IMF Working Paper

WP/98/79

INTERNATIONAL MONETARY FUND

Research Department

Responses of the Stock Market to Macroeconomic Announcements Across Economic States

Prepared by Li Li, and Zuliu F. Hu*

Authorized for distribution by Peter Wickham

May 1998

Abstract

Is the stock market responsive to macroeconomic news? This paper employs the daily returns of the Dow Jones Industrial Index, the S&P 500 index, the Russell 1000 index, and the Russell 2000 index to examine stock market reactions to a broad list of macroeconomic announcements, including money supply, inflation, employment, housing starts, and trade balances, etc. Several announcements concerning real economic activity that have received little attention in previous research are shown to have a significant impact on stock prices. The paper also presents preliminary evidence for the different reaction to macroeconomic news by small cap stocks and large cap stocks.

JEL classification numbers: E44, G12, G14

Keywords: Stock markets, macroeconomic news, large caps, small caps

Author's e-mail address: lli@weber.ucsd.edu

---

*Li Li was a summer intern in the Research Department when much of the empirical work in the paper was completed. Zuliu F. Hu is now with Goldman Sachs, Hong Kong. The authors thank Peter Wickham for extensive comments.

Contents **Page**

SUMMARY

It is widely believed that the stock market is sensitive to macroeconomic news. Market participants tend to follow closely government releases of economic data and announcements of monetary policy changes. Any surprise moves stock prices up or down, or so suggests the financial press.

This paper employs the Dow Jones Industrial Index, the S&P 500, the Russell 1000 and the Russell 2000 Index to systematically examine stock market reactions to a broad set of nominal and real macroeconomic variables. The former includes the money supply, the Fed discount rate, and inflation. The latter consist of industrial production, nonfarm payroll, unemployment, the merchandise trade deficit, housing starts, business inventories, and capacity utilization.

This paper focuses on stock market responses to macroeconomic news conditional on the state of the economy (i.e., expansion, recession, etc.). Standard regressions treating different states of the economy symmetrically would bias the response coefficient towards zero. Thus, previous research often failed to find a significant impact on stock prices of many macroeconomic announcements other than monetary information, despite investors' close attention to those variables. The paper classifies the state of the economy by different monetary regimes and by characteristics of state variables, such as industrial production, unemployment, the leading indicators, and the NBER business cycle turning points. The paper finds strong evidence for variations in stock market responses to the same macroeconomic news across different economic states. Moreover, more macroeconomic variables become significant after allowing the response coefficients to vary across the states of the economy. Several real variables, including housing starts, that have received little attention in previous research actually have a significant impact on stock prices.

The paper also examines the possible differences in reactions to macroeconomic surprises between small caps and large caps, especially across different monetary regimes, but the results are less than conclusive, and further exploration is warranted.

I. INTRODUCTION

There is a widespread belief that the stock market is sensitive to announcements of economic events. Reports of stock prices falling because of "disappointing nonfarm payroll employment figures" or rising due to "encouraging news on the inflation front" is commonplace in the financial media. While such market behavior is consistent with standard finance theories that suggest that rate of return on an asset is determined by systematic economic news while no extra reward can be earned for diversifiable risk, there exists a large gap in the empirical identification of the state variables determining asset pricing. Indeed, despite the strong association as suggested by the press between movements in stock prices and macroeconomic announcements, there has been relatively scanty hard evidence to support the belief that stock prices respond to general macroeconomic news apart from some types of monetary information.

An important reason for the failure to capture the impact of macroeconomic news on stock prices is that standard regressions treat the market reaction to the same type of macroeconomic news as being identical at all times. The market, however, seems to treat otherwise similar macroeconomic information differently, depending on the stages of the business cycle or the states of the economy. Take the release of data on industrial production as an example. During a recession, a surprising pick-up in industrial production could be interpreted by market participants as indicating a recovering economy and an improved outlook for corporate earnings and thus might cause a stock market rally. On the other hand, if the same piece of news occurs, after a long period of expansion with the economy running near full capacity, it may result in fears of an overheating economy and possible moves by policy makers to hike interest rates. Thus higher than expected industrial production growth figures might well cause the stock market to fall. Thus the same type of macroeconomic surprise could be "good" or "bad" news to the stock market depending on its timing. By contrast, most of the empirical research assumes that the response of investors to news is the same over different stages of the business cycle and over different monetary policy regimes. To the extent that actual market behavior deviates from this assumption, the estimated response coefficient on the news variable in these studies would be biased toward zero.

In this paper, we study the relationship between daily percentage changes in the closing values of four leading stock indexes and an expanded set of macroeconomic announcements related to equity discount rates and cash flows. By considering various ways to distinguish between different conditions of the economy and allowing stock prices to respond differently across different states, we hope to provide unbiased estimates of the influence on stock prices of fundamental information about the economy.

A closely related issue is whether the same macroeconomic innovations have identical effects on small and large stocks. The press seems to provide plenty of examples that the Dow leaps up while the Russell 2000, the premier index for small stocks, moves in the opposite direction. Literature points out that size matters in asset pricing. Existing research has been silent, however, about whether macroeconomic news has different influences on small stocks (or small caps) and large stocks (or large caps). Our paper explores such differences.

This paper contributes to the understanding of financial market reactions to macroeconomic news in three ways. First, we extend previous research by examining more macroeconomic announcements to help identify systematic "state variables." Second, we make a broader search for indicators of economic conditions, including both real economic indicators and monetary policy regimes. Allowing the market's reaction to the news to vary with different stages, we attempt to provide unbiased estimates of the effects of underlying economic variables on stock prices and identify a more complete list of potentially influential announcement variables. Third, this paper provides the first evidence for the different reactions to macroeconomic news by blue chips (large caps) and small caps.

The remainder of this paper proceeds as follows. Section II outlines the theoretical framework and briefly reviews the related literature. Section III describes the data with summary statistics. Section IV presents the econometric models and the main empirical results, and the final section contains conclusions and discussion.

II. Theoretical Framework and Literature Review

A. Theory

Macroeconomic announcements influence stock market returns if changes in the information set revealed by the news affect either expectations of the pricing operator, future dividends, or both. Expected cash flows change in response to both real and nominal forces. Changes in the expected level of real production clearly have effects on the current real value of cash flows. Changes in the expected rate of inflation would affect nominal expected cash flows as well as the nominal rate of interest. Changes in the discount rate affect both the level of rates and the term-structure spreads across different maturities, as well as the risk premium. Innovations in the risk-free interest rate will therefore have an influence on pricing both directly and through their influence on future cash flows. Real forces can bring unanticipated changes in the risk premium. Innovation in real consumption, for example, changes the indirect marginal utility of real wealth, and it in turn changes the risk premium.

A common model linking stock prices to information posits that stock prices equal the present discounted value of a rationally forecasted dividend stream. The model can be written as:

$$P_t = E\left(\sum_{\tau=1}^{\infty} \frac{d_{t+\tau}}{1+r_{t+\tau}} | \Omega_t \right), \quad (1)$$

where P_t is the stock price at time t, $d_{t+\tau}$ is the dividend paid at time $t+\tau$, and $r_{t+\tau}$ is the stochastic discount factor for cash flows that occurs at time $t+\tau$, and Ω_t, denotes the information set available at time t.

The new information is represented by the difference between information sets Ω_t and Ω_{t-1}. On the announcement day, the anticipated component of the news and all the past announcements of other economic variables have been included in Ω_t. Under rational expectations and the efficient market hypothesis, stock prices respond only to the unanticipated part of the news. Since announcement surprises are uncorrelated across time, combining daily security-price changes with announcement surprises on different days allows us to isolate the effects of individual macroeconomic variables.

B. Existing Evidence

Impact of money supply surprises

It has been well established in the literature that unanticipated increases in the money supply lead to immediate increases in interest rates and thus decreases in security prices. There are two prominent competing explanations for the role of monetary news in affecting the stock market. The first hypothesis is the policy anticipation effect (or the liquidity effect), which says an unanticipated expansion of the money supply might lead market participants to expect the central bank to tighten in order to offset the increase, which will result in higher real interest rates in the future. The second one, the inflation expectation effect, postulates that a positive shock in the money supply leads to an upward adjustment of inflation expectations, which in turn leads to higher nominal interest rates. Both hypotheses lead to the same effect of monetary information on stock prices.

The money supply announcement effect was first observed by Berkman (1978), and further documented by Cornell (1979, 1983), Grossman (1981), and Urich and Wachtel (1981, 1984). Hardouvelis (1984,1987), Pearce and Roley (1983, 1985), and Strongin and Tarhan (1990) also examine this phenomenon.

Impact of inflation surprises

If interest rates, and hence stock prices, respond to money supply announcements because of inflationary expectations, they should also be affected by shocks contained in inflation rate announcements. A negative effect should emerge if a positive surprise in announced inflation induces agents to raise their level of expected inflation. Such effects are well documented, e.g., in the study by Fama and Schwert (1977).

Inflation surprises could also affect the financial market through channels other than changes in inflationary expectations. Unanticipated higher inflation may lead to the expectation of more restrictive monetary policies, which in turn will lead to the reduced cash flows and lower stock prices. A positive inflation surprise could also induce agents to adjust their savings, resulting in higher interest rates and lower stock prices. In any event, all these potential links suggest that surprises in CPI and PPI announcements could be positively related to interest rates and negatively related to stock prices.

However, the empirical evidence for the inflation announcement effect is not as strong as the money supply announcement effect. For instance, Pearce and Roley (1985) find no significant CPI announcement effects on stock prices, and Roley and Troll (1983) find no significant effects of unanticipated inflation on U.S. Treasury bill yields. Urich and Wachtel (1984), however, find some announcement effects of inflation rates on the futures contracts for 3-month Treasury bills, but not for the U.S. Federal Funds rate.

Impact of discount rate changes

Discount rate changes reveal new information about short-run policy objectives. An increase, for example, corresponds to a short-run objective of returning to the implied long-run money growth target more quickly. With short-run money growth reduced and the long-run objectives unchanged, the change will raise market interest rates, and stock prices should fall as a result.

While the discount rate may be considered a weak and infrequently used tool of monetary policy, discount rate changes generally attract close attention from both researchers and market participants. Discount rate changes typically send a clear signal of the U.S. Federal Reserve Board's (Fed hereafter) monetary policy stance and can be easily interpreted by market participants. Furthermore, rate changes are established by a public body, which is perceived as being competent to judge the economy's cash and credit needs, and rate changes are made only at substantial intervals, thus capturing widespread attention once they are announced. Smirlock and Yamitz (1985), Cook and Hahn (1988), and Jensen and Johnson (1995) find evidence for responses of financial markets to discount rate changes.

