GIKAS A. HARDOUVELIS *

Stock Prices: Nominal vs. Real Shocks

1. Introduction

The impressive increase in stock prices during the 1980s, their subsequent October 1987 worldwide crash, their large daily fluctuations, and the historically high trading volumes have recently spurred new interest in the forces underlying stock price movements. The question typically asked is: 'Do stock prices respond appropriately to new information about economic conditions?' This article attempts to answer part of this question. It examines the direction of the stock price responses to different types of economic news and assesses the consistency of these responses with the predictions of Finance theory.

Section 2 discusses the fundamental determinants of stock price movements. Section 3 reviews the academic literature that attempts to explain an observed anomalous relationship between stock prices and one of their fundamental determinants, inflation. Section 4 presents the empirical methodology, which involves an analysis of the immediate response of stock prices to announcements of economic variables. Section 5 analyzes the empirical evidence and section 6 summarizes the principal findings.

2. The Fundamental Determinants of Stock Prices

Finance theory asserts that the stock price of a corporation equals the discounted or present value of all future dividends. More precisely, three key variables determine a corporation's stock price: the stockholders' required real rate of return, the expected growth rate of future real dividends, and expected inflation. The required real rate of return is the rate at which future cash flows are capitalized and has a negative effect on stock prices. It equals the risk-free real rate of interest plus a risk premium specific to the corporation. The risk premium is a reward to risk-averse investors in order to induce them to invest in risky stocks. Put differently, investors bid down the stock price of a firm whose cash flows become more uncertain, even if on average these cash flows do not change. According to the Capital Asset Pricing Model, the risk premium is a reward only for the undiversifiable component of risk, or systematic risk, which is typically caused by economy-wide shocks that affect all corporations uniformly. Unsystematic risk caused by shocks that are firm specific can be diversified by holding a portfolio of stocks and bears no reward.

The second variable that determines the level of stock prices is stockholders' expectations of the future growth rate in real dividends. Real dividends represent the purchasing power of nominal dividends and are defined as nominal dividends divided by the GNP deflator. Clearly, other things being equal, an increase in the expected growth rate of a company's real dividends causes its stock price to increase.

The last variable behind the evolution of stock prices is stockholders' expectations of future rates of inflation. When inflation is neutral, that is, when inflation affects all commodities and asset prices uniformly, an increase in the expected rate of inflation increases nominal stock prices but leaves real stock prices (nominal stock prices divided by the GNP deflator) unchanged. When inflation is not neutral because, say, nominal dividends are taxed at a different rate than interest on debt, the theoretical effect of inflation on stock prices is ambiguous. We discuss the non-neutrality issue in greater detail in the next section.

* Department of Economics, Barnard College, Columbia University, 3009 Broadway, New York, NY 10027, USA.

Empirical evidence confirms the theoretical effects of the required real rate of return and of the expected growth rate of future real dividends on stock prices. For example, COATE and VANDERHOFF (1986) estimate that over the period 1968–1982 an increase in the expected growth of future U.S. real output of 1% (which is taken to imply an expected increase in future dividends) increases real stock prices (as measured by the New York Stock Exchange value weighted index dividend by the consumer price index) by 11%. Similarly, casual daily evidence on the movements of stock prices and interest rates suggests a negative association between real returns and stock prices.

Empirical evidence appears to be at odds, however, with the presumed neutral effect of expected inflation on real stock prices. The evidence shows that inflation (expected or unexpected) and stock prices (real *and* nominal) tend to move in opposite directions. This empirical anomaly is observed not only in the United States but also in most industrialized countries with active stock markets during the postwar period (see GULTEKIN, 1983, and SOLNIK, 1983). For example, in the 1970s when rates of inflation increased worldwide, stock markets were depressed around the globe, and in the 1980s when rates of inflation decreased, stock markets boomed.

3. Is the negative association between inflation and real stock prices explainable?

The observation that inflation is 'bad' for stocks led financial economists to reexamine both the traditional theory of stock price determination, that is, the present value model in which inflation is neutral, and the nature of the statistical evidence. The current consensus is that the various inflation non-neutralities have an aggregate ambiguous effect on real stock prices, and that the negative empirical association between real stock prices and inflation reflects third factors that cause the two variables to move in opposite directions. We begin by describing the theoretical reasons behind the non-neutral effects of inflation on real stock prices; for an earlier review of this topic, see MODIGLIANI (1982), who presents a detailed model of stock price determination for a levered corporation with a rich set of different tax rates, or PEARCE (1982). Then we review the hypothesis that third factors cause inflation and stock prices to move in opposite directions.

