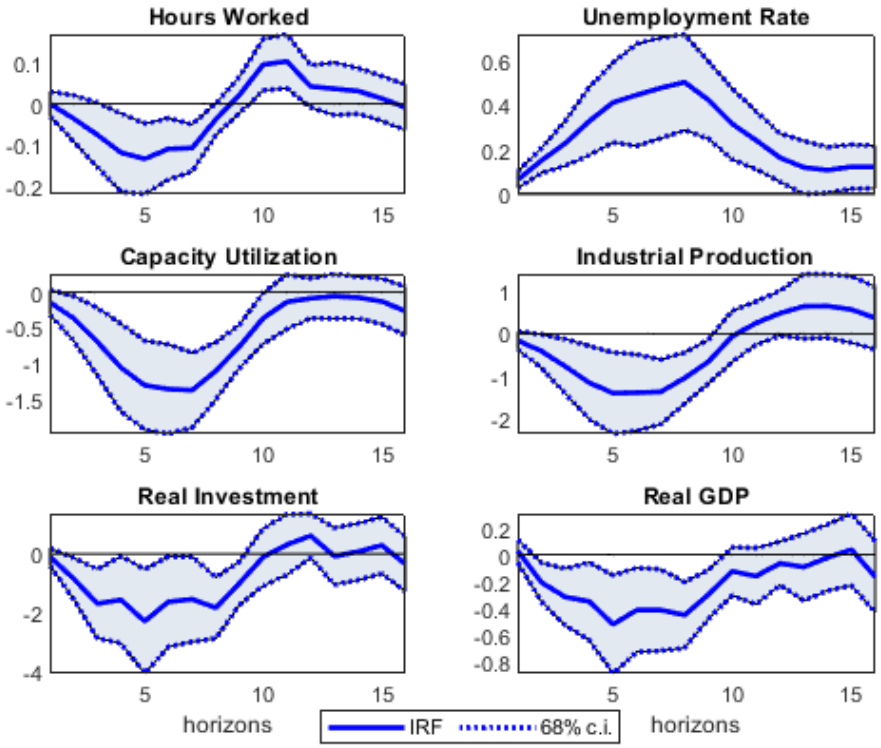
Figure 3: IRFs to Activity News Index



Notes: The figure reports impulse response functions (IRFs) of six macro variables to a standard deviation increase in our activity news index *ani*, together with their 68% confidence intervals

The positive developments in labor markets are paired with an increase in the utilization of the economy production activities as both total capacity utilization and industrial production significantly increase, as reported by the middle panels in Figure 3. The bottom panels show that the economy responds not only by increasing the utilization of its two most important production factors (labor and capital), but also by expanding its productive capacity. The bottom-left panel shows that gross real investment significantly increases following a quarter of good activity-related macro news, and this increase persists in a significant fashion up to about 10 quarters into the future. All in all, the economy reacts to positive macro news with production and investment expansions that have a positive effect also on the summary measure of the health of the economy, the real GDP, shown in the bottom-right panel. These results are qualitatively similar to the ones we obtain when we expand our sample covering the period from 1998 to 2019, although the price index, for which almost half of the input series are available after 2003, has a more negligible effect on GDP and investments, as reported in Appendix D.

Figure 4: IRFs to Price News Index



Notes: The figure reports impulse response functions (IRFs) of six macro variables to a standard deviation increase in our price news index *pni*, together with their 68% confidence intervals

Figure 4 reports the response to price-related macro news. Again, the results are consistent with the firm-level evidence and the reaction of the whole economy to a quarter of overall positive price-related macro news is negative. The top panels of Figure 4 show that hours worked decline and the unemployment rate shoots up, while the middle panels show a decline in both total capacity utilization and industrial production. This contraction in resource utilization remains significant well beyond the one-year horizon. To conclude, the bottom-left panel shows that real investment also contracts, a result broadly in line with the firm-level evidence. Again, the overall negative effect in resource utilization and investment translates into a drop of real GDP, which decreases 0.2% on impact and recovers after about 10 quarters.

6 Conclusion

Stock prices' fluctuations are robustly associated with macroeconomic news once the latter are considered as a whole and separated into activity and price news. By proposing two novel macro news indexes, we show that about one-third of the variability in quarterly equity prices can be attributed to market participants updating their information set about the state of the economy. When we consider the real activity news index, a one standard deviation increase in the latter quantity is associated, in an average quarter, with a stock market appreciation of about 4%. Aggregate macroeconomics price news also matter for equity prices, but elicit a generally lower response. In the latter case, a one standard deviation increase is associated, in an average quarter, with a stock market depreciation of about 2%.

