MONETARY POLICY AND THE INVESTMENT COMPANIES[♦]

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Monetary Policy and the Investment Companies

Abstract

We examine the impact of monetary policy actions on the returns of investment companies. We observe that an expansionary monetary policy action increases the returns of investment companies, while a contractionary policy action depresses the returns. We observe that monetary policy actions have asymmetric effects on returns across different monetary policy environments. We observe that the response of the returns of investment companies to surprise federal funds target rate changes is large and statistically significant. Returns are statistically significantly affected by positive policy surprises (larger than expected value of the federal funds target rate) while they are not significantly affected by negative positive surprises. We observe that the effects of monetary policy on the investments companies are asymmetric across different business conditions and the results are robust to different identification schemes of the business conditions. We find evidence that the effect of monetary policy on the returns of investments companies in good business conditions is statistically significant compared to bad business conditions. Surprise monetary expansion is interpreted by investors as bad news in high levels of economic activity while it is interpreted as good news in low levels of economic activity. Furthermore, we find that the asymmetric effect of monetary policy across different business conditions are due to the asymmetric effect of monetary policy on the discount rates and expected cash flow proxies. Moreover, we find evidence that the effect of monetary policy on the returns of investments companies are driven by its effect through changes in discount rate proxies as opposed to expected cash flow proxies. The results imply that the monetary policy plays a strong signaling role for the stock market and that any asset-pricing model for investments companies should take into account the effect of monetary policy by incorporating an interest rate-based indicator of monetary policy in the model.

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I. Introduction

Monetary policy actions can affect stock price movements if new information is revealed by the policy changes and if the new information affects future cash flow or discount rate expectations. Monetary policy affects interest rates, which in turn affect the cost of capital for corporations. Through this channel, monetary policy can have significant effect on stock returns. Monetary policy can also provide signals about the future direction of the economy by providing information about future growth prospects, inflation, and therefore expected future cash flows. In fact, assets such as equities are claims on future economic output. Thus, if monetary policy has real economic effects, then shifts in monetary policy should affect stock prices. Chami, Cosimano and Fullenkamp (1999) argue that the stock market is an important channel of monetary policy, which has grown in importance in the last two decades. Given the importance of monetary policy, it is not surprising that investors and analysts in the stock market and the financial press closely watch the actions taken by the Federal Reserve Bank. In recent years, the stock market seems to react even to the comments made by the Chairman and other high officials of the Federal Reserve Bank (the Fed).

A number of recent studies confirm the importance of Federal Reserve Bank announcements and document the relationship between monetary policy and stock returns. For instance, Jensen and Johnson (1995) find that stock returns are negatively related to changes in the discount rate. Lobo (2000) examines the asymmetric adjustment of stock prices around the federal funds target rate announcements in the 1990s and observes that positive returns are more persistent than negative returns as a result of target rate changes. He also observes that risk aversion increases before the announcement of a rate change. Madura and Schnusenberg (2000) investigate the reaction of bank equity returns to changes in monetary policy. They observe that bank equity returns are inversely related to changes in monetary policy and that the sensitivity of bank equity returns depends on the direction of policy change. They also find that larger banks and banks with low-capital ratios are more exposed to changes in monetary policy. These papers illustrate the importance of Federal Reserve announcements as related to stock returns.

Several articles have recently investigated the importance of monetary policy for equity returns using specific monetary policy environments. For example, Jensen, Mercer and Johnson (1996) extend the Fama and French (1989) analysis by incorporating a measure of monetary policy and observe that monetary policy actions have a significant effect on security returns.

Moreover, they observe that business condition proxies (dividend yield, term spread and default spread) play substantially different roles in explaining variation in stock and bond returns, depending upon monetary policy environments. Specifically, the authors find significant explanatory contributions by any of the forecasting variables in explaining stock (bond) returns only in periods that are characterized by an expansive (restrictive) monetary policy environments.

Patelis (1997) examines whether shifts in the stance of monetary policy can account for the observed predictability in stock returns. He concludes that monetary policy can predict stock returns over long horizons. The author also observes that monetary policy shocks primarily affect expected excess returns, followed by expected dividend growth, but that they have little effect on expected real returns. Thorbecke (1997) examines whether monetary policy has contemporaneous effects on stock returns at the industry level and on size-based portfolio returns. He observes that monetary policy shocks have similar effects across industries and that the returns on small firms are significantly affected by the policy shock. The results support the hypothesis that monetary policy, at least in the short run, has real and statistically significant effects on the economy. Park and Ratti (2000) observe that contractionary monetary policy shocks cause statistically significant negative movements in inflation and expected real stock returns. They also observe that monetary policy tightens significantly in response to positive shocks to inflation, and that the impact of monetary policy shocks on stock returns is negative and volatile.

Internationally, Conover, Jensen and Johnson (1999) observe that stock returns in foreign markets are associated with both local and U.S. monetary environments and that several of the foreign stock markets are more strongly related to the U.S. monetary environments than to local monetary conditions. This association renders a further investigation of monetary policy changes in the U.S. even more important.

Durham (2001) and Wachtel and Urich (2001) observe weaker and diminished relationship between monetary policy and the stock returns in the 1990s using traditional measures of monetary policy (the federal funds rate or the discount rate). Lange, Sack, and Whitesell (2001) observe that the financial markets are better able to anticipate policy changes since the Fed moved towards greater transparency in the operation of monetary policy starting 1994.

McQueen and Roley (1993) observe that the response of the stock market to macroeconomic news is different across different business conditions. They observe that the variation of stock prices to economic news is due to the asymmetric response of the expected cash flows across different business conditions. Furthermore, they observe that the stock market responds negatively to good economic news when the economy is strong and this negative relation is caused by the larger increase in discount rates relative to expected cash flows.

The present paper examines the impact of monetary policy on stock returns of investments companies and expands on previous studies in many ways. The primary objective of this paper is to investigate the stock price reaction of investments companies to monetary policy actions taken by the Federal Reserve Bank. Another objective of the paper is to examine the effect of unanticipated, or surprise, changes in monetary policy on the returns of investments companies. Another objective of this paper is to investigate whether the stock price reaction of investments companies to monetary policy is symmetric across different business conditions.

We contribute to the growing body of literature on the relationship between monetary policy and stock returns in several ways. First, we investigate the reaction of monetary policy actions by investments companies. Jensen, Mercer and Johnson (1996), Park and Ratti (2000), Patelis (1997), and Thorbecke (1997) examine the reaction of the general stock market to monetary policy in the stock return predictability framework. Thorbecke (1997) also investigates a variety of manufacturing industry returns, while Madura and Schnusenberg (2000) investigate the relationship between commercial bank returns and monetary policy actions. However, the impact of monetary policy changes on investments companies has not been investigated. Second, we investigate the effect of unanticipated monetary policy actions on the returns of investments companies. Kuttner (2001) uses this approach to analyze the impact of monetary policy actions on Treasury bills, notes and bonds; however, he does not investigate equity returns. Third, we seek to determine whether the effect of monetary policy actions on the returns of investments companies are the same across different monetary policy environments. Jensen, Mercer and Johnson (1996) examine this issue for overall stock and bond market returns but do not investigate separate industry responses. Fourth, we examine the effect of monetary policy actions on the returns of investments companies across different business conditions. McQueen and Roley (1993) investigate the effect of different macroeconomic news on the stock prices across different business conditions while Jensen, Mercer and Johnson (1996) investigate the effect of monetary policy on stock and bond returns across different monetary policy environments. Finally, we also investigate the causes of asymmetric effect of monetary policy on stock returns. McQueen and Roley (1993) investigate the reason macroeconomic news affect stock prices differently across different business conditions. Following their approach, we examine whether the discount rate proxies or the expected cash flow proxies are causing the differential effect of monetary policy on the returns of investments companies.

Although we report the results using the federal funds rate as an indicator of monetary policy, we observe qualitatively similar results using the federal funds target rate, or the spread between the federal funds and the discount rate as indicators of monetary policy. Furthermore, to identify the expansionary and contractionary monetary policy environments, we use the relevant policy tool (either the federal funds target rate or the discount rate) contingent on the policy period under consideration. Most of the aforementioned studies ignore the consequences of different monetary policy regimes. Bonser-Neal, Roley and Sellon (1998), and Madura and Schnusenberg (2000) are exceptions.[1]

To identify unanticipated monetary policy changes, we utilize futures rate expectations. A majority of studies [(Patelis (1997), Thorbecke (1997), and Park and Ratti (2000)] use vector auto regression (VAR) methodology to extract exogenous innovations or unanticipated monetary policy shocks to the federal funds rate as a measure of monetary policy surprise. However, Rudebusch (1998) shows that unanticipated policy shocks may not be measured accurately using VAR methodology. In fact, he strongly criticizes the VAR methodology in analyzing the effect of monetary policy and argues that the measures of monetary policy in VAR are not useful at all. He favors using futures rate expectations to identify the unanticipated movements in the federal funds rate. Kuttner (2001) uses federal funds futures rates to identify monetary policy surprises and decomposes the federal funds target rate changes into anticipated and unanticipated components. We use his data of anticipated and unanticipated federal funds target rate changes to investigate the effect of monetary policy surprises on the returns of investments companies.[2]

To ensure the robustness of our results, we apply different methodologies to assess the effect of monetary policy actions on the returns of investments companies. Specifically, in

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[1] Bonser-Neal, Roley and Sellon (1998) examine the effect of monetary policy actions on the exchange rates while Madura and Schnusenberg (2000) examine the effect on commercial bank stock returns.

[2] We thank Kenneth Kuttner of the Research Department of the Federal Reserve Bank of New York for kindly providing us the data.

addition to applying the standard regression approach using over monthly data, we also apply the event study methodology using daily data to estimate the effectiveness of monetary policy actions on the returns of investments companies.

