ABSTRACT

DARWIN, ROBERT WILLIAM. Asymmetric Responses of Nominal Rates, TIPS Rates, Break-Even Inflation Rates, and the Stock-Bond Correlation to Macroeconomic Announcements. (Under the direction of Dr. Douglas Pearce.)

Utilizing daily instantaneous forward rates of nominal and inflation-indexed bonds as well as realizations of stock and bond index returns, I examine the informational content of a broad set of macroeconomic announcements. I find evidence that, with a few exceptions, price variables mainly move break-even inflation rates, while real variables move TIPS rates and/or break-even inflation rates. An analysis of movements in the stock-bond correlation finds that, with some exceptions, expected future interest rates are the important component of the informational content of expansionary announcements to production variables and employment variables. In recessions, I find evidence that expectations of future economic growth or an equity risk premium are the important news conveyed by shocks to some production and employment variables, again with some exceptions. Similarly, for price variables I find evidence that in expansions shocks either proxy for future economic activity or provide information about expected future nominal rates which investors mistakenly use to value equities rather than expected real rates. In recessions (at least for core PPI) some evidence points to the news content referencing future economic growth or the equity risk premium. Consistent with previous results in the literature, results on movements in the stock-bond correlation agree with rising correlations in expansions and falling correlations in recessions. Additionally, in looking at monetary policy shocks to the federal funds target rate I notice that expectations of growth or the equity risk premium are embedded in shocks that 'go against the grain' of the expected path given an economic state (negative expansionary and positive recessionary shocks).

Formal tests for state and sign asymmetries in the magnitudes of responses to macroeconomic shocks generally yield sparse significant results, though for production variables mainly indicate greater effects of expansionary over recessionary and negative over positive shocks, with some exceptions. Finally, state asymmetry in the response of TIPS rates to monetary policy announcements indicates long-run expansionary momentum and long-run recessionary reversal in monetary policy.

Asymmetric Responses of Nominal Rates, TIPS Rates, Break-Even Inflation Rates, and the Stock-Bond Correlation to Macroeconomic Announcements

by
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DEDICATION

To my parents

BIOGRAPHY

Robert W. Darwin grew up in the town of Asheboro, North Carolina before attending North Carolina State University for both his undergraduate and graduate studies. In 2006, he received bachelor of science degrees in applied mathematics and economics, graduating as class valedictorian. He chose to continue his education at North Carolina State University after being awarded the Andrews Fellowship, given annually by the graduate school to the top entering PhD student at the university.

ACKNOWLEDGMENTS

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Chapter 1

Introduction and Overview of Inflation-Indexed Bonds

Utilizing daily instantaneous forward rates of nominal and inflation-indexed bonds as well as realizations of stock and bond index returns, I examine the informational content of a broad set of macroeconomic announcements, quantifying how announcement data tend to affect nominal versus real rates (as well as break-even inflation rates which I define shortly), stock prices, and the stock-bond correlation. The distinction between expected movements in nominal and real rates is important in the field of asset pricing as expected real, not nominal, rate movements should be used to discount future income streams (Modigliani and Cohn 1979). Additionally, determining movements in the stock-bond correlation has powerful implications for portfolio construction (Ilmanen 2003). In examining rate and stock-bond correlation movements, I construct announcement-day shocks by comparing the median survey of forecasters to the actual, realized value and I allow for asymmetries across the business cycle and across different types of shocks (positive or negative). Determining the informational content of macroeconomic announcements should contribute to an understanding of their effects on asset prices and optimal portfolio design.

The rest of this chapter describes the market for inflation-indexed bonds, which I use to determine movements in real rates (as well as break-even inflation rates). Chapter 2 provides a literature review of relevant work, chapter 3 describes my econometric specification, chapter 4 details my data, chapter 5 reports my results, and finally chapter 6 concludes my work.

The emergence of inflation-indexed bonds has created a new set of financial instruments for practitioners to use and academicians to study. Garcia and Rixtel (2007) provide a comprehensive background on their history, as well as summarizing the rationale

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for their issuance. While inflation-indexed securities have a long history of attempted application, their widespread usage has been limited until recent years. Now, however, many countries issue these bonds and their liquidity is increasing. The gains to issuers of inflation-adjusted debt are acquired through the inflation risk premia of holders of this debt. Purchasers of this type of debt would like to reduce potential losses accruing to unexpected inflation, and are willing to pay a premium for this insurance. Debt issuers could face losses, however, in the face of illiquid markets, as debt holders would require a liquidity premium as compensation. In general, once markets are well-established, any liquidity premium should be small as the holders of inflation-indexed securities likely do not demand highly liquid markets (they are long-term investors such as pension funds). Inflation-indexed securities also can match government revenues with obligations, as both are now subjected to the same inflation risk, and governments that issue inflation-indexed debt ensure that they will have a market for debt even when future inflation is uncertain.

Garcia and Rixtel (2007) also describe the informational content contained in the markets of nominal and inflation-adjusted bonds, defining the break-even inflation rate (BEIR) as the difference in yields between a nominal bond and an inflation-indexed bond. Inflation expectations are a major component of break-even inflation rates, though other information (such as an inflation risk premium and a liquidity premium) is contained in this spread as well. Specifically, the break-even inflation rate (also called inflation compensation) can be decomposed as:

$$\text{BEIR} = \text{Expected Inflation - Liquidity Premium + Inflation Risk Premium}$$

As the inflation risk premium increases, investors are willing to pay more to insure themselves against inflation-influenced losses, demanding more inflation-indexed bonds and pushing real yields down. In contrast, in the face of illiquid markets for inflation-indexed bonds, investors' demand for inflation-indexed bonds falls and real yields rise. Once markets for inflation-indexed debt are sufficiently liquid, however, the liquidity premium should subside and stabilize, leaving only inflation expectations and risk premia as the components of BEIR. Specifically, when examining daily differences in break-even inflation rates, the liquidity premium component will be eliminated due to this constancy. Thus, once markets are sufficiently liquid, changes in break-even inflation rates can be thought of as a sum of changes in expected inflation and the inflation risk premium.

$$\Delta \text{ BEIR} = \Delta \text{ Expected Inflation} + \Delta \text{ Inflation Risk Premium}$$

The use of break-even inflation rates of forward yields (also called forward inflation compensation) can help determine how these various components behave at a fixed point

in the future in response to news today.

In the United States, the market for Treasury Inflation-Protected Securities (TIPS) formed in 1997, initially offering inflation-indexed bonds with maturities of five and ten years. Thirty-year bonds were subsequently introduced and phased out, while twenty-year bonds are also now actively traded. The five-year bond was phased out for a brief time, then reintroduced. As a reference for this and other information on the TIPS market, see the presentation "Treasury Inflation-Protected Securities (TIPS)" by the Office of Debt Management, United States Treasury (2008), at:

http://www.treas.gov/offices/domestic-finance/key-initiatives/tips-presentation.pdf

This presentation contains graphs on page 5 and 6 that illustrate the history of issuance and liquidity of TIPS, providing evidence that transaction volume (as measured by primary dealer activity) appears to grow until it levels off around 2005.

Armed with zero-coupon yield curves for nominal and inflation-indexed securities, I can compute break-even inflation and forward inflation compensation rates across a term structure, examining their evolution over time and in response to macroeconomic announcements. Gürkaynak et al. (2007, 2008) provide a blueprint for modelling these yield curves in the U.S., and I review their set-up and results. Defining the main difference between nominal and inflation-indexed bonds, they note that nominal bonds are characterized by fixed payments including coupons and the principal at maturity, while TIPS' payments are indexed by ratios of reference CPI realizations. Specifically, they write in their 2008 paper:

> if the maturity or issue date falls on day d_t of a month with d_n days, then the reference CPI is
>
> $$\text{CPI(-2)} \frac{d_t - 1}{d_n} + \text{CPI(-3)} \frac{d_n - d_t + 1}{d_n}$$
>
> where CPI(-2) and CPI(-3) denote the non-seasonally adjusted U.S. City Average All Items Consumer Price Index for the second and third months prior to the month in which the maturity or issue date falls, respectively. (p. 3)

Gürkaynak et al. (2008) explain that the lag in the CPI indexing corresponds to release-date delay of this information, and basically embeds a two-and-a-half month lag in TIPS. So for short-run issuances, this lag means that part of the break-even inflation rates will be based on realized inflation, not just inflation expectations. Examining longer-term forward inflation compensations remedies this problem.

Moving on to modelling the zero-coupon term structures of nominal and inflation-indexed bonds, Gürkaynak et al. (2008) first define the prices of these securities as $P_t^{nom}(n)$ for a security that pays one nominal dollar at maturity and $P_t^{real}(n)$ for a security that pays one real dollar at maturity. Continuously compounded yields are represented as $y_t^{nom}(n) = -\ln(P_t^{nom}(n))/n$ and $y_t^{real}(n) = -\ln(P_t^{real}(n))/n$ (p. 4-5). First modelling the yield curves in terms of forward rates, they follow a functional form outlined by Svensson (1994), an extension of the Nelson-Siegel (1987) framework. Specifically, where $f_t(n)$ denotes an instantaneous forward rate in n periods, they model for nominal and real yields (p. 6):

$$f_t(n) = \beta_0 + \beta_1 exp(-\frac{n}{\tau_1}) + \beta_2(\frac{n}{\tau_1})exp(-\frac{n}{\tau_1}) + \beta_3(\frac{n}{\tau_2})exp(-\frac{n}{\tau_2}) \qquad (1.1)$$

Note that in equation 1.1, $\beta_0, \beta_1, \beta_2, \beta_3, \tau_1, \tau_2$ are parameters to be estimated, and the τ variables determine yield curve curvature. Integrating equation 1.1, they find that zero-coupon yields follow (p. 7):

$$y_t(n) = \beta_0 + \beta_1 \frac{1 - exp(-\frac{n}{\tau_1})}{\frac{n}{\tau_1}} + \beta_2 \left[\frac{1 - exp(-\frac{n}{\tau_1})}{\frac{n}{\tau_1}} - exp(-\frac{n}{\tau_1}) \right]$$
$$+ \beta_3 \left[\frac{1 - exp(-\frac{n}{\tau_2})}{\frac{n}{\tau_2}} - exp(-\frac{n}{\tau_2}) \right] \qquad (1.2)$$

This specification allows well-defined end points with the possibility of two humps between them (which the authors find is an important provision), whereas a simple Nelson-Siegel (1987) form without the Svensson (1994) extension only allows one hump. Additionally, Gürkaynak et al. (2008) point out that the Svensson (1994) specification smooths through potential short-term seasonality effects of the CPI on TIPS and is quite successful at fitting the TIPS market.

Gürkaynak et al. (2007, 2008) provide detailed updates of zero-coupon yields and forward rates for nominal and TIPS rates, as well as break-even and forward inflation compensation rates online at

http://www.federalreserve.gov/econresdata/researchdata.htm

Using their data, figure 1.1 illustrates term structures of zero-coupon and forward yields for nominal, TIPS, and and break-even inflation rates on December 31, 2008, as well as indicating zero-coupon and forward inflation compensation on the same date. The nominal zero-coupon yield curve exhibits normal upward-sloping convexity, while zero-coupon TIPS are characterized by an inverted yield curve on this date. Zero-coupon

inflation compensations evolve according to a standard upward-sloping convex curve. Nominal forward rates are upward-sloping until about the nine-year point, then decrease through the twenty-year maturity. Forward rates of TIPS yields are upward-sloping until about the twelve-year point, then level off or decrease through the twenty-year maturity. Break-even inflation forward rates are upward sloping until about the ten-year point, then decrease through the twenty-year maturity.

Figure 1.2 provides a historical view of five and ten year zero-coupon nominal yields and forward rates from 1999-2008. Nominal five-year zero-coupon yields fall from 2000 through around 2003, rebounding until early 2007, then falling through the end of 2008. Ten-year zero-coupon yields are more stable, falling from 2000 to 2003, but generally holding steady until late 2007. Five and ten-year forward rates show drops from 2000-2005, then a levelling off until mid 2008.

Additionally, figure 1.3 shows the evolution of five and ten year zero-coupon TIPS yields and forward rates. As can be seen, five and ten year zero-coupon TIPS yields fall steadily from 2000-2005, rebounding slightly from 2005-2007, and then become more volatile from 2007-2009. Five and ten year forward rates experience similar directional trends, but move over smaller ranges.

Finally, figure 1.4 shows the evolution of inflation compensations, both zero-coupon and forward rates at five and ten year horizons. Note that all measures appear to be consistently higher from 2004-2007 than from 1999-2003, presumably owing, at least in part, to the improved liquidity in the TIPS market as noted in the figure on page 6 of the Office of Debt Management (2008) presentation. Recent turmoil increases volatility and drives down inflation compensations, with five year zero-coupon yields even becoming negative.
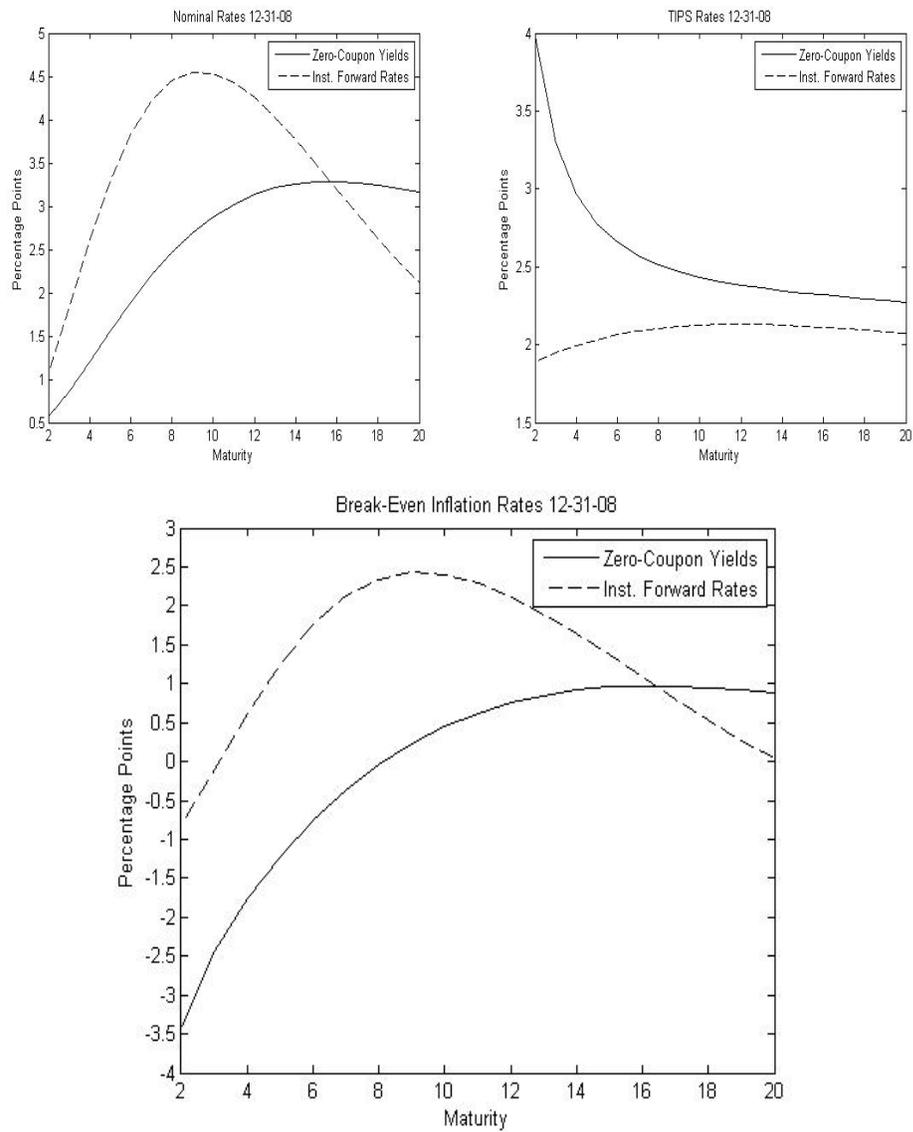
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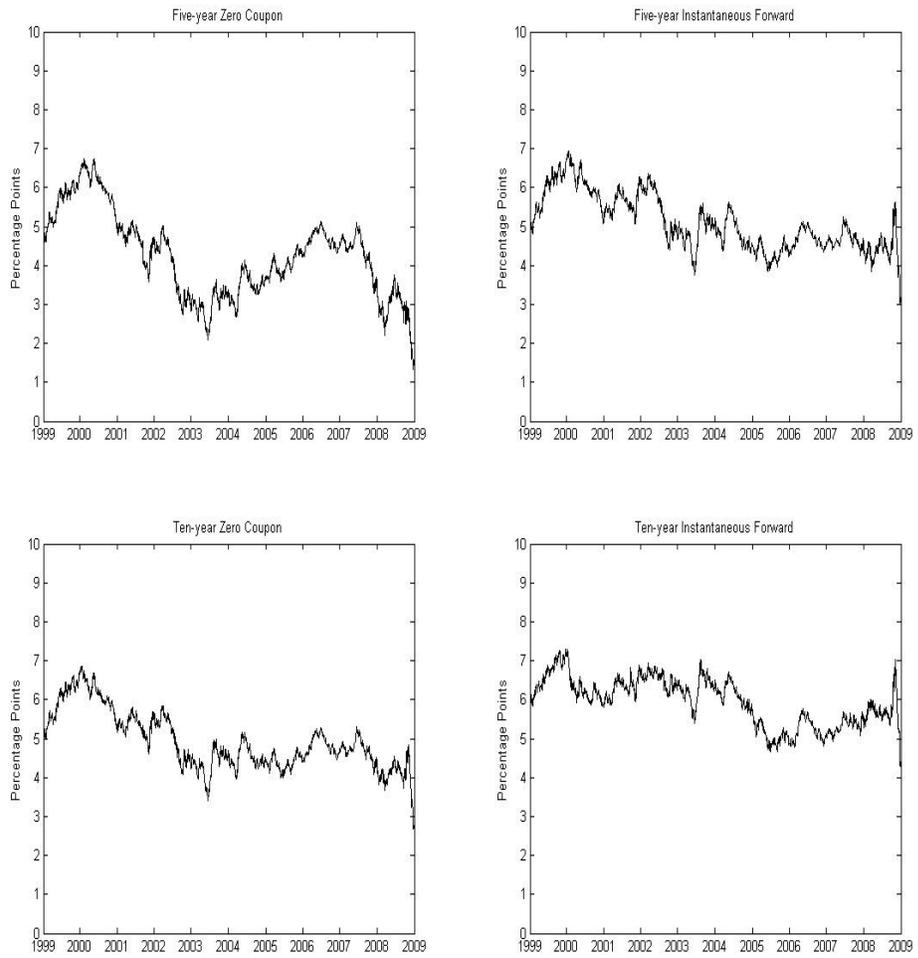
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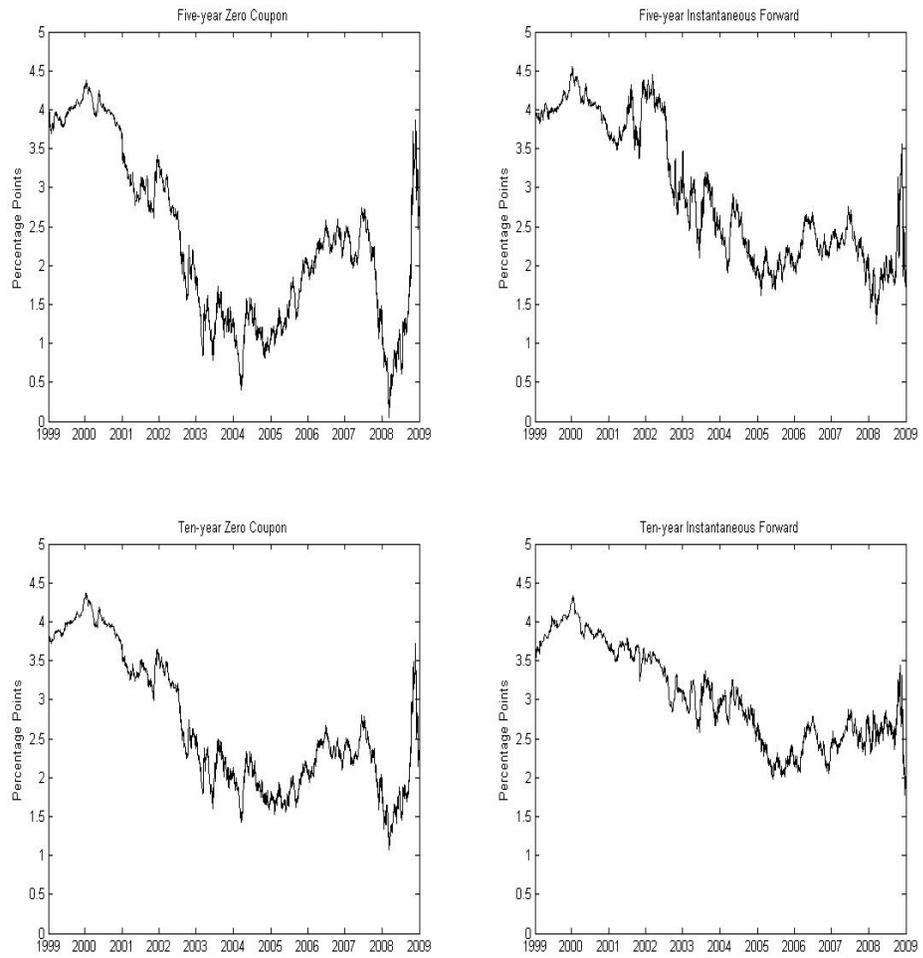
Figure 1.3: TIPS rates
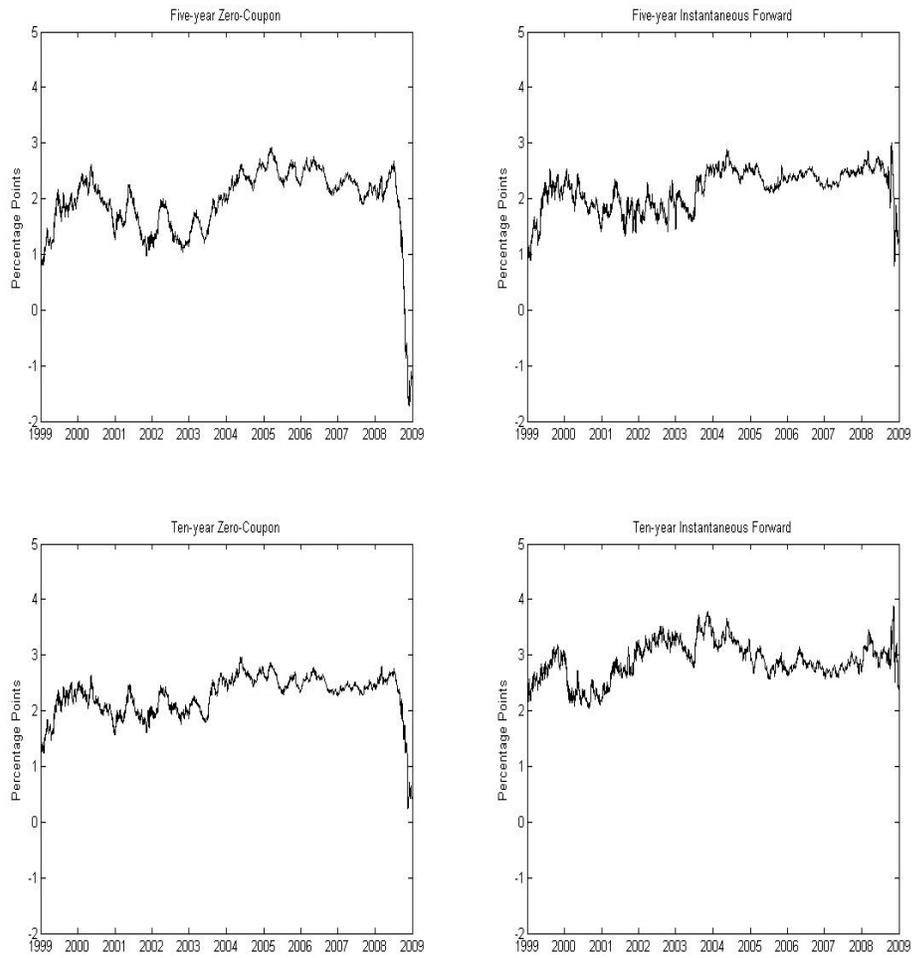
Figure 1.4: Break-even inflation rates