Unlike other announcements, changes in the Fed's discount rate and surcharge are announced intermittently with no typical announcement day or time, and no survey data are available for them. As a consequence, all such changes are treated in this paper as unanticipated in this paper. Although it is often argued that the response of stock prices may be different in the pre- and post-October 1979 sample periods, this paper focuses on the post-October 1979 period, which witnessed the adoption of a more forward-looking approach to containing inflation.

Impact of real economic activity surprises

A positive innovation in real economic activity may increase agents' expectations of future growth and, thus, cause an increase in share prices. Alternatively, greater than expected real economic activity may also cause agents to worry about a more restrictive monetary policy in the future and thus likely depress stock prices. Therefore, the exact impact of real activity surprises on security prices can not be determined a priori. This perhaps explains why many announcements concerning real activity receive considerable attention in the financial press, but find no grounds in empirical research. Hardouveils (1987), for instance, concludes that financial markets respond primarily to monetary news. Pearce and Roley (1985) fail to find significance of announcements concerning unemployment and industrial production. Using monthly stock returns, Chen, Roll and Ross (1986) and Cutler, Poterba and Summers (1989) find that the explanatory power of real macroeconomic variables is low.

C. Stock Market Responses to Macroeconomic News Across Different Economic States

McQueen and Roley (1993) define economic states using the seasonally-adjusted monthly industrial production index. The authors examine time series of the monthly announcements for the sample period of September 1977 to May 1988 for industrial production, the unemployment rate, the nonfarm payroll, the merchandise trade deficit, PPI, CPI, along with the weekly M-1 announcement and the discount rate. The authors provide evidence that the stock market's response to macroeconomic news depends on the state of the economy.

Jensen, Mercer and Johnson (1996) analyze expected stock and bond returns over monthly and quarterly return horizons for the period February 1954 through December 1992. Their evidence indicates that monetary conditions affect the manner in which the business-conditions proxies track variation in expected returns. Though the focus of their study is not on the effects of macroeconomic announcements, their work suggests it can be a fruitful approach to consider varying coefficients for announcements according to monetary policy regimes.

Strongin and Tarhan (1990) study money supply announcements and market perception of the announcements. The authors argue convincingly that the liquidity effect dominates, while both the policy anticipation effect and the inflation expectation effect play a role. According to the liquidity effect, the tighter monetary policy perceived, the stronger should be the reaction of market participants, and hence the larger the magnitude of the interest rate increases, and the more stock prices decline. Intrinsic to this theory is the idea that the influence of money supply innovations on financial markets varies over time.

Kearney (1996) examines the sample period from October 1977 to December 1984 and finds unanticipated changes in money have negative effects on stock prices; however, the magnitude of the response of stock prices depends on the current operating procedure at the Fed.

D. Small Firms versus Big Firms

Why do small capitalization stocks (small caps) earn different mean returns than large capitalization stocks (large caps)? This question has attracted much interest. Many experts are of the view that small and large stocks have different sensitivities to the risk factors important for pricing assets. Chan, Chen and Hsieh (1985) find that small firms are more exposed to production risk and changes in the risk premium. Huberman, Kandel and Karolyi (1987) find that returns of firms in the same size range tend to respond to risk factors in similar ways and their returns tend to move together. Chan and Chen (1991) argue that small caps tend to be more sensitive to changes in the economy and are less likely to survive adverse economic conditions. These studies suggest the importance of investigating the different reactions to news by blue chips and small caps.

Fama and French (1993) show that size (defined as stock price times shares outstanding) proxies for sensitivity to risk factors that capture strong common variation in stock returns. Fama and French (1995) present evidence that size is related to profitability. For the period from July 1963 to December 1992, small stocks tended to be less profitable than big stocks. The authors claim that the relation between size and profitability is, however, largely due to the small-stock depression of the 1980s, though no explanation is given for the depression. This line of research again leads us to test whether small caps respond differently from large caps to macroeconomic announcements.

Gertler and Gilchrist (1994) analyze the responses of small versus large manufacturing firms to monetary policy. They find that small firms account for a significantly disproportionate share of the manufacturing decline that follows a tightening of monetary policy. Small firms play a surprisingly prominent role in the slowdown of inventory demand. Both the balance sheet view and the credit view suggest that monetary policy should have a disproportionate impact on borrowers with limited access to capital markets, everything else being equal. While size *per se* may not be a direct determinant measure of capital market access, the informational frictions that add to the costs of external finance apply mainly to younger firms, firms with a higher degree of idiosyncratic risk, and firms that are not well collateralized. These firms are, on average, smaller firms. Small firms, even including publicly traded ones, tend to be balance sheet constrained and bank-dependent. These characteristics of small firms could lead to observable differences in the responses of small caps to macroeconomic announcements compared to large caps.

III. DATA

Our sample period begins on February 1, 1980 and ends on December 31, 1996. The starting date corresponds to the initial availability of U.S. median survey data from Money Market Services International (MMS).

A. Stock Indices

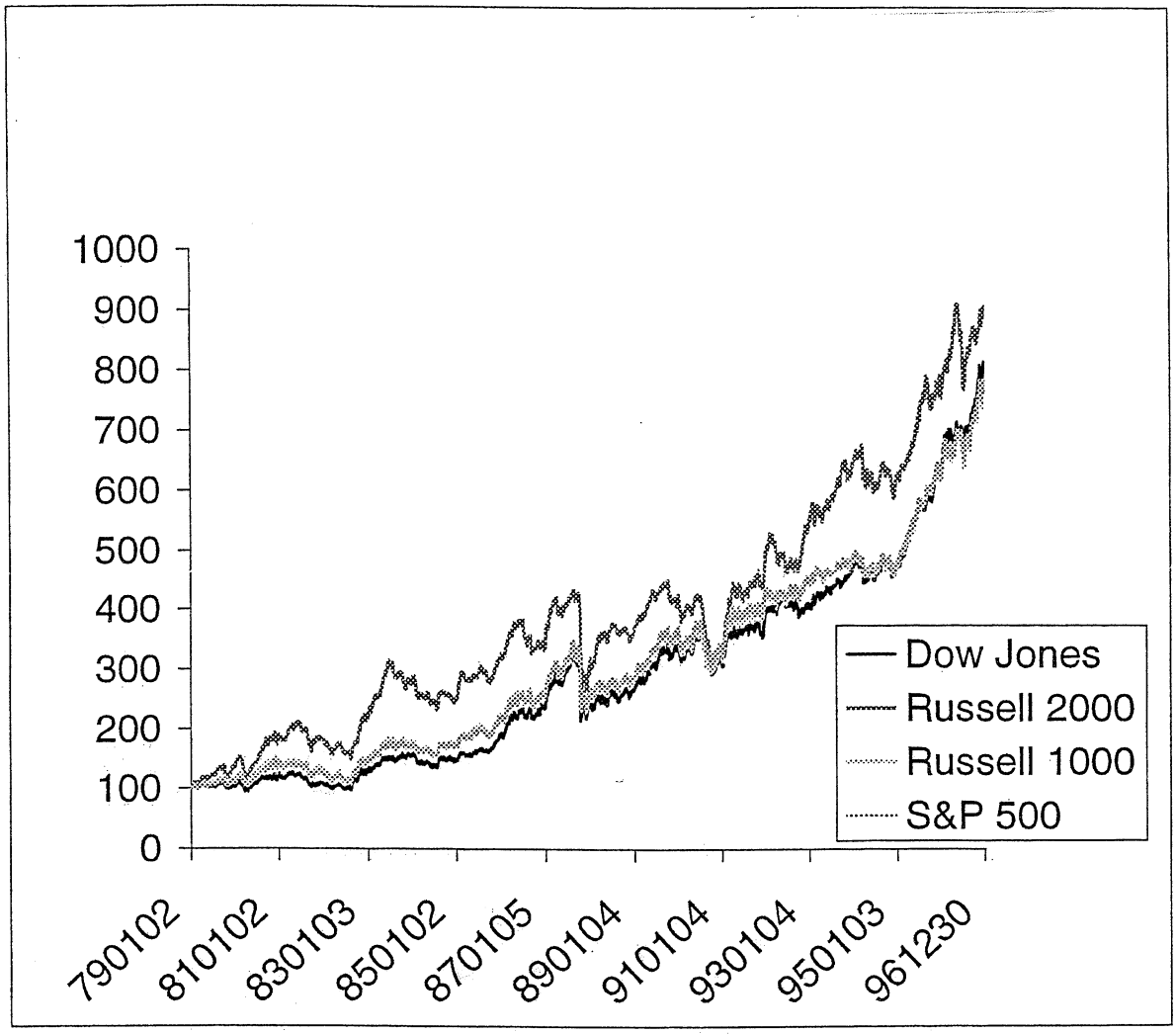
To estimate the response of stock prices to new macroeconomic information, we use the daily changes of the log of stock indices (it is multiplied by 100 to be in percentage terms). For economic announcements occurring either before or while the stock market is open, the log of indices from the previous business day's closing price to the closing price on that day is used. For announcements made after the stock market is closed, we use the log change in the indices from that day's closing quote to that of the next business day.

Throughout this paper, we examine four U.S. stock indices. The Dow Jones Industrial Index is the one that has received the most attention from the popular press. It is composed of 30 large industrial stocks and is regarded as representing the biggest and most influential capitalized stocks (blue chips). The other stock index with a widespread appeal is the Standard and Poors (S&P) 500 Index, whose value is determined by the total market value of the 500 largest firms. The time series for the Dow Jones Industrial Index and the S&P 500 Index were obtained from the databank of the Federal Reserve Board.

The Russell Indexes are designed to be a comprehensive representation of the U.S. equity market, of which, the Russell 3000 index (composed of 3000 large U.S. companies) represents approximately 98 percent of the investable equity market. The Russell 1000 index comprises the 1000 largest companies (large and mid caps) in the Russell 3000 index, representing 88 percent of the total market capitalization of the Russell 3000. The Russell 2000 index consists of the smallest 2000 companies in the Russell 3000 index and is widely regarded in the industry as the premier measure of small cap stocks. In this paper, we study the Russell 1000 Index and the Russell 2000 Index. Russell Indexes were made available to us by the Russell Company.