Our results underline the importance of monetary policy actions. We contribute to the literature of the effect of monetary policy on stock returns by providing some new results. First, consistent with the previous literature, we find that expansionary monetary policy actions increase the returns of investments companies while contractionary policy actions decrease returns. Second, the effect of monetary policy actions (as measured by changes in the federal funds rate) on the returns of investments companies investigated in this study is found to be statistically significant. Third, we observe that monetary policy actions have asymmetric effects across different monetary policy environments. In particular, returns of investments companies are more sensitive to monetary policy actions in an expansionary monetary policy environment compared to a contractionary environment. Fourth, we present evidence that unanticipated monetary policy actions significantly affect returns of investments companies. We observe that the response of the returns of the investments companies to unanticipated federal funds target rate changes is large and statistically significant. The results suggest that the greater transparency in the operation of the Fed policy resulted in the stock market being responsive mainly to unanticipated changes in monetary policy. This finding is significant because it shows that investors react significantly to unanticipated changes in monetary policy. Fifth, we observe that the returns of investments companies are affected by the direction of surprise policy changes. Returns of investments companies are significantly affected by positive policy surprises (larger than expected reduction or smaller than expected increases) in the federal funds target rate while they are not significantly affected by negative surprises.

We present new evidence that monetary policy actions have asymmetric effect across different business environments. Returns of investments companies are more sensitive to monetary policy in good business conditions (the bull market or the expansionary phase of the economy or the high level of industrial production) compared to bad business conditions (the bear market or economic recession or low level of industrial production). This suggests that the effectiveness of monetary policy depends on the states of the economy and where monetary policy plays a major signaling role. Furthermore, we observe that the asymmetric effect of monetary policy across different business conditions can be attributed to the asymmetric effect of monetary policy on the discount rates and expected cash flow proxies. We find evidence that the effect of monetary policy on the returns of investments companies are driven by its effect through changes in discount rate proxies as opposed to expected cash flow proxies.

Following the introductory section, we discuss the relationship between the returns of investments companies and monetary policy in section II. We analyze the issues in identifying the monetary policy in section III. We discuss the issues related to classifying monetary policy environments and business conditions in section IV. We describe the data in section V and present our results regarding the effect of monetary policy on the returns of investments companies in section VI. In section VII, we evaluate the causes behind the observed differential effect of monetary policy across different monetary environments and business conditions. We summarize the main conclusions in section VIII.

II. Monetary Policy and the Portfolio Returns

Jensen and Johnson (1995), and Jensen, Mercer and Johnson (1996) observe that CRSP value-weighted and equally-weighted stock returns are inversely related to changes in the discount rate. Park and Ratti (2000) observe that the impact of monetary policy shocks (as measured by the VAR shock in federal funds rate changes) on real S&P 500 composite index returns is negative. Thorbecke (1997) observes that the impulse response functions of size-decile portfolios and industry level portfolio returns of manufacturing firms are negatively related to federal funds rate innovations. Madura and Schnusenberg (2000) observe that commercial bank equity returns are inversely related to changes in the key policy tool of the Federal Reserve (discount rate in reserve targeting period and federal funds target rate in interest rate targeting period). Therefore, we hypothesize: *Expansionary (contractionary) monetary policy actions increase (decrease) stock returns of investments companies. Monetary policy indicators (based on interest rates) are negatively related to the returns of investments companies.*

Jensen, Mercer and Johnson (1996) observe that the business condition proxies (dividend yield, term, and default spread) play substantially different roles in explaining stock and bond return variations across different monetary policy environments. Madura and Schnusenberg (2000) observe that the sensitivity of bank equity returns depends on the direction of the policy changes. Both of these studies find that policy tool reductions (expansionary policy changes) have significantly greater effects on stock returns than policy tool increases (contractionary policy changes). McQueen and Roley (1993) find that the stock prices react to macroeconomic news differently in different stages of business cycle. This leads to our next hypothesis: *Monetary policy actions have asymmetric effects on the returns of investments companies across different monetary policy environments and business conditions. Expansionary policy changes have a more pronounced effect on returns than contractionary policy changes. Furthermore, the effect of monetary policy actions on portfolio returns are more pronounced in good business conditions compared to back business conditions.*

In the 1990s, the operation of monetary policy has become more transparent. The Fed not only announces the federal funds target rate, they regularly announce their future intentions (the policy bias) after the FOMC meeting. With more information, financial markets have become better able to anticipate future monetary policy actions. As a result, we observe the stock market to move in anticipation even before the FOMC announces its policy directives. If the announced policy is in line with the stock market's expectation, the market does not move much after the actual announcement because it has already adjusted based on the expectation about the policy. On the other hand, unanticipated changes in monetary policy significantly move the market. Kuttner (2001) observes that the response of market interest rates (Treasury bills, notes, and bonds) to anticipated federal funds target rate changes is small while the response to unanticipated changes is large and highly significant. A similar reasoning may be applied to the stock market, as rational investors only react to new information in an efficient market. Therefore, we expect to observe little or no impact of anticipated policy changes on the portfolio returns because investors have already discounted the anticipated changes and incorporated the information into stock prices. Conversely, any unanticipated change in monetary policy actions is new information and investors will react to the new information. The stock price will change as a result of the arrival of new information in the market. Moreover, we expect to find differential effects of positive and negative policy surprises in federal funds target rate on returns. Positive policy surprises – larger than expected value of the federal funds target rate (defined as larger than expected reduction and smaller than expected increase) can be identified as a policy stance more expansionary (or less contractionary) than expected. We expect the market to be pleasantly surprised by positive surprises in policy. On the other hand, negative surprises –smaller than expected values of the federal funds target rate (defined as smaller than expected reduction and larger than expected increase) can be identified as a policy stance less expansionary (or more contractionary) than expected. We expect the market to be unpleasantly surprised by negative policy surprises. Therefore, we expect the stock market to react differently to these changes. Bomfim (2000) observe that surprise monetary policy actions affect stock market volatility and that positive surprises tend to have a larger effect on volatility than negative surprises. Based on our earlier hypothesis and Bomfim's (2000) observation, we expect the market to react more to a better than expected expansionary move (positive policy surprises) compared to a worse than expected expansionary move (negative policy surprises) by the Fed. Therefore, we hypothesize that: *Unanticipated monetary policy actions have significant effects on the returns of investments companies. The returns are asymmetrically affected by the direction of surprise policy changes: positive policy surprises have more significant effects on the returns than negative policy surprises.*

McQueen and Roley (1993) also observe that the effect of macroeconomic news on the stock market is caused by larger changes in the discount rates relative to expected cash flows. Consequently, we hypothesize that: *The asymmetric effect of monetary policy across different business conditions are due to the asymmetric effect of monetary policy on the discount rates and expected cash flow proxies and that the effect of monetary policy on the returns of investments companies are driven by its effect through discount rates.*

III. Measuring Monetary Policy

There is no consensus among economists about how to measure the size and direction of changes in monetary policy [Bernanke and Mihov (1998)]. In the monetary policy literature, a strong argument is made in favor of using the actual federal funds rate as an indicator of monetary policy over monthly or longer horizons. This is the standard practice in the vector auto regression (VAR) based literature attempting to estimate the effect of monetary policy on the economy. Christiano, Eichenbaum, and Evans (1999) provide an extensive review of this literature. Bernanke and Mihov (1998) argue that the actual federal funds rate is a reasonably good indicator of monetary policy because it is sensitive to the shocks in the supply of bank reserves. The daily federal funds rate includes a lot of noise but when averaged over monthly or longer horizon, the noise is eliminated and it is argued that the resulting average and the trend reflect the Fed's monetary policy stance. Moreover, the difference between the federal funds target rate and the actual federal funds rate is very small on a monthly basis (usually within a few basis points). Bernanke and Blinder (1992) argue that the Fed has implemented monetary policy changes through open market operations in the federal funds market over the last 30 years. Therefore, the federal funds rate can be used as an indicator of monetary policy stance. It has also been argued that the spread between the federal funds rate and the discount rate directly affects the level of borrowed reserves and therefore is another potential indicator of monetary policy, especially in the reserves targeting periods. Mishkin (2001) also argues that the Fed has tried to keep this spread within a narrow range over the years and thus may convey useful information about the stance of monetary policy.

In the traditional VAR literature on the effect of monetary policy on the economy, monetary policy is identified as the exogenous shock (or innovation) in the monetary policy indicator variable (usually the federal funds rate). In analyzing the effect of monetary policy on the stock market, Patelis (1997), Thorbecke (1997), Park and Ratti (2000) also use VAR to identify exogenous innovations or unanticipated monetary policy shocks to the federal funds rate as a measure of monetary policy surprise. However, Rudebusch (1998) shows that unanticipated monetary policy shocks may not be measured accurately using VAR methodology. In fact, he strongly criticizes the VAR methodology in analyzing the effect of monetary policy and argues that the measures of monetary policy in VAR are not useful at all. He favors using futures rate expectations to identify the unanticipated movements in the federal funds rate. Kuttner (2001) uses federal funds futures rates to identify monetary policy surprises and decomposes the federal funds target rate changes into anticipated and unanticipated components using information available from the federal funds futures market. The advantage of using the federal funds futures prices is that it is the only market-based proxy available for Fed policy expectations. However, the disadvantage of using futures data is that it limits the analysis to the post-1989 period because the federal funds futures market was established in 1989 at the Chicago Board of Trade. Another issue is that the futures contracts are based on the federal funds rate, not on the federal funds target rate. In monthly frequency, the two are usually within a few basis points, but at daily frequency, the difference sometimes is too large to be ignored. This approach also shifts the focus away from the precise timing of policy actions as in event studies, giving it more of the flavor associated with the traditional VAR literature on monetary policy shocks[3].

[3] See Kuttner (2001) for details.