Chapter 2

Literature Review

My first goal is to examine reactions of nominal, real, and break-even inflation rates to macroeconomic announcements, accounting for two types of asymmetry: state and sign. I also study movements in stock prices and the stock-bond correlation in response to these announcements. This section provides a review of the literature relevant to these pursuits, detailing important issues I encounter. Specifically, I review estimates of the magnitude and time-variability of the inflation risk premium while documenting and describing two types of asymmetry commonly discussed in the economic literature. Additionally, I provide a survey of prior work studying the effect of macroeconomic announcements on nominal and inflation-indexed securities, and finally I conclude with an examination of factors influencing the stock-bond correlation.

2.1 Inflation Risk Premium

As a reminder, in studying the reaction of break-even inflation rates to macroeconomic announcements, changes in break-even inflation rates can be represented as:

Δ BEIR = Δ Expected Inflation - Δ Liquidity Premium + Δ Inflation Risk Premium

Once markets stabilize, this simplifies to:

$$\Delta \text{ BEIR} = \Delta \text{ Expected Inflation} + \Delta \text{ Inflation Risk Premium}$$

Since the development of the TIPS market in 1997, a number of authors have attempted to estimate the magnitude and variability of the inflation risk premium with inconsistent results. Some examples include D'Amico et al. (2008) who use a statistical three-factor affine model of nominal rates, real rates, and inflation expectations from 1990-2007 before backing out the inflation risk premium. They find time variability in the inflation

risk premium, with the 1 year premium generally ranging from 0-50 basis points and the 10 year premium from 50-100 basis points. Durham (2006) takes a related approach, using forward rates to recover term premia and then inflation risk premia from statistical three-factor affine models of nominal and real rates from 2000 to mid-2006. He finds ten year instantaneous premia to vary from 27 to 105 basis points, averaging 61 basis points and seven year instantaneous premia to vary from -23 to 73 basis points, averaging 13 basis points. Ang et al. (2007) also use a three-factor affine term structure model based on realized inflation and two unknown factors, incorporating regime switching in the inflation factor from 1952-2004. They find high levels of inflation risk premia in three of four regimes and overall their results indicate variation across time of premia. Chen et al. (2005) use a Cox-Ingersoll-Ross (1985) two-factor model for real rates and inflation from 1998 to 2004, finding the inflation risk premium to exhibit little time variation across a steep term structure, with small premia at short horizons and large (over 130 basis points) premia at longer (ten year) horizons.

Moving away from affine term structure models, Buraschi and Jiltsov (2005) build a structural economic model, accounting for taxes and monetary policy, to solve for inflation risk premia. They find a one month premium of around 15 basis points and a ten year premium of around 70 basis points. These premia vary through time and across the business cycle. Hördahl (2008) models rates and risk premia according to macroeconomic variables (output gap, inflation, monetary policy) from 1999 to mid-2008. Contrary to models discussed above, he finds inflation risk premia are generally stable across time and across maturity. Specifically, the ten year inflation risk premium is small and near zero.

The general lack of consistent methodology and concrete estimates of inflation risk premia impedes my ability to remove the inflation risk premium from break-even inflation rates with any confidence. Additionally, the fact that many studies find evidence of (in some cases extensive) time-variation in risk premia prevents me from assuming that taking daily first differences of break-even inflation rates will only leave changes in inflation expectations. Therefore, in looking at changes in break-even inflation rates once liquidity in the TIPS market stabilizes, I note that they reflect the sum of changes in inflation expectations and changes in inflation risk premia, but leave further decomposition to future studies.

2.2 Asymmetries Across Announcements and the Business Cycle

Much of the previous work examining market reactions to macroeconomic news implicitly ignores asymmetry across the state of the economy and the type of news. Such studies thus ignore the possibility that similar shocks could convey different information depending upon economic state (expansion versus recession) or news type (positive versus negative shock). Using these symmetric models could yield errors in predicting market movements and determining appropriate portfolio allocations based on macroeconomic news.

Asymmetries in prices and real variables are generally thought of as resulting from capacity constraints or learning asymmetries. I define and discuss two types of asymmetry:

1. State Asymmetry: Asymmetry across the business cycle (expansions vs. recessions)

2. Sign Asymmetry: Asymmetry across types of shocks (positive vs. negative)

2.2.1 State and Sign Asymmetry in Real Variables

After defining the two types of asymmetry, I first review three manifestations of state and sign asymmetries considered in the literature. Sichel (1993) introduces the concepts of steepness and deepness, while McQueen and Thorley (1993) define sharpness. 'Steepness' refers to the idea that the rates of movement to expansionary peaks and recessionary troughs differ, while 'deepness' occurs when peaks and troughs deviate from trend at different magnitudes. Finally, 'sharpness' represents the idea that probabilities of transition to and from one state of the economy to another at peaks and troughs are not identical. Clements and Krolzig (2002) summarize these authors' arguments and subsequent findings, mathematically defining these three occurrences:

1. Steepness: $E[(x_t - \mu_t)^3] \neq 0$

2. Deepness: $E[(\Delta x_t)^3] \neq 0$

3. Sharpness: $p_{m1} \neq p_{mM}$ and $p_{1m} \neq p_{Mm}$

Note: p_{xy} indicates the transition probabilities between states x and y. M is the number of possible states, and $1 < m < M$.

Sichel (1993) finds evidence of deepness in unemployment, industrial production, and (to

a lesser extent) GNP, while also seeing steepness present in GNP. McQueen and Thorley (1993) find that both industrial production and unemployment exhibit sharpness around recessionary troughs and roundness around expansionary peaks. While intuition behind business cycle sharpness is lacking in the economic literature, the reasons behind possible state and sign asymmetries in reactions to macroeconomic announcements can be explained through the concepts of steepness and deepness.

Briefly reviewing some of the literature on the importance of accounting for state and sign asymmetries, I focus first on an argument by Van Nieuwerburgh and Veldkamp (2006) who attribute business cycle steepness to an asymmetry in learning about true states of macroeconomic indicators. Their hypothesis posits that the clarity of economic signals varies across the business cycle, leading to state-dependent reactions to announcements. Periods of high production produce clear economic signals, leading to the immediate recognition of future conditions, while periods of low production cloud signals and increase uncertainty about the future. The increased output levels of expansions provides more data points to use in studies and projections, leading to cleaner forecasts. Firms and agents can thus react strongly and immediately to economic data, allocating resources according to their beliefs about future economic activity. In contrast, the lower output levels in recessions reduce forecast precision and firms and agents cannot respond as strongly or quickly. This asymmetry in reaction time and strength helps to explain business cycle steepness, by which movements away from expansionary peaks occur quicker than movements away from recessionary troughs. The authors find evidence of this steepness in output, industrial production, fixed investment, and hours worked. This 'signal clarity' argument thus implies a greater significance of expansionary than recessionary shocks.

In addition to the 'signal clarity' argument for explaining deepness, I note that greater (or different) expansionary effects of shocks could also be the result of the sharpness asymmetry found by McQueen and Thorley (1993). The probability of transitioning out of an expansion is less than out of a recession, so market participants can form stronger expectations about future economic conditions given they are in an expansion than in a recession. Additionally, sharpness has a potentially important implication when looking at market reactions across varying time horizons. To be consistent with sharpness, given an expansionary economic state, markets may forecast greater long-run momentum in response to a shock than in a recessionary economic state, where they may even expect long-run reversal due to the increased state transition probability.

Similar to the 'signal clarity' argument of Van Nieuwerburgh and Veldkamp (2006), Ishikawa (2002) discusses a 'learning' argument for explaining steepness and deepness through asymmetry in technological shocks, arguing that negative shocks produce

quicker and larger responses than positive shocks. Positive shocks require learning and implementation of new technology, slowing and dampening the response as otherwise-productive resources must be allocated to the learning process. Negative shocks, however, do not require this delay and responses can occur quickly and fully. The increased speed of reaction to negative shocks accounts for steepness, as movements away from expansionary peaks are quicker than those from recessionary troughs. Additionally, the costs of learning associated with positive technological shocks account for deepness, as expansionary peaks deviate from trend less than recessionary troughs. Ishikawa (2002) finds evidence in the United States for steepness and deepness in output, consumption, investment, and aggregate hours worked, as well as steepness in productivity.

Like Ishikawa's argument about 'learning,' Gilchrist and Williams (2000) present a model that explains steepness and deepness via asymmetry due to capacity constraints. In their model, positive productivity or technological shocks require an increase in production and thus input resources. However, the full increase may not be possible due to capacity constraints or implementation costs of these inputs. In contrast, firms face no costs or capacity constraints in reducing inputs, allowing quicker and fuller movements downward. This asymmetry helps account for both steepness and deepness when considering movements away from expansionary peaks or recessionary troughs.

Finally, Chalkley and Lee (1998) hypothesize that business cycle steepness can be explained by agents who are risk-averse in terms of work effort. In their model, agents want to exert high (low) effort in periods of high (low) productivity, but are biased towards selecting low effort if the state probabilities are equal. In this case, when a downturn starts, the belief of impending low productivity causes a domino effect of workers shifting to low effort. However, because of their risk aversion, upswings are more gradual since workers require stronger signals to shift to high effort.

To recap, real variables exhibit three types of asymmetry that characterize the business cycle: steepness, deepness, and sharpness. Steepness and deepness can be explained through 'signal clarity,' 'learning,' capacity constraint, or 'worker risk-aversion' arguments. The 'signal clarity' explanation implies a greater significance of expansionary rather than recessionary shocks, while the 'learning,' capacity constraint, and 'worker risk-aversion' arguments indicate that negative shocks have greater effects than positive shocks.

2.2.2   State and Sign Asymmetry in Prices

In examining state and sign asymmetry in responses to price variable (such as CPI, PPI, etc.) shocks, I note first that to the extent that these shocks reflect the business cycle

properties (steepness, deepness, sharpness) of real variables, they can produce similar asymmetric market reactions. So, if the shock to a real variable in question is reflected in movements in price variables, market responses should exhibit similar asymmetric reactions to price variable shocks as they do to real variable shocks.

Aside from their direct relationship to production variables, prices can exhibit sign asymmetry in their own responses to shocks. Consider the case of a firm needing to raise or lower its prices in the face of aggregate price shocks to keep relative prices stable. Ball and Mankiw (1994) show that in a positive-trend inflationary environment, firms that want to lower prices can allow inflation to perform some or all of this task rather than paying potentially sizeable menu costs, but firms that need to raise prices must incur these costs. Thus, the response to lower than expected prices will be more gradual than that to higher than expected prices. In the latter case, firms incur a one-time menu cost and make full adjustment, while in the former case firms slowly allow inflation to erode their real prices. Additionally, the authors underscore the importance of considering sectoral shocks that imply price increases for some firms and decreases for others. Due to the slower downward response of prices, the price increases will be felt at a greater magnitude than the decreases, leading to above-trend inflation.

So, if the main information contained in price shocks is reflective of actual price movements and not just movements in real variables, we can expect to see sign asymmetry in the form of positive shocks having greater effects than negative shocks. However, if a price shock simply proxies for a real variable shock, the hypothesized sign asymmetry present in real variables should be revealed, with negative shocks having greater effects than positive shocks.

2.2.3   State and Sign Asymmetry in Monetary Policy

First, in looking at potential asymmetries in monetary policy creation, I note that, as explained in Clarida et al. (1999), the anticipation of monetary policy is an important consideration for asset market participants. Therefore, to the extent that people view expected monetary policy reactions to announcement data differently across the business cycle, market responses could vary depending upon the current and expected future economic state. Dolado et al. (2005) allow for potential asymmetries via a nonlinear Phillips curve, and while they find evidence of asymmetric monetary policy for several European central banks, they find no such evidence for the United States. In contrast, Bec et al. (2002) find evidence for asymmetric monetary policy action in the United States, with more aggressive behavior in expansionary rather than recessionary periods. Thus, according to the results of Bec et al. (2002), similarly sized announcement shocks

in expansions and recessions could affect expected monetary policy action by different magnitudes, leading to state asymmetry in movements in financial markets.

Moving on to asymmetries in the responses to monetary policy shocks, Cover (1992) expounds upon Ball and Mankiw (1994) by providing an argument that downward stickiness and upward flexibility of wages and prices are responsible for sign asymmetries in the responses of prices and output to monetary policy shocks. Increases in the money supply are accommodated with rises in wages, but downward wage rigidity prevents a full accommodation of money supply contractions leading to a reduction in employment and output.