Figure 1 shows the level of normalized stock indices. We will find that the Dow Jones Index, the S&P 500 Index and the Russell 1000 Index move pretty much together, while for most of the time period studied in our paper, the Rusell 2000 Index outperformed indices for bigger firms. Throughout our paper, we will study the reaction to news disclosure for all the four stock indices; however, we will concentrate on a comparison of the behavior between the Russell 2000 Index and the Dow Jones Index.

Figure 1. Normalized Value of Stock Indices



Note: all the stock indices are normalized to 100 at Jan. 1 1979

B. Macroeconomic Announcements

Discount rate changes are announced intermittently over the same sample period with no typical announcement day or time. All other well-publicized macroeconomic announcements have regular schedules. The money stock data consists of announced weekly changes in the narrowly defined money stock as reported in the Federal Reserve's H.6 release. Before November 29, 1982, the M-1 announcements were made at 4:10 P.M. on Fridays; from November 29, 1982 to February 16, 1984, these announcements were switched to Thursdays, and since March 22, 1984, they have been made at 4:30 P.M. Since for our sample period, the M-1 announcements were made after the market closed, we study the log change in the indices from that day's closing quote to the next business day's closing quote.

The inflation data corresponds to the percentage changes in CPI and PPI, as initially announced by the U.S. Bureau of Labor Statistics. They provide information about inflation during the preceding month and are released monthly on various days of the week. Before March 1982, the CPI announcements were typically made at 9:00 A.M., and since then, at 8:30 A.M. The PPI announcement is, however, made earlier in the month than the CPI announcement.

Data on the unemployment rate and on the percentage change in nonfarm payroll employment are based on the initial monthly announcements by the Bureau of Labor Statistics. The merchandise trade deficit is announced by the Foreign Trade Division of the U.S. Department of Commerce. The industrial production data corresponds to the percentage changes announced initially by the Federal Reserve. We have also included announcements concerning real economy activity, such as housing starts, retail sales, durable goods orders, the leading economic indicators, business inventories, capacity utilization, and home sales. Throughout our sample period, these announcements are made either before or while the stock market was open.

C. Expectation Data

In this study, we use U.S. survey data compiled by MMS International to form measures of the stock market's expectation of economic announcements. The survey data for business inventories, capacity utilization, and home sales have been available since February 1988. For the discount rate, no survey data are available. Table 1 reports the basic statistics for the innovations contained in the news calculated by the difference between the survey data and the actual data. Unbiasedness cannot be rejected at the 5 percent level of significance for all of the data. Though not reported here, the coefficients of those shocks regressing on the lagged values of all the announced data are insignificantly different from zero. This result indicates the efficiency of the survey data.

Table 1. Basic Statistics for Shocks of Announcements

Announcements	Mean	Median	Standard Deviation	No. of Observations
Business Inventory	0.06699	0.1	0.233111	103
Capital Utilization	0.062981	0.1	0.31875	104
Home Sales	3.903846	2	54.35045	104
Durable Goods	0.091089	0.2	3.09332	202
Housing Starts	0.014747	0.01	0.105958	198
Retail Sales	-0.046207	-0.1	0.774095	203
CPI	-0.00297	0	0.156107	202
PPI	-0.08125	-0.1	0.292341	200
Industrial Production	-0.000248	0	0.301097	202
Leading Indicator	-0.000448	0	0.392257	201
Unemployment	-0.054569	-0.1	0.187979	197
Nonfarm Payrolls	-2.19064	-7	1,232,327	139
Trade Balance	-0.314328	-0.2	1.704962	201
M1	0.007023	0.009598	0.398895	901

IV. Empirical Models and Results

We examine how the financial market responds to news only on days when one or more announcements are made. On the basis of our tests for unbiasedness and efficiency of the MMS survey data, we consider the surveys as rational expectations for future announcements. Under the efficient market hypothesis, only new economic information will have influences on stock prices.

A. Preliminary Estimates for Market Response to Macroeconomic Announcements

We start by using the following model to estimate the impact of a surprise contained in announcements:[1]

$$DP_t = a + X_t^u b + e_t \tag{2}$$

where DP_t represents the change in the log of the stock price index from the market close of business day t-1 to the market close of business day t. The variable X_t^u indicates the vector of unanticipated components of economic data announcements, computed as the difference between announced values and survey values.

Table 2 reports the results. Consistent with previous research, we find significant negative coefficients for M-1 and discount rate change announcements. Inflation rate announcements are found to depress stock prices. For real economic activity, positive shocks for nonfarm payrolls push down the S&P 500 and the Russell 1000, and positive trade balance innovations tend to push up the Dow Jones Industrial index. Although the influence of housing starts has not been examined before in the literature, it emerges here as a significant variable. Unanticipated rises in housing starts have a significant positive impact on all four of the stock indices in our analysis. By contrast, an unemployment shock is insignificant in the regressions for the Dow Jones and the Russell 2000. Interestingly, small caps are found to react significantly differently to shocks of unemployment news compared to the blue chips.

B. Estimates for Responses Conditional on the State of the Economy

To estimate responses that are conditional on the state of the economy, we classify the stages of the economy by industrial production, the leading economic indicators, NBER business cycle turning points, the unemployment rate, and the discount rate.

---

[1]Although the daily changes in the various stock price indexes are highly correlated, the OLS estimates are as efficient as the estimates from a seemingly unrelated regression (SUR) procedure, because the set of independent variables is identical in each equation.

Table 2. Preliminary Estimates for Market Reactions to News

Announcements	Dow Jones	S&P 500	Russell 1000	Russell 2000
C	0.03481	0.027831	0.029401	0.04698
	(0.020903)*	(0.020073	(0.018795)	(0.016579)**
Business	0.281564	0.117714	-0.009364	-0.154647
Inventory	(0.384025)	(0.369055)	(0.346388)	(-0.305546)
Capital	-0.104313	-0.100231	-0.081027	-0.119068
Utilization	(0.313342)	(0.301124)	(0.274915)	(0.2425)
Home	-0.001392	-0.001411	-0.001533	1.36E-05
Sales	(0.001702)	(0.001636)	(0.001521)	(0.001342)
Durable	-0.002138	-0.005144	-0.008503	0.001789
Goods	(0.021249)	(0.020421)	(0.019174)	(0.016913)
Housing	1.223341	1.363548	1.347013	1.220103
Starts	(0.621232)*	(0.597019)**	(0.562435)**	(0.496118)**
Retail	-0.115071	-0.082202	-0.076967	-0.037203
Sales	(0.084054)	(0.080779)	(0.076343)	(0.067341)
CPI	-0.842421	-0.869596	-0.863893	-0.688132
	(0.420964)**	(0.404563)**	(0.382324)**	(0.337244)**
PPI	-0.552232	-0.569639	-0.543443	-0.448878
	(0.220946)**	(0.212336)**	(0.197311)**	(0.174046)**
Industrial	0.003217	0.073558	0.108825	0.076632
Production	(0.23342)	(0.224326)	(0.211376)	(0.186453)
Leading	0.125537	0.067185	0.058529	0.187882
Indicator	(0.167802)	(0.161264)	(0.152202)	(0.134256)
Unemployment	0.348661	0.279523	0.223952	-0.110115
	(0.34996)	(0.336316)	(0.314044)	(0.277015)[c]
Nonfarm	-0.000684	-0.001258	-0.001188	-0.000424
Payrolls	(0.000655)	(0.000629)**	(0.00059)**	(0.000521)
Trade	0.076506	0.049665	0.045189	0.045088
Balance	(0.038162)*	(0.036604)	(0.03444)	(0.030379)
M1	-0.318284	-0.272442	-0.260526	-0.215398
	(0.082599)**	(0.079051)**	(0.073348)**	(0.0647)**
Discount	-0.580393	-0.606271	-0.56368	-0.499225
Rate	(0.217643)**	(0.209163)**	(0.197655)**	(0.17435)
Number of obs.	2020	2023	2058	2058
R^2	0.023462	0.023709	0.024188	0.02026
Prob(F-statistic)	0.000028	0.000023	0.000011	0.000231

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

We proceed to estimate the conditional responses to economic news, using the following specification:

$$DP_t = a + \sum_i D_i X_t^u b_i + e_t \qquad (3)$$

where D_i is the dummy variable for states of the economy.

Classification of economic states by industrial production and leading indicators

Following McQueen and Roley (1993), we use the seasonally-adjusted monthly industrial production index to define economic states. We first estimate a trend in the log of industrial production by regressing the actual log of industrial production on a constant and a time trend. Then, we add and subtract a constant from the trend to create upper and lower bounds, so that 25 percent of the actual log is above the upper bound while the other 25 percent is below the lower one, denoted as "high" and "low" respectively. We call the 50 percent remaining observations as "medium". We then mark the calendar for different economic states. As shown in Table 3a the stock market reactions to macroeconomic news vary dramatically across different states.

For instance, for the Dow Jones Industrial Index, S&P 500, and the Russell 1000, shocks in M1 appear significant only when the economic activity is high. In "high" states, unexpected unemployment has significant positive effects on the Dow Jones. Surprises in nonfarm payroll employment have significant effects in "high" and "medium" states for the S&P 500, and "medium" states for the Russell 1000. Discount rate changes have significant negative effects on stock prices in high and medium state. Coefficients for CPI shocks are negative and significant when the level of economic activity is low, while coefficients for PPI shocks are negative and significant in high economy states. Positive news on housing starts and positive inventory shocks tend to boost the stock market.

While the Dow Jones, the S&P 500, and the Russell 1000 behave in highly correlated ways, Russell 2000 responds to macroeconomic news quite differently. For the Russell 2000, M-1 remains significant in the "low" state while the discount rate plays a role across all states. We find it surprising that discount rate displays a positive sign in the "low" state for this could not be explained by either the credit view or the balance sheet view, if these small caps are believed to have limited capital market access. News on trade balance, nonfarm payrolls, and unemployment rate plays a significantly different role for the Russell 2000 compared to their role for the Dow Jones.

Table 4a presents the results when we classify the states of economy by leading indicators instead of industrial production. For all the four indices, M-1 appears negative and significant in "medium" and "low" states, but not in "high" states. Neither the inflation expectation effect nor the liquidity effect seems to be adequate to explain this finding.