3.1 Inflation Non-Neutralities

Non-neutralities may arise from different sources and can cause stock prices to move in different directions. We first describe the non-neutral effects of inflation on corporate earnings and on expected future real dividends. Subsequently, we examine the non-neutral effects of inflation on the required real rate of return.

FELDSTEIN (1980) and others have explained the negative association between inflation and stock prices as a result of the non-neutralities of the tax law, claiming that a higher rate of inflation decreases corporate earnings and thus stock prices. Corporate earnings decrease for two major reasons: First, a higher rate of inflation diminishes the depreciation allowances to corporations because, under the tax law, depreciation is computed based on nominal historical costs. In real terms, therefore, the depreciation allowances and the after tax profits are smaller. Second, when firms sell from their inventories and use FIFO (first-in, first-out) accounting, a higher rate of inflation causes an artificial increase in nominal gains, which are taxed as ordinary income. The artificial increase in gains occurs because firms can only deduct the original cost of buying goods rather than the current cost of replenishing inventories. The final effect is higher taxes and lower after-tax profits.

The negative effect of inflation on after-tax corporate profits under the current tax law may be offset, however, by a corporation's nominal debt contracts. KESSEL (1956) and others have asserted that as long as a firm is a net debtor, an unanticipated increase in inflation should benefit its stockholders because it becomes cheaper for firms to pay back their nominal debt. Indeed, BERNARD (1986) and PEARCE and ROLEY (1987) find evidence that firms with high debt-equity ratios benefit from unanticipated inflation. Thus, theoretically, the aggregate effect of inflation on after-tax corporate profits and, subsequently, real stock prices is ambiguous and depends on the tax and debt status of corporations.

Many authors have also examined the non-

neutral effects of inflation on stockholders' required real rate of return. Their arguments are plausible, but less persuasive than the arguments affirming that inflation affects real dividends. MALKIEL (1979) contended that an increase in expected inflation increases systematic risk because corporate profits become more unpredictable. A higher level of systematic risk increases the risk premium component of the required real rate of return and lowers real stock prices. PINDYCK (1984) expanded MALKIEL'S analysis, tracing the increase in systematic risk to an increase in the volatility of stock prices. However, POTERBA and SUMMERS (1966) have criticized the MALKIEL-PINDYCK hypothesis as being inadequate to explain the large drop in stock prices during the 1970s in the United States. POTERBA and SUMMERS found that shocks to volatility do not persist and thus changes in volatility cannot have a large effect on systematic risk and on the required real rate of return.

Other authors have concentrated on the effects of inflation on the risk-free component of the required real rate of return. HENDERSHOTT and HU (1981) and SUMMERS (1981) argued that an increase in expected inflation increases the after-tax real rate of return and offered as an example the return to owner-occupied housing. This argument depends critically on the higher tax benefits of housing in an inflationary environment and runs counter to the traditional MUNDELL-TOBIN effect, which claims that an increase in expected inflation drives investors out of money into short-term debt assets and thus decreases the risk-free real rate of interest in equilibrium. However, BARSKY (1986) provided a model that rationalizes higher housing prices, lower risk-free real rate of interest, and lower stock prices.

Finally, MODIGLIANI and COHN (1979) have argued that investors suffer from money illusion and use the nominal interest rate rather than the real interest rate to discount future cash flows; in addition, investors do not take into consideration the gains from the fall in the real value of outstanding nominal debt that we discussed earlier. During a period when inflation rises unexpectedly, the combination of these two effects causes a drop in stock prices. MODIGLIANI and COHN'S hypothesis is attractive, but because it is based on the assumption that market participants are not rational, it is heavily criticized by most financial economists. Furthermore, PEARCE and ROLEY (1987) find evidence that investors do take into consideration a firm's gains from nominal debt.

3.2 A Statistical Illusion?

NELSON (1979) and FAMA (1981) concentrated on the nature of the empirical evidence and argued that the negative association between inflation and real stock prices should not be interpreted as evidence that higher inflation *causes* real stock prices to decline. FAMA attributed the negative association between inflation and real stock prices to the omission of a third factor, real economic activity, from the empirical analysis. He argued that an increase in real economic activity, which increases real stock prices, also increases money demand and, for a given money supply, lowers the rate of inflation. DAY (1984) and LEROY (1984) present theoretical analyses consistent with the FAMA hypothesis.