The revision of equity valuations triggered by macroeconomic news is consistent with reactions in the real economy. At the firm level, following a stream of positive macroeconomic surprises, publicly traded U.S. firms experience not only a mechanical reaction –i.e., is higher revenues, liquidity, and profitability– but also a positive change in financing and investment activities, hinting at a causal relation between macro surprises and firms' behavior. These firm-level results are mirrored in the reaction of the overall U.S. economy, which responds to favorable macroeconomic news with production and investment expansions that have a positive effect also on the summary measure of the health of the economy, the real GDP.

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A Data

Table A.1: Activity surprises

Variables	Start	# obs.	Freq.	Rel.
ISM Manufacturing	1/2/1998	317	M	95
Factory Orders	1/6/1998	315	M	85
New Home Sales	1/7/1998	316	M	88
Initial Jobless Claims	1/8/1998	1373	W	98
Consumer Credit	1/8/1998	316	M	42
Change in Nonfarm Payrolls	1/9/1998	317	M	99
Unemployment Rate	1/9/1998	316	M	89
Philadelphia Fed Business Outlook	1/9/1998	317	M	77
Wholesale Inventories MoM F	1/9/1998	304	M	79
Business Inventories	1/14/1998	317	M	37
Industrial Production MoM	1/14/1998	316	M	87
Capacity Utilization	1/15/1998	315	M	61
Trade Balance	1/15/1998	317	M	82
Monthly Budget Statement	1/16/1998	315	M	72
Conf. Board Consumer Confidence	1/16/1998	316	M	92
Personal Income	1/21/1998	315	M	85
Personal Spending	1/23/1998	314	M	85
Leading Index	1/27/1998	317	M	82
Current Account Balance	1/28/1998	104	Q	71
Durable Goods Orders P	1/28/1998	308	M	92
Housing Starts	1/30/1998	313	M	88
Change in Manufact. Payrolls	1/30/1998	305	M	69
GDP Annualized QoQ A	1/30/1998	106	Q	96
Retail Sales Advance MoM	2/2/1998	316	M	93
Retail Sales Ex Auto MoM	2/2/1998	316	M	65
Continuing Claims	2/3/1998	1094	W	69
Building Permits	2/27/1998	261	M	61
GDP Annualized QoQ S	2/27/1998	104	Q	96
Empire Manufacturing	3/12/1998	259	M	83
Wards Total Vehicle Sales	3/17/1998	256	M	42
NAHB Housing Market Index	3/26/1998	254	M	44
GDP Annualized QoQ T	3/26/1998	104	Q	96
Nonfarm Productivity P	5/11/1998	94	Q	43
Construction Spending MoM	10/1/1998	305	M	78
Existing Home Sales	1/6/1999	231	M	86
Pending Home Sales MoM	1/8/1999	228	M	75
Richmond Fed Manufact. Index	2/5/1999	222	M	72
Existing Home Sales MoM	5/11/1999	216	M	47
New Home Sales MoM	5/14/1999	214	M	45
U. of Mich. Sentiment P	5/14/1999	300	M	94
ADP Employment Change	5/28/1999	211	M	91
U. of Mich. Sentiment F	5/28/1999	301	M	94
Dallas Fed Manf. Activity	3/6/2001	183	M	64
Nonfarm Productivity F	3/26/2001	90	Q	43
Chicago Fed Nat Activity Index	12/28/2001	156	M	62
Durables Ex Transportation P	12/28/2001	261	M	73
Retail Sales Ex Auto and Gas	8/8/2002	178	M	55
Pending Home Sales NSA YoY	8/16/2002	126	M	30
Building Permits MoM	11/15/2002	171	M	29
Housing Starts MoM	1/1/2003	169	M	32
Average Weekly Hours All Employees	1/30/2003	301	M	28
Personal Consumption A	1/30/2003	85	Q	67
NFIB Small Business Optimism	2/28/2003	170	M	58
Personal Consumption S	2/28/2003	83	Q	67
Change in Private Payrolls	3/27/2003	169	M	35
Personal Consumption T	3/27/2003	85	Q	67
JOLTS Job Openings	4/15/2003	146	M	51
Kansas City Fed Manf. Activity	3/23/2005	149	M	23
Manufacturing (SIC) Production	6/1/2005	143	M	19
Wholesale Trade Sales MoM	10/25/2005	109	M	16
MNI Chicago PMI	6/27/2006	316	M	81
ISM Services Index	7/27/2006	303	M	80
Cap Goods Ship Nondef Ex Air P	1/26/2012	139	M	49
Cap Goods Orders Nondef Ex Air P	6/15/2012	156	M	53

Notes: The table reports the activity series in chronological order. For each series, we report the date the consensus forecast was first available in Bloomberg, the number of observations in our sample, the frequency, and the relevance index. The relevance index is the number of Bloomberg users that set up n automatic alert to be notified when the figure for a given macroeconomic variable has been released.