Table 3a. By Industrial Production

Announcement	Dow Jones			S&P 500			Russell 1000			Russell 2000		
	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	low
C	0.015736	0.046049	0.047682	0.019671	0.031616	0.038588	0.031442	0.02899	0.038769	0.010887	0.056835	0.072838
	(0.045147)	(0.03034)	(0.041434)	(0.040731)	(0.029044)	(-0.039621)	(0.037607)	(0.027289)	(0.037451)	(0.033187)	(0.024081)**	(0.033049)**
Inventory	0.042655	0.980956	-0.827727	0.144109	0.686962	-0.809097	-0.180481	0.529754	-0.749642	-0.63451	0.13204	-0.252257
	(0.944492)	(0.565309)*	(0.66766)	(0.854205)	(0.541428)	(0.63931)	(0.779811)	(0.511975)	(0.604583)	(0.688151)	(0.451796)^{c}	(0.533519)
Capital	-1.105242	-0.332019	0.353961	-0.902133	-0.488563	0.428006	-1.169883	-0.292884	0.359513	-1.058387	-0.237283	0.190246
Utilization	(1.618327)	(0.453965)	(0.492516)	(1.105634)	(0.434778)	(0.471686)	(1.008811)	(0.389736)	(0.446061)	(0.890233)	(0.343926)	(0.39363)
Home	-0.003513	0.000253	-0.000701	-0.003883	0.000668	-0.001475	-0.003792	-0.0000543	-0.001238	-0.001424	0.000676	0.000486
Sales	(0.003642)	(0.002678)	(0.0031)	(0.003048)	(0.002565)	(0.002969)	(0.00287)	(0.00234)	(0.002807)	(0.002533)	(0.002065)	(0.002477)
Durable	-0.024986	-0.013061	0.036957	-0.028918	-0.013173	0.024483	-0.028351	-0.017801	0.021768	-0.028221	0.008324	0.012582
Goods	(0.050938)	(0.029515)	(0.039604)	(0.047013)	(0.028268)	(0.037931)	(0.043503)	(0.02661)	(0.03587)	(0.03839)	(0.023483)	(0.031654)
Housing	0.519876	1.984444	0.663823	0.398882	2.187854	0.917296	0.532201	2.054539	0.976414	0.610144	1.763508	0.878935
Starts	(1.280727)	(0.899397)**	(1.198581)	(1.198509)	(0.861403)**	(1.147887)	(1.133367)	(0.814602)**	(1.073393)	(1.000148)	(0.718852)**	(0.947225)
Retail	-0.131225	-0.111771	-0.146762	-0.083939	-0.025174	-0.222994	-0.087942	-0.02084	-0.191337	-0.140466	0.04422	-0.056614
Sales	(0.15409)	(0.122309)	(0.18352)	(0.145527)	(0.117142)	(0.175767)	(0.137613)	(0.110779)	(0.16622)	(0.121438)	(0.097758)	(0.146682)
CPI	-0.500575	-0.436715	-1.584533	-0.778865	-0.351569	-1.603221	-0.888188	-0.351572	-1.487495	-1.05131	-0.384951	-0.668511
	(0.786606)	(0.658621)	(0.782646)**	(0.747937)	(0.630798)	(0.749585)**	(0.707243)	(0.596374)	(0.708869)**	(0.624112)*	(0.526275)	(0.625547)
PPI	-1.096524	-0.362661	-0.335838	-1.102456	-0.353536	-0.349277	-1.013251	-0.295966	-0.429835	-0.552087	-0.188302	-0.71778
	(0.474615)**	(0.309505)	(0.450336)	(0.447606)**	(0.296429)	(0.431294)	(0.394355)**	(0.280303)	(0.407865)	(0.348001)	(0.247356)	(0.359924)**
Industrial	0.244068	0.043747	-0.008244	0.019632	0.256316	0.043526	0.125539	0.257944	0.058196	-0.035909	0.165084	0.121151
Production	(0.591305)	(0.344118)	(0.410226)	(0.541462)	(0.329581)	(0.392891)	(0.505018)	(0.311659)	(0.371548)	(0.445657)	(0.275026)	(0.327875)
Leading	0.253982	0.033326	0.237923	0.188627	-0.11447	0.369798	0.197521	-0.122856	0.337477	0.187041	0.178308	0.246726
Indicator	(0.301635)	(0.246071)	(0.373533)	(0.287654)	(0.235676)	(0.357748)	(0.27176)	(0.222347)	(0.338316)	(0.239816)	(0.196212)	(0.29855)
Unemployment	1.172381	0.759424	-0.659247	0.824713	0.670288	-0.751494	0.631126	0.540817	-0.710538	0.601295	-0.084315	-0.816103
rate	(0.709412)*	(0.518053)	(0.695647)	(0.661967)	(0.496076)	(0.666255)	(0.59072)	(0.46895)	(0.630064)	(0.521285)	(0.413828)^{c}	(0.556005)
Nonfarm	-0.003916	-0.00081	0.001485	-0.003469	-0.001309	0.000198	-0.002502	-0.001318	0.000215	-0.000285	-0.000731	0.000274
Payrolls	(0.002529)	(0.000791)	(0.001523)	(0.002068)*	(0.000757)*	(0.001458)	(0.001774)	(0.000716)*	(0.001379)	(0.001566)^{c}	(0.000632)	(0.001217)
Trade	-0.099862	0.161302	0.046435	-0.061366	0.125604	0.01662	-0.062101	0.11305	0.022776	-0.005694	0.055325	0.098985
Balance	(0.076539)	(0.052522)**	(0.090801)	(0.068281)	(0.050303)**	(0.086025)	(0.06416)	(0.047283)**	(0.081352)	(0.056619)^{c}	(0.041725)^{c}	(0.07179)
M1	-0.574318	-0.139688	-0.262851	-0.489039	-0.093998	-0.229887	-0.439869	-0.101657	-0.233073	-0.324563	-0.109684	-0.285264
	(0.15791)**	(0.129777)	(0.164751)	(0.141517)**	(0.123614)	(0.156685)	(0.12829)**	(0.115746)	(0.148172)	(0.11321)**,^{c}	(0.102141)	(0.130755)**
Discount	-1.044377	-0.578954	0.255672	-0.993939	-0.555284	-0.009795	-0.936041	-0.53284	0.039304	-0.812263	-0.680181	0.684632
Rate	(0.398273)**	(0.308623)*	(0.524799)	(0.38101)**	(0.295584)*	(0.50262)	(0.359677)**	(0.279527)*	(0.475314)	(0.3174)**	(0.246671)**	(0.419445)*
N /R^2 /Prob(F-stat)	1964	0.042008	0.000894	2023	0.040295	0.001146	2058	0.03929	0.001349	2058	0.034619	0.011876

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

Table 3b. By Industrial Production

Announcement	Dow Jones			S&P 500			Russell 1000			Russell 2000		
	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	low
C	0.063372	0.008275	0.094118	0.052813	0.011607	0.073116	0.056323	0.012638	0.070245	0.075033	0.012243	0.114963
	(0.034476)*	(0.03159)	(0.052331)*	(0.033125)	(0.030296)	(0.050279)	(0.031093)*	(0.028205)	(0.047359)	(0.027412)**	(0.024866)^{c}	(0.041753)**
Inventory	0.260044	0.487225	0.50023	0.074038	0.252107	0.484364	-0.152547	0.218765	0.511519	-0.40427	-0.056807	0.533515
	(0.533666)	(0.715047)	(1.010068)	(0.512741)	(0.687004)	(0.970465)	(0.481054)	(0.641075)	(0.916535)	(0.424107)	(0.565185)	(0.808036)
Capital	-0.611922	0.210456	0.228401	-0.525464	0.185668	0.185837	-0.516111	0.216776	0.212545	-0.229998	-0.13637	0.546716
Utilization	(0.502762)	(0.473641)	(0.869966)	(0.483049)	(0.45505)	(0.835856)	(0.454661)	(0.402503)	(0.789471)	(0.400839)	(0.354855)	(0.696014)
Home	-0.000944	-0.00144	-0.003999	-0.000217	-0.002369	-0.004606	-0.000342	-0.002511	-0.004448	0.000652	-0.0000667	-0.004255
Sales	(0.002348)	(0.002774)	(0.005564)	(0.002256)	(0.002665)	(0.005346)	(0.002127)	(0.002423)	(0.005049)	(0.001875)	(0.002136)	(0.004451)
Durable	-0.00664	-0.011954	0.030371	-0.010881	-0.02701	0.04529	-0.004987	-0.039055	0.041913	0.015859	-0.022111	0.031781
Goods	(0.035378)	(0.035314)	(0.04137)	(0.033991)	(0.03393)	(0.039748)	(0.032096)	(0.031494)	(0.037543)	(0.028297)	(0.027766)	(0.033099)
Housing	1.574014	0.147347	2.735358	1.560144	0.289186	3.324633	1.553374	0.370895	3.072533	1.176045	1.154762	1.43277
Starts	(0.926112)*	(1.014586)	(1.512366)*	(0.8898)*	(0.974751)	(1.453069)**	(0.840406)*	(0.912812)	(1.372484)**	(0.740919)	(0.804753)	(1.21001)
Retail	-0.157623	-0.140965	-0.005857	-0.120952	-0.084036	-0.030761	-0.110345	-0.08429	-0.027166	-0.02053	-0.137217	0.073648
Sales	(0.126347)	(0.13735)	(0.202672)	(0.121393)	(0.131964)	(0.194725)	(0.114658)	(0.124639)	(0.183923)	(0.101085)	(0.109885)	(0.162151)
CPI	-0.56271	-0.436583	-1.645634	-0.474939	-0.635534	-1.551737	-0.441195	-0.734631	-1.400818	0.496364	-1.237079	-0.855583
	(0.885014)	(0.65529)	(0.727887)**	(0.850314)	(0.629593)	(0.699348)**	(0.803135)	(0.594128)	(0.660561)**	(0.70806)	(0.523795)**	(0.582364)
PPI	-0.738231	-0.40629	-0.371907	-0.794891	-0.378848	-0.419007	-0.845322	-0.294557	-0.434197	-0.625543	-0.266235	-0.547151
	(0.382264)**	(0.333329)	(0.487191)	(0.367276)**	(0.320257)	(0.468089)	(0.344444)**	(0.292855)	(0.442118)	(0.303669)**	(0.258187)	(0.38978)
Industrial	-0.423146	-0.25499	0.72156	-0.234343	-0.212802	0.764802	-0.144108	-0.167226	0.693499	-0.07299	0.124903	0.095245
Production	(0.488089)	(0.335236)	(0.482689)	(0.468952)	(0.322089)	(0.463763)*	(0.440208)	(0.304061)	(0.437982)	(0.388097)	(0.268067)	(0.386134)^{c}
Leading	0.156516	0.005813	0.156773	0.201	0.061994	0.011693	0.194765	-0.019723	0.037956	0.433872	-0.032464	0.190628
Indicator	(0.380877)	(0.324713)	(0.232005)	(0.365943)	(0.311977)	(0.222908)	(0.345407)	(0.293327)	(0.210544)	(0.304518)	(0.258603)	(0.18562)
Unemployment	0.798637	0.468703	-0.473778	0.629567	0.530423	-0.552658	0.584194	0.452852	-0.61426	0.401735	-0.121692	-0.848714
rate	(0.536277)	(0.602677)	(0.744308)	(0.515251)	(0.579024)	(0.715125)	(0.475146)	(0.544665)	(0.675464)	(0.418898)	(0.480188)	(0.595503)
Nonfarm	-0.001606	-0.000303	0.000893	-0.002096	-0.000949	0.00022	-0.00188	-0.00088	-0.000178	-0.000096	-0.000319	-0.002136
Payrolls	(0.00105)	(0.000941)	(0.001935)	(0.001008)**	(0.000904)	(0.001859)	(0.000946)**	(0.000846)	(0.001756)	(0.000834)^{c}	(0.000746)	(0.001548)^{c}
Trade	0.130689	-0.017716	0.12806	0.1136	-0.038156	0.062327	0.108042	-0.0404	0.063329	0.085898	-0.004853	0.063673
Balance	(0.055443)**	(0.066315)	(0.088387)	(0.053269)**	(0.063355)	(0.084922)	(0.050311)**	(0.059128)	(0.080211)	(0.044355)*	(0.052128)	(0.070716)
M1	-0.22004	-0.326301	-0.425468	-0.14034	-0.266406	-0.450584	-0.136488	-0.243835	-0.450401	-0.01956	-0.260462	-0.439086
	(0.150112)	(0.124758)**	(0.171167)**	(0.144227)	(0.118738)**	(0.164456)**	(0.132449)	(0.110257)**	(0.154317)**	(0.116769)^{c}	(0.097205)**	(0.136049)**
Discount	0.132331	-0.962616	-0.409692	0.02153	-0.963836	-0.435694	0.078072	-0.948649	-0.388137	-0.118902	-0.792935	-0.263875
Rate	(0.538592)	(0.344751)**	(0.341726)	(0.517475)	(0.331227)**	(0.328327)	(0.488429)	(0.312805)**	(0.310098)	(0.430609)	(0.275775)**	(0.273389)
N /R^2 /Prob(F-stat)	2020	0.035318	0.011623	2023	0.03604	0.008338	2058	0.037[illegible]	0.003458	2058	0.034509	0.012448