GESKE and ROLL (1983) expanded FAMA'S hypothesis and provided interesting empirical evidence. They found that expectations of higher future real activity (and thus real dividends) increase current stock prices and at the same time lead market participants to expect smaller government budget deficits and thus a smaller expansion in the money supply and a lower rate of inflation. The expectation of a lower rate of inflation in the future leads to a drop in the current rate of inflation, and thus higher stock prices occur together with lower actual and expected rates of inflation. JAMES, KOREISHA and PARTCH (1985) confirmed the GESKE-ROLL results with more sophisticated statistical techniques.

Using survey data, COATE and VANDERHOFF (1986) showed that including the expectation of future real activity in the regression of real stock prices on expected inflation reduces the size of the negative inflation coefficient, although it does not eliminate the negative coefficient completely. Similar evidence was also found by PEARCE (1984). Finally, KAUL (1987) and KOOL and HAFER (1986) found that the negative post-World War II association between inflation and real stock prices in the United States is not present in the prewar data. KAUL attributes this difference to the lack of countercyclical monetary policy before 1940. The absence of countercyclical monetary policy

breaks the link between government deficits and inflation in the GESKE-ROLL argument.

4. Economic News and Stock Prices

One way to assess empirically the directional effects of inflation, the required real rate of return, and the expectations of future real dividends on stock prices is to examine how stock prices change after a piece of news about each of the three fundamental determinants of stock prices hits the market. This approach, followed by PEARCE and ROLEY (1985) and HARDOUVELIS (1987a), has a major advantage: it identifies each news variable as the causal variable and the change in the stock price as the caused variable. In most empirical work, one simply *assumes* a causal relationship between two variables. Recall that financial economists have explained the puzzle of the negative association between inflation and stock prices by arguing that the assumption of a causal relationship between inflation and stock prices is not valid. Thus one of the benefits of the news approach is to clarify whether or not an increase in inflation causes stock prices to decrease.

In this article I single out announcements of U.S. economic data from all the information that hits the market daily. Because these announcements do not represent single occurrences but are made regularly over long periods at a specified date and time, usually at one-month intervals, they are easy to isolate and study. The economic series that I examine are representative of the U.S. economy and are closely watched by market professionals. They belong to five broad categories. The first category represents inflation news and includes the producer and consumer price indices. The second category reflects news about real economic activity and consists of the unemployment rate, housing starts, the industrial production index, and the index of leading indicators. The third category includes an interest rate news variable, the Federal Reserve's discount rate. Announcements of prospective discount rate changes are not regular but are easy to isolate. The fourth category represents monetary news and includes two variables that are announced weekly, the level of bank nonborrowed reserves and the level of money (M_1). Finally, the last category includes macroeconomic variables that are denominated in nominal terms and have a mixed informational content: personal income, consumer credit, manufacturers' orders of durable goods, retail sales, and the trade deficit.

Market participants respond to an announcement because of the new information contained in the announcement. Old information is already incorporated into stock prices and cannot have an effect. Thus it is critical to be able to measure the part of the announcement containing new information. An attractive feature of the series examined here is the existence of survey data on market participants' expectations about the announced number. The surveys are conducted among market professionals before each announcement by Money Market Services Inc. (MMS) of Belmont, California. MMS provides the median forecasts. The difference between the announced number and the survey median represents the unanticipated component of the announced number, which I utilize below. In the case of announced discount rate changes, no survey data exist, but during our sample period most of these changes were largely unanticipated because they were not 'technical' adjustments, that is, delayed expected responses of the Federal Reserve to past changes in the level of the federal funds rate (see BATTEN and THORNTON, 1984, or SMIRLOCK and YAWITZ, 1985).

Table 1 shows that the survey medians are more accurate predictors of the announced economic numbers than forecasts based on simple econometric models. The measure of forecast accuracy is the root mean squared error (RMSE) shown in the first two columns of Table 1. The RMSE represents the average size over the sample period of the mistake made in forecasting each announced number. Thus a lower RMSE implies better forecasting performance. With the exception of consumer installment credit, the RMSEs of the survey forecasts are always smaller than the corresponding RMSEs of the forecasts generated from simple econometric models. The econometric models consist of relating the current value of an economic series to its own lagged values. Table 1 shows the estimated parameters of these relations. The tabulated parameters provide useful information on the persistence of a change in an economic variable across time, a topic relevant to our analysis of the empirical evidence of the next section.