Consistent with Cover's argument, Devereaux and Siu (2007) outline a rationale for why real variables and prices respond to monetary policy differently across types of shocks, finding that real variables respond more to negative money supply shocks than positive shocks. Focusing on marginal costs, they argue that positive money supply shocks (resulting in higher input costs) will be fully accompanied by rises in firm-level prices, leaving real variables unchanged. In a case of near-perfect competition, if a firm raises prices to the new marginal cost level, its profits go to zero. However, if it does not adjust prices while others do, its demand curve becomes the industry-level demand curve and profits become large and negative due to price being beneath marginal costs. This phenomenon generates large incentives for firms to respond to positive marginal cost shocks by raising prices. In the case of falling marginal costs, however, the incentives for full adjustment are not as strong. If a firm lowers its prices to the new marginal cost level, profits go to zero. However, with no adjustment, firm-level demand falls and profits also go to zero. There is less impetus for firms to adjust prices in response to the negative supply shock, leading to greater real effects than for a similarly-sized positive shock.

2.3 Effects of Macroeconomic Announcements on Fixed-Income Markets

Though the literature is relatively young, I provide a brief review of work examining how macroeconomic announcements affect nominal and inflation-indexed securities. Gürkaynak et al. (2006) investigate long-term nominal and inflation-indexed bond forward rates in three countries, contrasting monetary policy regimes. If expected inflation is contained in the spread of nominal minus real yields, movements in expected inflation should be reflected in movements of this spread. Specifically the authors examine how long-run inflation expectations change with macroeconomic announcements or monetary policy changes in countries with varying policy objectives. In Sweden and recently in the

U.K., central banks have operated under a strict inflation-targeting regime as opposed to the U.S. which tends to follow a dual mandate of stabilizing inflation and output, similar to the rule outlined by Taylor (1993). The authors find that inflation-targeting countries tend to have more stable long-term yields and forward inflation compensations that are less affected by macroeconomic announcements or short-run monetary policy. Their model takes the form (p. 8):

$$\Delta y_t = \alpha + \beta X_t + \epsilon_t$$

where y_t represents either a long-term forward rate or forward inflation compensation, and X_t is the set of independent variables which are measured as surprises to macroeconomic announcements, constructed by subtracting the median of a survey of forecasters from the actual announcement realization, then standardizing by the standard deviation of these forecast errors (announcements are indexed by j) [1]:

$$s_{j,t} = \frac{A_{j,t} - E_{j,t}}{\sigma(A_{j,t} - E_{j,t})}$$

While the literature examining the effect of macroeconomic announcements on inflation compensation and real yields is still evolving, Beechey and Wright (2008) provide further examination of the subject. Using intra-daily data measured at five-minute intervals, they estimate a regression of the form (p. 8):

$$\Delta y_t(h) = \sum_{j=1}^{J} \beta_j(h) s_{j,t} + \epsilon_t$$

The variable y_t represents forward nominal yields, real yields, or break-even inflation rates, with 'h' denoting the length in time in minutes after an announcement is made. They also present results using a daily model. Note that $s_{j,t}$ is the measure of announcement surprise commonly used in the literature and defined above.

The specification of Beechey and Wright (2008) estimates coefficients on surprise elements of announcements, but ignores both types of asymmetry (state and sign). Decomposing changes in nominal rates into real and inflation compensation movements, they find that price surprises significantly affect break-even inflation rates, while shocks to real variables such as GDP impact real rates. Positive (negative) price surprises cause break-even inflation rates to rise (fall) and positive (negative) real shocks cause real rates to rise (fall). Additionally, shocks to the federal funds rate affect both real rates and inflation compensation, as tightening (loosening) causes real rates to rise (fall)

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[1] Notation follows p.5 of Beechey and Wright (2008)

and break-even inflation rates to fall (rise). Beechey et al. (2007) conduct similar analysis, using daily data to contrast responses in the United States to the ECB.

Ezer et al. (2008) expand upon the work of Beechey and Wright (2008) by studying the reaction of the term structure of TIPS to macroeconomic surprises. Specifically, they "find that TIPS breakevens respond consistently across the maturity structure to core CPI surprises, employment surprises and to surprises reflected in oil futures" (p.3). No other surprises produce significant reactions. They run regressions similar to Beechey and Wright (2008), but like these authors they do not estimate positive and negative surprises separately, abstract from possible proportional asymmetries, and do not explicitly consider the cases of expansions and recessions. Interestingly, they do find structural breaks in their results in 2004 and 2008, pointing to the possibility of state-dependent reaction functions. Finally, they conclude that daily frequency of data on break-even inflation rates is sufficient for capturing appropriate responses.

Although the model of Beechey and Wright (2008) provides an excellent introduction to the study of the effect of macroeconomic announcements on real rates and break-even inflation rates, it does leave room for further study and improvement. Namely, the authors estimate a model in which responses are symmetric around positive and negative surprises and around recessions and expansions. However, as outlined earlier, a variety of compelling arguments point to the need for considering both types of asymmetry.

While Gürkaynak et al. (2006), Beechey and Wright (2008), and Ezer et al. (2008) present studies of the effect of macroeconomic announcements on inflation-adjusted securities, other authors have examined nominal securities in the same context and investigated asymmetric reactions. Andersen et al. (2003) examine the foreign exchange market and find that bad news is more important than good news in moving asset prices. Beber and Brandt (forthcoming) compare the impact of macroeconomic announcements on nominal bond futures returns and volatility, separating data into expansions and recessions using the XRI-C rubric developed by Stock and Watson (1989). They find specifically that "bad news is what matters in good times and, to a slightly lesser extent, good news is what matters in bad times." To translate those results to yields from prices, I note that their findings imply that the important announcements are positive shocks in expansions and negative shocks in recessions.

To summarize, my contribution to the literature is to provide an analysis of movements in real rates and break-even inflation rates across two types of asymmetry (state and sign).

2.4 Stock-Bond Correlation

Practitioners have an interest in monitoring movements in the correlation between equity and bond prices because this interaction can determine proper portfolio design (Ilmanen 2003). Boyd et al. (2005) and Ilmanen (2003) document three elements that move stock prices, offering insight into relative factors that affect the stock-bond correlation. First is the discount factor. As interest rates rise, equity and bond prices both fall. Additionally, as expectations of economic growth rise, equity prices rise and finally, as equity volatility/risk premium rises, equity prices fall. This is commonly referred to as "flight to quality" in the literature. In order to clarify, I replicate Ilmanen (2003), who denotes the stock and bond[2] pricing equations as (p. 57):

$$P_S = E\left[\sum_{t=1}^{\infty}\left(\frac{1+G}{1+Y_t+ERP_t}\right)^t * D\right] \qquad (2.1)$$

$$P_B = E\left[\sum_{t=1}^{T}\frac{C_t}{(1+Y_t)^t} + \frac{100}{(1+Y_T)^T}\right] \qquad (2.2)$$

Y is the bond yield, D represents dividends, G the growth rate of dividends, and ERP the equity risk premium required for holding riskier equity assets.

In the context of my study, the direction of co-movements in stocks and bonds can indicate which of the three factors is nested in the informational content of macroeconomic announcements. I note that negative co-movements can only arise from a higher relative importance of G or ERP over Y, so periods of divergent stock and bond returns must be characterized by a dominance of a growth or equity risk premium effect. Additionally, the stock and bond pricing equations show that positive co-movements should result if Y gains relative importance over G or ERP. Note that movements in G or ERP do not necessarily need to push equity and bond prices in opposite directions if they are coupled with rate movements (for instance rising (falling) Y and either falling (rising) G or rising (falling) ERP). For the rest of this paper, when I describe the growth or 'flight-to-quality' effect dominating the discount effect, I am only referring to the cases in which there is a conflict in the price implications of movements in Y and either G or ERP. References to the discount effect dominating mean that no change in the relative importance of G or ERP is present to overwhelm the directional price changes due to changes in expected interest rates.

Since a major subset of macroeconomic announcements concerns overall price levels, it is important to consider the effect of inflation on equity and bond prices (and

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[2]Par value 100, coupon rate C, maturity T

thus yields). The relationship between inflation and equity prices is complex and has received much attention in the economics literature throughout history. The original view, outlined by Fisher (1930), stated that equity holdings hedged against inflation risk, thus increasing demand and prices of equities in the face of high inflation. Higher inflation, he argued, would lead to higher overall cash flows and nominal returns, leaving real returns from equities unchanged. So, in equation 2.1, rises in Y will be offset by rises in G. However, as outlined in Sharpe (1999), evidence from the late 1970s showed that high inflation negatively impacted stock values. A rebuttal to the Fisher argument is enumerated by Fama (1981), who introduces the "proxy hypothesis," where increasing inflation predicts a decline in real variables (fall in G) to which the stock market ultimately responds.

While the negative inflation-stock correlation in the late 1970s can be seen as support for Fama's "proxy hypothesis", Modigliani and Cohn (1979) advance the idea that poor stock performance in the face of inflation is not due to changes in expected economic activity, but rather due to basic misvaluations of equities. Investors do not allow for the fact that higher inflation erodes nominal debt. Creditors of course know this and demand higher interest rates, increasing nominal outflows to creditors while leaving real debt payments unchanged. Investors see the increased nominal payments and view this as an increased cost (and thus a reduction in profit), when in fact real profits are unchanged. In terms of equation 2.1, investors expect a rise in Y, but do not expect the offsetting rise in G due to inflation. The basic error of focusing on nominal instead of real interest rates contributes to an undervaluation of equities in the face of high inflation (nominal discount rates rise even though real discount rates remain unchanged). Thus, in the view of Modigliani and Cohn (1979), equities theoretically *should* act as hedges against inflation, implying a positive correlation between inflation and stock returns. Any deviations from this result are due to fundamental errors committed by investors. Support for the Modigliani and Cohn (1979) hypothesis can be found in Brunnermeier and Julliard (2008) and Cohen et al. (2005), for example.

Additionally, in order to explain the effects of inflation on equity markets, Hess and Lee (1999) decompose economic surprises into supply and demand shocks, categorizing supply shocks as resulting from surprises to real output (e.g. technological innovations) and demand shocks as mostly due to monetary surprises. They find supply shocks move equity prices and inflation in opposite directions, while demand shocks move them in the same direction. In the postwar U.S. the supply effect dominates, leading to an overall negative relationship between equities and inflation, consistent with basic results of Fama (1981) and Modigliani and Cohn (1979).

So, if equity prices are potentially negatively correlated with inflation (either due

to the "proxy hypothesis" or due to systematic misvaluation)[3] , what does this imply for the relationship between equities and bonds? Ilmanen (2003) points out that high levels of inflation reduce bond prices due to increasing risk premia and the expectations of higher future discount rates, and thus the correlation between inflation and nominal bond prices is also negative.

- In cases where the "proxy hypothesis" effect dominates but investors do not commit misvaluations, G rises (falls) in equation 2.1 due to increased (decreased) cash flows which offsets a rise (fall) in Y, but also falls (rises) due to downward (upward) revisions to expectations of economic conditions, leading to an overall drop (rise) in stock prices. Combining this with a drop (rise) in bond prices, stocks and bonds co-move positively.

- In cases where the misvaluation/discount effect dominates, Y rises (falls) in both equation 2.1 and equation 2.2, with no proper adjustment of G in equation 2.1. Both stock and bond prices fall (rise), co-moving positively.

Ilmanen (2003) finds that in periods of high inflation expected movements in rates Y lead to higher stock-bond correlations, consistent with the 'proxy hypothesis' or the misvaluation effect, while in periods of low inflation stable rates Y lead to lower stock-bond correlations as movements in G and ERP in equation 2.1 become more significant.

The results of Ilmanen (2003) are consistent with an increasing stock-bond correlation in expansionary (high inflation) periods and a decreasing stock-bond correlation in recessionary (low inflation) periods, and point to greater effects of macroeconomic news on interest rates in expansions than recessions. Supporting these findings, Yang et al. (2009) also show that higher inflationary periods are characterized by a higher stock-bond correlation, and Li (2002) shows that as expected inflation becomes less stable the stock-bond correlation increases.

In addition to providing information on price levels, macroeconomic announcements also indicate movements of real variables and thus G in equation 2.1. Boyd et al. (2005) examine the impact of unemployment news on the stock-bond correlation, trying to separate information contained in announcements into that on a discount factor, growth factor, and equity premium. In recessionary or expansionary periods, bad news about unemployment ("bad news" meaning higher unemployment than expected) negatively impacts growth expectations with the effect more pronounced in recessions. Additionally, negative employment shocks raise the equity premium in expansions, but do not

---

[3]Although I abstract from tax considerations, I note that Feldstein (1980) attributes the negative correlation between inflation and equity returns to a tax code structure which penalizes increased cash flows even if they are only due to inflation

affect it in recessions. Overall, they find that stock and bond prices both increase in response to negative unemployment shocks in expansions, while stock prices decline and bond prices remain unchanged in the face of negative recessionary unemployment shocks. These findings agree with the discount effect dominating in expansions[4] and the growth effect dominating in recessions and imply that stocks and bond co-move positively with news in expansions and negatively with news in contractions.

Focusing on equity returns, McQueen and Roley (1993) provide for asymmetries, noting that accounting for state asymmetry is important in obtaining statistically significant results. They find, in particular, that positive shocks to real variables lower stock prices in expansions and raise stock prices in recessions, attributing these differences to the growth expectation factor. Positive shocks to real variables indicate future economic growth in recessions, but do not have this effect in expansions.

Additional work studying stock-bond correlation includes Connolly et al. (2007) who show that high levels or first differences of implied volatility in equity markets decrease stock-bond correlation, while low levels or first differences increase stock-bond correlation. Andersen et al. (2007) show that the stock-bond correlation is small and positive in expansions, and large (in absolute value) and negative in recessions. In expansions, stocks respond negatively to real or inflationary shocks. Stocks respond positively to real shocks in recessions, while bonds respond negatively to real or inflationary shocks regardless of the state of the economy. The signs of these correlations are consistent with the findings in Boyd et al. (2005) that the discount effect dominates during expansions while the growth effect dominates during recessions.

My contribution to the literature is to examine movements in correlation for each announcement across states of the economy and across types of news.

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[4]Even though growth expectations are affected for negative expansionary shocks, they do not imply different directional stock-bond co-movements than those of movements in the discount rate

Chapter 3

Econometric Specification for the Effect of Macroeconomic Announcements

3.1 Fixed-Income

In order to provide a baseline for my subsequent asymmetric results, I initially estimate a model designed to test the overall effects of surprise macroeconomic announcements on nominal yields, without focusing on asymmetric responses (similar to the analyses conducted by Gürkaynak et al. (2006), Beechey and Wright (2008) and Ezer et al. (2008)). For each announcement tested, these regressions take the form:

$$\Delta y_{t,t-1} = \alpha + \beta X_t + \epsilon_t \tag{3.1}$$

The left-hand side variable y denotes instantaneous forward nominal rates and X represents the surprise component of a given macroeconomic announcement. In this specification, if no announcement occurs at time t, $X_t = 0$. Thus 'zero' magnitude surprises are assumed for days where no announcement is made. Data on instantaneous forward rates are available for horizons of 2-20 years, and specifically I examine the horizons of 2, 5, 10, 15, and 20 years. For announcements that produce statistically significant movements in nominal yields, I proceed with my asymmetric model.

Incorporating the approaches of Beechey and Wright (2008) and Beber and Brandt (forthcoming), I first investigate the responses of forward nominal rates, real rates, and break-even inflation rates across maturities where data are present, accounting for state

and sign asymmetries. I run the following regression for each announcement considered:

$$
\begin{aligned}
\Delta y_{t,t-1} &= \alpha + \beta_{Pexp,k}(CFNAI_t)S_{kt}P_{kt} + \beta_{Nexp,k}(CFNAI_t)S_{kt}N_{kt} \\
&\quad + \beta_{Prec,k}(1 - CFNAI_t)S_{kt}P_{kt} \\
&\quad + \beta_{Nrec,k,fo}(1 - CFNAI_t)S_{kt}N_{kt} + \epsilon_t
\end{aligned}
\tag{3.2}
$$

which is based loosely on equation (3) of Beber and Brandt (forthcoming). Note that $\Delta y_{t,t-1}$ represents the change in either the nominal, real or break-even inflation rate from time t-1 to time t, $CFNAI_t$ is the probability of the economy being in an expansion at time t using the Chicago Fed National Activity Index, and P and N are dummy variables representing whether an announcement is a positive or negative shock. S_{kt} is taken as a measure of surprise of announcement k at time t, defined throughout the literature and this paper, and rooted in Balduzzi et al. (2001). Similar to my earlier analysis, I run these regressions for instantaneous forward nominal, real, and break-even inflation rates of maturities 2, 5, 10, 15, and 20 years.

The specification in equation 3.2 addresses both state and sign asymmetry. I test sign asymmetry by examining whether the varying coefficients for the type (positive or negative) of shock are equal. If positive and negative shocks have equal effects (no asymmetry), then all corresponding β_P and β_N terms should be statistically indistinguishable. The CFNAI terms account for the possible presence of state asymmetry. If no state asymmetry is present, the coefficients β_{exp} and β_{rec} should be statistically indistinguishable.

3.2 Equities

3.2.1 Stock Prices

I perform similar analysis for movements in stock prices as I do for fixed-income security yields.

I rewrite equation 3.2 in terms of log equity returns:

$$
\begin{aligned}
r_{e:t,t-1} &= \alpha + \beta_{Pexp,k}(CFNAI_t)S_{kt}P_{kt} + \beta_{Nexp,k}(CFNAI_t)S_{kt}N_{kt} \\
&\quad + \beta_{Prec,k}(1 - CFNAI_t)S_{kt}P_{kt} \\
&\quad + \beta_{Nrec,k,fo}(1 - CFNAI_t)S_{kt}N_{kt} + \epsilon_t
\end{aligned}
\tag{3.3}
$$

3.2.2 Stock-Bond Correlation

I model correlation movements in a similar way to the way I model fixed-income yields or stock returns, allowing for state and sign asymmetries for each announcement:

$$
\begin{aligned}
r_{e:t,t-1}r_{b:t,t-1} &= \alpha + \beta_{Pexp,k}(CFNAI_t)S_{kt}P_{kt} + \beta_{Nexp,k}(CFNAI_t)S_{kt}N_{kt} \\
&\quad + \beta_{Prec,k}(1 - CFNAI_t)S_{kt}P_{kt} \\
&\quad + \beta_{Nrec,k,fo}(1 - CFNAI_t)S_{kt}N_{kt} + \epsilon_t
\end{aligned}
\tag{3.4}
$$

In equation 3.4, $r_{e:t,t-1}$ and $r_{b:t,t-1}$ refer to daily log returns in equity and bond markets, respectively, and their product is a measure of co-movement over time. Macroeconomic announcements that move equity and bond markets in the same direction increase this product, and announcements that move these markets in opposite directions decrease the product. Therefore, equation 3.4 can be used to gauge the effect of macroeconomic surprises on the stock-bond correlation accounting for state and sign asymmetry.