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

Discount rate surprises carry negative signs in "high" states. Durable goods shocks appear to be marginally significant for the Russell 1000. Evidence for varying coefficients with different states is again very strong. Small caps tend to react to news differently from large caps, especially when news on inflation, employment and trade figures is concerned. The Russell 2000 index shows a higher return than the Dow Jones when the economy is in the low state.

The above economic stage classification method, however, is subject to the selection bias. The high states are defined using ex post industrial production. For example, when we label the economy as being in the high state, we already include information that industrial production growth is likely to fall in the future, therefore, current stock prices are likely to fall in response to any news in the high state.

We hence introduce an *ex ante* state definition. We mark the economy state as "high" when we observe the fourth consecutive positive growth rate for industrial production, and we denote the state as "low" after two back-to-back decreases, and denote "medium" for what remains. This classification takes into account of the upward sloping time trend for the production level and the high correlation for the historical data for the growth in industrial production; at the same time, it also captures the increasing worry for an overheated economy (recession) with consecutive industrial production growth (decline). In this modified procedure, "high" states account for about 38 percent of the time, while "low" states account for about 18 percent of the time. Considering the otherwise similar but less autocorrelated growth rate for leading indicator, we classify the state to be "high" after a third consecutive positive growth rate. To classify "medium" and "low" states, we apply the same method used for industrial production growth. "High" states amount to about 33 percent of the total time, while "low" states account for about 17 percent. The estimates are reported in Table 3b and Table 4b respectively.

Except for the Russell 2000 index, M-1 announcements fail to produce significant influence in the "high" economic state. The puzzling significantly positive sign of discount rate disappears now for the Russell 2000 at the low economy activity level. Instead, in the "low" state classified by the leading indicator, a negative and yet significant coefficient shows up. Retail sales shocks show their importance for big caps when the economy is in the medium state classified by the leading indicator. The results lend strong support to the view that the stock market reacts differently to news across different states.

Classification of economic states by NBER business cycle turning points

The related business cycle reference dates from NBER are the following: November 1982 and March 1991 for trough, July 1981 and July 1990 for peak. For the time from trough to peak, we denote it as expansions; for the time from peak to trough, we denote it as

Table 4a. By Leading Indicator

Announcement	Dow Jones			S&P 500			Russell 1000			Russell 2000		
	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	low
C	0.071762	0.023082	0.061561	0.068134	0.02106	0.04323	0.065364	0.023603	0.043902	0.032004	0.050137	0.081506
	(0.04389)*	(0.029343)	(0.041272)	(0.042143)	(0.028217)	(0.039612)	(0.038802)*	(0.026576)	(0.037468)	0.034273)	(0.023474)**	(0.033094)**
Inventory	1.200198	-0.426985	0.609214	1.059771	-0.471967	0.263408	0.696552	-0.499131	0.254301	0.181761	-0.63026	0.475863
	(0.777034)	(0.55692)	(0.76144)	(0.747212)	(0.535558)	(0.732132)	(0.696008)	(0.502922)	(0.692505)	(0.614764)^{c}	(0.444216)	(0.611669)
Capital	-1.044206	-0.012557	0.63203	-0.556645	-0.078773	0.518715	-0.102417	-0.093767	0.494609	-0.389256	-0.043462	0.521606
Utilization	(0.849863)	(0.401241)	(0.682597)	(0.817263)	(0.38585)	(0.656359)	(0.616992)	(0.363744)	(0.620833)	(0.544972)	(0.321285)	(0.548364)
Home	-0.001211	-0.001671	-0.000548	-0.001752	-0.001256	-0.001744	-0.002978	-0.001084	-0.001588	-0.001422	0.000927	-0.002146
Sales	(0.004102)	(0.002095)	(0.004048)	(0.003944)	(0.002015)	(0.003893)	(0.003441)	(0.001903)	(0.003682)	(0.003039)	(0.001681)	(0.003252)
Durable	-0.058697	0.013472	0.030198	-0.061843	0.005699	0.032105	-0.058719	-0.001435	0.028429	-0.048792	0.032006	0.007338
Goods	(0.040049)	(0.033668)	(0.037305)	(0.038512)	(0.032377)	(0.035874)	(0.035831)*	(0.030478)	(0.033933)	(0.031648)	(0.026921)	(0.029972)
Housing	2.92369	0.647077	0.860464	2.832791	0.808401	1.190922	2.667789	0.835469	1.212723	2.021865	1.0341	0.83795
Starts	(1.284325)**	(0.874623)	(1.201191)	(1.235055)**	(0.841075)	(1.155054)	(1.168144)**	(0.790527)	(1.092535)	(1.031788)**	(0.69825)	(0.965005)
Retail	-0.067372	-0.152949	-0.107597	0.00396	-0.111354	-0.152574	-0.006451	-0.102504	-0.132884	0.016859	-0.079515	-0.017094
Sales	(0.14711)	(0.121971)	(0.185764)	(0.141466)	(0.117293)	(0.178638)	(0.133802)	(0.110944)	(0.168969)	(0.118183)	(0.097993)	(0.149246)
CPI	-0.385156	-0.382846	-1.626597	-0.586426	-0.522431	-1.470864	-0.724548	-0.595134	-1.291105	-0.51644	-0.639462	-0.692854
	(0.967982)	(0.629463)	(0.701144)**	(0.930851)	(0.605318)	(0.674248)**	(0.880343)	(0.572538)	(0.637754)**	(0.777582)	(0.505706)	(0.563309)^{c}
PPI	-1.602015	-0.1894	-0.497878	-1.722549	-0.159074	-0.51322	-1.481431	-0.169135	-0.525652	-0.960655	-0.146328	-0.694207
	(0.481321)**	(0.298843)	(0.454347)	(0.462846)**	(0.28738)	(0.436897)	(0.41311)**	(0.269716)	(0.41325)	(0.364888)**,^{c}	(0.238232)	(0.365012)*
Industrial	0.129186	0.001076	-0.177936	0.345051	0.101337	-0.135481	0.554938	0.142679	-0.1333	0.458052	0.194957	-0.255522
Production	(0.589912)	(0.360856)	(0.382578)	(0.567284)	(0.347014)	(0.367903)	(0.515714)	(0.328156)	(0.34799)	(0.455516)	(0.289851)	(0.307369)
Leading	0.385074	0.040832	0.095035	0.304233	0.069972	-0.019979	0.221481	0.048497	0.016209	0.298978	0.119101	0.194524
Indicator	(0.405014)	(0.276765)	(0.247876)	(0.389469)	0.266149)	(0.238357)	(0.366912)	(0.251516)	(0.225456)	(0.324083)	(0.222157)	(0.199139)
Unemployment	1.417753	0.398737	-0.655428	1.263812	0.398874	-0.743359	0.900651	0.394993	-0.781537	0.261776	0.079798	-0.84029
rate	(0.789813)*	(0.45826)	(0.739348)	(0.759268)*	(0.440682)	(0.710982)	(0.679071)	(0.416499)	(0.672499)	(0.599804)^{c}	(0.367882)	(0.593999)
Nonfarm	-0.003478	0.00232	-0.001717	-0.003474	0.001457	-0.00264	-0.003018	0.001358	-0.002691	-0.00092	0.001715	-0.003109
Payrolls	(0.00115)**	(0.001017)**	(0.001286)	(0.001106)**	(0.000978)	(0.001236)**	(0.001024)**	(0.000924)	(0.001169)**	(0.000904)^{c}	(0.000816)**	(0.001033)**
Trade	0.261671	-0.012852	0.055153	0.230422	-0.033018	0.019003	0.224872	-0.037585	0.017256	0.165254	-0.006271	0.012324
Balance	(0.071318)**	(0.053241)	(0.084277)	(0.068582)**	(0.051199)	(0.08029)	(0.064642)**	(0.048269)	(0.075944)	(0.057096)**,^{c}	(0.042634)	(0.067079)
M1	-0.191783	-0.329767	-0.354456	-0.133943	-0.268899	-0.332295	-0.167489	-0.249879	-0.314854	-0.030836	-0.266339	-0.330283
	(0.157451)	(0.132639)**	(0.143605)**	(0.150117)	(0.127551)**	(0.137332)**	(0.136119)	(0.119169)**	(0.129898)**	(0.12023)	(0.105259)**	(0.114736)**
Discount	-1.100332	-0.444547	-0.389975	-1.19645	-0.414781	-0.428618	-1.219259	-0.37423	-0.382345	-0.871413	-0.431762	-0.307662
Rate	(0.50223)**	(0.342564)	(0.346242)	(0.482966)**	(0.329424)	(0.332924)	(0.455936)**	(0.311584)	(0.314904)	(0.402715)**	(0.275213)	(0.278146)
N./R^2/Prob(F-stat)	2020	0.049339	0.000008	2023	0.048368	0.000014	2058	0.046987	0.00002	2058	0.040588	0.000697