Table A.2: Price surprises

Variables	Start	# obs.	Freq.	Rel.
PPI Ex Food and Energy MoM	1/8/1998	316	M	67
PPI Final Demand MoM	1/8/1998	316	M	90
CPI Ex Food and Energy MoM	1/13/1998	316	M	78
CPI MoM	1/13/1998	317	M	97
CPI Index NSA	08/17/2004	232	M	40
GDP Price Index T	3/31/1999	99	Q	77
GDP Price Index S	4/30/1999	97	Q	77
GDP Price Index A	1/28/2000	96	Q	77
CPI Ex Food and Energy YoY	2/21/2003	247	M	69
CPI YoY	2/21/2003	248	M	95
PPI Ex Food and Energy YoY	7/11/2003	239	M	66
PCE Deflator YoY	5/28/2004	234	M	55
FHFA House Price Index MoM	4/22/2008	192	M	68
CPI Core Index SA	2/19/2010	136	M	48
PCE Deflator MoM	3/30/2012	145	M	33
PPI Ex Food, Energy, Trade MoM	12/12/2014	113	M	20
PPI Final Demand YoY	11/15/2002	243	M	68
PCE Core Deflator MoM	6/30/2005	226	M	60
PCE Core Deflator YoY	8/3/2004	235	M	58
Core PCE QoQ A	7/28/2006	70	Q	67
Core PCE QoQ S	5/25/2006	71	Q	67
Core PCE QoQ T	9/28/2006	70	Q	67

Notes: The table reports the price series in chronological order. For each series, we report the date the consensus forecast was first available in Bloomberg, the number of observations in our sample, the frequency, and the relevance index. The relevance index is the number of Bloomberg users that set up n automatic alert to be notified when the figure for a given macroeconomic variable has been released.

Table A.3: Firm-Level Data

	Mean	Std. Dev.	p10	Median	p90	Obs.
MKT Return	1.85	26.65	-27.96	2.39	30.45	194,103
Sales	2.01	28.13	-20.40	2.34	24.22	201,652
Income	0.16	6.20	-3.21	0.05	3.20	201,557
Gross Margin	1.27	24.60	-7.98	0.16	9.14	175,229
Cash Holdings	2.64	59.62	-49.23	0.26	56.98	197,683
Receivables	2.19	30.27	-24.82	1.72	29.39	188,549
Inventories	1.86	19.04	-15.75	1.33	19.95	144,583
Book Equity	2.05	21.05	-11.76	1.47	11.37	186,969
Liabilities	2.53	19.31	-12.46	0.63	18.86	198,893
Equity Issuance	0.69	14.39	-0.58	0.00	0.65	191,767
Net Debt Issuance	0.18	6.70	-3.46	0.00	3.66	182,541
Total Payout	-0.02	2.17	-0.66	0.00	0.69	176,780
R&D	-0.03	2.18	-0.63	0.00	0.83	102,479
CAPX	0.04	1.10	-0.69	0.01	0.74	195,943

Notes: The table reports the summary statistics for the quarterly changes in the firm-level variables used in the empirical analysis. For each series, we report the mean, standard deviation, bottom decile, median, top decile, and the number of total firm-quarter observations. The sample goes from 2003q4 to 2019q4, to be consistent with the sample used in the baseline analysis.

Table A.4: Macro Data

Description	Transformations	Fred mnemonics
1-year Treasury Yield	none	DGS1
Average Weekly Hours	log	AWHMAN
Consumer Price Index	log	CPIAUCSL
Commodity Price Index	log	PPIACO
Industrial Production	log	INDPRO
Noncyclical Rate of Unemployment	none	NROU
Real GDP	log	GDPC1
Real Gross Investment	log	GPDIC1
Real Potential GDP	none	GDPPOT
Total Capacity Utilization	none	TCU
Unemployment Rate	none	UNRATE

Notes: The table reports the macroeconomic data used in section 5, the transformation we imposed, and the mnemonics of FRED, the economic data set maintained by the Saint Louis Federal Reserve.

B Stock Prices' Reaction to Macro News: Including post-Covid Data

In the main text, our analysis is executed on a sample that covers the period 2003-2019. The reason why we start in 2003 is the fact that about 40% of our news (and in particular the expectations) are available from that year. The reason why we stop in 2019 is the difficulty of controlling for the effect of the unprecedented expansionary fiscal policies on our firm-level results over the Covid and post-Covid sample. Here we include the pre-2003 and post-2019 sample in the analysis about the ability of our indexes to explain S&P 500 returns, to understand how lack of information and extreme events experienced in the Covid period have affected the relation between macro news and stock prices. Table B shows the estimation results of equation 4 when we expand our sample. Compared to the results relative obtained over the sample 2003-2019, showed in Table 3, the most striking difference is the loss of statistical significance of the price index.