IV. Classification of Monetary Environments and Business Conditions

One way of measuring monetary stringency is to identify monetary policy environments by evaluating the policy actions taken by the Fed. Romer and Romer (1989), and Boschen and Mills (1995) use a "narrative approach" to identify a set of dates at which the policy-makers appeared to shift the stance of monetary policy by carefully reading the minutes of Federal Open Market Committee (FOMC). Jensen and Johnson (1995), and Jensen, Mercer and Johnson (1996) use discount rates to identify 'expansive' and 'restrictive' monetary policy environments. However, they do not take into account the different operating policy procedures of the Fed over the last 40 years.

Based on the history of Federal Reserve Bank operating procedures, we can identify several major operating policy regimes. The sub-periods identified are consistent with the literature [Strongin (1995), Bonser-Neal, Roley, and Sellon (1998), Madura and Schnusenberg (2000), and Mishkin (2001)].

July 1962 – September 1974: Reserves targeting (free reserves are targets).

October 1974 – September 1979: Federal funds rate targeting.

October 1979 – October 1987: Reserves targeting (Nonborrowed reserves targeted until 1982, borrowed reserves targeted after 1982).

November 1987 – December 2000: Federal funds rate targeting.

Empirical findings generally support the notion that the federal funds target rate significantly affects market interest rates and that discount rate changes do not convey any additional information about monetary policy under the federal funds rate targeting procedure (Smirlock and Yawitz 1985, Thornton 1996). Consequently, the federal funds target rate conveys information regarding monetary policy during the two federal funds rate targeting periods from 1974 to 1979 and from 1987 to 2000. On the other hand, the discount rate changes convey more information about monetary policy during the free reserves targeting period (1962-1974) and the borrowed reserves targeting period (from 1982 to 1987). The discount rate changes also convey information about monetary policy during the nonborrowed reserves targeting period (from 1979 to 1982). Based on the history of the operating policy regimes of the Fed, we use the federal funds target rate and/or the discount rate to identify 'expansionary' and 'contractionary' monetary policy environments following Bonser-Neal, Roley, and Sellon (1998), and Madura and Schnusenberg (2000). The advantage of our approach is that we use the information contained in both the discount rate and the federal funds target rate and take account the history of the Fed's operating procedures.

In this paper, we measure business conditions using three different approaches. First, we look at the stock market and identify the business conditions according the states of the stock market. We identify the bull and bear markets by examining the Dow Jones Industrial Average (DJIA) and the Standard and Poor's 500 index returns. The standard industry practice is to define a bull (bear) market if the a broad stock market index increases (decreases) by a certain percentage from the most recent low (high) level. The industry regards any change of the stock indices in 5-15 percent range as a market correction while change in excess of 15-20 percent as an indication of the changes in the market conditions. To identify the bull and bear markets, we identify all the instances where both the S&P500 and DJIA went up (down) by at least 15 percent. By using two most widely used stock market indices instead of using only one, we avoid over-identifying the bear markets. We observe that not all 15 percent decline qualifies as a bear market but is probably a 'large' market correction because either it is quickly reversed or other indices do not move much. We also take into account the changes in CRSP value weighted and equal weighted indices and the NASDAQ index although the identification of bull and bear markets depend mainly on the S&P500 and DJIA indices.

Panel-a of table-1 presents the bull market and bear market dates and some relevant data. We observe that the lowest amount of price increase in a bull market is 29.4 percent by DJIA in 1966-68 bull market and the lowest amount of price decline in a bear market is 19.3 percent by S&P500 in 1976-78 and by both DJIA and S&P500 in 1998 bear market. We observe 9 bear markets over the period 1962-2000 while 3 of them are in 1990s. We observe that the bear markets in the 1990s are very short-lived compared to other bear markets. The shortest bear market is in 1998 (only for 2 months) while the longest bear markets are in 1973-74 and 1980-82 (both are 21 months long). The S&P 500 index fell as high as 48.2 percent (in 1973-74 bear market) and as low as 19.3 percent (in 1976-78 and 1998 bear market). We also observe that the bear markets in the sample period are short-lived compared to bull markets. The longest bull market is in 1990-98 (94 months) and the shortest one is in 1998-2000 (19 months). The S&P 500 index rose as high as 294.6 percent (in 1990-98 bull market) and as low as 44.6 percent (in 1966-68 bull market). In the whole sample period of 1962-2000, 22 percent of the months (101 months) are in bear market while 78 percent of the months (361 months) are in bull market. In the sub-sample of 1989:6-2000:1, only 4 percent of the months (5 months) are in bear market and 96 percent (123 months) are in bull markets.

The classification of the market into bull and bear markets is an indication of the conditions of the stock market in general. They may not accurately reflect the economic conditions, however. To classify the economy in different states, the most obvious choice is to use the widely accepted National Bureau of Economic Research (NBER) business cycles dates. NBER defines a recession as "a period of significant decline in total output, income, employment, and trade, usually lasting from six months to a year, and marked by widespread contractions in many sectors of the economy".[4] We observe only 5 recessions in our sample period of July 1962 to December 2000. The shortest recession is in 1980 (6 months) and the longest recessions are in 1973-75 and 1981-82 (both 16 months) while the shortest expansion is in 1980-81 (12 months) and the longest expansion is in 1961-69 (106 months). As we observe from panel-b of table-1, there are only 57 months (12.34 percent) in recession in the sample period 1962-2000 while 405 months (87.66 percent) in expansion. In the sub sample of June 1989 to January 2000, only 8 months (6.25 percent) are in recession while 120 months (93.75 percent) are in expansion.

Although NBER business cycles are widely accepted, there are several problems associated with it in using it as a guide to economic states of the economy. First, NBER expansions and recessions (as well as bull and bear markets) classify the direction of economic activity rather than the level. Second, the NBER business cycle dating committee does not determine the start or end of a recession until after at least six months beyond the peak date and has even taken as long as 21 months (the March 1991 trough is announced in December 22, 1992). To adjust for these problems, we look at another alternative way to identify the business conditions following McQueen and Roley (1993).

The third classification scheme used in the article uses the seasonally adjusted industrial production index of all items (1992=100). We identify the high, medium and low states of the economy using the industrial production index following a procedure used by McQueen and Roley (1993). We estimate a trend in the industrial production index by regressing the log of the industrial production index on a constant and a time trend from July 1962. We then identify a upper bound and a lower bound of the industrial production index by adding and subtracting a

[4] NBER business cycle dating committee report from NBER website at http://www.nber.org.

constant from the trend. We add the constant 0.0462 to the trend to identify the upper band, and we subtract 0.0345 from the trend to identify the lower bound. The constants are chosen so that the log of industrial production index are above the upper bound 25 percent of the time and below the lower bound 25 percent of the time. If the actual log of industrial production index is above the upper bound, we identify it as "high" economic state, and if it is below the lower bound, we identify it as "low" economic state. If the actual log of the industrial production index lies within the upper and the lower bound, we identify the period as "medium" economic states. By construction, the economy in the full sample period remains in medium economic states 50 percent of the time. We observe from panel-b of table-1, that the industrial production is at high levels for 116 months (25 percent) and at low levels for another 116 months (25 percent) while the rest 231 months (50 percent) it is at medium level in the full sample period from 1962 to 2000. On the other hand, in the sub-sample period from 1989 to 2000, the industrial production index is at high states for 13 months (10 percent) and at low states for 53 months (41 percent) while for 62 months (48 percent) it is at medium states.

Figure-1 shows the actual log of the industrial production index as well as the upper and lower bounds. In addition, it also shows the periods identified as bear markets and recessions. We observe several interesting facts. First, every recession (except the one in 1980) is preceded by a bear market. Second, the majority of the bear markets are when the economy is at high states and also the majority of the time the economy is in low states the stock market is actually in the bull market. The observations seem to confirm the idea that the bear markets are good predictors of slowdown of industrial production and recession.

V. Data

For the purpose of this study, we use both daily and monthly data spanning from July, 1962 to December, 2000. July, 1962 is the starting point, because daily stock returns on CRSP begin in July, 1962. To facilitate the analysis, we divide the sample into two sub-samples based on monetary policy environments. We use the relevant policy tool (federal funds target rate and/or the discount rate) to identify different monetary policy environments. The policy environments are defined as expansionary (contractionary) if the relevant policy tool decreases (increases). As discussed earlier, the relevant policy tool for the Fed is the discount rate for the reserves targeting periods of July, 1962 to September, 1974 and October, 1979 to October, 1987, while it is the federal funds target rate for the federal funds rate targeting periods of October, 1974 to September, 1979 and November, 1987 and December, 2000.

Federal funds target rate data is collected from the Federal Reserve Bank of New York while daily federal funds rate and discount rate data are collected from the Federal Reserve Bank of St. Louis. Panel-a of table-2 shows that the Fed changed the federal funds target rate 158 times in the 1962-2000 period, of which 81 are target rate increases and 77 are target rate decreases. Furthermore, 98 of the 158 federal funds target rate changes are made during the federal funds rate targeting period of 1974-1979, and 60 are made during 1987-2000 period. There are 93 discount rate changes in the same time period, of which 48 are increases and 45 are decreases. Out of the 93 discount rate changes, 26 changes are made in the 1962-1974 period, 19 in the 1974-1979 period, 27 in the 1979-1987 period, and 21 in the 1987-2000 period. Not surprisingly, there have been fewer changes in the discount rate in the federal funds rate targeting periods compared to the reserves targeting periods, which is consistent with the fact that the Fed's main policy tool in the reserves targeting periods is the discount rate, but that it is not a major policy tool in the federal funds rate targeting periods.