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

Table 4b. By Leading Indicator

Announcement	Dow Jones			S&P 500			Russell 1000			Russell 2000		
	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	low
C	0.069575	0.016588	0.013596	0.056394	0.012396	0.006008	0.059672	0.010351	0.008774	0.06584	0.031654	0.030295
	(0.037722)*	(0.029514)	(0.050941)	(0.036284)	(0.028347)	(0.048998)	(0.033845)*	(0.026592)	(0.045831)	(0.029873)**	(0.023471)	(0.040452)
Inventory	-0.061978	0.500502	-0.370307	-0.440471	0.458362	-0.958618	-0.548783	0.377319	-1.869962	-0.714335	0.081357	-0.651263
	(0.687046)	(0.495616)	(1.573709)	(0.660847)	(0.476699)	(1.513699)	(0.623612)	(0.447881)	(1.347125)	(0.550419)	(0.395313)	(1.189013)
Capital	-0.669132	0.239966	-0.874867	-0.690784	0.240745	-0.996698	-0.344899	0.162131	-1.348132	-0.25734	-0.000971	-0.814809
Utilization	(0.613715)	(0.399278)	(1.056738)	(0.590312)	(0.384005)	(1.016442)	(0.505235)	(0.361796)	(0.938922)	(0.445936)	(0.319332)	(0.828721)
Home	-0.003134	0.001195	-0.003922	-0.002842	0.000997	-0.004881	-0.002965	0.000906	-0.004606	-0.000191	0.000427	-0.000433
Sales	(0.002463)	(0.002562)	(0.005981)	(0.00237)	(0.002464)	(0.005753)	(0.002173)	(0.002325)	(0.005369)	(0.001918)	(0.002052)	(0.004738)
Durable	0.011787	0.018779	-0.098079	0.00073	0.007906	-0.062021	-0.003485	0.001103	-0.05598	-0.012085	0.015537	-0.012767
Goods	(0.034035)	(0.03185)	(0.054149)*	(0.032737)	(0.030636)	(0.052084)	(0.030564)	(0.028827)	(0.049213)	(0.026977)	(0.025443)	(0.043437)^{c}
Housing	1.027108	0.264918	3.967072	1.134427	0.482606	4.082127	1.233226	0.460905	3.838578	1.08359	0.546184	3.315925
Starts	(0.921053)	(1.001985)	(1.563787)**	(0.885931)	(0.963739)	(1.504156)**	(0.837086)	(0.903269)	(1.42099)**	(0.738837)	(0.797253)	(1.254209)**
Retail	0.043371	-0.234854	-0.076434	0.089013	-0.21568	-0.035317	0.07799	-0.199406	-0.030099	0.061544	-0.117886	0.002442
Sales	(0.146502)	(0.120667)*	(0.195945)	(0.140916)	(0.116065)*	(0.188473)	(0.133137)	(0.109672)*	(0.178089)	(0.117511)	(0.0968)	(0.157186)
CPI	-1.412649	-0.786768	-0.289559	-1.094891	-1.004619	-0.390548	-1.014367	-1.030899	-0.41179	-0.047721	-0.999924	-0.718215
	(0.845616)*	(0.61066)	(0.8331)	(0.81337)	(0.587361)*	(0.801332)	(0.768439)	(0.554933)*	(0.756932)	(0.678248)^{c}	(0.4898)**	(0.668091)
PPI	-0.319076	-0.867791	-0.052205	-0.382525	-0.805078	-0.196996	-0.300089	-0.776009	-0.33955	-0.243938	-0.624908	-0.248871
	(0.386073)	(0.313698)**	(0.551902)	(0.371351)	(0.30173)**	(0.530857)	(0.340097)	(0.282694)**	(0.490945)	(0.30018)	(0.249515)**	(0.433323)
Industrial	-0.120258	-0.066773	0.431722	0.169912	-0.053029	0.444875	0.233903	-0.013806	0.455547	0.349668	0.010802	0.118371
Production	(0.481422)	(0.3236)	(0.497717)	(0.463064)	(0.31126)	(0.478738)	(0.435937)	(0.294073)	(0.446801)	(0.384772)	(0.259558)	(0.39436)
Leading	0.28992	0.208676	-0.182543	0.396171	0.119946	-0.296601	0.281505	0.138764	-0.291195	0.277038	0.333467	-0.188763
Indicator	(0.382496)	(0.225833)	(0.345532)	(0.36791)	(0.217222)	(0.332356)	(0.345297)	(0.205199)	(0.313875)	(0.30477)	(0.181115)**	(0.277036)
Unemployment	-0.011203	0.205639	1.821293	-0.138281	0.157296	1.610021	-0.243575	0.107903	1.524698	-0.985926	-0.151584	1.378865
rate	(0.676285)	(0.484522)	(0.801791)**	(0.650496)	(0.466028)	(0.771216)**	(0.613809)	(0.432122)	(0.722688)**	(0.541766)*,^{c}	(0.381404)	(0.637866)**
Nonfarm	0.001288	-0.001717	-0.000508	0.00018	-0.001953	-0.001355	0.000191	-0.001911	-0.001227	0.000698	-0.000834	-0.001131
Payrolls	(0.001256)	(0.000908)*	(0.001505)	(0.001208)	(0.000873)**	(0.001448)	(0.001127)	(0.000821)**	(0.001359)	(0.000995)	(0.000725)	(0.001199)
Trade	0.082319	0.109593	-0.003915	0.052119	0.091237	-0.045996	0.042562	0.089378	-0.051205	0.019919	0.075156	0.043739
Balance	(0.061085)	(0.058885)*	(0.088911)	(0.058756)	(0.056384)	(0.085521)	(0.055116)	(0.053072)*	(0.080808)	(0.048647)	(0.046843)*	(0.071323)
M1	-0.198009	-0.487704	-0.142993	-0.175457	-0.38323	-0.196915	-0.192602	-0.333797	-0.203987	-0.262723	-0.204118	-0.200515
	(0.149232)	(0.121666)**	(0.175831)	(0.143541)	(0.11598)**	(0.169126)	(0.133886)	(0.108323)**	(0.154057)	(0.118172)**	(0.095609)**,^{c}	(0.135976)
Discount	-0.332007	-0.597938	-0.742836	-0.299345	-0.65864	-0.766285	-0.336315	-0.595265	-0.669054	-0.499959	-0.414361	-0.546061
Rate	(0.414809)	(0.351025)*	(0.390507)*	(0.398991)	(0.337639)**	(0.375616)**	(0.37697)	(0.319015)*	(0.354583)*	(0.332725)	(0.281572)	(0.312966)*
N /R^2 /Prob(F-stat)	2020	0.040255	0.001204	2023	0.038825	0.002342	2058	0.039367	1.75254	2058	0.034319	0.013498

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

recession. We present our results in Table 5. M-1 announcements tend to be more significant during expansion, which is in line with the liquidity effect hypothesis. In an expansion, the Russell 2000 index shows significantly less strong responses to M-1 shocks when compared with the Dow Jones Index. News on M-1 data seems to have a stronger effect on small caps during recession. The unexpected discount rate changes have strong negative influence during both an expansion and a recession for all the four indexes. Several macroeconomic variables now become significant, such as capital utilization for the S&P 500 during expansion and home sales for the Russell 2000 during contraction. During contraction, the Russell 2000 index earns significantly lower return than blue chips, although it tends to earn more during expansions. Figure 1 also shows that the Rusell 2000 Index suffered from larger loss during the recession from late 1990 to early 1991. This observation lends support to the view that small caps are less likely to survive adverse business conditions. We note, however, that recession periods account for only a very small proportion of the total sample period. In addition, note that the NBER business cycle turning points classify the direction of economic activity rather than the level of it.

Classification by the unemployment rate

The benchmark 7 percent unemployment rate is used here to divide time into two states. For the time where the unemployment rate is higher than 7 percent, it is classified as a contraction; the remaining time is considered to be an expansion. Expansion accounts for roughly 62 percent of the total time. In Table 6, the unanticipated part of the M-1 data and discount rate changes have significant negative effects only when the unemployment rate is high. Positive trade balance shocks increase all four indexes during expansions. When the economy is in contraction, positive innovations in housing starts announcements push up all indexes. As expected, positive surprises in nonfarm payrolls depress the S&P 500 and the Russell 1000 during expansion. Retail sales and durable goods again show some importance. The Russell 2000 responds differently from the Dow Jones to the news on business inventory, unemployment rate, and the M-1 data.