Table 1: Forecast Performance of Survey Data and Autoregressive Models (October 1979 – August 1984)

Autoregressive Equation: $x_t = c_0 + c_1 x_{t-1} + \ldots + c_k x_{t-k} + u_t$

x_t	RMSE Survey	RMSE Model	c_0	c_1	c_2	c_3	c_4	c_5
CPI	0.23	0.32	.19*	.66*				
PPI	0.33	0.44	.22*	.51*				
Unemployment	0.22	0.27	.48*	1.3*	–.36*			
Housing starts	0.15	0.18	.10	.56*	.38*			
Industrial production	0.69	1.06	.07	.59*				
Leading indicators	1.37	1.90	.30	.29*				
Nonborrowed reserves	0.87	0.87	–.13	.43*	.22*	.16*	.20*	–.13
Money (M_1)	0.61	0.67	.25*	–.32*	–.21*	–.20*		
Personal income	0.42	0.50	.48*	.33*				
Consumer credit	1.40	1.38	.37	.88*				
Durable goods	3.69	4.05	.41	.10				
Retail sales	1.45	1.60	.57*	.05				
Trade deficit	1.65	1.69	.39	.31*	.37*	.27		

Notes: * denotes statistical significance at the 5% level. RMSE denotes the root mean squared error and is a measure of forecasting accuracy. The units of the x_t variables are as follows: Monthly percentage change for CPI, PPI, industrial production, durable goods, leading indicators, personal income, and retail sales. Weekly percentage change for nonborrowed reserves (as a percent of M_1), and money. Change in levels for consumer installment credit ($ billions), and discount rate. Levels for unemployment rate, housing starts (millions of units), trade deficit ($ billions).

Table 2: Reactions to the Unanticipated Component of Announced Economic Data

	Variable	October 1979 – October 1982 S&P 100	T-bill	T-bond	October 1982 – August 1984 S&P 100	T-bill	T-bond
M	CPI	–.32	.09	.19*	–.02	.07	.35*
M	PPI	–.43	.29	.30*	.46	.06	.14*
M	Unemployment	.42	–.58*	–.09	2.30#	–.21*	–.19*
M	Housing starts	2.64#	.99#	.09	2.07	–.01	.01
M	Industrial production	.10	.04	.05	.07	.03	–.01
M	Leading indicators	–.15	–.10	.00	.07	.00	.00
	Discount rate	–.80*	.37*	.09*	.55	.26*	.14
W	Nonborrowed reserves	.28*	–.12*	–.02	.23	–.01	–.01
W	Money (M_1)	–.20	.22*	.10*	–.70*	.16*	.13*
M	Personal income	.65#	–.23#	–.18*	.88	.08	.03
M	Consumer credit	–.04	–.05	–.02	–.13	.00	.01
M	Durable goods	.02	.21	–.00	–.00	.01	.02*
M	Retail sales	–.08	.06	.03	.13	.02	.02
M	Trade deficit	.28	–.09*	–.02	.09	–.00	.00
$\bar{R}^2$		.04	.16	.09	.01	.12	.10
SEE		1.05	0.34	0.16	1.09	0.10	0.09

Notes: M and W denote monthly and weekly announcements respectively. * and # denote statistical significance at the 5% and 10% level respectively. $\bar{R}^2$ is the coefficient of determination adjusted for degrees of freedom, and SEE is the regression standard error. The S&P 100 is the percentage change over a business day from market close to market close. The three-month T-bill and the twenty-year T-bond rates are changes in yields to maturity from 3:30 p.m. New York time to 3:30 p.m. of next trading day.

5. Empirical Evidence

Table 2 contains the main empirical results. It shows the percentage change in the Standard and Poor 100 index due to the unanticipated component of an announced number. This percentage change is measured from the market close prior to an announcement to the market close following an announcement. The responses of stock prices can thus be interpreted as responses of real stock prices, because the GNP deflator does not change very much over

a single business day. The Standard and Poor 100 index is a representative index of the U.S. stock market. The index is of additional interest because it serves as a base for actively traded futures and options contracts. The table also shows the simultaneous response of the three-month U.S. Treasury bill rate and the twenty-year U.S. Treasury bond rate. The responses of the two interest rates provide helpful information for correctly interpreting the underlying causes of the stock price responses.