An interesting subset for the purpose of our study is the 1989-2000 period. This period is interesting for several reasons. First, we are able to use the data on unanticipated changes in federal funds target rate (supplied by Kuttner). The unanticipated changes in federal funds target rate is calculated using the federal funds futures market data. Since, the federal funds futures market started operating in 1989, we can observe the effect of unanticipated changes in monetary policy on the stock market using data for this period. Second, these are the Greenspan years (Alan Greenspan became the Fed Chairman in 1987). It is widely believed that the operation of monetary policy under Greenspan has been more effective and that the Fed paid more attention to the stock market. Consequently the stock market also paid more attention to the monetary policy. Third, the U.S. stock market enjoyed unprecedented growth in this period and observed only moderate inflation. The Fed is given a lot of credit for that. Therefore, the effect of monetary policy on the stock market in this period deserves special attention [Mankiw (2001)].

We observe from panel-b of table-2 that there are 44 changes in the federal funds target rate but only 19 changes in the discount rate during the 1989 to 2000 period. Out of the 44 federal funds target rate changes, 30 are decreases and 14 are increases; of the 19 changes in the discount rate, 9 are increases while 10 are decreases. During this period, the Federal Open

Market Committee (FOMC) met 88 times but decided to change the federal funds target rate only 24 times. Of these changes, 13 are increases, while 11 are decreases. Also during this period, 20 changes in the federal funds target rate are announced on non-FOMC meeting dates. The FOMC decided to keep the rate unchanged in majority (64) of their meetings.

Panel-c of table-2 shows that, there are 57 changes in the federal funds target rate during the bull markets while only 3 changes are made during the bear markets in 1987-2000 period. In this same period, 53 of the changes in the federal funds target rate are made during economic expansion and only 7 changes are made during recessions defined by NBER business cycle dating committee. Finally, in the high states of industrial production, 7 changes are made in the federal funds target rate while 25 changes are made during low states of industrial production.

Table-3 provides information regarding changes in the federal funds rate and the discount rate across different monetary policy environments. In most cases, the federal funds target rate, the daily federal funds rate, and the discount rate gives us the same result: an expansionary monetary environment is characterized by falling interest rates, while a contractionary environment is characterized by rising interest rates. However, during the reserves targeting periods (when the Fed did not target the federal funds rate), a few exceptions are noteworthy. The daily federal funds rate and the discount rate move in the opposite direction at least twice in the expansionary environments and three times in the contractionary environments. This apparent conflict can be explained by the fact that the Fed is trying to control the level of borrowed reserves at this time through the discount rate. However, the daily federal funds rate also reflects the condition of the highly volatile reserves market at that time period. Therefore, our emphasis on the discount rate during this period as a policy tool is justified. Another interesting observation is that the Fed did not change the discount rate during the federal funds rate targeting period despite the fact that the changes in the federal funds target rate are pronounced. This reflects the fact that the Fed usually does not use the discount rate to signal policy in the federal funds targeting periods.

To form the portfolio of investments companies, we use 1987 SIC codes because CRSP database utilizes 1987 SIC codes to identify industry groups for individual firms. However, CRSP does not actively assign SIC codes to the firms. CRSP obtains NYSE and AMEX SIC codes from FT Interactive Data (formerly Interactive Data Services), and obtains NASDAQ SIC codes directly from the NASDAQ exchange. Both data providers refer to SEC documents as SIC code sources. SIC codes can be useful for rough groupings of industries. Beyond that, they should be used with caution – because they are not assigned or reviewed with a strict procedure by any government agency. Most large companies belong in multiple SIC codes, and they change over time. After the initial SIC code assignment when a company goes public, no government agency ever looks at that code or the company again - quite often a company reports its initial SIC code forever. Cases have been observed in which companies would have obsolete SIC codes from the 1972 coding scheme in their SEC filings from the early 1990s[5].

We obtain the returns (both equally-weighted and value-weighted) of all the firms included in the portfolio (defined on the basis of SIC codes) from the CRSP database. Since the results are qualitatively similar, we report only the results using equally-weighted portfolio returns. The portfolio of investment companies includes the security and commodity brokers, dealers, exchanges and services (SIC code 62). These are the establishments engaged in the underwriting, purchase, sale, or brokerage of securities and other financial contracts on their own account or for the account of others, and exchanges, exchange clearinghouses, and other services allied with the exchange of securities and commodities. In addition, we added the industry group of investment offices (SIC code 672) and miscellaneous investing (SIC code 679) to construct the portfolio of 1,639 companies (SIC codes 62, 672, 679) that can be broadly identified as investment companies.

The descriptive statistics of selected variables are presented in Table-4 for the full sample as well as the sub-samples of expansionary and contractionary monetary policy environments. It also presents the tests for the equality of the means and variances of the selected variables. The return data are from CRSP, and all the interest rates and other data are collected from the Federal Reserve Bank of St. Louis. The mean interest rates in the economy (except for the discount rate and the prime rate) are statistically significantly higher in the contractionary monetary environments compared to the expansionary environments. The mean returns of all portfolios are statistically significantly higher in an expansionary environment although the variability of returns is not significantly different except for the NASDAQ and CRSP index returns and the returns of insurance companies and REITs. Interestingly, we observe that mean risk premium (term, default and quality) as well as unemployment rates are high in an expansionary

[5] This information has been provided by CRSP research support personnel upon inquiry about some problems observed by the authors in CRSP database regarding SIC code assignments to some individual firms.

environment. Conversely, inflation, the consumer sentiment index, and the dividend yield are high in a contractionary environment. This could be explained by the fact that the Fed usually pursues an expansionary policy in economic downturns to promote economic growth while it pursues a contractionary policy in economic upswings to control inflation [Romer and Romer (1989), and Boschen and Mills (1995)]. The observation that the mean and variance of the interest rates, risk premium, monetary aggregates, and inflation are different across expansionary and contractionary monetary environments indicates that the classification scheme of identifying different monetary policy environments is a useful indicator of monetary stringency.

The descriptive statistics of selected macroeconomic variables are presented in Table 5 for the full sample as well as the sub-samples of bull and bear markets. It also presents the tests for the equality of the means and variances of the variables. The mean interest rates in the economy (except for federal funds target rate and the default and quality premiums) are statistically significantly higher in the bear markets compared to the bull markets. The mean returns of all the portfolios are statistically significantly higher in the bull market and the variability of returns are significantly different except for S&P500, DJIA, the portfolios of manufacturing firms, depository and non-depository institutions and bank holding companies.

VI. Analysis of the Results

VI.a. Monetary policy across different monetary policy and business environments

The standard approach in the literature showing a link between stock returns and monetary policy indicators is regression analysis. The regression coefficients of the monetary policy indicator variables should be statistically significant in explaining the stock returns, if monetary policy affects stock returns. The explicit incorporation of the monetary policy indicators should also improve the explanatory power of the regression if monetary policy is an important determinant of the stock market returns. Using monthly data from July 1962 to December 2000, we calculate the unconditional return sensitivity of the portfolios by applying the following model:

$$R_{pt} = \beta_0 + \beta_1 R_{mt} + \beta_2 FED_t + e_t \qquad (1)$$

where,

R_{pt} is the equally weighted portfolio return on month t;

R_{mt} is the S&P500 index return on month t;

FED_t is the changes in the monetary policy indicator in month t.

Applying ordinary least squares (OLS) estimation method to this equation results in consistent estimates of the coefficients and standard errors in the absence of heteroskedasticity (Judge et. al. 1988). However, the variance of coefficient estimates, the standard errors and the associated t-statistics are calculated using White's (1980) heteroskedasticity consistent estimator to take into account possible heteroskedasticity.

Panel-a of table-6 displays the regression results for the entire sample period from July 1962 to December 2000. We observe that the coefficient of the market return (R_{mt}) variable is positive and highly statistically significant. A one-percentage point increase in the S&P 500 index is associated with a 0.78 percent increase in the returns of investments companies. As expected, the market return is a highly significant determinant of the portfolio return.

For the entire sample period, changes in federal funds rate is used as the monetary policy indicator. The coefficient of the federal funds rate (FFR) variable is negative and statistically significant. As expected, the returns are highly negatively related to changes in the federal funds rate. These results support the hypothesis that returns of investments companies and changes in an interest rate-based monetary policy indicator are inversely related. We observe that a one-percent change in the monthly federal funds rate will on average change the returns of the investments companies by 0.96 percent in the opposite direction. The adjusted R^2 is 0.53 which suggest that the market return and a monetary policy indicator can explain 53 percent of the variations of the monthly returns of the investments companies. The high F-values suggest that the coefficients of the two variables are jointly significant, and the Durbin-Watson d-statistics values suggest the absence of autocorrelation in the regressions.

To check the robustness of the results, we use the federal funds spread (the spread between the federal funds rate and the discount rate) instead of the federal funds rate in equation-1 and observe qualitatively similar results. We also use the federal funds target rate instead of the actual federal funds rate for the post-1987 interest rate targeting period and observe qualitatively similar results although the results are less significant statistically.[6] Therefore, the observed results are not dependent upon any specific proxies used for monetary policy indicator. Using three different proxies for monetary policy indicators, we observe that the returns of investments companies and changes in the monetary policy indicators are negatively related. Specifically, an

[6] The results are not reported in this paper but available from the authors.

increase in the federal funds rate (a contractionary policy) depresses the portfolio returns while a decrease in the federal funds rate (an expansionary policy) increases the portfolio returns.

Following McQueen and Roley (1993), we estimate the conditional responses of the portfolio returns to monetary policy actions across different monetary policy environments and business conditions using the following models:

$$R_{pt} = \beta_0 + \beta_1 R_{mt} + \beta_2 (G_t * FED_t) + \beta_3 (B_t * FED_t) + e_t \quad (2)$$

$$R_{pt} = \beta_0 + \beta_1 R_{mt} + \beta_2 (H_t * FED_t) + \beta_3 (M_t * FED_t) + \beta_4 (L_t * FED_t) + e_t \quad (3)$$

where,

G_t is a dummy variable, which takes a value of 1 if month t is in monetary expansion/bull market/economic expansion and zero otherwise;

B_t is a dummy variable, which takes a value of 1 if month t is in monetary expansion/bear market/recession and zero otherwise;

H_t is a business condition dummy variable, which takes a value of 1 if month t is in high state of industrial production and zero otherwise;

M_t is a business condition dummy variable, which takes a value of 1 if month t is in medium state of industrial production and zero otherwise; and

L_t is a business condition dummy variable that takes a value of 1 if month t is in low state of industrial production and zero otherwise.