If my results for price variables are consistent with those of Ilmanen (2003), I expect the 'proxy hypothesis' or the equity misvaluation effect to dominate in expansionary periods and a growth or 'flight-to-quality' effect to dominate in recessions, leading to positive stock-bond co-movements in expansions and negative stock-bond co-movements in recessions. Similarly, for real variables, evidence in the literature points to a discount effect dominating in expansions and a growth or 'flight-to-quality' effect dominating in recessions in moving the stock-bond correlation.

Chapter 4

Data

Table 4.1 describes the sources of all data, which I elaborate on in the rest of this chapter.

4.1   Fixed-Income and Equity Markets

In examining how macroeconomic surprises move TIPS yields and break-even inflation rates, I need term structures for these variables. As discussed earlier, Gürkaynak et al. (2007, 2008) calculate zero-coupon term structures for TIPS, nominal bonds, and break-even inflation rates, providing daily estimates available at:

> http://www.federalreserve.gov/econresdata/researchdata.htm.

I obtain daily first-differences of nominal rates, TIPS rates, and break-even inflation rates from 1999-2008 to form my dependent variables to regress on surprises to macroeconomic variables. Additionally, I allow for the relative youth and increasing liquidity of the TIPS market by including a dummy variable in all my regressions for the pre-2005 period, before liquidity began to stabilize according to the figure on page 6 of the Office of Debt Management (2008) presentation.

In examining movements in equities and the stock-bond correlation, I need price returns from equity and bond indices. For equity markets, I use daily log returns on the S & P 500 as reported by the University of Chicago's Center for Research in Security Prices. In examining bond markets, I use daily log returns on bond indices, as provided by Barclays (see table 4.2) through Datastream Advance. From here forward, I will reference these indices by their average maturities, rounding to 2 year, 4 year, 7 year, and 20 year.

Figure 4.1, figure 4.2, figure 4.3, figure 4.4, and figure 4.5 show historical stock and bond price returns for the period 1999-2008. As the graphs indicate, stock volatility

begins to increase near the end of 2008, while bond volatility picks dramatically around the third quarter of 2007 after calmer periods start in 2005.

4.2 Macroeconomic Announcements

Based on Ezer et al. (2008), I study surprises to the following economic variables:

- Price Variables: CPI, Core CPI, Core PPI, PPI

- Production Variables: Capacity Utilization, Durable Goods, GDP, Industrial Production, ISM Manufacturing Survey, New Home Sales, Retail Sales

- Employment Variables: Employment Cost Index, Nonfarm Payrolls, Unemployment Rate

- Monetary Policy Variables: Federal Funds Futures

- Overall Indicator Variables: Consumer Confidence, Leading Indicators

Ignoring the federal funds futures data momentarily, I obtain median survey data on forecasts of all announcements from Bloomberg. For each macroeconomic variable considered, Bloomberg provides data on median forecasts of future realizations, which I then compare to the actual announcement and construct surprise measures using the standardized measure discussed throughout this paper and the literature. Note: I reverse the sign of the shock to unemployment such that a positive surprise represents better than expected employment.

Forming surprises to federal funds futures is trickier. Ezer et al. (2008) follow methodology outlined by Kuttner (2001) for dates of rate announcements and reproduced here. The settlement of a monthly federal funds futures contract is for the average funds rate for the given month. So, denoting the spot futures contract on day n as f_n^0, the number of days in the current month as N, and the daily federal funds rate as r, we have [1] :

$$f_n^0 = E_n \frac{1}{N} \sum_{i=1}^{N} r_i + \mu_n$$

where μ_n accounts for deviations of the effective rate from the target rate. Kuttner then backs out a measure of the surprise to the federal funds rate assuming $\mu_n = 0$. Let h_n denote the daily surprise:

$$h_n = \frac{N}{N - n + 1}(f_n^0 - f_{n-1}^0)$$

---

[1] Notation and equations follow Kuttner (2001) and Hamilton (2008)

For an announcement on the first day of the month, I use the previous day's month-ahead contract, constructing the surprise as:

$$h_n = \frac{N}{N - n + 1}(f_n^0 - f_{n-1}^1)$$

As Kuttner (2001) and Hamilton (2008) both note, however, this measure is problematic due to potentially non-zero values of μ_n occurring at the end of months. The multiplier term that accounts for the time averaging also scales μ_n, potentially skewing the magnitude of $(f_n^0 - f_{n-1}^0)$ by large amounts as n approaches N. Thus, if there is an announcement within the last 3 days of a given month, I use the change in one-month futures rates:

$$h_n = (f_n^1 - f_{n-1}^1)$$

The dates on which surprises may occur are all scheduled FOMC meetings and unscheduled meetings or conference calls in which rate changes occur. For a scheduled meeting, even if a rate change does not occur, this news potentially could be a surprise if the market expected rates to move. However, I do not include unscheduled meetings in which rates do not move, as no movement was anticipated for the given day. After forming the raw surprises, I again standardize by the standard deviation of the surprises.

I obtain data on fed funds futures and all forecasts from Bloomberg, and all surprises are treated such that positive values indicate good news and negative values indicate bad news. I obtain news of FOMC meetings from the Federal Open Market Commitee[2].

In measuring the state of the economy, I use the Chicago Fed National Activity Index (CFNAI) calculated at a monthly frequency and posted online by the Federal Reserve Bank of Chicago[3]. I run models using three-month moving averages of the CFNAI. Evans et al. (2002) provide a summary of the features of the CFNAI. Similar to the XRI-C index constructed by Stock and Watson (1989) but subsequently discontinued, this index uses eighty-five macroeconomic indicators to characterize current states of the economy. The index is formed to have a mean of zero and a standard deviation of one, with the mean representing trend growth. Using the cumulative distribution function of a normal distribution, I obtain expansion probabilities from the CFNAI. This is used in my model to identify any asymmetric effects across states of the economy. Figure 4.6 indicates historical values of the CFNAI index, showing both series of monthly realizations and 3-month moving averages, and figure 4.7 transforms these values into time-series plots of expansionary probabilities.

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[2]http://www.federalreserve.gov/monetarypolicy/fomccalendars.htm,
http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm
[3]http://www.chicagofed.org/webpages/publications/cfnai/index.cfm

Table 4.3 contains descriptions from Bloomberg of all economic variables and forecasts used, while table 4.4 provides summary statistics of surprise measures of all announcements. The average surprise measure for the announcements considered are all less than 0.1 standard deviations, excepting new home sales (0.1344), nonfarm payrolls (-0.3092), and the unemployment rate (0.1422). In order to test for any possible forecast bias, for each announcement variable I calculate a t-statistic for the hypothesis of zero bias according to:

$$\frac{\mu_s}{\sigma_s}\sqrt{n}$$

where μ represents the mean forecast error, σ is the standard deviation of the mean forecast error, and n is the number of observations. As indicated in table 4.5, the variable nonfarm payrolls is the only announcement for which I can reject the null hypothesis of no bias. In order to investigate whether this bias differs from potential market bias or merely reflects it, I examine the correlation between forecast error signs and changes in the 2 year nominal instantaneous forward rates. If the forecast bias differs from potential market bias, the mean-adjusted forecast errors should produce a higher sign correlation with rate movements than unadjusted errors. In fact, the unadjusted errors yield a sign correlation with nominal 2 year instantaneous forward rates of 0.3837, while the adjusted errors yield a correlation of only 0.3667. I thus refrain from adjusting forecasts for bias.

Additionally, table 4.6 shows the first-order autocorrelation between forecast errors. Most announcements have very low level first-order error autocorrelation, with the highest magnitudes present for core PPI (-0.3954), retail sales (-0.3745), and durable goods (-0.2640). All other autocorrelations are less than 0.13 in magnitude. Finally, table 4.7 shows monetary policy announcements and surprise measures over the course of our sample.
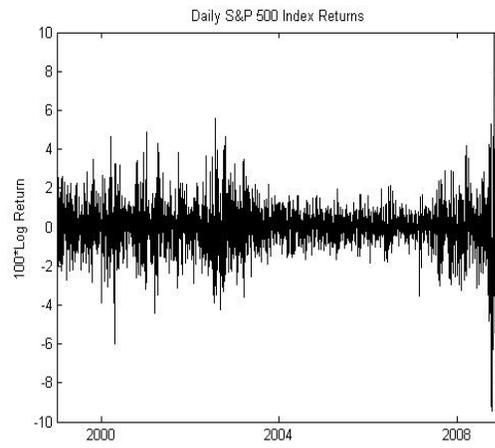
Figure 4.1:   Stock price returns
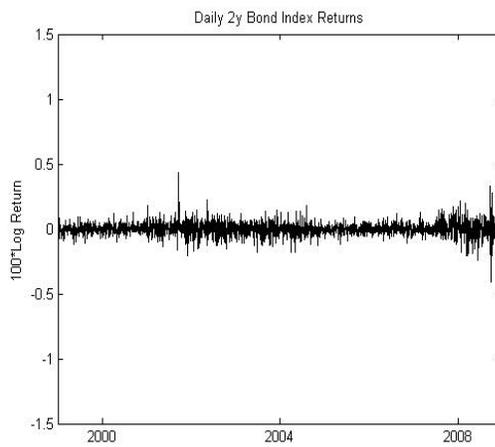
Figure 4.2:   2y bond index returns
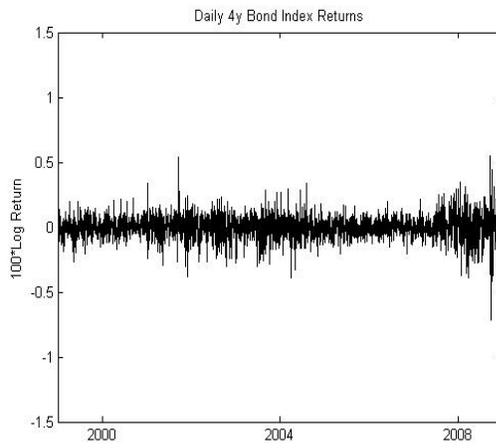
Figure 4.3: 4y bond index returns
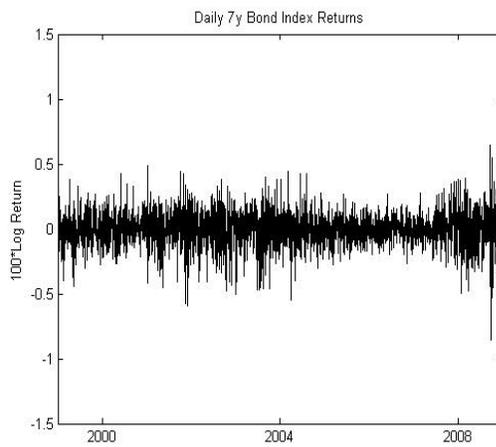
Figure 4.4: 7y bond index returns
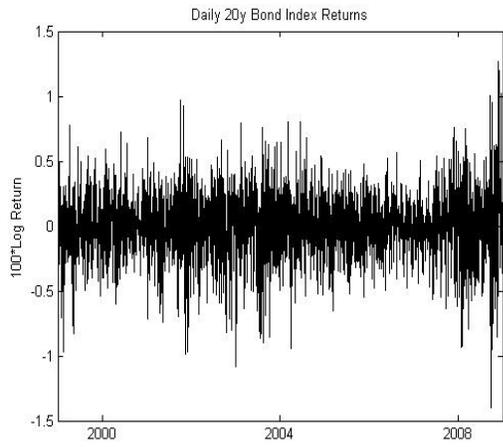
Figure 4.5: 20y bond index returns
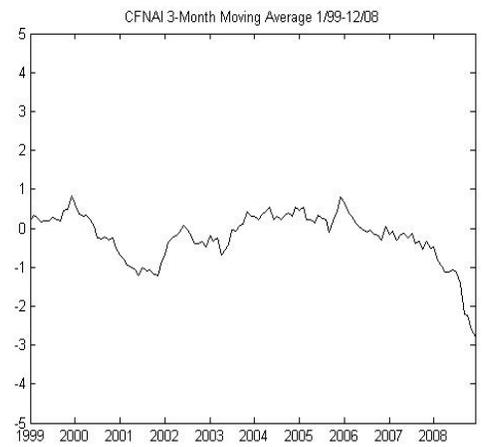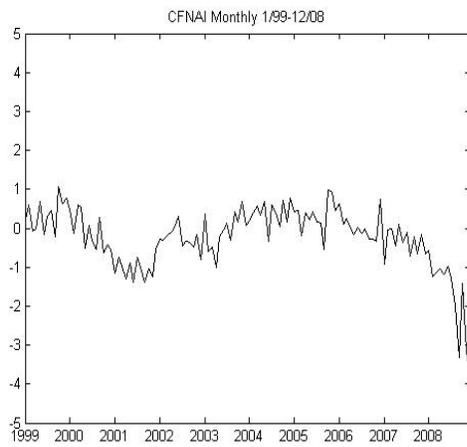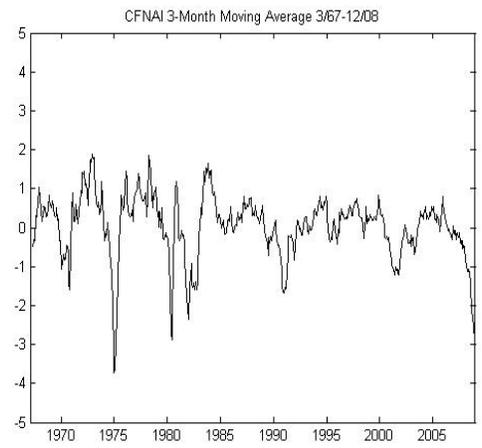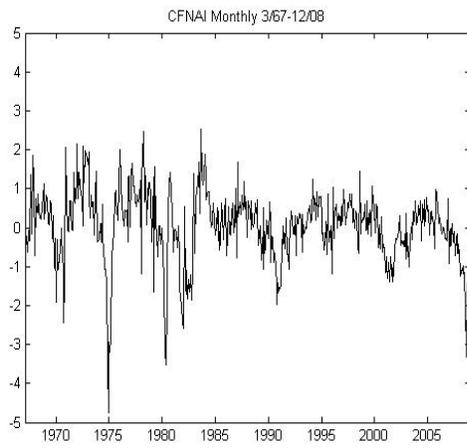
Figure 4.6: Historical CFNAI
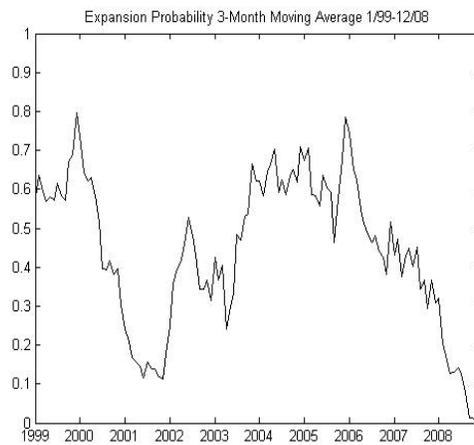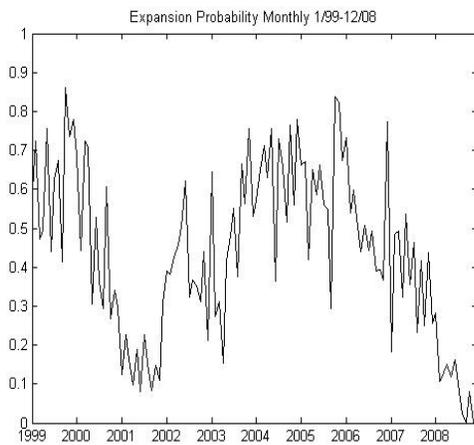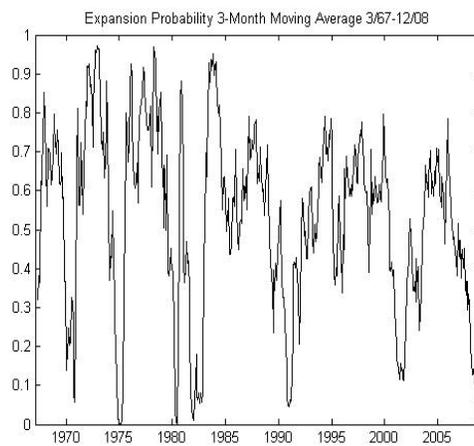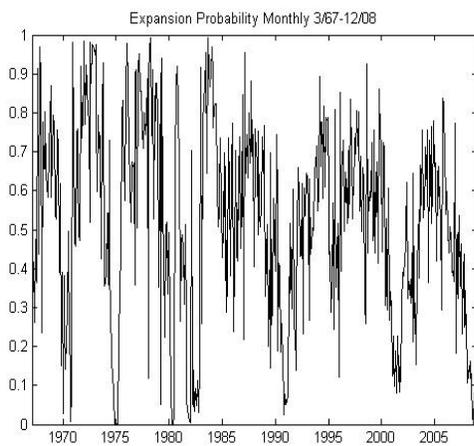
Figure 4.7: Historical expansion probabilities

Table 4.1: Data sources

Data	Source	Series	Access Date
Instantaneous Forward Nominal Rates	Gürkaynak et al. (2007)	SVENF02, SVENF05, SVENF10, SVENF15, SVENF20	9/29/2009
Instantaneous Forward TIPS Rates	Gürkaynak et al. (2008)	TIPSF02, TIPSF05, TIPSF10, TIPSF15, TIPSF20	6/11/2009
Instantaneous Forward Break-Even Inflation Rates	Gürkaynak et al. (2008)	BKEVENF02, BKEVENF05, BKEVENF10, BKEVENF15, BKEVENF20	6/11/2009
Barclays Bond Indices	Datastream Advance, Thomson Financial Limited, via Fuqua School of Business, Duke University	LHGUS3Y, LHGUSIN, LHGUSTR, LHGUSLG	11/12/2009
S & P 500 Index	Center for Research in Security Prices, Graduate School of Business, The University of Chicago, via Wharton Research Data Services	spindx	9/23/2009
Median Macro Forecasts and Realizations	Bloomberg Finance LP, via Fuqua School of Business, Duke University	All variables in table 4.3	10/30/2009-11/3/2009
Federal Funds Futures Prices	Bloomberg Finance LP, via Fuqua School of Business, Duke University	Spot and One-Month-Ahead Contracts	11/12/2009
FOMC Calendar	Federal Open Market Committee, Federal Reserve	Scheduled FOMC Meetings and Unscheduled Rate Changes	11/12/2009
Chicago Fed National Activity Index	Federal Reserve Bank of Chicago	CFNAI 3m Moving Average	9/23/2009

Table 4.2: Barclays bond indices

Name from Datastream	Average Life	Average Duration
Barclays Global US Treasury 1-3 Year	1.98	1.94
Barclays Global US Treausry Intermediate	4.33	3.92
Barclays Global US Treasury	6.73	5.22
Barclays Global US Treasury Long	19.91	12.39

Table 4.3: Data series descriptions from Bloomberg

Variable	Bloomberg Ticker	Description	Frequency	Observations
Capacity Utilization	CPTICHNG	% of Total Capacity SA	Monthly	118
Consumer Confidence	CONSSENT	University of Michigan Survey of Consumer Confidence Sentiment	Biweekly	231
Core CPI	CPUPXCHG	CPI Urban Consumers Less Food and Energy MoM SA	Monthly	119
Core PPI	PXFECHNG	PPI By Processing Stage Finished Goods Except Food and Energy MoM SA	Monthly	120
CPI	CPI CHNG	Urban Consumers MoM SA	Monthly	120
Durable Goods	DGNOCHNG	New Orders Industries MoM SA	Monthly	120
Employment Cost Index	ECI SA%	Bureau of Labor Statistics Employment Cost Civilian Workers QoQ SA	Quarterly	40
GDP	GDP CQOQ	GDP Chained 2000 Dollars QoQ SAAR	Monthly	120
Industrial Production	IP CHNG	Industrial Production MoM 2002 = 100 SA	Monthly	120
ISM Manufacturing Survey	NAPMPMI	ISM Manufacturing PMI SA	Monthly	120
Leading Indicators	LEI CHNG	Conference Board Leading Index MoM	Monthly	120
New Home Sales	NHSLTOT	New One Family Houses Sold Annual Total SAAR	Monthly	120
Nonfarm Payrolls	NFP TCH	Employees on Nonfarm Payrolls Total MoM Net Change SA	Monthly	120
PPI	PPI CHNG	PPI By Processing Stage Finished Goods Total MoM SA	Monthly	120
Retail Sales	RSTAMOM	Adjusted Retail & Food Services Sales SA Total Monthly % Change	Monthly	120
Unemployment Rate	USURTOT	Unemployment Rate Total in Labor Force Seasonally Adjusted	Monthly	120

Source: Bloomberg Finance LP.