5.1 Some General Remarks

The sample period runs from October 1979 through August 1984. I partitioned the sample period into two subperiods with a break point in October 1982 because of the different course which U.S. monetary policy followed during these two subperiods. In the period October 1979 – October 1982, the Federal Reserve allowed interest rates to fluctuate more freely than in the period October 1982 – August 1984. The Federal Reserve's response to news was different across the two subperiods, and this may have affected the way stock prices responded to news.

Table 2 shows that the explanatory power of the macroeconomic variables is very small. Explanatory power is measured by the adjusted coefficient of determination, $\bar{R}^2$. An $\bar{R}^2$ of 0.04 for the S & P 100 means that only 4% of the daily variation in the S & P 100 is explained by announced unanticipated changes in the macroeconomic variables of the table. Therefore, if one were to use the table's estimated responses as a guide for an appropriate short-term investment strategy, such a strategy would be very risky. Notice that after October 1982, the explained variation of the S &P 100 falls from 4% of the total variation to only 1%. Table 2 also presents the absolute size of the unexplained variation of the daily percentage change in stock prices, the SEE. SEEs are quite large and remain fairly stable across the two subperiods.

The macroeconomic variables are more successful in explaining movements in the two interest rates. In both subperiods the $\bar{R}^2$s for the two interest rates are in the neighbourhood of 10%, which is much larger than the $\bar{R}^2$s of the S & P 100. Observe also that in the period October 1979 – October 1982, when the Federal Reserve allowed interest rates to fluctuate freely, the volatility of both short- and long-term interest rates is much larger than their corresponding volatility of the October 1982 – August 1984 period. For example, the unexplained daily variation in short-term interest rates was 34 basis points during the first subperiod, but only 10 basis points during the second subperiod.

5.2 Responses to Individual News

Let us begin by examining the response to inflation news. The response of long-term interest rates to inflation news shows that markets revise their inflationary expectations upward after an announced unanticipated increase in the previous month's rate of inflation. For example, an unanticipated monthly increase in producer prices of 1% increases the annualized twenty-year Treasury bond yield by 30 basis points in the first period and by 14 basis points in the second period. The asterisk next to these coefficients shows that the responses are reliably different from 0 (5% significance level; the number symbol, #, denotes significance at the 10% level). These responses are also consistent with the evidence of Table 1. Table 1 shows that for both the CPI and the PPI, the monthly rate of inflation is positively related with its own lagged value. Thus a rational market participant who finds that the previous month's rate of inflation was higher than expected, correctly revises his expectation of the current and future inflation rates upward.

Despite the strong interest rate responses to inflation news, the corresponding stock price responses are negligible and mixed. For example, an unanticipated increase in the monthly rate of producer prices of 1% decreases stock prices by 0.43% in the first period and increases stock prices by 0.46% in the second period. None of these coefficients is reliably different from 0. The message from these results is clear: inflationary expectations affect bond yields but do not affect stock prices. Thus our evidence reinforces the assertion of FAMA that the negative correlation between inflation and stock prices found by most researchers is in fact due to third factors.

Let us turn now to the stock price responses to announcements of real economic activity. Table 1 shows that variables that capture monthly changes in real economic activity are positively related to their lagged values. Thus

an unanticipated increase in real economic activity should lead to an expected increase in future real economic activity, which is good for profits and dividends, and should lead to an increase in stock prices. However, an expected future increase in real activity will also increase the expected real rate of interest and thus the required real rate of return, an outcome which is bad for stocks. It is unclear which of the two opposing forces will prevail. Table 2 shows no reliable response to the index of leading indicators or the industrial production index. There is some response to the unemployment rate and housing starts. An unanticipated increase in the unemployment rate provides information on a weakening economy, lower future real economic activity, and thus lower future real interest rates. The expectation of lower future real interest rates decreases interest rates and increases stock prices following the announcement. The increase in stock prices shows that the positive effect of the lower required real rate of return dominates the direct negative effect of lower future dividends. Observe also that the market responses to the unemployment rate become stronger after October 1982. This may be evidence that after October 1982 markets expected the Federal Reserve to follow a more active countercyclical policy. In such case, the Fed would expand the supply of money to counteract the drop in aggregate demand, which puts additional downward pressure on interest rates and additional upward pressure on stock prices. Next, observe that an unanticipated increase in housing starts causes a minor increase in interest rates and an increase in stock prices. In the case of housing starts the direct effect of a change in future dividends appears to dominate the stock price reactions.