The advantage of using the dummy variables this way is that the coefficients (ß$_2$ and ß$_3$ in equation-2 and ß$_2$, ß$_3$ and ß$_4$ in equation-3) directly and simultaneously estimate the effect of monetary policy in different monetary environments and business conditions on the portfolio returns.

The results reported in panel-b and c of table-6 reinforce our conclusion that monetary policy indicators and the returns of investments companies are inversely related. The coefficients of federal funds rate (FFR) are negative across different monetary policy environments and business conditions. The coefficient is statistically significant in expansionary monetary policy environments (panel-b) while not significant in contractionary environments. We also observe that the coefficients of FFR are higher in absolute magnitude in expansionary environments compared to contractionary environments. The results support the hypothesis that monetary policy has asymmetric effects across different monetary policy environments. More specifically, we observe that monetary policy changes in expansionary environments have more pronounced effects on the portfolio returns compared to the policy changes in contractionary environments.

Panel-c of table-6 presents the conditional responses of the portfolio returns to monetary policy across different business conditions using monthly data from July 1962 to December 2000 using the changes in the actual federal funds rate as the indicator of monetary policy. The portfolio returns sensitivity of investment companies to monetary policy is statistically significant in bull market while it is not significant in the bear market. We also observe that the coefficients of the monetary policy indicator variables are larger in absolute magnitude in the bull market compared to that in the bear market. The results indicate that monetary policy has statistically significant effect and the effect is larger in magnitude in the bull market for the investment companies compared to bear markets. Across expansion and recession, we observe that the monetary policy indicator variable is statistically significant for the portfolio returns, while it is not significant in recessions. However, we observe that the magnitude of the effect of monetary policy on the portfolio returns is larger in recessions compared to expansions. In case of the economic states based on industrial production index, we observe statistically significant results only in the medium states. The results support our hypothesis that monetary policy has asymmetric effect across different business conditions. It appears from the results that monetary policy has statistically more significant effect on a variety of investments companies' returns in good times as opposed to bad times, although monetary policy seems to affect the portfolio returns in larger magnitude in bad times as opposed to good times.

To check the robustness of the results, we again use the federal funds spread (the spread between the federal funds rate and the discount rate) and the federal funds target rate (in post-1987 period) instead of the federal funds rate in equations 2 and 3, and observe qualitatively similar results. The results support our hypothesis that monetary policy actions have asymmetric effects on the returns of investments companies across different monetary policy environments and business conditions. We also find evidence to support the hypothesis that monetary policy in expansionary policy environments has a larger effect on the portfolio returns compared to monetary policy in contractionary environments.

The Fed has traditionally followed an expansionary monetary policy to promote higher growth in the times of economic downturns, while it has followed a contractionary policy to contain higher inflation in times of economic upswings. The more pronounced results in an expansionary environment may be an indicator of investor confidence about the Fed's role in promoting growth in this period. Moreover, an expansionary monetary policy environment may be interpreted as providing good news (rate reduction) in bad times (economic downturns) while a contractionary policy may be interpreted as bad news (rate hike) in good times (economic upswing). The observed results may be a manifestation of the fact that investors' react more to good news in bad times compared to bad news in good times.[7]

VI.b. Effect of surprise monetary policy actions

We apply the monetary policy surprises measured on monthly frequency to estimate (equations 1-3) the portfolio return sensitivities for the period from June 1989 to January 2000. The results reported in table-7 are qualitatively similar to the results reported in table-6. On a monthly basis, the investments companies are significantly affected by the surprise changes in the federal funds target rate.

In panel-b of table-7, we present the results of estimating equation-2 for the period from June 1989 to January 2000, using positive and negative monetary policy surprises to test whether the portfolio returns are affected by the direction of surprise policy changes. Positive monetary policy surprise is defined as the actual federal funds target rate being larger than expected while the negative monetary policy surprise is defined as the target rate being smaller than expected. We observe that the positive monetary policy surprises significantly affect the returns of investments companies while negative monetary policy surprises do not significantly affect the returns. Positive monetary policy surprises reflects a larger than expected reduction (more expansionary policy move) or smaller than expected increase (less contractionary policy move) in the federal funds target rate and therefore can be interpreted as good news for the market. On the other hand, negative monetary policy surprises can be interpreted as bad news for the market because it reflects a smaller than expected rate reduction (less expansionary policy move) or larger than expected rate increase (more contractionary policy move). We observe that investments companies react significantly to good news about monetary policy (positive monetary policy surprises) but do not react significantly to bad news (negative surprises). The absence of reaction to bad news in this period can be the result of the uniqueness of this sub-

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[7] McQueen and Roley (1993) show that good news about economic activity in good states of the economy may be bad news for the stock market. Lobo (2000) also provides evidence consistent with the overreaction hypothesis in explaining the asymmetric effects of federal funds target rate changes on stock prices.

period. The 1990s are characterized by high growth and low inflation. The bad news about the monetary policy did not automatically translate into any indication of a deterioration of the high growth and low inflation situation in the absence of subsequent information regarding the deterioration of the economy. So, any negative effect of the bad news regarding monetary policy on the stock market during the month may have been offset by the subsequent release of other economic news (mostly good) within the month. On the other hand, good news about the monetary policy with subsequent confirmation about the strength of the economy (from the subsequent release of other economic news) within the month results in statistically significant effect on the stock market. The results are consistent with the signaling role of monetary policy and possibly show investors' confidence on the Fed in dealing with the economy.

To find out whether monetary policy surprises affect the portfolio returns in the same way across different monetary policy environments and business conditions, we apply the monetary policy surprises measured on a monthly basis to measure the portfolio return sensitivities. We estimate equations 10 and 11 for the period June 1989 to January 2000 using the surprise changes in federal funds target rate as the monetary policy indicator. The results are reported in table-8. We observe that the effect of monetary policy surprises on the returns of investments companies are statistically significant in bull markets and both high and low states of industrial production but not significant in the bear markets, in economic expansions and recessions.

An interesting observation from table-8 is that the coefficient of the portfolio is positive and statistically significant in high level of industrial production activity level while it is negative and statistically significant. We observe is that not only the effect is asymmetric across business conditions but also the nature (direction) of the effect is different. We observe that an unexpected change in monetary policy is negatively related to returns in low states of the economy while they are positively related in high states of the economy. This apparent contradiction of the results for high and low states of the economy can explained by the direction of the industrial production growth. The classification of the economy into high, medium and low states is based on the levels of economic activity compared to the long-term trend in industrial production. However, it ignores the direction of change in the industrial production. It is not a serious problem most of the time, but the 1990s are different than other decades. As we observe in fig-1, the industrial production index is at low states for most of the early 1990s. However, other than the short bear market in 1990 and the short recession in 1990-91, the industrial production index is rising continuously over the whole 1990s. So, it can be argued that while the level of industrial production is at low states, it is moving to the right direction and so the low states of the economy in 1990s can not necessarily be labeled as a bad economy. A surprise monetary expansion (unexpected reduction of or more than expected reduction) in the low states of the economy signals the market that the Fed is trying to promote growth. A surprise expansionary monetary policy in this period also signals that the Fed is confident in future prospect of growth. As a result, the investors react favorably to the monetary expansion and so the portfolio returns rise. A surprise contraction (unexpected increase or more than expected increase) signals to the market that the Fed is concerned about the future prospect of growth. The market reacts unfavorably to the action and portfolio returns decline. On the other hand, a surprise monetary contraction or expansion may signal different information in high states of economic activity. A surprise expansion (reduction in fed funds target) at high states of the economy may signal to the market that the Fed is concerned about the future growth prospect and so the market may react unfavorably to the move. The results support the idea that monetary policy plays a strong signaling role.

The results are similar to the finding by McQueen and Roley (1993) that good news about economic activity in good states of the economy is bad news for the stock market. A surprise contraction (increase in federal funds target rate) may signal that the Fed is concerned about inflation but not the growth prospect and acting to control the inflation. The investors may react favorably to the Fed's action if they have confidence in the Fed and if the inflation expectation is low. In the 1990s, the Federal Reserve Bank has enjoyed an extremely high level of confidence and despite very high growth, inflation is at control, partly due to Fed's actions. As a result of different dynamics in play in high states of economic activity, the relationship between the portfolio returns and the monetary policy surprises may have been different in high states compared to low states in the 1990s.

The models applied to estimate the sensitivities of the portfolio returns to monetary policy surprises (results reported in tables 7-8) are also applied to actual changes in the federal funds target rate for this sample period (1989-2000). We observe (from results not reported in the paper) that the responses of the portfolio returns to surprise changes in the federal funds target rate are considerably larger in magnitude and statistically more significant than the reaction to the actual changes in the federal funds target rate. The results provide another indication that the surprise changes in monetary policy are the driving force behind the relationship between the returns of the investments companies and monetary policy.

VI.c Event study evidence

Event study is a standard approach in the finance literature to capture the stock price response of any announcement. We apply the event study method to evaluate the announcement effect of monetary policy actions on the returns of investments companies. One advantage of event study methodology is that we are able to concentrate on the specific dates when the monetary policy changes are announced. Also in the event studies, we take into account the Fed's different operating procedures regimes and use the appropriate policy tool as the indicator of monetary policy in different operating policy procedures regimes. We estimate the following model including data only for the announcement days:

$$R_{pt} = \beta_0 + \beta_1 FED_t + e_t \qquad (4)$$

where,

R_{pt} is the equally weighted portfolio return on day t; and

FED_t is the changes in the monetary policy indicator.