Classification by discount rate

Finally, economic conditions are classified by differences in monetary policy. We consider the discount-rate-change series since the Fed is assumed to be operating under the same policy rule until a discount-rate change in the opposite direction is announced. Restrictive policy periods occur when the Fed is raising discount rates, and expansionary policy periods occur when the rate is being lowered. According to the liquidity effect, the tighter is monetary policy perceived, the stronger should be the reaction of market participants. As shown in Table 7, M-1 appears to be significant regardless of monetary policy regime. However, when the monetary policy is restrictive, the magnitude of the responses is larger. At a time when monetary policy is restrictive, stocks tend to react to discount rate change more strongly. Unexpectedly higher inflation is found to depress stock prices. During the restrictive policy period, we find positive shocks to industrial production significantly decrease stock prices. The reason is that the unanticipated pickup in production triggers

Table 5. By NBER

Announcement	Dow Jones		S&P 500		Russell 1000		Russell 2000	
	Contraction	Expansion	Contraction	Expansion	Contraction	Expansion	Contraction	Expansion
C	0.022884	0.037788	0.005048	0.033538	-0.013217	0.037444	-0.051949	0.063998
	0.053355	(0.022891)*	(0.051206)	(0.021947)	(0.048182)	(0.020532)*	(0.042559)[c]	(0.018136)**
Business Inventory	0.654379	0.268356	0.699641	0.069404	0.818187	-0.072066	0.084913	-0.172261
	(1.490435)	(0.398266)	(1.430412)	(0.382212)	(1.352285)	(0.358621)	(1.194475)	(0.31677)
Capital Utilization	0.38488	-0.150991	0.043841	0.808974	0.067747	-0.074662	0.027369	-0.158111
	(0.84292)	(0.339698)	(-0.095641)	(0.326005)**	(0.764802)	(0.296815)	(0.675551)	(0.262177)
Home Sales	-0.018712	-0.001096	-0.01442	-0.001221	-0.016755	-0.001306	-0.019278	0.000306
	(0.012681)	(0.001715)	(0.01217)	(0.001646)	(0.011069)	(0.001533)	(0.009777)**	(0.001354)
Durable Goods	0.002773	-0.003085	0.040322	-0.012049	-0.002636	-0.009873	-0.036365	0.006725
	(0.059455)	(0.02276)	(0.057061)	(0.021844)	(0.05317)	(0.020537)	(0.046965)	(0.01814)
Housing Starts	5.443055	0.598833	5.92221	0.702695	5.71123	0.723999	3.818787	0.859353
	(1.763281)**	(0.662939)	(1.692271)**	(0.636228)	(1.599836)**	(0.599281)	(1.413137)**	(0.529346)*
Retail Sales	0.107732	-0.158953	0.116604	-0.119953	0.11422	-0.11165	0.108833	-0.060228
	(0.199303)	(0.092631)*	(0.191276)	(0.0889)	(0.180829)	(0.084044)	(0.159726)	(0.074236)
CPI	-0.942123	-0.760331	-1.040092	-0.789308	-0.90864	-0.800468	-0.804855	-0.540022
	(0.761777)	(0.507968)	(0.731098)	(0.487506)*	(0.690846)	(0.460803)*	(0.610225)	(0.407028)
PPI	0.242445	-0.700818	0.218407	-0.723189	0.258724	-0.690939	0.026135	-0.512261
	(0.563982)	(0.240769)**	(0.54127)	(0.23107)**	(0.511714)	(0.214075)**	(0.451998)	(0.189092)**
Industrial Production	0.161738	-0.142013	0.228906	-0.049947	0.206333	0.014888	-0.002575	0.071581
	(0.385094)	(0.296547)	(0.369586)	(0.284604)	(0.349396)	(0.267541)	(0.308622)	(0.23632)
Leading Indicator	-0.03934	0.288653	-0.192536	0.3074	-0.152779	0.248794	0.076286	0.268821
	(0.252261)	(0.226238)	(0.242102)	(0.217127)	(0.228802)	(0.204827)	(0.202101)	(0.180924)
Unemployment	-0.323702	0.538613	-0.505114	0.507301	-0.445872	0.421009	-0.190803	-0.027614
	(0.787656)	(0.391071)	(0.755935)	(0.375301)	(0.714657)	(0.349521)	(0.631257)	(0.308733)[c]
Nonfarm Payrolls	0.003421	-0.001001	0.003283	-0.001613	0.002872	-0.001504	0.002456	-0.000683
	(0.002328)	(0.000682)	(0.002234)	(0.000655)**	(0.002112)	(0.000614)**	(0.001866)	(0.000542)
Trade Balance	-0.050128	0.099842	-0.096244	0.077291	-0.076404	0.067555	0.107216	0.034137
	(0.097029)	(0.041465)**	(0.093121)	(0.039702)**	(0.088035)	(0.037343)*	(0.077761)[c]	(0.032985)[c]
M1	-0.234755	-0.345345	-0.26203	-0.277953	-0.230676	-0.268796	-0.255548	-0.203636
	(0.175341)	(0.093635)**	(0.168279)	(0.089378)**	(0.159083)	(0.082571)**	(0.140518)*	(0.072935)**,[c]
Discount Rate	-0.641102	-0.594529	-0.666901	-0.619634	-0.623073	-0.596496	-0.698885	-0.45146
	(0.342839)*	(0.288234)**	(0.329032)**	(0.276626)**	(0.311045)**	(0.261488)**	(0.274746)**	(0.230973)**
No. of obs.\ R^2	2020	0.034354	2023	0.037223	2058	0.036931	2058	0.030397
Prob(F-statistic)	0.000076		0.000012		0.000009		0.000592	

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

Table 6. By Unemployment Rate

Announcement	Dow Jones		S&P 500		Russell 1000		Russell 2000	
	Contraction	Expansion	Contraction	Expansion	Contraction	Expansion	Contraction	Expansion
C	0.034468	0.042825	0.02903	0.034347	0.02618	0.037812	0.055237	0.050424
	(0.033369)	(0.027192)	(0.032055)	(0.026074)	(0.030285)	(0.024282)	(0.026638)**	(0.021358)**
Business Inventory	-0.337127	0.421284	-0.407894	0.235399	-0.355758	0.059427	-0.145702	-0.17815
	(0.921502)	(0.425278)	(0.885207)	(0.408511)	(0.836664)	(0.382875)	(0.735907)	(0.336767)^{c}
Capital Utilization	-0.380553	-0.129775	-0.187483	-0.145847	-0.172126	-0.097899	0.09526	-0.169859
	(1.003902)	(0.360447)	(0.964362)	(0.346212)	(0.911477)	(0.317893)	(0.801711)	(0.27961)
Home Sales	-0.003862	-0.001086	-0.004327	-0.001027	-0.003639	-0.001257	-0.000359	6.80E-05
	(0.004851)	(0.001821)	(0.00466)	(0.00175)	(0.004404)	(0.001624)	(0.003874)	(0.001428)
Durable Goods	0.040279	-0.033663	0.03979	-0.038466	0.037149	-0.041639	0.048118	-0.030569
	(0.032418)	(0.028197)	(0.031141)	(0.027086)	(0.029434)	(0.02531)*	(0.025889)*	(0.022262)
Housing Starts	1.382806	0.967033	1.538702	1.082741	1.487782	1.130284	1.186193	1.245641
	(0.799429)*	(0.992493)	(0.767943)*	(0.95335)	(0.722166)**	(0.901027)	(0.635197)*	(0.792518)
Retail Sales	-0.187301	-0.002699	-0.151001	0.027319	-0.13858	0.021215	-0.099414	0.064454
	(0.107671)*	(0.134934)	(0.103431)	(0.129619)	(0.097759)	(0.122506)	(0.085986)	(0.107753)
CPI	-1.142152	-0.424114	-1.001515	-0.649233	-0.905035	-0.771862	-0.447541	-0.954729
	(0.563502)	(0.63726)	(0.541308)*	(0.612151)	(0.511624)*	(0.578409)	(0.45001)	(0.508753)*
PPI	-0.374704	-0.712652	-0.301039	-0.786034	-0.324688	-0.718063	-0.392814	-0.526062
	(0.345029)	(0.290391)**	(0.331439)	(0.278953)**	(0.31326)	(0.25624)**	(0.275535)	(0.225381)*
Industrial Production	0.040968	-0.090236	0.108333	-0.005185	0.1372	0.046717	0.070783	0.059201
	(0.286655)	(0.405076)	(0.275365)	(0.389121)	(0.260265)	(0.364463)	(0.228922)	(0.320571)
Leading Indicator	0.142604	0.070368	0.117335	-0.022073	0.127626	-0.060284	0.277871	0.006731
	(0.220146)	(0.263334)	(0.211475)	(0.252962)	(0.199878)	(0.238321)	(0.175807)	(0.209621)
Unemployment	-0.005375	0.691654	0.015165	0.558706	0.053503	0.403404	-0.228364	0.033023
	(0.511192)	(0.485953)	(0.491058)	(0.466733)	(0.46413)	(0.431291)	(0.408236)	(0.379352)^{c}
Nonfarm Payrolls	0.000865	-0.000804	0.000287	-0.001399	0.000313	-0.001347	0.00071	-0.000569
	(0.001937)	(0.000706)	(0.001861)	(0.000678)**	(0.001759)	(0.000636)**	(0.001547)	(0.000559)
Trade Balance	0.017642	0.114813	-0.018379	0.091977	-0.019848	0.083865	0.00786	0.067232
	(0.062319)	(0.048417)**	(0.059865)	(0.046362)**	(0.056582)	(0.043506)*	(0.049768)	(0.038267)*
M1	-0.466953	-0.163555	-0.42253	-0.117278	-0.410387	-0.119624	-0.490856	0.017335
	(0.120922)**	(0.115123)	(0.116159)**	(0.109656)	(0.109789)**	(0.100099)	(0.096567)**	(0.088045)^{c}
Discount Rate	-0.715806	-0.416169	-0.671589	-0.521522	-0.654059	-0.429284	-0.658288	-0.258347
	(0.279904)**	(0.35621)	(0.268879)**	(0.34218)	(0.254134)**	(0.323288)	(0.22353)**	(0.284356)
No. of obs.\ R^2	2019	0.029813	2022	0.030723	2057	0.030987	2057	0.032759
Prob(F-statistic)	0.001154		0.000669		0.00042		0.000142	