After an announced increase in the Federal Reserve's discount rate, markets expect tighter monetary policy and higher future real rates of interest. Thus interest rates increase and stock prices decrease. Stock prices decrease both because the required real rate of return is higher and because the future tightening is expected to reduce real economic activity and thus profits and dividends. Observe that the post-October 1982 stock price reactions appear anomalous but the coefficient estimates are not reliable. HAFER (1986) finds similar evidence.

Strong responses follow the announcements of the two monetary variables, nonborrowed reserves and M_1. An increase in nonborrowed reserves is associated with a future increase in the supply of money and lower future real rates of interest, which cause a decrease in interest rates and an increase in stock prices following the announcement. Stock prices increase both because the required real rate of return is lower and because future economic activity is expected to increase due to the lower real rates of interest. Table 1 confirms this scenario because changes in nonborrowed reserves are positively related with their own past changes. Observe also that the market responses disappear after October 1982 probably because of a change in the operating procedures of the Federal Reserve. Before October 1982 the Federal Reserve used nonborrowed reserves as the weekly operating target, but after October 1982 it substituted borrowed reserves for nonborrowed reserves. In HARDOUVELIS (1987b), I argue that this switch eliminated the informative content of reserves announcements.

An unanticipated increase in M_1 has opposite effects from those of nonborrowed reserves. Table 1 shows why. The weekly percentage change in M_1 is negatively related to its past values. Thus an unanticipated increase in M_1 leads markets to expect a future decrease in the supply of money and higher future real rates of interest, which cause an increase in interest rates and a decrease in stock prices immediately following the announcement. Again, the response of stock prices to the announcement of M_1 is caused by a simultaneous change in the required real rate of return and the expected future growth of real dividends, both of which move stock prices in the same direction. Observe that the reaction of long-term interest rates is too strong to be explained simply as arising from a change in the real rate of interest. This is a well known puzzle in the academic literature. For an explanation, see HARDOUVELIS (1984).

Of the remaining series, only the announcement of personal income causes stock prices to respond reliably and only during the first subperiod. An unanticipated increase in personal income increases stock prices and decreases interest rates. A scenario consistent with these reactions is the following: Personal income is a signal of aggregate supply. Thus an increase in personal income is associated with an expansion in output and a decrease in interest rates.

Both of these cause stock prices to decrease. The reactions become weaker after October 1982 perhaps because the Federal Reserve began following countercyclical policy, thus reacting to future expansions in output by restricting the money supply. The Fed reaction opposes the decrease in interest rates and the increase in stock prices.

There is practically no response to the trade deficit, a statistic that has recently gained eminence and causes considerable turbulence in financial markets. This shows that at different points in time markets focus on different economic variables as indicators of policy and future economic prospects.

6. Conclusions

The paper analyzed the reaction of stock prices to the first announcement of fourteen key macroeconomic variables that are closely watched by professional economic forecasters, and found that the direction of the stock price responses to each piece of economic news is consistent with the predictions of the present value model of stock prices. Most of the recent evidence against the present value model is of different nature, however. Critics of the present value model argue that stock prices move too much to be justified by the movement of expected dividends or discount factors. In the paper's framework, excessive volatility corresponds to overreaction to economic news, but this issue was not analyzed.

Let us highlight the most important findings. First, consistent with Finance theory, changes in expected inflation have a neutral effect on real stock prices. When the previous month's rate of inflation is announced and it is larger than anticipated, long-term bond yields increase instantaneously. This response shows that inflationary expectations increase. Nevertheless, stock prices remain largely unchanged. This evidence confirms the assertion of FAMA that the anomalous post-World War II negative association between inflation and stock prices does not reflect a causal relationship running from inflation to stock prices but rather is due to third factors that push inflation and stock prices in opposite directions. Second, news about real economic activity has ambiguous effects on stock prices. This is consistent with Finance theory because an exogenous increase in real economic activity typically causes real rates of interest to increase. Thus the positive effect of higher economic activity on stock prices is counteracted by the negative effect of higher capitalization rates. Third, news about monetary policy has strong effects on stock prices. An expansionary (contractionary) monetary policy causes higher (lower) real economic activity *and* lower (higher) real rates of interest, both of which increase (decrease) stock prices. Overall, the stock price responses vary across time as the informative content of each variable changes. We found that perceived changes in the behavior of the monetary authority alters the size of the market responses considerably.

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