We are interested in estimating the announcement effect of surprise monetary policy actions and so we confine our analysis to the post-1989 period, because we have data regarding surprise monetary policy changes for this period. There are 44 announcements of the federal funds rate change in the sample period from March 1989 to December 2000. We estimate equation-4 using the data on unanticipated changes in the federal funds target rate as the monetary policy indicator for this period. The announcement day responses of the portfolio returns due to federal funds surprises are presented in table-9. The variance of coefficient estimates, the standard errors and the associated t-statistics are calculated using White's (1980) heteroskedasticity consistent estimator to take into account possible heteroskedasticity. We observe that the announcement effect of monetary policy surprises is negative and statistically significant.[8] The results imply that the unexpected component of the changes in the monetary policy is important for the investments companies.

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[8] In a variation of the standard event study methodology, following Madura and Schnusenberg (2000), we also estimate the portfolio return sensitivities due to federal funds surprises using daily data from March 1989 to

Kuttner (2001) observe that only unanticipated monetary policy significantly affect the Treasury bill, notes and bond while anticipated policy have no significant effect. Wachtel and Urich (2001) and Demiralp (2001) also observe similar results and argue that the increased transparency of the operation of monetary policy in the 1990s result in the reduced significance of anticipated policy responses. Lange, Sack and Whitesell (2001) observe that the financial markets in the 1990s are better able to anticipate monetary policy changes and adjust accordingly even before the Fed announces the policy changes. All of these studies observe that the financial market reacts significantly only to unanticipated changes in monetary policy. To test the relative effectiveness of anticipated and unanticipated changes in monetary policy, we also estimate equation-4 adding the anticipated change in the federal funds target rate as another variable in the equation. As expected, we observe that only unanticipated policy changes significantly affect the portfolio returns while anticipated policy changes do not significantly affect the portfolio returns.

An interesting sample would be one consisting of those days on which the investors thought there *might* be a target rate change, regardless of whether a change actually occurred. It is impossible to know all such dates, but an interesting subset consists of FOMC meeting dates. There are 88 FOMC meeting dates between June 1989 and June 2000. Twenty-four of the 44 target rate changes in the sample are associated with FOMC meetings, with the rest occurring in the interval between meetings. We estimate equation-4 on FOMC meeting dates and observed similar results (not reported) to those reported in announcements dates (Table-9) although the coefficients are smaller in magnitude and less significant. The difference in the results are likely to be due to having a smaller number of target rate changes in the sample (24 of the 44 changes took place on FOMC meeting dates) which precludes 20 non-meeting date target rate changes, many of which contained a large surprise element. Moreover, investors expect monetary policy actions on FOMC meeting dates and so the surprise element in policy is smaller on FOMC meeting dates compared to non-meeting dates.

Furthermore, qualitatively similar results are observed regarding the effect of monetary policy on the returns of investments companies using changes in the actual federal funds rate or

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December 2000. We estimate equation-4 using daily data where the unanticipated change in the federal funds target rate variable ($UFFT_t$) is non-zero on only 44 days (on the days the federal funds target rates are actually changed) but are zero on the rest of the days, because there are 44 changes of the federal funds target rate during this period. We observe basically the same results as reported in table-7, and, therefore do not report them.

the actual federal funds target rate as the policy tool in equation-4 using the event study methodology. The results presented in table-9 are statistically more significant compared to the results (not reported) using changes in the actual federal funds rate or the federal funds target rate as the policy tool for this sample period.

Following McQueen and Roley (1993), we estimate the conditional responses of the portfolio returns to monetary policy across different monetary policy environments and business conditions using the following models:

$$R_{pt} = \beta_0 + \beta_1 (G_t * FED_t) + \beta_2 (B_t * FED_t) + e_t \quad (5)$$

$$R_{pt} = \beta_0 + \beta_1 (H_t * FED_t) + \beta_2 (M_t * FED_t) + \beta_3 (L_t * FED_t) + e_t \quad (6)$$

where,

G_t is a dummy variable, which takes a value of 1 if day t is in monetary expansion/bull market/economic expansion and zero otherwise;

B_t is a dummy variable, which takes a value of 1 if day t is in monetary contraction/bear market/recession and zero otherwise;

H_t is a business condition dummy variable, which takes a value of 1 if day t is in high state of industrial production and zero otherwise;

M_t is a business condition dummy variable, which takes a value of 1 if day t is in medium state of industrial production and zero otherwise; and

L_t is a business condition dummy variable that takes a value of 1 if day t is in low state of industrial production and zero otherwise.

We estimate equations 5 and 6 with unexpected changes in the federal funds target rate on the announcement days of the change in the target rate. The results are presented in panel-b of table-9. In the sample period (March 1989 – December 2000) there are 44 announcements of federal funds target rate changes of which only one fell in a bear market (rendering the inference unusable), and 7 fell in a recession. We observe that the portfolio returns are statistically significant in response to monetary policy announcements in the bull market, in economic expansion, and in high levels if industrial production activity. The results confirm our earlier findings that monetary policy is more effective in good times compared to bad times.

However, unlike the results reported in table–8, we observe that the announcement day response of monetary policy surprises is negative and statistically significant in both high and low levels of industrial production activities. How do we explain this apparent contradiction that monetary policy surprises affect portfolio returns positively in the high states of the economy in monthly frequency while the announcement effect is negative? The answer may be found in the chain of events that takes place in the month. Investors may react favorably to a surprise monetary expansion (decrease in unexpected federal funds target rate) initially. But within the course of the month, as more information becomes available (specially the growth of industrial production and inflation), if the investors realize that Fed is pursuing a expansionary policy because they are concerned about future growth prospect of the economy, the portfolio returns may decline in the monthly horizon. Goto and Valkanov (2001) have explained the negative correlation between inflation and excess return by arguing that a contractionary monetary policy shock will be followed by an increase in inflation if Fed has some private information about future inflation. Therefore, if a contractionary monetary policy shock is followed by a higher inflation, the announcement effects and longer horizon effects will be in the same direction. On the other hand, if a contractionary monetary policy shock is followed by low inflation and/or high growth, then the announcement effect and the longer horizon effects of monetary policy may move into opposite direction. We believe that the second process is in place in the 1990s because this period is characterized by high growth and low inflation. Any unexpected contractionary monetary policy may initially raise concern about the future (and hence the negative announcement effect). As soon as more information comes in about growth and inflation, investors realize that the contraction may actually have helped the economy from becoming over-heated (and hence the positive reaction in monthly interval). We may therefore argue that investors' reactions to the Fed policy are conditional on the states of business condition.

We observe similar results using event study methodology in different monetary policy operating procedure regimes using the appropriate policy tool for those regimes (since the results are similar to those reported earlier, we do not report these results in the paper). In the latest operating procedures regime (1987-2000), there are 60 announcements of the federal funds rate change. Since the Fed followed federal funds rate targeting in this period, we use the federal funds target rate as a policy indicator in equations 4-6. The unconditional responses show that the returns of the investments companies significantly respond to changes in the federal funds target rate on the announcement days. We observe that the announcement day response of the portfolio returns are statistically significant in bull markets, while not significant in the bear market or in economic expansion and recessions. The lack of significant results in either the bear markets or in economic recessions may, however, be the results of lack of sufficient announcements in these economic conditions. Out of the 60 announcements of federal funds target rate changes, only 3 are in the bear market and only 7 are under economic recession.

Our conclusions also hold up when we apply the event study method to two other operating procedures regimes. In the first federal funds rate targeting regime (1974-1979), there are 98 federal funds target rate changes. When we estimate the announcement day response of federal funds target rate in this period, we observe that portfolio returns are more sensitive to monetary policy in the bull market compared to the bear market, in the economic expansion compared to recession and in the high states of economic activity compared to low states. For the reserve targeting period (1979-1987), we use discount rate as the policy tool, and there are 27 discount rate changes in this period. For this period, we observe that the changes in discount rate announcements has significant effect on both the bull and bear markets and in expansions and recessions; however, the announcement day return is found to be statistically significant in high and medium states but not significant in low states of economic activity. Thus, the results in these different sub-periods are also consistent with our conclusion that monetary policy is more effective on investments companies in better business conditions.

VII. Discount Rates or Expected Cash Flows?

To measure the response of equity discount rates and expected cash flows to changes in monetary policy, we consider several proxies. The discount rate proxies include changes in the three-month Treasury bill and 10-year Treasury bond yields. Following Fama and French (1989), Fama (1990) and McQueen and Roley (1993), we also include variables denoted as term premium, default premium and quality premium as equity discount rate proxies. We define term premium (TERM) as the difference between 10-year Treasury bond and 3-month Treasury bill rates; default premium (DEF) as the difference between the Moody's Baa corporate bonds and 10 year Treasury bond yields; and quality premium (QUAL) as the difference between Moody's Baa and Aaa corporate bond yields. The expected cash flow proxies used in the paper are dividend yield (DIVYLD) defined by the total annual dividend received divided by the current price and the growth rate of industrial production (IPG) following Fama and French (1989), Fama (1990, and McQueen and Roley (1993) .

Following McQueen and Roley (1993), the tests for asymmetric responses of discount rates and the expected cash flow proxies to monetary policy are done using the specification:

$$X_t = \beta_0 + \beta_1(G_t * FED_t) + \beta_2(B_t * FED_t) + e_t \qquad (7)$$

$$X_t = \beta_0 + \beta_1(H_t * FED_t) + \beta_2(M_t * FED_t) + \beta_3(L_t * FED_t) + e_t \qquad (8)$$

where,

G_t is a dummy variable, which takes a value of 1 if day t is in monetary expansion/bull market/economic expansion and zero otherwise;

B_t is a dummy variable, which takes a value of 1 if day t is in monetary contraction/bear market/recession and zero otherwise;

H_t is a business condition dummy variable, which takes a value of 1 if day t is in high state of industrial production and zero otherwise;

M_t is a business condition dummy variable, which takes a value of 1 if day t is in medium state of industrial production and zero otherwise; and

L_t is a business condition dummy variable that takes a value of 1 if day t is in low state of industrial production and zero otherwise.