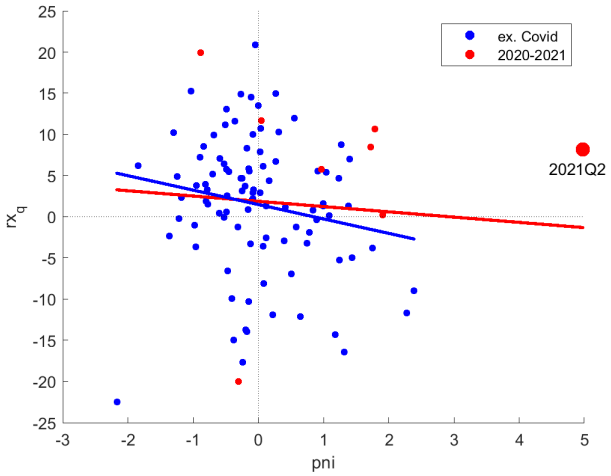
Table B.1: Quarterly Results quarterly 1998-2023

ani_q	pni_q	mps_q	rx_{q-1}	R^2	R^2_{adj}
3.82	-1.06	-0.12	-0.06	20%	17%
5.05	*-1.22*	*-0.13*	*-0.63*		
3.70		-0.11	-0.06	19%	16%
5.03		*-0.12*	*-0.64*		
	-0.64	-0.25	-0.01	1%	-2%
	-0.66	*-0.23*	*-0.07*		

Notes: The table reports estimates of the coefficients described in equation 4 where we regress the quarterly returns of the S&P 500, rx_q, on the quarterly activity news index, ani_q, and price news index, pni_q, together (first row), or separately (second and third row). In each regressions we control for the quarterly aggregation of the monetary policy shock, mps_q, of Bu, Rogers and Wu (2021), and a lag of the quarterly returns. In italic we report the relative t-stat corrected for heteroschedasticity and autocorrelation. The last two columns report the relative R^2s and their adjusted version R^2_{adj}.

The main reason why there is a loss of significance of the parameter that estimates the relation between the quarterly S&P returns with the price news index are the observations relative to Q2 2021. As we can see in the scatter plot reported in Figure B.1, in that quarter, although market participants started to be surprised by higher than expected releases about prices, the stock price index was still raising in the aftermath of the extreme declines experienced at the beginning of the COVID period and embracing the narrative of the temporary nature of increase of inflation. Indeed, when we exclude Q2-2021, our price news index becomes again significant, as shown in the first row of Table B.

Figure B.1: S&P Returns and Price News Index



Notes: The figure compares the of the quarterly returns of the S&P 500 (rx_q) with the z-score of the price news index (pni_q). The red dotes are pair of observations during Covid. The blue line is the regression line excluding Covid, the red line is including Covid.

Table B.2: Quarterly Results quarterly 1998-2023 excluding Q2-2021

ani_q	pni_q	mps_q	rx_{q-1}	R^2	R^2_{adj}
3.91	-1.59	-0.24	-0.07	22%	19%
4.95	*-2.09*	*-0.28*	*-0.69*		
3.70		-0.11	-0.06	19%	16%
5.03		*-0.12*	*-0.64*		
	-0.64	-0.25	-0.01	1%	-2%
	-0.66	*-0.23*	*-0.07*		

Notes: The table reports estimates of the coefficients described in equation 4 where we regress the quarterly returns of the S&P 500, rx_q, on the quarterly activity news index, ani_q, and price news index, pni_q, together (first row), or separately (second and third row). In each regressions we control for the quarterly aggregation of the monetary policy shock, mps_q, of Bu, Rogers and Wu (2021), and a lag of the quarterly returns. In italic we report the relative t-stat corrected for heteroscedasticity and autocorrelation. The last two columns report the relative R^2s and their adjusted version R^2_{adj}.

C Firm-level analysis with full sample

Tables C.1 to C.3 report the firm-level results using the full sample of data that goes from 1998q4 to 2023q4. The overall narrative that emerges using the restricted sample still broadly survive for the real activity news index: Following a stream of positive macroeconomic surprises, publicly traded firms experience an improvement of their economic outlook. This is not the case when we look at the aggregate price news index. In the full sample, the great majority of firm-level variables are not significantly associated to price news, independently from the horizon. Such an outcome is entirely due to the post-2019 period, when we consider the 1998-2019 period the reaction of firm-level variables to aggregate price news is similar to the one in the restricted sample.