Table 4.4: Surprise summary statistics

Surprise Variable	Mean Surprise	Maximum Surprise	Minimum Surprise
Capacity Utilization	-0.0526	2.3461	-4.4327
Consumer Confidence	-0.0495	3.0550	-3.2875
Core CPI	-0.0523	2.0743	-2.0743
Core PPI	-0.0059	3.8689	-3.5172
CPI	-0.0289	2.7776	-2.7776
Durable Goods	-0.0099	3.6991	-2.8086
Employment Cost Index	-0.0504	2.5195	-2.0156
GDP	0.0153	2.8521	-3.4633
Industrial Production	-0.0987	2.9938	-5.4433
ISM Manufacturing Survey	0.0040	3.5431	-2.8728
Leading Indicators	-0.0762	3.1517	-3.1517
New Home Sales	0.1344	3.4108	-2.3205
Nonfarm Payrolls	-0.3092	2.0786	-3.5156
PPI	0.0667	3.4033	-2.4024
Retail Sales	0.0460	7.1455	-2.4854
Unemployment Rate	0.1422	2.1786	-2.9048

Table 4.5: Test for forecast bias

Surprise Variable	T-Stat for Unbiased Test
Capacity Utilization	-0.5713
Consumer Confidence	-0.7527
Core CPI	-0.5705
Core PPI	-0.0642
CPI	-0.3169
Durable Goods	-0.1079
Employment Cost Index	-0.3187
GDP	0.1674
Industrial Production	-1.0808
ISM Manufacturing Survey	0.0437
Leading Indicators	-0.8344
New Home Sales	1.4726
Nonfarm Payrolls	-3.3867
PPI	0.7310
Retail Sales	0.5034
Unemployment Rate	1.5579

Table 4.6: First-order forecast error autocorrelation

Surprise Variable	First-Order Autocorrelation
Capacity Utilization	-0.0917
Consumer Confidence	0.0125
Core CPI	0.1267
Core PPI	-0.3954
CPI	0.0754
Durable Goods	-0.2640
Employment Cost Index	-0.0607
GDP	-0.0517
Industrial Production	-0.1504
ISM Manufacturing Survey	0.0000
Leading Indicators	-0.0593
New Home Sales	-0.0708
Nonfarm Payrolls	0.1176
PPI	-0.1079
Retail Sales	-0.3745
Unemployment Rate	-0.0539

Table 4.7: Monetary policy announcements

Date	Old Target	New Target	Change	Surprise
2/3/1999	4.75	4.75	0	0
3/30/1999	4.75	4.75	0	0
5/18/1999	4.75	4.75	0	-0.0332
6/30/1999	4.75	5.00	0.25	-0.0400
8/24/1999	5.00	5.25	0.25	0.0194
10/5/1999	5.25	5.25	0	-0.0402
11/16/1999	5.25	5.50	0.25	0.0800
12/21/1999	5.50	5.50	0	0.0141
2/2/2000	5.50	5.75	0.25	-0.0518
3/21/2000	5.75	6.00	0.25	-0.0282
5/16/2000	6.00	6.50	0.50	0.0484
6/28/2000	6.50	6.50	0.00	-0.0200
8/22/2000	6.50	6.50	0.00	-0.0155
10/3/2000	6.50	6.50	0.00	0
11/15/2000	6.50	6.50	0.00	0
12/19/2000	6.50	6.50	0.00	0.0477
1/3/2001	6.50	6.00	-0.50	0
1/31/2001	6.00	5.50	-0.50	0.0050
3/20/2001	5.50	5.00	-0.50	0.0517
4/18/2001	5.00	4.50	-0.50	-0.3923
5/15/2001	4.50	4.00	-0.50	-0.0729
6/27/2001	4.00	3.75	-0.25	0.0850
8/21/2001	3.75	3.50	-0.25	0.0141
9/17/2001	3.50	3.00	-0.50	-0.3000
10/2/2001	3.00	2.50	-0.50	-0.0672
11/6/2001	2.50	2.00	-0.50	-0.0960
12/11/2001	2.00	1.75	-0.25	0
1/30/2002	1.75	1.75	0	0.015
3/19/2002	1.75	1.75	0	-0.0238
5/7/2002	1.75	1.75	0	0
6/26/2002	1.75	1.75	0	0
8/13/2002	1.75	1.75	0	0.0326
9/24/2002	1.75	1.75	0	0.0214
11/6/2002	1.75	1.25	-0.50	-0.1860

Table 4.7 Continued

Date	Old Target	New Target	Change	Surprise
12/10/2002	1.25	1.25	0	0
1/29/2003	1.25	1.25	0	0.0050
3/18/2003	1.25	1.25	0	0.0443
5/6/2003	1.25	1.25	0	0.0358
6/25/2003	1.25	1.00	-0.25	0.1250
8/12/2003	1.00	1.00	0	0
9/16/2003	1.00	1.00	0	0
10/28/2003	1.00	1.00	0	0
12/9/2003	1.00	1.00	0	0
1/28/2004	1.00	1.00	0	0
3/16/2004	1.00	1.00	0	0
5/4/2004	1.00	1.00	0	-0.0055
6/30/2004	1.00	1.25	0.25	-0.0100
8/10/2004	1.25	1.50	0.25	0.0210
9/21/2004	1.50	1.75	0.25	0.0150
11/10/2004	2.00	2.25	0.25	0
12/14/2004	2.00	2.25	0.25	0
2/2/2005	2.25	2.50	0.25	0
3/22/2005	2.50	2.75	0.25	0
5/3/2005	2.75	3.00	0.25	0
6/30/2005	3.00	3.25	0.25	0
8/9/2005	3.25	3.50	0.25	0
9/20/2005	3.50	3.75	0.25	0.0136
11/1/2005	3.75	4.00	0.25	0
12/13/2005	4.00	4.25	0.25	0
1/31/2006	4.25	4.50	0.25	0
3/28/2006	4.50	4.75	0.25	0.0050
5/10/2006	4.75	5.00	0.25	-0.0070
6/29/2006	5.00	5.25	0.25	-0.015
8/8/2006	5.25	5.25	0.00	-0.0388
9/20/2006	5.25	5.25	0.00	0
10/25/2006	5.25	5.25	0.00	0
12/12/2006	5.25	5.25	0.00	0
1/31/2007	5.25	5.25	0.00	0
3/21/2007	5.25	5.25	0.00	0

Table 4.7 Continued

Date	Old Target	New Target	Change	Surprise
5/9/2007	5.25	5.25	0.00	0
6/28/2007	5.25	5.25	0.00	0
8/7/2007	5.25	5.25	0.00	0.0248
9/18/2007	5.25	4.75	-0.5	-0.1385
10/31/2007	4.75	4.50	-0.25	-0.02
12/11/2007	4.50	4.25	-0.25	0.0074
1/22/2008	4.25	3.50	-0.75	-0.6665
1/30/2008	3.50	2.00	-0.50	-0.0950
3/18/2008	3.00	2.25	-0.75	0.1550
4/30/2008	2.25	2.00	-0.25	-0.0550
6/25/2008	2.00	2.00	0.00	-0.0250
8/5/2008	2.00	2.00	0.00	-0.0057
9/16/2008	2.00	2.00	0.00	0.0550
10/8/2008	2.00	1.50	-0.50	-0.1356
10/29/2008	1.50	1.00	-0.50	-0.0600
12/16/2008	1.00	0.00:0.25	(-0.75):(-1.00)	-0.1114

Source: For target rates, Federal Open Market Committee, Federal Reserve

Chapter 5

Results

5.1 Model Specification

As described earlier, I consider daily responses to 17 different macroeconomic announcements. My asymmetric analysis requires each announcement be represented by 4 independent variables, which would bring the total number of independent variables (not including a constant or dummy variable for pre-2005) to 68 if the regressions were run jointly. In order to reduce this over-specification, I run regressions for each announcement separately. However, announcements which often occur on the same day must still be run jointly in order to separate their effects, and thus I group announcements based on concurrence of announcements, running joint regressions for announcements occurring at least 30% of the time together either for my entire sample of 1999-2008 or 35% for the sub-sample of 1999-2004 or 2005-2008. My announcement sets then become:

- Consumer Confidence, PPI, Core PPI, Employment Cost Index, Retail Sales, GDP

- Capacity Utilization, Industrial Production, CPI, Core CPI

- Durable Goods, New Home Sales

- Nonfarm Payrolls, Unemployment Rate

- ISM Manufacturing Survey

- Leading Indicators

- Federal Funds Futures

When running the joint regressions, however, I must be careful to address multicollinearity concerns. Including announcements that occur on the same day and are highly correlated (e.g. CPI, Core CPI) can produce misleading results. To address this potential

problem, I first examine the correlation in announcement surprises when they occur on the same day. Core CPI and CPI realizations have a correlation of 0.50, core PPI and PPI realizations have a correlation of 0.47, and industrial production and capacity utilization relations have a correlation of 0.74. In order to eliminate one announcement from each pair, I run basic regressions (no asymmetries) of individual announcements on nominal rates across maturities of 2, 5, 10, 15, and 20 years from 1999-2008, then select the announcement with the most significant results (as measured by coefficient estimates and t-statistics). I choose core CPI over CPI, core PPI over PPI, and capacity utilization over industrial production[1] . This leaves the following announcement sets for my regressions:

- Consumer Confidence, Core PPI, Employment Cost Index, Retail Sales, GDP

- Capacity Utilization, Core CPI

- Durable Goods, New Home Sales

- Nonfarm Payrolls, Unemployment Rate

- ISM Manufacturing Survey

- Leading Indicators

- Federal Funds Futures

In describing my results, I group my variables into four categories, organized as:

- Price Variables - Core CPI, Core PPI

- Production Variables - Capacity Utilization, Durable Goods, GDP, ISM Manufacturing Survey, New Home Sales, Retail Sales

- Employment Variables - Employment Cost Index, Nonfarm Payrolls, Unemployment Rate

- Monetary Policy Variables - Federal Funds Futures

- Overall Indicators - Consumer Confidence, Leading Indicators

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[1]The choice of core CPI and core PPI over CPI and PPI agree with the results of Ezer et al. (2008) who find positive effects of core CPI and core PPI but minimal effects of CPI and PPI shocks on break-even inflation rates

I first run the basic model of Gürkaynak et al. (2006), Beechey and Wright (2008), and Ezer et al. (2008):

$$\Delta y_{t,t-1} = \alpha + \beta X_t + \epsilon_t$$

I examine this specification for nominal, TIPS, and break-even inflation rates across horizons of 2, 5, 10, 15, and 20 years, including a dummy variable in the TIPS and break-even inflation regressions set equal to one for the pre-2005 period to account for potential changes in the liquidity premium. Additionally I examine movements in stock prices and the stock-bond correlation. Appendix A contains all regression estimates for this model, while table 5.1, table 5.2, table 5.3, table 5.4, and table 5.5 document the directional movements in response to shocks not allowing for asymmetries.[2]

In order to interpret the regression results in appendix A, note that the coefficient estimates correspond to the movement in rates for a one-standard-deviation shock. For example, in table A.1 a one-standard-deviation positive shock to the variable capacity utilization increases the 2 year nominal rate by 3.08 basis points. Similarly in table A.6 a one-standard-deviation positive shock to the variable nonfarm payrolls raises the 2 year TIPS rate by 6.28 basis points and in table A.11 a one-standard-deviation positive surprise to core CPI raises the 2 year break-even inflation rate by 3.10 basis points. Although no statistically significant results are found in analyzing stock price responses, table A.16 shows that a one-standard-deviation positive shock to core PPI would lead to around a -0.1630 percent return on stocks[3] if it possessed statistical significance. Finally, table A.17 indicates that a one-standard-deviation positive shock to consumer confidence raises the product of percent returns[3] of stocks and a 2y nominal bond by a magnitude of approximately 0.0070.

After establishing my baseline results, I allow for state and sign asymmetry, running regressions of movements in nominal rates, real rates, or break-even inflation rates (once again including a pre-2005 dummy variable in the TIPS and break-even inflation rate regressions) on macroeconomic surprises according to equation 3.2:

$$\begin{aligned} \Delta y_{t,t-1} &= \alpha + \beta_{Pexp,k}(CFNAI_t)S_{kt}P_{kt} + \beta_{Nexp,k}(CFNAI_t)S_{kt}N_{kt} \\ &\quad + \beta_{Prec,k}(1 - CFNAI_t)S_{kt}P_{kt} \\ &\quad + \beta_{Nrec,k,fo}(1 - CFNAI_t)S_{kt}N_{kt} + \epsilon_t \end{aligned}$$

I also run a similar regression for stock prices and the stock-bond correlation according to equation 3.3 and equation 3.4, with the stock-bond correlation regression taking the

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[2]In all regressions, I follow White (1980) to obtain heteroskedasticity-consistent estimates (see equations 10-14 and 11-9 of Greene (2003) for more reference)

[3]100*log return

form:

$$r_{e:t,t-1}r_{b:t,t-1} = \alpha + \beta_{Pexp,k}(CFNAI_t)S_{kt}P_{kt} + \beta_{Nexp,k}(CFNAI_t)S_{kt}N_{kt}$$
$$+\beta_{Prec,k}(1 - CFNAI_t)S_{kt}P_{kt}$$
$$+\beta_{Nrec,k,fo}(1 - CFNAI_t)S_{kt}N_{kt} + \epsilon_t$$

Appendix B documents regression estimates for the asymmetric specification. Table 5.6 indicates the directions nominal instantaneous forward rates move in response to surprise components of macroeconomic announcements, allowing for asymmetries. For horizons of 2, 5, 10, 15, and 20 years, I indicate with a '+', '-', or '0' as to whether instantaneous forward nominal rates rise, fall, or remain unchanged in response to four types of news: positive shocks in expansions, negative shocks in expansions, positive shocks in recessions, and negative shocks in recessions. Tables 5.7 and 5.8 provide similar analyses for instantaneous forward TIPS and break-even inflation rates. Additionally, table 5.9 indicates movement in stock prices and table 5.10 shows the movement in the correlation between stock prices and the price of bond indices across horizons of 2, 4, 7, and 20 years.

Similar to the results in appendix A, coefficients in appendix B correspond to movements in rates or prices, but now coefficients correspond to specific states of the economy and types of shocks. As an example, table B.1 indicates that 2 year nominal rates rise by 6.15 basis points in response to positive shocks to retail sales in a perfect (CFNAI = 1) expansion but rise by only 2.85 basis points in response to positive shocks in a perfect (CFNAI = 0) recession.

To test for state asymmetry, I perform the following hypothesis tests, with all results documented in appendix C:

1. $\beta_{Pexp} - \beta_{Prec} = 0$

2. $\beta_{Nexp} - \beta_{Nrec} = 0$

Finally, to test for sign asymmetry, I perform the following hypothesis tests, with results documented in appendix D:

1. $\beta_{Pexp} - \beta_{Nexp} = 0$

2. $\beta_{Prec} - \beta_{Nrec} = 0$

In the case of testing for sign asymmetry in moving the stock-bond correlation, I adjust my hypothesis test to:

1. $\beta_{Pexp} + \beta_{Nexp} = 0$

2. $\beta_{Prec} + \beta_{Nrec} = 0$

This adjustment is due to the fact that, under the null hypothesis, different types of news should not change the direction of movement in the stock-bond correlation, but rather may change the magnitude. Before continuing, I note that all results presented are at a 95% confidence level unless denoted with a *, indicating a 90% confidence level.

5.2 Basic Regressions, No Asymmetry

5.2.1 Price Variables

Shocks to core CPI and core PPI are positively correlated with movements in nominal rates across all horizons with the exception of 2 year nominal rate responses to core PPI surprises, where there is no statistically significant movement. Coefficient estimates on β in core CPI regressions are: 0.0228 (2 year), 0.0182 (5 year), 0.0150 (10 year), 0.0156 (15 year), and 0.0145 (20 year), while coefficient estimates on β in core PPI regressions are: 0.0100 (5 year), 0.0115 (10 year), 0.0115 (15 year), and 0.0112 (20 year). Note: from here forward when I report statistical significance, coefficient estimates are generally reported in parentheses after the time horizon.

As hypothesized, core CPI surprises are positively correlated with changes in break-even inflation rates (at horizons of 2 (0.0310), 10 (0.0166), and 15 (0.0142) years) and are uncorrelated with changes in the TIPS rate except at a 20 (0.0080) year horizon where they are positively correlated. My baseline symmetric model results for responses by TIPS and break-even inflation instantaneous forward rates to core CPI shocks are generally consistent with those of Ezer et al. (2008), Gürkaynak et al. (2006), Beechey et al. (2007), and the daily model of Beechey and Wright (2008) who find core CPI surprises to move break-even inflation measures across most time horizons considered. Additionally, the daily analyses of Gürkaynak et al. (2006) and Beechey and Wright (2008) which look at TIPS rates find no evidence of movement in TIPS yields or forward rates in response to core CPI shocks, though neither examines a horizon as distant as 20 years, which is the only time point for which I find movement in TIPS instantaneous forward rates.