Table-10 reports the F-statistics and the p-values for the null hypothesis (H_0): $ß_1 = ß_2$ and $ß_1 = ß_3$. The test statistics are estimated using White's (1980) heteroskedasticity consistent procedure. We conduct the tests using the changes in the federal funds rate as the indicator of monetary policy for the period July 1962 to December 2000 (reported in panel-a of table-10) and using the unexpected changes in the federal funds target rate as the indicator of monetary policy for the sub-period June 1989 to January 2000 (panel-b).

The null hypothesis that the response of discount rate and expected cash flow proxies to monetary policy actions is the same across expansionary and contractionary monetary policy environments can be rejected in both periods. All the test statistics are statistically significant (except the term premium) in the period 1962-2000. The test statistics are significant for default and quality premiums (discount rate proxies) and dividend yield and the industrial production growth (expected cash flow proxies). The null hypothesis across bull and bear markets, however, cannot be rejected in both periods (except for the 3-month Treasury bill rates in the 1962-2000 period and term premium in the 1989-2000 period). On the other hand, the null hypothesis can be rejected for across expansion and recession. We observe that, the F-statistics is statistically significant for default and quality premium (discount rate proxies) and for dividend yield and industrial production growth (expected cash flow proxies) in the full sample of 1962 to 2000. In addition to these variables, we observe that the term premium also responds differently (F-statistics is statistically significant) to monetary policy surprises in the sub-period of 1989 to 2000. We observe similar results across different business conditions identified by the high and low levels of industrial production. The discount rate proxies (default premium, quality premium and the 3-month Treasury bill rates) and the expected cash flow proxies (dividend yields and industrial production growth) respond differently across high and low states of the economy for the period 1962 to 2000. For the period 1989 to 2000, term premium and default premium respond differently to monetary policy surprises across high and low level of industrial production. The results suggest that the discount rates or the expected cash flow proxies respond significantly differently across expansion and recession and across high and low states of the economy, although do not respond differently across bull and bear markets. The results support our hypothesis that the differential effect of monetary policy on the returns of investments companies across different monetary policy environments and business conditions are driven by the differential effect of the equity discount rates and expected cash flows.

From panel-a and b of table-10, we also observe that term premium does not respond significantly due to monetary policy across different business conditions in the full sample period of 1962 to 2000, while it responds significantly differently due to monetary policy across different business conditions in the 1990s. We also observe that the industrial product growth does not vary significantly across high and low states in the 1990s. Furthermore, we observe (results not reported in the table) that the adjusted R^2s for the discount rate proxy equations are significantly higher (over 0.30) compared to that of expected cash flow proxies (below 0.10). These observations suggest that the equity discount rate proxies drive the differential effect of monetary policy across different monetary policy environments and business conditions.

McQueen and Roley (1993) observe that the variation of stock prices to macroeconomic news across different economic states is due to asymmetric response of expected cash flow proxies but they do not find significant asymmetric response of equity discount rate proxies across different economic states. We observe that monetary policy actions result in asymmetric response of both equity discount rates and expected cash flow proxies across different business conditions. The differences in the results can be attributed to the fact that McQueen and Roley (1993) concentrate on the types of economic news (industrial production, unemployment, trade deficit, inflation) that probably have more impact on expected cash flows as opposed to discount rates. In this paper, we concentrate on monetary policy changes that probably affect discount rates more that the expected cash flows. However, the observation that monetary policy actions have asymmetric affects on the expected cash flow proxies across different business conditions further support the idea that monetary policy plays a strong signaling role regarding the future of the economy. Furthermore, McQueen and Roley (1993) also observe that the strong stock market responds to monetary news is mainly caused by larger increase in the discount rates relative to expected cash flow proxies. We also report similar findings.

To test whether the expected cash flow proxies take longer time to adjust due to changes in monetary policy (an issue addressed by McQueen and Roley (1993)) compared to discount rate proxies, we have estimated the equations 7 and 8 by allowing the expected cash flow proxies to be affected by monetary policy changes with a lag of one or two months. The results are similar to those observed in table-10 and are less significant statistically. We also have done the same exercise for the discount rate proxies and observe insignificant results.

VIII. Conclusion:

We investigate the effect of changes in monetary policy actions on the returns of investments companies. We observe that the returns of investments companies are negatively related to an interest rate based indicator of monetary policy. Specifically, an expansionary monetary policy increases returns while a contractionary monetary policy depresses the returns. We find that monetary policy actions have asymmetric effects across different monetary policy environments: returns are more sensitive to monetary policy actions in an expansionary monetary policy environment compared to a contractionary environment..

We present evidence that unanticipated monetary policy actions significantly affect the returns of investments companies. The response of the returns of the investments companies to surprise federal funds target rate changes is large and statistically significant. This is a significant finding because it shows that investors react mostly to unanticipated changes in monetary policy. We also observe that the returns of investments companies are asymmetrically affected by the direction of surprise policy changes. The returns of investments companies are significantly affected by positive monetary policy surprises while negative policy surprises do not seem to affect them.

Our findings imply that monetary policy matters for the investments companies. Investors' react more to unanticipated changes in monetary policy than anticipated changes. In the 1990s, we observe that investors in investments companies respond to good news about monetary policy while bad news does not seem to affect them. The results are consistent with the signaling role of monetary policy and possibly show investors' confidence on the Fed in dealing with the economy. Our results provide strong evidence the returns of investments companies are significantly affected by monetary policy actions. Therefore, the asset pricing models (especially for investments companies) should incorporate an interest-based monetary policy indicator to reflect the relationship between monetary policy and returns.

Furthermore, we observe that the effects of monetary policy on the investments companies are asymmetric across different business conditions and the results are robust to different identification scheme of the business conditions. We find evidence that the effect of monetary policy on the returns of investments companies in good business conditions is statistically significant compared to bad business conditions. This suggests that the effectiveness of monetary policy depends on the states of the economy. Moreover, we observe that unanticipated monetary policy actions significantly affect the returns of investments companies. The results suggest that the greater transparency in the operation of the Fed policy during the 1990s resulted in the stock market being more responsive to unanticipated changes in monetary policy. We observe that the investors' reactions to surprise monetary expansion or contraction depend on the states of business conditions: monetary expansion is interpreted by investors of investments companies as bad news in high levels of economic activity while it is interpreted as good news in low levels of economic activity. We also observe that the announcement effect and longer horizon (monthly) effect of surprise monetary policy changes on portfolio returns of investments companies are asymmetric across different business conditions.

We find that the asymmetric effect of monetary policy across different business conditions is due to the asymmetric effect of monetary policy on the discount rates and expected cash flow proxies across different business conditions. We also find evidence that the effect of monetary policy on the returns of investments companies are driven by its effect through changes in discount rate proxies as opposed to expected cash flow proxies. The results suggest that monetary policy plays a strong signaling role for the stock market.

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TABLE-1: Portfolio return sensitivities due to Fed policy.

The unconditional and conditional portfolio return sensitivities are estimated using the following models:

$R_{pt} = ß_0 + ß_1*R_{mt} + ß_2*FFR_t + e_t$

$R_{pt} = ß_0 + ß_1*R_{mt} + ß_2\ (G_t*FFR_t) + ß_3\ (B_t*FFR_t) + e_t$

$R_{pt} = ß_0 + ß_1*R_{mt} + ß_2\ (H_t*FFR_t) + ß_3\ (M_t*FFR_t) + + ß_4\ (L_t*FFR_t) + e_t$

where, R_{pt} is the equally weighted portfolio return on month t, R_{mt} is the S&P 500 return on month t, and FFR_t is is the changes (percentage point) in the federal funds rate in month t. We use monthly data from July 1962 to December 2000. G_t is a dummy variable reflecting expansionary monetary policy environments or good business conditions (bull markets or economic expansion), and B_t is another dummy variable reflecting contractionary monetary policy environments or bad business conditions (bear markets or recession); while H_t, M_t, L_t are dummy variables reflecting high, medium and low states of the economy based on the industrial production index. (See text for details). The figures in parenthesis are the t-statistics (*, **, *** represents significant at 10%, 5%, and 1% level respectively) estimated using White's (1980) heteroskedasticity consistent procedure

Panel-a. Effect of monetary policy on the returns of investment companies.

July 1962 - December 2000 (n=462)

	Intercept	R_{mt}	FFR	Adj. R^2	F-Value	DW
Investment Companies	0.01	0.78	-0.96	0.53	264.00	1.99
	(5.60)***	(13.94)***	(-2.26)**			

Panel-b. Portfolio return sensitivity across monetary policy environments.

July 1962 - December 2000 (n=462)

Intercept	R_{mt}	Expansion	Contraction	H_O: $ß_2 = ß_3$ F-Test	Adj. R^2	F-Value	DW
0.01	0.78	-1.31	-0.64	0.59	0.53	176.42	1.99
(5.57)***	(14.41)***	(-1.74)*	(-1.47)				

Panel-c. Return sensitivity due to monetary policy across different business conditions.

July 1962 to December 2000 (n=462)

Bull	Bear	H_O: $ß_2 = ß_3$ F-Test
-1.09	-0.62	0.37
(-2.01)**	(-1.16)	

Expansion	Recession	H_O: $ß_2 = ß_3$ F-Test
-0.60	-1.84	0.85
(-1.73)*	(-1.45)	

IP_High	IP_Medium	IP_Low	H_O: $ß_2 = ß_4$ F-Test
-0.82	-0.66	-2.01	0.35
(-1.04)	(-1.82)*	(-1.1)	

TABLE-2: Monetary Policy surprises and the portfolio returns.
June 1989 - January 2000 (n=128).