Figures C.1 and C.2 further highlight the problematic nature of including the COVID-19 period. Figure C.1 shows how, outside the year 2020, the co-movement between change in sales and changes in cash holdings is robustly positive. However, in the first two quarters of 2020, large decreases in sales are associated with large increases in cash holdings. The reason being the corporate dash-for-cash episode during which corporations draw an unprecedented amount of cash from their credit lines (e.g., Acharya and Steffen (2020)).

Figure C.2 shows that the breakdown of the sales-cash holdings relationship during COVID-19 affects the way we interpret the relation between these two variables and the activity news index. The top panel shows how in the second quarter of 2020, an unprecedented sequence of positive real activity news was associated to an unprecedented increase in cash and a sharp decline in sales. Including the COVID-19 period delivers a much weaker relation between the activity news index and sales growth in the near term, as column 2 of Table C.1 illustrates. The opposite is true for cash holdings, as Table C.2 reports a much stronger association between the activity news index and cash holdings in the near term.

Table C.1: Revenues and Profitability

	(1) MKT	(2) Sales	(3) Income	(4) Gross Margin
Panel A: Same quarter				
ani	6.651***	-0.443	0.132*	0.084
	(5.160)	(-0.433)	(1.973)	(0.233)
pni	-0.887	1.388***	0.065	0.232
	(-0.779)	(2.831)	(1.416)	(1.441)
mps	-0.217	0.734**	0.017	0.201*
	(-0.195)	(2.161)	(0.467)	(1.756)
Obs	289,940	290,155	298,735	250,144
R^2	0.080	0.074	0.148	0.082
Obs	172,965	173,528	177,510	151,136
R^2	0.091	0.082	0.154	0.083
Panel B: One quarter ahead				
ani	9.145***	1.626*	0.126***	0.684***
	(4.979)	(1.844)	(2.774)	(3.757)
pni	-0.813	1.463**	-0.002	0.127
	(-0.387)	(2.085)	(-0.030)	(0.772)
mps	0.349	0.830	-0.043	0.084
	(0.217)	(1.657)	(-0.930)	(0.585)
Obs	284,701	284,809	293,458	245,491
R^2	0.125	0.132	0.141	0.110
Panel C: Four quarter ahead				
ani	8.910***	3.828***	0.067	0.650***
	(2.648)	(5.166)	(0.901)	(3.103)
pni	-4.332	1.652	-0.085	0.110
	(-1.431)	(1.515)	(-0.818)	(0.507)
mps	1.443	0.589	-0.100	-0.157
	(0.556)	(0.738)	(-1.463)	(-0.753)
Obs	262,349	262,836	270,766	226,019
R^2	0.192	0.174	0.140	0.161
Firm-Level Controls	Yes	Yes	Yes	Yes
Macro-Level Controls	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes

Notes: The table reports estimates of the coefficients described in equation 7. Columns (1) to (4) report the effect of a one standard deviation change in macro news and monetary policy shock on market capitalization, revenues, income-to-asset, and gross margin, respectively. The sample goes from 1998q4 to 2023q4. In parenthesis, we report the relative t statistics calculated using standard errors clustered at the firm and time level.*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Table C.2: Balance Sheet

	(1) Cash	(2) Rec.	(3) Invt.	(4) Book Equity	(5) Liabilities
Panel A: Same quarter					
ani	2.396***	0.181	0.096	1.123***	0.337**
	(3.810)	(0.290)	(0.675)	(3.920)	(2.465)
pni	0.165	0.625	0.568***	0.614**	0.121
	(0.386)	(1.584)	(2.779)	(2.061)	(0.727)
mps	-0.140	0.427	0.090	0.159	0.001
	(-0.453)	(1.364)	(0.495)	(0.703)	(0.009)
Obs	295,625	280,842	215,366	279,250	298,427
R^2	0.070	0.057	0.039	0.049	0.036
Panel B: One quarter ahead					
ani	2.650***	1.604**	0.254	2.012***	0.731**
	(2.830)	(1.985)	(0.734)	(5.173)	(2.593)
pni	-0.672	0.894	1.131***	0.717	0.268
	(-1.137)	(1.400)	(2.820)	(1.315)	(0.880)
mps	-0.360	0.863*	0.423	0.296	0.286
	(-0.885)	(1.789)	(1.173)	(0.718)	(1.030)
Obs	290,291	275,372	211,347	273,245	293,117
R^2	0.096	0.106	0.084	0.098	0.087
Panel C: Four quarter ahead					
ani	1.763	3.636***	2.432***	3.451***	2.126***
	(0.974)	(4.772)	(4.677)	(4.520)	(4.227)
pni	-2.094*	1.266	2.065**	0.306	0.263
	(-1.887)	(1.134)	(2.257)	(0.331)	(0.378)
mps	0.272	0.663	0.530	0.699	0.207
	(0.375)	(0.754)	(0.824)	(0.941)	(0.372)
Obs	267,714	253,567	195,337	250,140	270,415
R^2	0.149	0.155	0.163	0.215	0.205
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes
Macro-Level Controls	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes

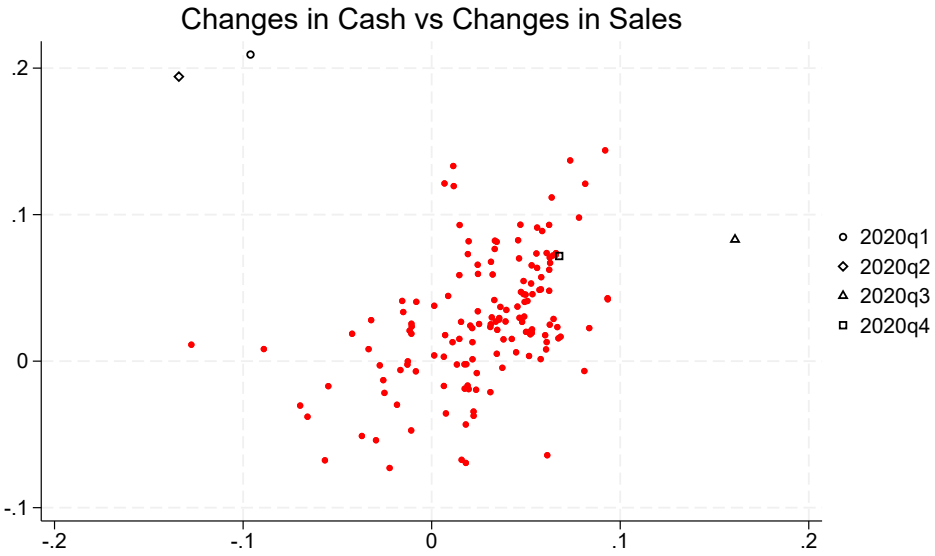
Notes: The table reports estimates of the coefficients described in equation 7. Columns (1) to (5) report the effect of a one standard deviation change in macro news and monetary policy shock on cash holdings, receivables, inventories, book equity, and total liabilities, respectively. The sample goes from 1998q4 to 2023q4. In parenthesis, we report the relative t statistics calculated using standard errors clustered at the firm and time level.*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Table C.3: Financing and Investment

	(1) SSTK	(2) Net Debt Iss.	(3) Total P.O.	(4) R&D	(5) CAPX
Panel A: Same quarter					
ani	0.488***	0.125***	-0.011	-0.017	0.001
	(4.113)	(3.307)	(-0.744)	(-1.201)	(0.080)
pni	0.048	0.068**	0.017	0.031**	0.021**
	(0.470)	(2.255)	(1.212)	(2.274)	(2.437)
mps	0.055	0.030	0.008	0.003	0.008
	(0.605)	(1.293)	(0.831)	(0.273)	(1.257)
Obs	283,513	265,899	254,426	152,531	290,216
R^2	0.254	0.242	0.194	0.069	0.123
Panel B: One quarter ahead					
ani	0.368***	0.008	0.014	0.041**	0.026
	(4.415)	(0.193)	(0.573)	(2.171)	(1.602)
pni	-0.027	0.102**	0.022	0.034	0.024
	(-0.360)	(2.595)	(1.272)	(1.560)	(1.598)
mps	0.006	0.059**	0.016	0.003	0.022*
	(0.087)	(2.182)	(1.056)	(0.172)	(1.863)
Obs	277,656	258,721	247,593	149,302	284,795
R^2	0.267	0.231	0.210	0.069	0.124
Panel C: Four quarter ahead					
ani	0.021	0.107***	0.079***	0.161***	0.093***
	(0.166)	(2.743)	(3.383)	(5.171)	(4.982)
pni	-0.192*	0.040	0.004	0.025	0.038
	(-1.783)	(0.757)	(0.140)	(0.534)	(1.277)
mps	0.086	-0.003	-0.010	0.043	0.020
	(1.046)	(-0.075)	(-0.386)	(1.174)	(0.890)
Obs	255,275	236,125	225,966	135,952	262,527
R^2	0.285	0.215	0.196	0.161	0.147
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes
Macro-Level Controls	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes

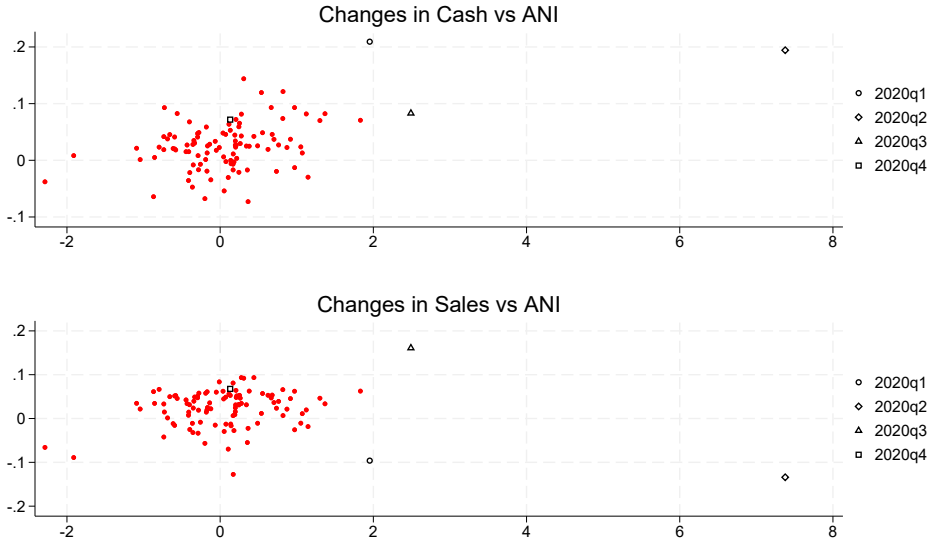
Notes: The table reports estimates of the coefficients described in equation 7. Columns (1) to (5) report the effect of a one standard deviation change in macro news and monetary policy shock on stock issuance, net debt issuance, total payout, R&D expenditures, and capital expenditures, respectively. The sample goes from 1998q4 to 2023q4. In parenthesis, we report the relative t statistics calculated using standard errors clustered at the firm and time level.*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Figure C.1: IRFs to Activity News Index 1998 2023



Notes: The figure reports firm-level quarterly changes in sales (x-axis) versus firm-level quarterly changes in cash holdings (y-axis) for the period 199q1-2023q4.

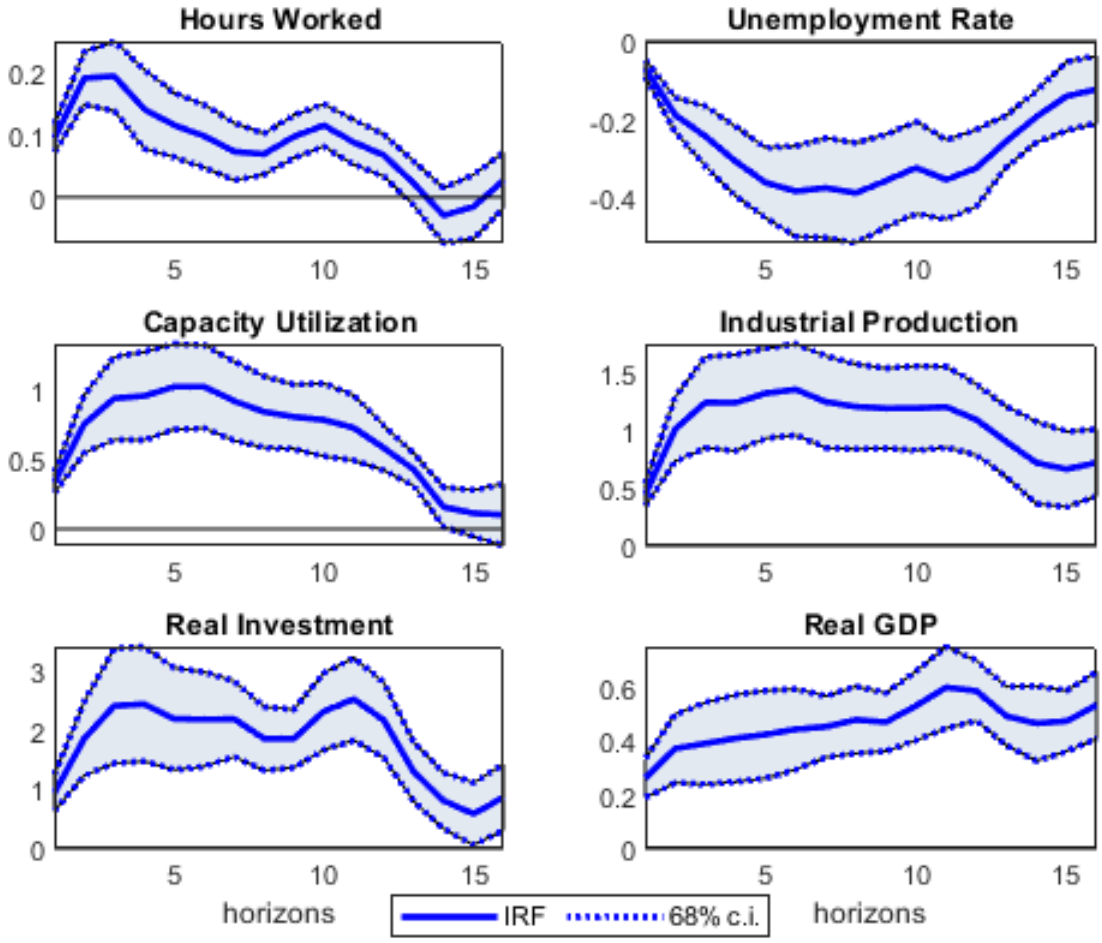
Figure C.2: IRFs to Price News Index 1998 2023