Core PPI surprises are also positively correlated with changes in break-even inflation rates at 10 (0.0096) and 15 (0.0094) year horizons, though they are additionally positively correlated with changes in the TIPS rate at a 2 (0.0095) year horizon. In examining core PPI shocks, I find long-term responses of break-even inflation rates, consistent with the results of Ezer et al. (2008) and the daily model of Beechey and Wright (2008). Additionally, the daily model of Beechey and Wright (2008) finds a

positive correlation between core PPI shocks and movements in 5 to 10 year forward TIPS rates, supporting my results indicating core PPI shocks can affect TIPS rates.

So, counter to the belief that real rates are unaffected by movements in price variables, my symmetric analysis shows that positive (negative) shocks to core PPI raise (lower) short-run TIPS rates. While TIPS rates include an inflation risk premium, it is hard to believe that higher than expected price levels would actually lower this premium (and thus raise rates). Therefore, core PPI must actually influence real rates rather than just inflation expectations. One possible explanation for this result is that core PPI proxies for industrial strength and not just price levels. In other words, higher (lower) levels of core PPI signal stronger (weaker) production variables, at least in the short-term. A similar explanation could explain the positive correlation between core CPI surprises and changes in TIPS rates at a 20 year horizon. Neither core CPI nor core PPI surprises influence stock prices or the stock-bond correlation in my symmetric regression.

5.2.2 Production Variables

Results for production variables are somewhat scattered, though most generally point to a positive correlation between surprises and TIPS and/or break-even inflation rates at various horizons. The strongest results appear to be for shocks to the ISM manufacturing survey, which are positively correlated with nominal rates at 2 (0.0506), 5 (0.0263), 10 (0.0297), and 15 (0.0226) year horizons, with TIPS rates across all horizons (0.0290, 0.0213, 0.0152, 0.0122, 0.0086 for 2, 5, 10, 15, 20 year horizons) and with break-even inflation rates at 2* (0.0152), 10 (0.0170) and 15 (0.0119) year horizons. The overall results suggest that, in addition to affecting break-even inflation rates at various points in time, realizations of the ISM manufacturing survey are important at moving TIPS rates consistently across horizons. My results pointing to the positive correlation between the ISM manufacturing survey and break-even inflation rates generally agree with the results of Gürukaynak et al. (2006) and Beechey et al. (2007) though not with Ezer et al. (2008) or the daily model of Beechey and Wright (2008) who find no evidence of break-even inflation rate responses. These two studies do, however, agree with my findings of a response in nominal and TIPS rates to ISM manufacturing survey shocks.

GDP shocks have no statistically significant effects on nominal rates, though they are positively correlated with movements in TIPS rates at 2 (0.0201) and 5 (0.0160) year horizons and with movements in break-even inflation rates at 10 (0.0108) year horizons. The daily model of Beechey and Wright (2008) points to evidence of a positive correla-

tion between GDP shocks and TIPS rates and the studies of Gürkaynak et al. (2006) and Beechey et al. (2007) show a positive correlation with movements in break-even inflation rates. I note that Exer et al. (2008) and the daily model of Beechey and Wright (2008) find no evidence of movements in break-even inflation rates in response to GDP shocks, though my result only holds at one specific time horizon. Additionally, incorporating equity markets, I find that shocks to GDP are negatively correlated with movements in the stock-bond correlation at 4* (-0.0176), 7 (-0.0353), and 20 (-0.0704) year horizons.

Surprises to new home sales are positively correlated with changes in nominal rates at 2* (0.0105), 5 (0.0113), 10 (0.0136), and 15 (0.0095) year horizons, with changes in the TIPS rate at a 20* (0.0070) year horizon, with changes in break-even inflation rates at 5 (0.0102), 10 (0.0148), and 15* (0.0072) year horizons, and with changes in the stock-bond correlation at a 2* (0.0086) year horizon. These results indicate that, at least at 5-15 year horizons, new home sales announcements are important in establishing break-even inflation rates. Movements in break-even inflation rates in response to shocks to new home sales are also found in Gürkaynak et al. (2006), Beechey et al. (2007), and Beechey and Wright (2008), though not in Ezer at al. (2008).

Further, capacity utilization shocks are positively correlated with movements in nominal rates at 2 (0.0308), 5 (0.0171), and 15* (0.0113) year horizons, with movements in TIPS rates at 10 (0.0111) and 15* (0.0087) year horizons, and with movements in the break-even inflation rate at a 2 (0.0201) year horizon. The limited responses to capacity utilization generally agree with the studies of Ezer et al. (2008), Gürkaynak et al. (2006), Beechey et al. (2007), and Beechey and Wright (2008), though supporting evidence of movements in TIPS rates is lacking.

Shocks to retail sales are positively correlated with movements in nominal rates at 2 (0.0295), 5 (0.0176), 10 (0.0114), 15 (0.0088), and 20* (0.0061) year horizons, and with movements in the TIPS rate at a 2 (0.0320) year horizon. Some nominal rate movements are also present in Gürkaynak et al. (2006) and in the daily model of Beechey and Wright (2008), with the latter study also finding evidence of movements in TIPS rates.

Durable goods shocks generally have little or no effects, generally consistent with the studies of Ezer et al. (2008) and Beechey and Wright (2008), though the latter analysis finds evidence of some movement in 5 year TIPS rates.

5.2.3 Employment Variables

While shocks to the employment cost index have no effects on TIPS or break-even inflation rates, shocks to the unemployment rate are positively correlated with TIPS and break-even inflation rates at a 2 year horizon (0.0276 and 0.0131* respectively). Beechey et al. (2007) and Beechey and Wright (2008) find evidence of the same positive correlation between unemployment rate shocks[4] and break-even inflation rates, though Ezer et al. (2008) and Gürkaynak et al. (2006) find no such evidence. Additionally, the daily model of Beechey and Wright (2008) points to a positive correlation between unemployment shocks and TIPS rate, though these results are also not found in Gürkaynak et al. (2006).

Moving back to the employment cost index briefly, both Ezer et al. (2008) and the daily model of Beechey and Wright (2008) actually find evidence of negative correlations between shocks to the employment cost index and movements in break-even inflations, contrasting my lack of significant results, and Beechey and Wright (2008) also find evidence positive correlation between shocks and some TIPS rates.

The most important employment variable appears to be nonfarm payrolls. Shocks to nonfarm payrolls are positively correlated with movements in nominal and TIPS rates across all horizons and with movements in the break-even inflation rate at a 2 year horizon. Coefficients for nominal rates are 0.0502, 0.0293, 0.0145, 0.0095, and 0.0099, while the coefficients for TIPS rates are 0.0628, 0.0212, 0.0123, 0.0114, and 0.0094 for 2, 5, 10, 15, and 20 year rates respectively. The coefficient corresponding to movements in the 2 year break-even inflation rate is 0.0333. These strong results indicate that nonfarm payroll realizations affect the entire spectrum of real rates. Evidence of the effects of nonfarm payroll shocks on TIPS rates can be found in Gürkaynak et al. (2006) and Beechey and Wright (2008), while Beechey et al. (2007) also point to consistent movements in break-even inflation rates in the face of nonfarm payroll shocks.

5.2.4 Monetary Policy Variables

Responses to shocks to the federal funds target rate are interesting, and characterized by long-run 'reversals' to current policy. While monetary policy surprises are positively correlated with TIPS rates at a 2* (0.0183) year horizon, they are also positively correlated with break-even inflation rates at this same point (0.0151). After this short-run response, monetary policy is negatively correlated with nominal rates at 10 (-0.0121), 15 (-0.0139), and 20 (-0.0199) year horizons, with the TIPS rate at a 20 (-0.0122) year horizon, and with break-even inflation rates at 5 (-0.0068) and 10 (-0.0142) year horizons.

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[4]Remember the sign is flipped

Interestingly, in their daily model, Beechey and Wright (2008) also find evidence of this 'reversal', as monetary policy shocks are positively correlated with 5 year TIPS rates, but negatively correlated with 5 to 10 year forward TIPS rates. Additionally, Beechey et al. (2007) find a negative correlation between monetary policy shocks and 1 year forward break-even inflation rates ending in 2 years. Neither Gürkaynak et al. (2006) nor Ezer et al. (2008) find significant evidence pointing to this 'reversal' effect. The short-term rise (fall) in the break-even inflation rate could be a result of the market adjusting to the Federal Reserve's expectation of higher (lower) inflation based on announced policy of higher (lower) rates, while the subsequent fall (rise) in the break-even inflation rate is consistent with the market expecting this monetary policy action to reverse the current trend. The additional long-run results for nominal and TIPS rates point to the expectation that once the Federal Reserve achieves its short to medium-term objects, they will eventually reverse their rate movements.

5.2.5   Overall Indicator Variables

While shocks to leading indicators are unimportant, consumer confidence shocks move both TIPS and break-even inflation rates. Surprises to the level of consumer confidence are positively correlated with movements in nominal rates at 2* (0.0114) and 5 (0.0126) year horizons, with movements in TIPS rates at 5 (0.0099), 15 (0.0101), and 20 (0.0177) year horizons, and with movements in the stock-bond correlation at 2* (0.0070), 4* (0.0141), and 7* (0.0231) year horizons. Interestingly, these shocks are negatively correlated with movements in break-even inflation rates at 15* (-0.0090) and 20* (-0.0154) year horizons. Contrary to my findings, very little evidence is present to point to the significance of consumer confidence shocks at moving any rates in the studies of Ezer et al. (2008), Gürkaynak et al. (2006), Beechey et al. (2007), or Beechey and Wright (2008), though I do note that Gürkaynak et al. (2006) find a positive correlation between shocks and movements in 1 year nominal rates.

5.3   Regressions Including Asymmetry

For each of my categories of announcements (price variables, production variables, employment variables, monetary policy variables, and overall indicator variables, I first report all significant regression results across economic states and shock types, then summarize the effects on equity and fixed-income markets.

5.3.1 Price Variables

Positive Shocks, Expansions

Positive shocks to price variables in expansions have no statistically significant effects on nominal, TIPS, or break-even inflation rates or the stock-bond correlation, though positive core CPI shocks lower stock prices* (-1.2230), consistent with the 'proxy hypothesis' or the systematic misvaluation of equities using nominal rather than real rates.

Negative Shocks, Expansions

Negative shocks to core PPI in expansions lower nominal rates at horizons of 5* (0.0504), 10 (0.0693), 15 (0.0705), and 20 (0.0655) years, leave TIPS rates unchanged, lower break-even inflation rates at 10 (0.0539) and 15 (0.0541) year horizons, and raise the stock-bond correlation at a 4* (-0.1027) year horizon. These results indicate that the main information content found in negative expansionary shocks to core PPI concerns break-even inflation rates, not real rates. Negative expansionary surprises to core CPI are unimportant, though surprisingly raise the TIPS rate at a 15* (-0.0228) year horizon. These results could reflect a drop in the inflation risk premium due to lower than expected values of core CPI rather than a rise in the real rate of interest.

Positive Shocks, Recessions

Statistically significant movements in any variables in response to price surprises are lacking for positive recessionary shocks, though positive shocks to core CPI raise nominal rates at 2 (0.0597) and 5* (0.0386) year horizons.

Negative Shocks, Recessions

Negative recessionary surprises to core CPI lower the nominal 5 (0.0541) year rate, lower the TIPS 20 (0.0408) year rate, and lower the 2 (0.0486) year break-even inflation rate. The lower 20 year TIPS rate is interesting, and could signal a rising long-run inflation risk premium. Negative shocks to core PPI in recessions only affect the stock bond correlation, lowering it at 4* (0.0623) and 7* (0.0701) year horizons. These results also differ from my earlier result that negative expansionary shocks to core PPI raise the stock-bond correlation at a 4 year horizon and point to state asymmetry.

State Asymmetry, Positive Shocks

Given the lack in response to positive price shocks in both expansions and recessions, it is unsurprising that no state asymmetry is present in any reaction to positive shocks

to price variables.

State Asymmetry, Negative Shocks

Evidence that the stock-bond correlation rises with negative expansionary core PPI shocks and falls with negative recessionary core PPI shocks points to state asymmetry, which is confirmed for the 4* year stock-bond correlation. Additional support for negative shock state asymmetry is present at 90% confidence levels for responses to core PPI shocks in nominal rates (10, 15, 20 year horizons) and in break-even inflation rates (15 year horizon). In all cases, negative expansionary shocks have greater effects than negative recessionary shocks. In contrast, the state asymmetry present in response to core CPI shocks (nominal 5* year rates, TIPS 20* year rates) indicates negative recessionary shocks have greater effects than negative expansionary shocks in these cases.

Sign Asymmetry, Expansionary Shocks

While no expansionary sign asymmetry is present for core CPI surprises, some evidence is present that negative shocks to core PPI are more significant than positive shocks in moving nominal rates (15 year horizon), and break-even inflation rates (10* and 15 year horizons). While still fairly scarce in presence, no contradictory evidence is present, pointing to negative expansionary core PPI having as great or greater effects than positive expansionary core PPI surprises.

Sign Asymmetry, Recessionary Shocks

In contrast to the expansionary sign asymmetry present for core PPI surprises, no such evidence is present for recessionary sign asymmetry in response to core PPI shocks. For core CPI shocks, only the 20 year TIPS rate exhibits sign asymmetry, with negative shocks exhibiting greater importance than positive shocks. This result is isolated, however, and encompasses the result of 20 year TIPS rates falling in response to negative recessionary core CPI shocks. In general, there does not appear to be evidence that positive and negative shocks to price variables differ in importance during recessions.

Summary and Conclusions

Equities:

While a basic symmetric model produces no significant results, examining my asymmetric specification points to the possibility of multiple effects being drowned out in the full sample. Consistent with the 'proxy hypothesis' or the systematic misvaluation of equities, stock prices fall in the face of positive expansionary shocks to core CPI.

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Additionally, the rise in the 4 year stock-bond correlation in response to negative expansionary core PPI shocks and the fall in the 4 and 7 year correlation in response negative recessionary core PPI shocks points to the 'proxy hypothesis' or the equity misvaluation effect dominating in expansions and an economic growth or 'flight-to-quality' effect dominating in recessions. Increasing correlations in expansions and decreasing correlations in recessions are consistent with Ilmanen (2003) and Yang et al. (2009). The state-dependent effects not present in the basic regression underscore the importance of allowing for asymmetries when analyzing reaction to price variable shocks.

Rates:

Not accounting for asymmetries reveals an overall positive correlation between core CPI shocks and movements in nominal rates at all horizons, movements in break-even inflation rates at 2, 10, and 15 year horizons, and movements in the TIPS rate at a 20 year horizon. Additionally, I see a positive correlation between core PPI shocks and movements in nominal rates at 5, 10, 15, and 20 year horizons, break-even inflation rates at 10 and 15 year horizons, and the TIPS rate at a 2 year horizon. The TIPS rate movements are interesting, as they imply movements in real rates or inflation risk premia at long horizons in response to core CPI shocks and at short horizons in response to core PPI shocks.

Allowing for asymmetries does not offer much evidence against the directional movements present for the basic regression model, though the rise in the 15 year TIPS rate in response to negative expansionary core CPI shocks is interesting and could point to the presence of a falling long-term inflation risk premium in the face of lower than expected expansionary core CPI realizations. Additionally, the 20 year TIPS rate falls in response to negative core CPI shocks in recessions (but is unmoved elsewhere), which could be driving the overall positive correlation between core CPI shocks and the 20 year TIPS rate found in the non-asymmetric model. This evidence could be consistent with a rising long-run inflation risk premium. No individual evidence is present to support the result found in the basic regression that core PPI shocks are positively correlated with movements in the 2 year TIPS rate.

Evidence on state asymmetry of the significance of price shocks shows that for core PPI, negative expansionary shocks are more important than negative recessionary shocks in moving nominal rates at 10, 15, and 20 year horizons and the break-even inflation rate at a 15 year horizon. This consistent long-run state asymmetry in response to negative core PPI shocks is consistent with the Van Nieuwerburgh and Veldkamp (2006) 'signal clarity' argument, by which expansionary shocks move markets more than recessionary shocks. For core CPI, negative recessionary shocks are more important than negative expansionary shocks in moving the 5 year nominal rate and the 20 year TIPS

rate. The result for the 20 year TIPS rate is consistent with this effect being isolated to negative recessionary news, while the result for the 5 year nominal rate conflicts with other results and theory that expansionary shocks have greater significance than recessionary shocks.

Finally, mild sign asymmetry is present in expansionary responses to core PPI shocks, as negative shocks have more significant effects in reactions of the 15 year nominal and 10 and 15 year break-even inflation rates. This sign asymmetry for core PPI, combined with the presence of some state asymmetry showing the greater effects of expansionary than recessionary shocks, points to the possibility that at least some of the information content of core PPI shocks concerns real variables and not just price variables as observed asymmetries are consistent with those found in the literature for real variables. In contrast, the state asymmetry present for core CPI shocks points to greater recessionary than expansionary effects, indicating a separation in the information content of core CPI and core PPI shocks.

5.3.2 Production Variables

Positive Shocks, Expansions

The most significant responses to positive expansionary shocks occur for retail sales and the ISM manufacturing survey. For retail sales, nominal rates rise at 2 (0.0616), 5 (0.0603), 10 (0.0636), 15 (0.0485), and 20* (0.0229) year horizons, TIPS rates rise at 5 (0.0468), 10 (0.0310), and 15 (0.0247) year horizons, the break-even inflation rate rises at a 10* (0.0326) year horizon, and the stock-bond correlation rises at 2* (0.0435), 4* (0.0867), and 7* (0.1277) year horizons. These results are consistent with the market expecting higher real interest rates and the stock-bond correlation rising due to the discount effect. Results for responses to the ISM manufacturing survey are also consistent with rising real and break-even inflation rates. Nominal rates rise at 2 (0.1004), 10 (0.0746), and 15 (0.0472) year horizons, TIPS rates rise at 5 (0.0303) and 10 (0.0288) year horizons, and break-even inflation rates rise at 2 (0.1119), 10 (0.0453), and 15 (0.0407) year horizons.