Panel-a. Policy surprises and the returns of investment companies

The portfolio return sensitivities due to monetary policy surprises are calculated using the following model:

$$R_{pt} = ß_0 + ß_1 * R_{mt} + ß_2 * UFFT_t + e_t;$$

where, R_{pt} is the equally weighted portfolio returns on month t, R_{mt} is the S&P 500 return on month t, and $UFFT_t$ is the unexpected change in the federal funds target rate in month t. The figures in parenthesis are the t-statistics (*, **, *** represents significant at 10%, 5%, and 1% level respectively) estimated using White's (1980) heteroskedasticity consistent procedure.

June 1989 - January 2000 n=128	**Intercept**	**R_{mt}**	**UFFT**	**Adj. R^2**	**F-Value**	**DW**
Investment Companies	0.01	0.49	-1.98	0.44	50.81	1.64
	(3.03)***	(6.96)***	(-1.82)*			

Panel-b. Portfolio return sensitivities to positive and negative policy surprises.

The portfolio return sensitivities to positive and negative policy surprises are calculated using the following model:

$$R_{pt} = ß_0 + ß_1 * R_{mt} + ß_2 (P_t * UFFT_t) + ß_3 (N_t * UFFT_t) + e_t;$$

Where, P_t and N_t are dummy variables reflecting positive and negative surprises in monetary policy, R_{pt} is the equally weighted portfolio returns on month t, R_{mt} is the S&P 500 return on month t, and FFR_t is the change (percentage point) in the federal funds rate in month t. The figures in parenthesis are the t-statistics (*, **, *** represents significant at 10%, 5%, and 1% level respectively) estimated using White's (1980) heteroskedasticity consistent procedure.

Intercept	**R_{mt}**	**PUFFT**	**NUFFT**	**H_O: $ß_2 = ß_3$** F-Test	**Adj. R^2**	**F-Value**	**DW**
0.01	0.49	-2.25	-0.72	0.41	0.44	33.70	1.65
(2.4)***	(6.97)***	(-1.63)*	(-0.43)				

TABLE-3: Effect of monetary policy surprises across different business conditions.

The conditional portfolio return sensitivities are calculated using the following models:

$R_{pt} = \beta_0 + \beta_1 * R_{mt} + \beta_2\ (G_t * UFFT_t) + \beta_3\ (B_t * UFFT_t) + e_t$;

$R_{pt} = \beta_0 + \beta_1 * R_{mt} + \beta_2\ (H_t * UFFT_t) + \beta_3\ (M_t * UFFT_t) + + \beta_4\ (L_t * UFFT_t) + e_t$;

where, R_{pt} is the equally weighted portfolio return on month t, R_{mt} is the S&P 500 return on month t, and $UFFT_t$ is the unanticipated changes in the federal funds target rate in month t. We use monthly data from June 1989 to January 2000. G_t is a dummy variable reflecting good business conditions (bull market or economic expansion), and B_t is another dummy variable reflecting bad business conditions (bear markets or recession); while H_t, M_t, and L_t are dummy variables reflecting high, medium and low states of the economy based on the industrial production index (see text for details). The figures in parenthesis are the t-statistics (*, **, *** represents significant at 10%, 5%, and 1% level respectively) estimated using White's (1980) heteroskedasticity consistent procedure.

June 1989 to January 2000 (n=128)

		H_O: $\beta_2 = \beta_3$
Bull	**Bear**	**F-Test**
-1.91	-21.68	1.09
(-1.76)*	(-1.15)	

		H_O: $\beta_2 = \beta_3$
Expansion	**Recession**	**F-Test**
-1.13	-7.00	0.45
(-1.13)	(-0.79)	

			H_O: $\beta_2 = \beta_4$
IP_High	**IP_Medium**	**IP_Low**	**F-Test**
14.10	0.73	-2.27	7.39***
(2.38)***	(0.31)	(-1.93)**	

TABLE-4: Effect of monetary policy surprises: Event study evidence.

The unconditional and conditional announcement returns of monetary policy are estimated using the following models:

$$R_{pt} = ß_0 + ß_1*UFFT_t + e_t \; ;$$
$$R_{pt} = ß_0 + ß_1 (G_t*UFFT_t) + ß_2 (B_t*UFFT_t) + e_t \; ;$$
$$R_{pt} = ß_0 + ß_1 (H_t*UFFT_t) + ß_2 (M_t*UFFT_t) + + ß_3 (L_t*UFFT_t) + e_t \; ;$$

where, R_{pt} is the equally weighted portfolio return on announcement day t, and $UFFT_t$ is the unanticipated changes in the federal funds target rate on that day. We use daily announcement day data for the period March 1989 to December 2000. G_t is a dummy variable reflecting good business conditions (bull market or economic expansion), and B_t is another dummy variable reflecting bad business conditions (bear markets or recession); while H_t, M_t, and L_t are dummy variables reflecting high, medium and low states of the economy based on the industrial production index (see text for details). The figures in parenthesis are the t-statistics (*, **, *** represents significant at 10%, 5%, and 1% level respectively) estimated using White's (1980) heteroskedasticity consistent procedure

Panel-a. Announcement effect of monetary policy surprises.

March 1989 to December 2000 n=44	**Intercept**	**UFFT**	**Adj. R^2**	**F-Value**	**DW**
Investment Companies	0.002	-0.059	0.090	5.234	2.321
	(2.28)**	(-1.75)*			

Panel-b. Effect of monetary policy surprises across different business conditions.

March 1989 - December 2000 (n=44)

Bull	**Bear**	**H_O: $ß_1 = ß_2$ F-Test**
-0.060	0.089	1.509
(-1.75)*	(0.88)	

Expansion	**Recession**	**H_O: $ß_1 = ß_2$ F-Test**
-0.066	0.001	0.640
(-1.81)*	(0.01)	

IP_High	**IP_Medium**	**IP_Low**	**H_O: $ß_1 = ß_3$ F-Test**
-0.343	-0.055	-0.036	7.214***
(-3)***	(-0.88)	(-1.27)	

Table 5: Tests for asymmetric responses of discount rate and expected cash flow proxies to monetary policy in different states of economy.

The tests for asymmetric responses of the discount rates and the expected cash flow proxies to monetary policy are done using the following specification:

$$X_t = \beta_0 + \beta_1 (G_t{*}FED_t) + \beta_2 (B_t{*}FED_t) + e_t$$

$$X_t = \beta_0 + \beta_1 (H_t{*}FED_t) + \beta_2 (M_t{*}FED_t) + \beta_3 (L_t{*}FED_t) + e_t$$

where, X_t is the proxy for discount rates and expected cash flows and FED_t is the monetary policy indicator on month t. G_t is a dummy variable reflecting good business conditions (bull markets or economic expansion), and B_t is another dummy variable reflecting bad business conditions (bear markets or recession). H_t, M_t and B_t are dummy variables reflecting high, medium and low levels of industrial production respectively. The F-statistics and the p-values are for the following null hypotheses (H_0): $\beta_1 = \beta_2$ and $\beta_1 = \beta_3$; The test statistics (*, **, *** represents significant at 10%, 5%, and 1% level respectively) are estimated using White's (1980) heteroskedasticity consistent procedure. The discount rate proxies are: Term premium (TERM) defined as the difference between 10 year Treasury bond and 3 month Treasury bill rates; Default premium (DEF) defined as the difference between the Moody's Baa corporate bonds and 10 year Treasury bond rates; Quality premium (QUAL) is defined as the difference between Baa and Aaa corporate bond rates; Changes in 3-month Treasury bill rates (TB3MS) and changes in 10 year Treasury bond rates (TB10Y). The proxies for expected cash flows are: Dividend yield (DIVYLD) defined by the total annual dividend received divided by the current price and the growth of industrial production index (IPG).

Panel-a. Hypothesis tests using changes in federal funds rate July 1962 - December 2000.

	H_o: $\beta_1 = \beta_2$						H_o: $\beta_1 = \beta_3$	
	Expansion-Contraction		**Bull-Bear**		**Expansion-Recession**		**High-Low IP**	
	F Stat	**p value**	**F Stat**	**p value**	**F Stat**	**p value**	**F Stat**	**p value**
TERM	0.167	0.683	0.972	0.325	0.013	0.910	0.746	0.388
DEF	4.983**	0.026	0.669	0.414	3.639*	0.057	4.976**	0.026
QUAL	7.886***	0.005	0.001	0.976	9.322***	0.002	6.955***	0.009
TB3MS	8.866***	0.003	4.035**	0.045	0.587	0.444	2.891*	0.090
TB10Y	2.851*	0.092	1.322	0.251	0.024	0.877	0.069	0.793
DIVYLD	4.169**	0.042	2.138	0.144	11.824***	0.001	4.861**	0.028
IPG	4.912**	0.027	1.878	0.171	15.416***	0.000	6.706***	0.010

Panel-b. Hypothesis tests using unanticipated changes in federal funds target rate for the period June 1989 to January 2000.

	H_o: $\beta_1 = \beta_2$						H_o: $\beta_1 = \beta_3$	
	Expansion-Contraction		**Bull-Bear**		**Expansion-Recession**		**High-Low IP**	
	F Stat	**p value**	**F Stat**	**p value**	**F Stat**	**p value**	**F Stat**	**p value**
TERM	2.490	0.117	2.780*	0.098	5.342**	0.022	7.241***	0.008
DEF	13.844***	0.000	2.030	0.653	12.730***	0.001	10.615***	0.001
QUAL	9.656***	0.002	0.458	0.500	30.331***	0.000	0.821	0.367
TB3MS	1.502	0.223	0.173	0.678	0.003	0.957	2.300	0.132
TB10Y	0.743	0.390	1.564	0.213	0.062	0.803	0.104	0.747
DIVYLD	7.543***	0.007	0.400	0.528	20.624***	0.000	2.318	0.130
IPG	6.480**	0.012	0.017	0.897	9.201***	0.003	2.550	0.113