Notes: The top (bottom) panel of this figure reports changes in *ani* (x-axis) versus firm-level quarterly changes in cash holdings (sales, y-axis) for the period 199q1-2023q4.

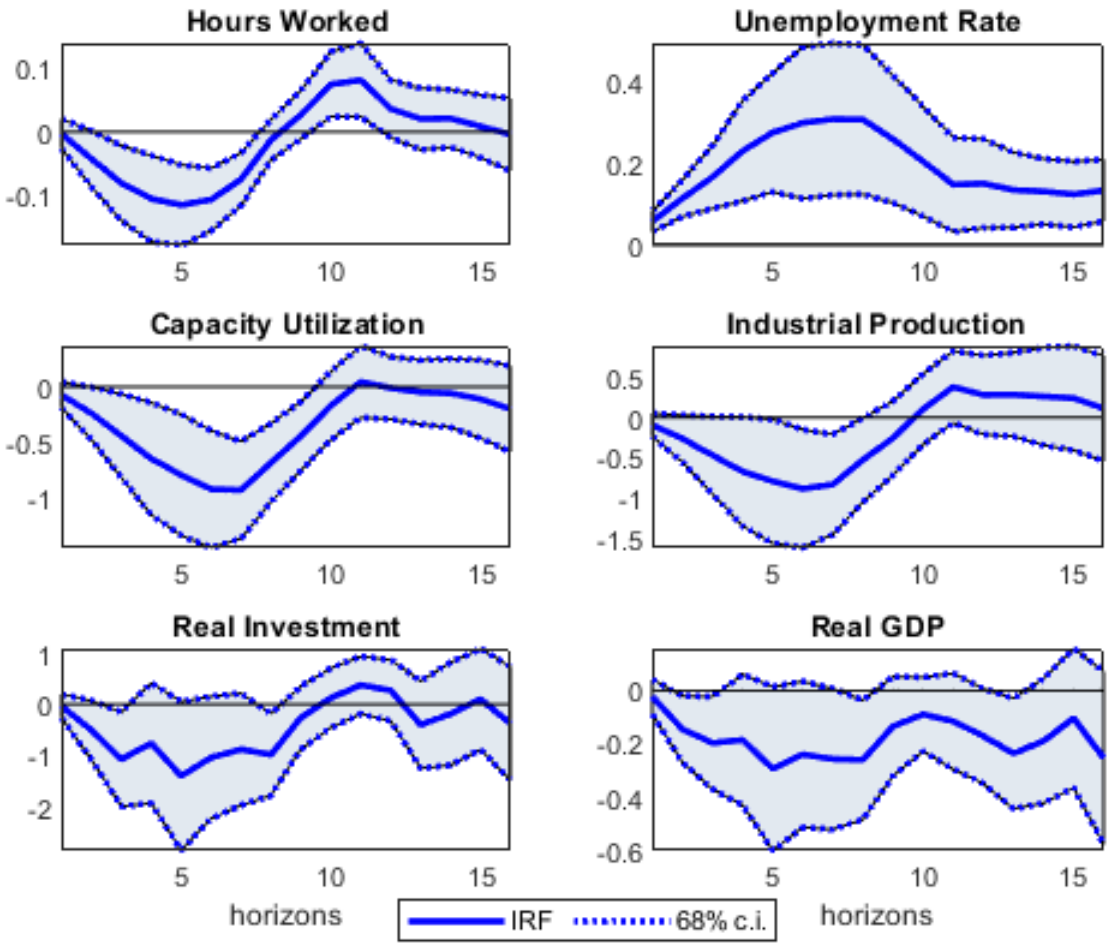
D The Macro Consequences of Firms' Reaction: Starting from 1998

Figure D.1: IRFs to Activity News Index 1998-2019



Notes: The figure reports impulse response functions (IRFs) of six macro variables to a standard deviation increase in our activity news index *ani*, together with their 68% confidence intervals

Figure D.2: IRFs to Price News Index 1998-2019



Notes: The figure reports impulse response functions (IRFs) of six macro variables to a standard deviation increase in our activity news index *ani*, together with their 68% confidence intervals