While results for other production variables are somewhat scattered, I point out some key reactions to positive expansionary shocks. Capacity utilization shocks raise the 2* (0.0598) year stock-bond correlation, durable goods shocks raise the 2 (0.0957) year nominal rate and lower the 20 (-0.0492) year break-even inflation rate, new home sales shocks raise the 2* (0.2078) year break-even inflation rate and raise the 7* (0.0869) and 20* (0.1550) year stock-bond correlations, and shocks to GDP lower stock prices* (-1.0551) and raise the 2 (0.0872) and 4 (0.1363) year stock-bond correlation. These

results, excepting the lower long-run break-even inflation rate in response to durable goods shocks, are consistent with strong expansionary activity. Lower stock prices in response to GDP shocks and higher stock-bond correlations in response to capacity utilization, new home sales, and GDP shocks point to the presence of a discount effect present in the response to positive expansionary production variable shocks.

Negative Shocks, Expansions

Negative expansionary shocks appear to be most important in regards to new home sales and the ISM manufacturing survey. Shocks to new home sales lower nominal rates at 2 (0.1050), 5 (0.0871), 10 (0.0541), 15 (0.0419), and 20 (0.0392) year horizons, lower the break-even inflation rate at a 5 (0.0584) year horizon, and raise the stock-bond correlation at 2 (-0.0961), 4 (-0.1556), 7 (-0.2084), and 20 (-0.3034) year horizons. Interestingly, shocks to the ISM manufacturing survey actually raise nominal rates at 10 (-0.0675), 15 (-0.0803), and 20 (-0.0581) year horizons, raise TIPS rates at 15 (-0.0383) and 20 (-0.0433) year horizons, and raise the break-even inflation rate at a 5 (-0.0349) year horizon. The results for the ISM manufacturing survey are somewhat puzzling, as they counteract the overall intuition that a negative shock should not lead to higher rates.

Capacity utilization shocks lower the 10* (0.0293) year nominal rate, raise the 5* (-0.0243) year TIPS rate, and raise the 2 (-0.0556) year break-even inflation rate, retail sales raise the 20* (-0.0585) year nominal rate, durable goods shocks lower stock prices* (0.8182), and GDP shocks raise the stock-bond correlation at 4* (-0.0559), 7* (-0.0928), and 20* (-0.1668) year horizons. These results are generally scattered and indicate either multiple effects or the lack of one overall driving effect, though falling stock prices and rising stock-bond correlations once again indicate the presence of a discount effect.

Positive Shocks, Recessions

Positive recessionary shocks appear to be the most significant in the case of capacity utilization. Shocks raise nominal rates at 5* (0.0275), 10* (0.0371), 15* (0.0337), and 20* (0.0328) year horizons, raise TIPS rates at 2* (0.0519), 15* (0.0176), and 20 (0.0219) year horizons, and raise the break-even inflation rate at a 5 (0.0265) year horizon. Additionally, retail sales shocks raise nominal rates at 2 (0.0285), 5 (0.0123), and 20* (0.0054) year horizons and the break-even inflation rate a 5 (0.0182) year horizon, new home sales shocks raise the 5* (0.0463) year break-even inflation rate, ISM manufacturing survey shocks raise the 20* (0.0250) year TIPS rate, and GDP shocks raise stock prices (0.8173) and lower the stock-bond correlation at 2 (-0.0592) and 4 (-0.0922) year horizons. Note

that the equity market response to GDP shocks (rise in stock prices, drop in stock-bond correlation) points to the dominance of an economic growth or 'flight-to-quality' effect, rather than a discount effect as is present in expansions.

Mixed results are present for durable goods shocks, with the nominal rate falling at a 2 (-0.0568) year horizon, the break-even inflation rate rising at a 2* (0.0894) year horizon and falling at a 5* (-0.0236) year horizon, stock prices rising (0.4206), and the stock-bond correlation rising at 4* (0.0497), 7* (0.0693), and 20 (0.1428) year horizons.

Negative Shocks, Recessions

Negative recessionary shocks to durable goods and the ISM manufacturing survey appear to produce the most statistically significant reactions of the production variables. Durable goods shocks lower nominal rates at 2* (0.0324), 10 (0.0397), 15 (0.0347), and 20* (0.0204) year horizons, ISM manufacturing survey shocks lower nominal rates at 2 (0.0737), 10 (0.0509), 15 (0.0637), and 20 (0.0419) year horizons and lower TIPS rates at 2* (0.0703), 10 (0.0314), 15 (0.0388), and 20 (0.0342) year horizons. Additionally, capacity utilization shocks lower the 2 (0.0655) year nominal rate, the 5 (0.0287) and 10 (0.0184) year TIPS rate, and the 2 (0.0572) year break-even inflation rate, retail sales shocks lower the 20* (0.0334) year nominal rate and GDP shocks lower the 2* (0.0470) year TIPS rate. Some mixed results are present for reactions to new home sales shocks, with the 5* (-0.0514) year nominal rate and the 5* (-0.0417) year break-even inflation rate both rising and the stock-bond correlation falling at 2 (0.1030), 4* (0.1384), 7 (0.1627), and 20* (0.1717) year horizons.

State Asymmetry, Positive Shocks

Formal tests for positive state asymmetry in responses to retail sales confirm that nominal rates rise at 5*, 10, and 15 year horizons and TIPS rates at 5, 10, and 15* year horizons more for expansionary rather than recessionary shocks. Additionally, I confirm that in response to capacity utilization shocks the 20* year TIPS rate rises more in recessions than expansions, in response to new home sales shocks the 2* year break-even inflation rate rises more in expansions, in response to GDP shocks stocks fall in expansions but rise in recessions and the stock-bond correlation rises in expansions but falls in recessions at 2 and 4 year horizons, and in response to ISM shocks break-even inflation rates rise more in expansions than recessions at 2 and 15* year horizons.

In examining shocks to durable goods, the results that the 2 year nominal rate rises in expansions and falls in recessions is confirmed, as is the fact that the break-even inflation rate falls at a 20 year horizon in expansions but not recessions and that stock

prices rise in recessions but not expansions. Additionally, some evidence is present (at a 90% confidence level) that the 15 year break-even inflation rate falls more in expansions than in recessions.

State Asymmetry, Negative Shocks

The ISM manufacturing survey and new home sales exhibit the most significant negative asymmetry. For new home sales, nominal rates fall in expansions and are mostly unchanged in recessions, and the stock-bond correlation rises in expansions and falls in recessions. Additionally for shocks to new home sales, the 5 year break-even inflation rate falls more in expansions than recessions. In examining shocks to the ISM manufacturing survey, negative shocks tend to lower nominal and TIPS rates in recessions but raise them in expansions. Also for ISM shocks, the 5 year break-even inflation rate rises in expansions.

Capacity utilization shocks raise the 5 year TIPS rate in expansions but lower it in recessions, creating natural asymmetry, as well as raising the 2 year break-even inflation rate in expansions but lowering it in recessions. Retail sales shocks raise the 20 year nominal rate in expansions but lower it in recessions, durable goods shocks lower the nominal rate in recessions but not expansions and decrease stock prices in expansions but not recessions, and GDP shocks exhibit no negative state asymmetry.

Sign Asymmetry, Expansionary Shocks

The main expansionary sign asymmetry present concerns the ISM manufacturing survey. As indicated earlier, oddly both positive and negative expansionary shocks tend to raise rates, though the negative shocks are mainly confined to medium to long-term nominal and TIPS rates while positive shocks raise these rates at shorter terms as well. Capacity utilization shocks raise the 2 year break-even inflation rate for negative news but have no effect for positive news, durable goods shocks lower stocks for negative shocks with no reaction for positive shocks, new home sales shocks lower nominal rates and break-even inflation rates at various horizons for negative shocks with no movement for positive shocks. While no expansionary sign asymmetry is present in regards to GDP, retail sales shocks raise nominal rates at 15, 20 year horizons for positive shocks and raise nominal rates at a 20 year horizon for negative shocks. Additionally, retail shocks raise the 10 year break-even inflation rate for positive shocks with no change for negative shocks.

Sign Asymmetry, Recessionary Shocks

Most of the sign asymmetry for recessionary shocks is scattered. Capacity utilization shocks drop the 2 year break-even inflation rate for negative shocks without a movement for positive shocks, while durable goods shocks raise the 2 and 5* year nominal rates and stock prices for positive shocks without a movement for negative shocks. Additionally new home sales shocks lower the 5 year nominal rate and the 2 year stock-bond correlation for negative shocks and raise the 5 year TIPS rate for positive shocks without corresponding movements, and ISM manufacturing survey shocks lower the 15 year nominal rate and lower the 2 year break-even inflation rate for negative shocks without corresponding movements for positive shocks. No recessionary sign asymmetry is present for retail sales or for GDP.

Summary and Conclusions

Equities:

Not accounting for asymmetries, I see that shocks to GDP are negatively correlated with movements in the stock-bond correlation at 4, 7, and 20 year horizons, while shocks to new home sales are positively correlated with movements in the 2 year stock-bond correlation. Allowing for asymmetries, the stock-bond correlation rises in response to positive expansionary shocks to retail sales (2, 4, 7 year), capacity utilization (2 year), new home sales (7, 20 year), and GDP (2, 4 year), and stock prices also fall in response to positive expansionary GDP shocks. The stock-bond correlation also rises in the face of negative expansionary shocks to new home sales (2, 4, 7, 20 year) and GDP (4, 7, 20 year) and stock prices fall after similar shocks to durable goods. Moving to recessions, positive shocks to GDP raise stock prices and lower the 2 and 4 year stock-bond correlation, while positive shocks to durable goods raise stock prices and also raise the stock-bond correlation at 4, 7, and 20 year horizons. Finally, negative recessionary shocks to new home sales lower the stock-bond correlation at all horizons.

Consistent with the results for price variables, production variable results generally support the stock-bond correlation rising in expansions and falling in recessions (with the notable exception that positive recessionary shocks to durable goods raise the stock-bond correlation), once again indicating state-dependent relative importance of the factors that move the stock-bond correlation and agreeing with Ilmanen (2003) and Yang et al. (2009). The state asymmetry present in response to positive shocks to GDP is consistent with the results of McQueen and Roley (1993) and Andersen et al. (2007) who find that equity prices fall after positive expansionary shocks but rise after positive recessionary shocks to real or inflationary shocks. Additionally, not allowing for asym-

metries allows the recessionary effects to dominate the expansionary effects in response to GDP shocks and hides state-dependent effects of shocks to new home sales, retail sales, and capacity utilization. Finally, positive recessionary shocks to the production variable durable goods precipitate reactions in the stock-bond correlation that differ from its counterparts in these results and in those found in the literature, warranting further study and examination.

Rates:

In explaining the effects of production variables on rates, I first describe whether variable shocks affect TIPS rates, break-even inflation rates, or both. Though effects are generally minimal, durable goods shocks only move break-even inflation rates, not real rates. For the most part, shocks to new home sales also only move break-even inflation rates, though the symmetric regression shows evidence of responses in the 20 year TIPS rate. In my asymmetric model, GDP shocks do not move break-even inflation rates, and only move the 2 year TIPS rate for negative recessionary shocks. I note, though, that the symmetric model for GDP shocks produces evidence of movements in 2 and 5 year TIPS rates and the 10 year break-even inflation rate. Shocks to retail sales, the ISM manufacturing survey, and capacity utilization all move TIPS and break-even inflation rates at various horizons, though the results for retail sales are sparse and ISM manufacturing survey shocks only move break-even inflation rates in expansions.

The basic symmetric regression for rate movements in response to production variable shocks generally produces a positive correlation between shocks and movements in nominal, TIPS, and/or break-even inflation rates at various horizons (with the notable exception of no movements in response to durable goods shocks). Accounting for asymmetries produces a few interesting deviations from these trends, however. Negative expansionary shocks to the ISM manufacturing survey raise nominal rates at 10, 15, and 20 year horizons, raise TIPS rates at 15 and 20 year horizons, and raise the 5 year break-even inflation rate. The consistency and extent of this deviation from expected movements is hard to reconcile with theory.

Additionally, positive expansionary shocks to durable goods lower the 20 year break-even inflation rate, negative expansionary shocks to capacity utilization raise the 2 year break-even inflation rate, and negative expansionary shocks to retail sales raise the 20 year nominal rate. Positive recessionary shocks to durable goods lower the 2 year nominal and 5 year break-even inflation rate, and negative recessionary shocks to new home sales raise the 5 year nominal and 10 year break-even inflation rate. Like the higher stock-bond correlation, the lower nominal and break-even inflation rates in response to positive recessionary shocks to durable goods are puzzling and indicate the need for further research.

In general, the state asymmetry in magnitude of rate responses points to some expansionary shocks moving rates more than recessionary shocks at short to medium term horizons. For positive shocks, 5, 10, and 15 year nominal and TIPS rates respond more significantly to expansionary shocks to retail sales, 2 year break-even inflation rates respond more significantly to expansionary shocks to new home sales, and 2 and 15 year break-even inflation rates respond more significantly to expansionary shocks to the ISM manufacturing survey. Additionally, for negative shocks, 2, 15, and 20 year nominal rate as well as 5 year break-even inflation rates respond more significantly to expansionary shocks to new home sales. The greater effects of expansionary shocks is consistent with the Van Nieuwerburgh and Veldkamp (2006) 'signal clarity' hypothesis, by which markets have more confidence in forecasting future expansionary activity rather than future recessionary activity. A couple of exceptions to these results include the fact that recessionary positive shocks to capacity utilization are more important than their expansionary counterparts at moving the 20 year TIPS rate and negative recessionary shocks move the 15 year nominal rate in response to durable goods shocks more than similar expansionary shocks.

Where significant, results for formal tests for sign asymmetry in magnitude of rate responses to production variable shocks generally point to greater effects of negative rather than positive shocks, consistent with Ishikawa's (2002) 'learning', Gilchrist and Williams's (2000) capacity constraint, or Chalkley and Lee's (1998) 'worker risk-aversion' explanation for business cycle steepness and deepness. In expansions, negative capacity utilization shocks have more significant effects on 2 year break-even inflation rates and negative new home sales shocks have greater effects on 2 and 5 year nominal and 5 year break-even inflation rates than their positive counterparts. Additionally, in recessions, negative shocks to capacity utilization have greater effects on 2 year break-even inflation rates, negative shocks to new home sales have greater effects on 5 year nominal and break-even inflation rates, and negative shocks to the ISM manufacturing survey have greater effects on 15 year nominal and 2 year break-even inflation rates than similar positive shocks. Deviations from the trend of negative shocks having greater significance than positive shocks are isolated to movements in the 10 year break-even inflation rate in response to expansionary retail sales shocks and movements in 2 and 5 year nominal rates in response to recessionary durable goods shocks [5]

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[5]Once again, responses to shocks to durable goods deviate from reactions to shocks to other production variables.

5.3.3 Employment Variables

Positive Shocks, Expansions

Though positive expansionary shocks to the unemployment rate have no statistically significant effects, similar shocks to employment variables nonfarm payrolls and the employment cost index do produce movements worth examining. Specifically, positive expansionary shocks to nonfarm payrolls raise nominal rates at 2 (0.1743), 5* (0.0836), and 20* (0.0373) year horizons, raise TIPS rates at 2 (0.3497) and 5 (0.0736) year horizons, and raise stock prices (1.1899). Positive expansionary shocks to the employment cost index also raise the nominal rate at a 2* (0.0934) year horizon and the TIPS rate at a 2 (0.4214) year horizon, and lower stock prices (-1.2837). The results for nonfarm payrolls and the employment cost index agree with the idea that employment variables affect real rates, though the contrasting results for the effects on stock prices are noted.

Negative Shocks, Expansions

While negative expansionary shocks to the employment cost index have few effects, nonfarm payrolls are again an important employment variable in moving rates. Negative expansionary shocks to nonfarm payrolls decrease nominal rates at 2 (0.1392), 5 (0.1137), 10 (0.0657), and 15* (0.0462) year horizons, decrease TIPS rates at 2 (0.1833), 5 (0.0790), and 10* (0.0280) year horizons, and decrease break-even inflation rates at 2 (0.0668), 10* (0.0380), and 15 (0.0317) year horizons. Once again, real rates respond to this employment shock, though break-even inflation rates do as well.

In response to negative expansionary shocks to the unemployment rate (higher than expected realizations), the TIPS rate falls at a 2 (0.1021) year horizon, break-even inflation rates fall at a 10 (0.0637) year horizon and the stock-bond correlation rises at 7* (-0.1847) and 20 (-0.3816) year horizons. The directional movement in TIPS and break-even inflation rates is consistent with that for nonfarm payrolls, though the significance of positive movements in the stock-bond correlation is interesting and is consistent with results for production variables that stock-bond correlation rises with news in expansions and falls with news in recessions.

Positive Shocks, Recessions

In contrast to expansionary shocks, positive recessionary shocks to employment variables have little effect on rates (in fact positive shocks to nonfarm payrolls and the employment cost index actually cause TIPS rates to fall at 2 year horizons (-0.2844* and -0.5579 respectively)), instead mostly affecting stock prices and the stock-bond correlation.

Positive recessionary shocks to nonfarm payrolls lower stock prices (-1.2645) and raise the stock-bond correlation at 2 (0.1044), 4 (0.1681), 7 (0.2239), and 20* (0.3219) year horizons. On the other hand, positive recessionary shocks to the employment cost index raise stock prices (0.9300) and positive recessionary shocks to the unemployment rate lower the stock-bond correlation at 4* (-0.0970) and 7* (-0.1241) year horizons.

Negative Shocks, Recessions

While positive recessionary shocks to employment variables mostly convey information about stocks or the stock-bond correlation, negative recessionary shocks only move rates. Negative shocks to nonfarm payrolls raise the nominal rate at a 5* (-0.0477) year horizon, and raise the break-even inflation rate at a 15 (-0.0301) year horizon. Negative shocks to the unemployment rate lower TIPS rates at 10 (0.0199) and 15* (0.0190) year horizons while raising break-even inflation rates at 10 (-0.0202) and 15 (-0.0194) year horizons. Finally, negative shocks to the employment cost index lower break-even inflation rates at 10 (0.0529) and 15 (0.0475) year horizons.

State Asymmetry, Positive Shocks

My results described above for positive shocks in expansions and recessions point to the presence of significant state asymmetry. Indeed, for nonfarm payrolls, nominal rates (2 year), TIPS rates (2 year), and stock prices all actually move in opposite directions, and their state asymmetry is confirmed in my hypothesis test. While no state asymmetry is present for responses to positive unemployment shocks, positive shocks to the employment cost index move 2 year TIPS rates and stock prices in opposite directions, and this state asymmetry is confirmed in my hypothesis test.

State Asymmetry, Negative Shocks

Although no state asymmetry is present for negative shocks to the employment cost index, state asymmetry is found in responses to shocks to nonfarm payrolls and the un-employment rate. Recall that negative shocks to these two variables in expansions lower nominal, TIPS, and break-even inflation rates, negative shocks in recessions raise break-even inflation rates (presumably due to rising inflation risk premia). Formal hypothesis tests confirm these state asymmetry results as well as confirming that negative shocks to the unemployment rate affect the stock-bond correlation (positively) in expansions but not in recessions.