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

Table 7. By Discount Rate

Announcement	Dow Jones		S&P 500		Russell 1000		Russell 2000	
	Contraction	Expansion	Contraction	Expansion	Contraction	Expansion	Contraction	Expansion
C	0.033139	0.0354	0.024237	0.027827	0.029326	0.027385	0.01346	0.07314
	(0.033059)	(0.027643)	(0.031802)	(0.026562)	(0.029436)	(0.025083)	(0.02593)	(0.022095)**,c
Business Inventory	0.639591	-0.065483	0.457186	-0.218078	0.186448	-0.218504	-0.182772	-0.136059
	(0.57262)	(0.519815)	(0.550843)	(0.500013)	(0.512801)	(0.472514)	(0.45172)c	(0.416231)
Capital Utilization	-0.396034	0.100421	-0.396679	0.129485	-0.305902	0.079848	-0.368746	0.061309
	(0.477486)	(0.427867)	(0.459327)	(0.411558)	(0.409414)	(0.388923)	(0.360647)	(0.342597)
Home Sales	-0.002528	-0.000554	-0.00212	-0.000863	-0.002646	-0.000609	-0.000713	0.000553
	(0.002681)	(0.002201)	(0.002579)	(0.002117)	(0.002346)	(0.002001)	(0.002066)	(0.001762)
Durable Goods	-0.055986	0.026009	-0.047009	0.01691	-0.051699	0.014925	-0.02697	0.015739
	(0.036429)	(0.026139)	(0.035043)	(0.025145)	(0.0325)	(0.023758)	(0.028628)	(0.020928)
Housing Starts	2.834806	0.40837	2.419258	0.83501	2.376793	0.842956	2.009993	0.779621
	(1.064288)**	(0.765021)	(1.023814)**	(0.735913)	(0.967463)**	(0.692184)	(0.852225)**	(0.609736)
Retail Sales	-0.381303	0.043185	-0.310414	0.051108	-0.289719	0.047814	-0.235605	0.075498
	(0.137122)**	(0.106457)	(0.131908)**	(0.102409)	(0.12464)**	(0.096777)	(0.109794)**	(0.085249)
CPI	-0.675529	-1.016536	-0.736191	-0.999791	-0.856177	-0.906561	-1.218597	-0.322098
	(0.653119)	(0.551509)*	(0.628281)	(0.530531)*	(0.593443)	(0.501353)*	(0.522756)**	(0.441635)
PPI	-0.713406	-0.482414	-0.791205	-0.45173	-0.72208	-0.440442	-0.517936	-0.411327
	(0.341182)**	(0.290996)*	(0.328207)**	(0.279921)*	(0.29834)**	(0.264524)*	(0.262804)**	(0.233016)*
Industrial Production	0.20232	-0.061716	0.197243	0.045192	0.267585	0.060618	0.293084	0.019986
	(0.416812)	(0.282603)	(0.400961)	(0.271855)	(0.37597)	(0.256904)	(0.331187)	(0.226303)
Leading Indicator	-0.264236	0.227821	-0.275799	0.159299	-0.329706	0.165063	-0.117269	0.251774
	(0.359742)	(0.19024)	(0.346061)	(0.183004)	(0.325193)	(0.172939)	(0.286458)	(0.15234)*
Unemployment	1.135825	-0.012492	1.120573	-0.11297	0.957179	-0.145158	0.621563	-0.436875
	(0.614871)*	(0.425946)	(0.591487)*	(0.409728)	(0.539204)*	(0.387191)	(0.474978)	(0.341071)
Nonfarm Payrolls	-0.000907	-0.000465	-0.001452	-0.001043	-0.001246	-0.001047	0.000292	-0.000832
	(0.001052)	(0.000837)	(0.001012)	(0.000806)	(0.000939)	(0.000761)	(0.000827)	(0.000671)
Trade Balance	0.093023	0.064324	0.061723	0.040147	0.048752	0.040749	0.068216	0.033716
	(0.061485)	(0.04866)	(0.059147)	(0.04666)	(0.055295)	(0.044094)	(0.048709)	(0.038842)
M1	-0.359009	-0.273527	-0.332299	-0.215761	-0.31942	-0.203073	-0.264068	-0.198679
	(0.129764)**	(0.108175)**	(0.124829)**	(0.10336)**	(0.113081)**	(0.097675)**	(0.099612)**	(0.08604)**
Discount Rate	-0.842253	-0.449188	-0.787623	-0.517316	-0.764058	-0.471712	-0.785425	-0.267763
	(0.346834)**	(0.284847)	(0.333644)**	(0.274004)*	(0.3151)**	(0.258928)*	(0.277568)**	(0.228086)
No. of obs.\ R^2	2020	0.033506	2023	0.03187	2058	0.032383	2058	
Prob(F-statistic)	0.000129		0.000338		0.000178		0.00038	

Note: Standard errors are in parentheses. * indicates significance at 10 percent; ** indicates significance at 5 percent while c indicates significance at 10 percent compared with coefficients of Dow Jones.

further policy tightening due to concerns over inflation risk. For the first time, it is found that the leading indicator shows some marginal significance for the Russell 2000. Small caps seem to earn less return than blue chips during the tight monetary policy period. From Figure 1, one can see that the Russell 2000 Index lost more ground during the 1987 crash, which is shortly after a interest rate hike.

V. CONCLUSIONS

Employing a variety of state variables for the level of economic activity, we classify economic conditions into different stages by various methods. We also classify business conditions by different monetary policy regimes. We then examine stock market responses to macroeconomic announcements conditional on economic states. We consistently find strong evidence for varying responses of the stock market to macroeconomic shocks across different stages of the business cycle. Furthermore, more macroeconomic variables show significance once we allow the response coefficients to vary. The evidence we find in this paper validates the good news/bad news story depicted in the financial press regarding the impact of macroeconomic announcements on the stock market. The significance of some announcements concerning real economic activity in our regressions suggests that ignoring the response variations across economic states would bias the response coefficients toward zero. This explains why the previous empirical research fails to capture the influence of many announcements even though the market watches them so closely. Our study shows that different sets of important state variables may appear with different classification of economic states. This again stresses the importance of distinguishing variables in association with business cycle stages. Note that a novel piece of evidence from our study is that announcements on housing starts appear to have significant impact on stock prices. Housing starts innovations reveal surprise in consumption demands and consumers' confidence into future. Therefore, they cause agents to update cash flow outlooks and thus move stock prices.

In addition to a broad set of real variables such as industrial production, unemployment, and housing starts, we have also examined the individual impact of M-1 and inflation rate announcements and also discount rate changes on stock prices. Inflation shocks are found significant with expected signs, while surprises in M-1 tend to have stronger effects on the stock market, roughly consistent with the inflation expectation hypothesis and the liquidity effect hypothesis.

Small caps are found to respond differently to macroeconomic variables, in terms of the relevant set of macroeconomic announcements, the magnitude and the signs. Figure 1 shows that small caps better performed than big caps during the time period from February 1, 1980 to December 31, 1996. However, small caps tend to have lower earnings during restrictive monetary policy periods and during contractions as classified by NBER. Whether small caps are less likely to survive adverse business conditions remains inconclusive. We find no evidence that small stocks are more exposed to production risk. Small firms are

found in previous research to account for a significantly disproportionate share of the manufacturing decline and inventory slowdown that follows a tightening of monetary policy. If this is the case, production activity announcements may reveal different information for small caps and big caps, and thus generate different responses. Though some difference in reaction to inventory shock between small caps and big caps is found, the evidence for this argument remains inadequate and inconclusive.

Throughout the paper, we focus on the differentiation of the states of the economy and examine the stock market reactions to macroeconomic news across states. Despite our comprehensive search for state variables, there remain alternative ways to classify business conditions. Capital utilization, for instance, may prove to be a good indicator for the state of economy. One may also classify economic states by joint state variables. This paper has, however, served to demonstrate the importance of distinguishing economic states in estimating stock market responses, in terms of returns, to macroeconomic announcements. It is the task of future research to study the stock market responses to macroeconomic announcements in terms of volatility.

REFERENCES

Chan, K., and N. Chen, 1991, "Structural and Return Characteristics of Small and Large Firms," *Journal of Finance*, pp. 1467-83.

Chen, N., R.Roll and S. Ross, 1986, "Economic Forces and the Stock Market," *Journal of Business*, No. 39, pp. 383-403.

Fama, E. , 1990, "Stock Returns, Expected Returns, and Real Activity," *Journal of Finance*, pp. 1089-1109.

Fama, E., and K. French, 1989, "Business Conditions and Expected Returns on Stocks and Bonds," *Journal of Financial Economics*, 25, pp. 23-49.

———, ———, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *The Journal of Finance*, pp. 3-56.Fama, E., and K. French, 1995, Size and Book-Market Factors in Earnings and Returns, *The Journal of Finance*, pp. 131-55.

Gertler, M. and S. Gilchrist, 1994, "Monetary Policy, Business Cycles, and The Behavior of Small Manufacturing Firms," *The Quarterly Journal of Economics*, pp. 309-40.

Goodhart C., and R. Smith, 1985, "The Impacts of News on Financial Markets in the United Kingdom," *Journal of Money, Credit, and Banking*, No. 17, pp.507-11.

Hardouvelis, G., 1984, "Market Perceptions of Federal Reserve Policy and the Weekly Monetary Announcements," *Journal of Monetary Economics*, No. 14, pp.225-40.

———, 1987, "Reserve Announcements and Interest Rates: Does Monetary Policy Matter," *The Journal of Finance*, pp. 407-21.

———, 1987, "Macroeconomic Information and Stock Prices," *Journal of Economics and Business*, pp. 131-39

Jensen, G.R., J.M. Mercer and R. Johnson, 1996, "Business Conditions, Monetary Policy, and Expected Security Returns," *Journal of Financial Economics*, No. 40, pp. 213-37.

Kearney, 1996, "The Effect of Changing Monetary Policy Regimes on Stock Prices," *Journal of Macroeconomics*, No. 18, pp. 429-47.

McQueen, G., and V. Roley, 1993, Stock Prices, News, and Business Conditions, *The Review of Financial Studies,* pp. 683-707.

Mitchell, M., and J. Mulherin, 1994, "The Impact of Public Information on the Stock Market," *The Journal of Finance*, pp. 923-50.

Pearce, D.K., and V.Roley, 1985, "Stock Prices and Economic News," *Journal of Business*, No. 58, pp. 49-67.

———, and ———, 1983, "The Reaction of Stock Prices to Unanticipated Changes in Money: A Note," *The Journal of Finance*, pp. 1322-33.

Strongin, S. and V. Tarhan, 1990, "Money Supply Announcements and the Market's Perception of Federal Reserve Policy," *Journal of Money, Credit, and Banking*, No. 21, pp. 135-53.

Urich, T. and P. Wachtel, 1984, "The Effects of Inflation and Money Supply Announcements on Interest Rates," *The Journal of Finance*, pp. 168-91.