Sign Asymmetry, Expansionary Shocks

No expansionary sign asymmetry is present for shocks to the unemployment rate, though asymmetry is present in responses to the other two variables. Specifically, stock prices are more affected by positive rather than negative expansionary shocks to nonfarm payrolls. Additionally, positive shocks to the employment cost index are more important in moving the 2* year nominal rate and the 2 year TIPS rate, while negative shocks to the employment cost index are more important in moving the 10* year TIPS rate.

Sign Asymmetry, Recessionary Shocks

Like its expansionary counterpart, no recessionary asymmetry is present for shocks to the unemployment rate, though both nonfarm payrolls and the employment cost index exhibit some recessionary asymmetry. Given the fact that recessionary responses to these employment variables often behave at odds with hypothesized movements, it is hard to draw conclusions from these sign asymmetries. Positive more than negative recessionary shocks to nonfarm payrolls tend to affect the stock-bond correlation at 2 and 20* year horizons, while the reaction of break-even inflation rates at 10 and 15* year horizons occurs more for negative recessionary shocks.

Summary and Conclusions

Equities:

   The symmetric model offers no evidence of movements in stock prices or the stock-bond correlation in response to employment variable shocks, but allowing for asymmetries yields insight into the effects of these announcements. First, negative expansionary shocks to the unemployment rate raise the stock-bond correlation at 7 and 20 year horizons, while positive recessionary shocks lower the stock-bond correlation at 4 and 7 year horizons. These results are consistent with those of Boyd et al. (2005) who find that the stock-bond correlation responds positively to negative unemployment shocks in expansions and agree with the discount or equity misvaluation effect dominating in expansions and the economic growth or 'flight-to-quality effect dominating in recessions. Official tests for state asymmetry also reveal that negative expansionary shocks to the unemployment rate are more significant than negative recessionary shocks in moving the stock-bond correlation. The fact that the stock-bond correlation is rising in expansions and falling in recessions is also consistent with the movements in production and price variables and the results found in Ilmanen (2003) and Yang et al. (2009).

   The asymmetry present for the employment cost index is similar to that found for the unemployment rate (both in these results and those of Boyd et al. (2005)), indicat-

ing that the news content in the employment cost index is similar to the news content of the unemployment rate, and pointing to the dominance of a discount effect in expansions and the dominance of an economic growth or 'flight-to-quality effect in recessions. Positive expansionary shocks to the employment cost index lower stock prices while positive recessionary shocks raise stock prices.

In contrast to the results for other employment variables, shocks to nonfarm payrolls exhibit an opposite asymmetry, pointing to a reversal in the dominance of factors seen for the unemployment rate and the employment cost index, and indicating a clear separation between the news content of nonfarm payrolls and that of major production variables. Positive expansionary shocks to nonfarm payrolls raise stock prices, while positive recessionary shocks to nonfarm payrolls lower stock prices and raise the stock-bond correlation at all horizons. Furthermore, positive shocks are more important than negative shocks in expansions for moving stock prices and in recessions for moving the stock-bond correlation at 2 and 20 year horizons. The reasons behind the results for nonfarm payrolls are unclear, but offer an interesting topic for future research.

Rates:

The symmetric regression points to positive correlations in shocks to the unemployment rate and movements in 2 year TIPS and break-even inflation rates and positive correlations between shocks to nonfarm payrolls and movements in nominal and TIPS rates across all horizons and with movements in the 2 year break-even inflation rate. Allowing for asymmetries generally produces results for all three employment variables pointing to a positive correlation between shocks and movements in nominal, TIPS, and/or break-even inflation rates (where significant), with a few exceptions. Negative recessionary shocks to nonfarm payrolls raise the 5 year nominal rate and the 15 year break-even inflation rate, and negative recessionary shocks to the unemployment rate raise the 10 year break-even inflation rate. The rise in break-even inflation rates in response to negative recessionary shocks to nonfarm payrolls or the unemployment rate points to the possibility of a rising inflation risk premium in the face of negative recessionary news. Finally, some sign asymmetry is present for the employment cost index, pointing to greater responses of 2 year nominal and TIPS rates to positive rather than negative shocks, which is inconsistent with the 'learning', capacity constraint, or 'worker risk-aversion' arguments explaining business cycle asymmetries.

5.3.4 Monetary Policy Variables

Positive Shocks, Expansions

Positive expansionary surprises to the federal funds target rate have minimal significant effects, only raising nominal and TIPS* rates at a 20 year horizon (0.1187 and 0.1172, respectively).

Negative Shocks, Expansions

Negative expansionary shocks raise the 2 (-0.1008) year break-even inflation rate, lower TIPS rates at 10 (0.0944) and 15* (0.0816) year horizons, and lower the stock-bond correlation at 2 (0.3968), 4 (0.8346), and 7* (0.9624) year horizons. The rise in short-term break-even inflation rate is an expected function of a lower target rate, and the drop in 10 and 15 year TIPS rates indicates a persistence of the effects of monetary policy change. Additionally, the falling stock-bond correlation indicates the presence of an economic growth or 'flight-to-quality' effect contained in the Federal Reserve announcement. An announcement of lower than expected rates in expansions could plausibly cause the market to revise growth expectations downward or the equity risk premium upwards and move stock and bond prices in opposite directions.

Positive Shocks, Recessions

Positive recessionary shocks to the federal funds target rate raise the 2 (0.1513) year nominal rate, lower the 20 (-0.0442) year nominal rate, lower TIPS rates at 15 (-0.0451) and 20 (-0.1010) year horizons, and lower the stock-bond correlation at 2* (-0.3937) and 4* (-0.5580) year horizons. The long-run declines in nominal and TIPS rates indicate lower future rates, perhaps as a sign that higher current rates will restrain economic activity which will precipitate future rate decreases. Additionally, the lower stock-bond correlation indicates that higher than expected rate announcements in recessions either raise growth expectations or lower the equity risk premium enough to move stock and bond prices in opposite directions.

Negative Shocks, Recessions

Negative recessionary target rate surprises lower the 2 (0.0575) year break-even inflation rate, raise the 15* (-0.0324) year TIPS rate, raise stock prices (-1.4981), and raise the stock-bond correlation at 2 (-0.1543) and 4* (-0.2879) year horizons. Theoretically, lower target rates should signal higher future inflation expectations, pushing up break-even inflation rates. The observed lower short-run break-even inflation rate could be

the result of the market adjusting inflation expectations to perceived Federal Reserve expectations, or it could be the result of a lower inflation risk premium. The increased 15 year TIPS rate is consistent with a lower inflation risk premium, but it is unclear why an inflation risk premium would fall. I also note that the rising stock-bond correlation indicates the dominance of the discount effect over any growth or equity risk premium effects that might move stock and bond prices in opposite directions.

State Asymmetry, Positive Shocks

Formal tests for asymmetry confirm the results discussed above, notably that positive expansionary shocks raise 20 year nominal and TIPS rates while positive recessionary shocks lower these rates (and also lower the 15 year TIPS rate). The tests also confirm that positive recessionary shocks have greater effects on 2* year nominal rates than do positive expansionary shocks.

State Asymmetry, Negative Shocks

Negative state asymmetry tests confirm that negative expansionary shocks to the target rate raise the 2 year break-even inflation rate while negative recessionary shocks lower this rate. Additionally, the tests confirm that negative expansionary shocks lower the 10 and 15 year TIPS rates while negative recessionary shocks raise the 10 year year TIPS rate. Finally, the tests also confirm that in addition to raising stock prices, negative recessionary shocks raise the stock-bond correlation at 2 and 4 year horizons while negative expansionary shocks reduce the stock-bond correlation.

Sign Asymmetry, Expansionary Shocks

Expansionary sign asymmetry is limited to movements in the stock-bond correlation and consistent with results present above points to negative expansionary shocks lowering the correlation without similar effects for positive expansionary shocks.

Sign Asymmetry, Recessionary Shocks

Formal tests for recessionary sign asymmetry produce results consistent with positive shocks lowering the correlation and negative shocks raising the correlation. Additionally, the results that positive recessionary shocks raise 2 year nominal rates and lower 20 year TIPS rates without corresponding responses for negative shocks are confirmed.

Summary and Conclusions

Equities:

While the basic symmetric model fails to produce evidence of movements in stock prices or the stock-bond correlation in response to target rate shocks, allowing for asymmetries shows some effects hidden in the overall regression. Negative expansionary shocks lower the stock-bond correlation at 2, 4, and 7 horizons, positive recessionary shocks lower the stock-bond correlation at 2 and 4 year horizons, and negative recessionary shocks raise stock prices and the stock-bond correlation at 2 and 4 year horizons. The lack of significant movement in the stock-bond correlation for positive expansionary shocks is confirmed through a formal test for sign asymmetry.

The results for movements in stock prices and the stock-bond correlation in response to target rate shocks are interesting and indicate that in certain cases target rate announcements affect growth expectations or the equity risk premium enough to offset the actual rate changes. Furthermore, these occurrences are isolated to negative expansionary and positive recessionary shocks. In both of these cases, the shock moves in the opposite direction of the expected path of rates (in expansions rates are expected to rise, in recessions they are expected to fall), indicating that significant revisions in growth expectations or the equity risk premium occur in response to target rate shocks that 'go against the grain.'

Rates:

The basic symmetric model shows a short-run positive correlation between target rate shocks and movements in TIPS and break-even inflation rates and a long-run negative correlation between target rate shocks and movements in nominal, TIPS, and break-even inflation rates. Allowing for asymmetries, however, indicates the presence of long-run momentum in expansions and long-run reversals in recessions which is consistent with the sharpness asymmetry found by McQueen and Thorley (1993), which points to round expansionary peaks and sharp recessionary troughs. This sharpness asymmetry means the probability of transitioning from an expansion to a recession is less than the reverse movement, and is consistent with the long-run momentum of TIPS rates in expansions and long-run reversal of TIPS rates in recessions. Additionally, recessionary sign asymmetry points to positive shocks being more important than negative shocks in moving the 2 year nominal and 20 year TIPS rate.

5.3.5 Overall Indicator Variables

Positive Shocks, Expansions

Positive expansionary shocks to leading indicators raise TIPS rates at 2 (0.0308), 10 (0.0249), 15 (0.0235), and 20 (0.0214) year horizons, raise the 2 (0.0171) year break-even inflation rate, lower stock prices* (-0.9375), and raise the stock-bond correlation at a 2* (0.0655) year horizon. The raised short-run break-even inflation rate is consistent with rising prices in the face of increasing production, while the consistently higher TIPS rates, lower stock prices, and higher stock-bond correlation once again point to the dominance of a discount effect in expansions.

Positive expansionary shocks to consumer confidence lower nominal rates at 10 (-0.0375) and 15 (-0.0380) year horizons and lower TIPS rates at 2* (-0.0421), 5 (-0.0235), 15 (-0.0321), and 20 (-0.0375) year horizons. These results are puzzling and lack economic intuition.

Negative Shocks, Expansions

While negative expansionary shocks to leading indicators have no significant effects, negative expansionary shocks to consumer confidence are worth examining. Nominal rates fall at 10 (0.0515) and 15 (0.0402) year horizons, the 2* (0.0425) year TIPS rate falls, the 5* (-0.0451) year TIPS rate rises, the 2 (-0.0447) year break-even inflation rate rises, and the 5 (0.0673) and 10 (0.0331) year break-even inflation rates fall. So, once again in expansions, the simple fact that consumer confidence changes (regardless of direction) lowers the 2 year TIPS rate. Additionally, the rising 5 year TIPS rate coupled with the falling 5 year break-even inflation rate points to the potential that negative expansionary shocks to consumer confidence lowers the inflation risk premium.

Positive Shocks, Recessions

Positive recessionary shocks to leading indicators lower the 2 (-0.0466) year TIPS rate, raise the 2 (0.0234) year break-even inflation rate, and raise the stock-bond correlation at 4 (0.0411), 7 (0.0847), and 20 (0.2198) year horizons. While the higher short-run break-even inflation rate is consistent with markets adjusting inflation expectations upward in response to this positive shock, the lower short-run TIPS rate is interesting. Due to the recessionary state, the Federal Reserve is likely unconcerned with 'overheating,' so future short-term rate hikes to restrain output or inflation are unlikely, but the fact that the 2 year TIPS rate actually falls could signal a rise in the inflation risk premium. The consistent rise in the stock-bond correlation at 4, 7, and 20 year horizons points

to the presence of a 'discount effect,' by which the main informational content of this announcement concerns interest rate changes.

In contrast to the mixed results observed for leading indicators, positive recessionary shocks to consumer confidence are characterized by consistent rises in nominal rates at 2* (0.0286), 5 (0.0374), 10 (0.0392), 15 (0.0344), and 20* (0.0239) year horizons, rises in TIPS rates at 2 (0.0496), 5 (0.0273), 15 (0.0359), and 20 (0.0423) year horizons, and rises in the stock-bond correlation at 4 (0.0635) and 7 (0.0727) year horizons. The results are consistent with higher consumer confidence values coinciding with higher expected future interest rates.

Negative Shocks, Recessions

Negative recessionary shocks to leading indicators have minimal effects, only raising TIPS rates at a 5 (-0.0364) year horizon. The reasons for this rise are unclear, but could indicate the presence of a falling inflation risk premium. Shocks to consumer confidence produce mixed results, with nominal rates rising at 10 (-0.0340) and 15 (-0.0325) year horizons, TIPS rates falling at a 5 (0.0529) year horizon, break-even inflation rates falling at a 2* (0.0332) year horizon, and break-even inflation rates rising at 5* (-0.0510) and 15* (-0.0652) year horizons. These mixed effects likely indicate the presence of multiple factors, possibly including short-run momentum/long-run reversal in business cycle/monetary policy and changes in the inflation risk premium.

State Asymmetry, Positive Shocks

Formal tests for state asymmetry produce results consistent with positive shocks raising TIPS rates in expansions, lowering the 2 year TIPS rate in recessions, and raising the long-run stock-bond correlation in recessions. Examining consumer confidence, tests confirm that positive expansionary shocks actually lower nominal and TIPS rates while positive recessionary shocks raise nominal and TIPS rates.

State Asymmetry, Negative Shocks

While little negative state asymmetry is present in reactions to shocks to leading indicators (the rise in 5 year TIPS rates in recessions is confirmed), the recessionary mixed results are again present when analyzing consumer confidence.

Sign Asymmetry, Expansionary Shocks

No expansionary sign asymmetry is present for leading indicators, though in the case of consumer confidence, the fact that nominal rates fall with positive and negative news

is confirmed, as well as short-run rise and medium-run fall in break-even inflation rates that occurs after a negative shock.

Sign Asymmetry, Recessionary Shocks

Recessionary sign asymmetry for leading indicators is only found in the fact that positive shocks raise the 2 year break-even inflation rate. In contrast, recessionary sign asymmetry is consistently present for shocks to consumer confidence. Rising nominal rates are present for both types of shock, a rising 2 year TIPS rate is found for positive shocks, rising break-even inflation rates (5 and 15 years) are found for negative shocks, and a rising stock-bond correlation is found for positive shocks (4 and 7 years). Additionally, the sign asymmetry test points to possibility of rising break-even inflation rates at 10 year horizon and a rising stock-bond correlation at a 2 year horizon in response to at least one type of shock.

Summary and Conclusions

Equities

Consumer confidence shocks are positively correlated with movements in the stock-bond correlation at 2, 4, and 7 year horizons in my symmetric regression, though the only statistically significant movements in the stock-bond correlation occur after positive recessionary shocks. Additionally, although no equity market movements are found when analyzing leading indicators using the symmetric model, the asymmetric specification shows that positive shocks (either expansionary or recessionary) raise the stock-bond correlation. These results contrast those for production variables, where either the economic growth or 'flight-to-quality' effect dominates the discount effect in recessions.

Rates

First, examining the symmetric model, consumer confidence shocks are positively correlated with short-run nominal rates and with medium to long-term TIPS rates, while being negatively correlated with long-term break-even inflation rates. Moving to the asymmetric specification, positive expansionary shocks tend to lower medium to long-term nominal rates and lower TIPS rates across horizons, deviating from the symmetric results. Negative expansionary shocks produce mixed results with the short-run TIPS rate falling, a medium-term TIPS rate rising, and medium-term break-even inflation rates falling. The medium-term results point to the potential presence of a falling inflation risk premium in the face of negative expansionary shocks. In contrast to the results for positive expansionary shocks, positive recessionary shocks to consumer confidence consistently raise nominal and TIPS rates, agreeing with the symmetric model

results. Finally, negative recessionary shocks once again produce mixed directional results, indicating the presence of multiple effects.

While the symmetric model for leading indicators offers no statistically significant results, the asymmetrical model reveals some insights. Positive expansionary shocks raise TIPS rates across horizons and short-run break-even inflation rates. Negative expansionary shocks have no significant effects, while positive recessionary shocks lower the 2 year TIPS rate and raise the 2 year break-even inflation rate, consistent with an increasing inflation risk premium. Finally, negative recessionary shocks only produce statistically significant movements in the 5 year TIPS rate, which rises. This result could be explained with a falling inflation risk premium.

To summarize, when analyzing consumer confidence shocks mixed results for rate movements likely indicate the presence of multiple effects. Additionally, some evidence is present that recessionary shocks to leading indicators move the inflation risk premium.

Table 5.1: Correlation between surprises and nominal rate changes

Announcement	2y	5y	10y	15y	20y
Consumer Confidence	+*	+	0	0	0
Core PPI	0	+	+	+	+
Employment Cost Index	0	+	0	0	0
Retail Sales	+	+	+	+	+*
GDP	0	0	0	0	0
Capacity Utilization	+	+	0	+*	0
Core CPI	+	+	+	+	+
Durable Goods	0	0	0	0	0
New Home Sales	+*	+	+	+	0
Nonfarm Payrolls	+	+	+	+*	+
Unemployment Rate	0	0	0	0	0
ISM	+	+	+	+	0
Leading Indicators	0	0	0	0	0
Federal Funds Rate	0	0	-	-	-

Note: * indicates 90% confidence, else 95% confidence

Table 5.2: Correlation between surprises and TIPS rate changes

Announcement	2y	5y	10y	15y	20y
Consumer Confidence	0	+	0	+	+
Core PPI	+	0	0	0	0
Employment Cost Index	0	0	0	0	0
Retail Sales	+	0	0	0	0
GDP	+	+	0	0	0
Capacity Utilization	0	0	+	+*	0
Core CPI	0	0	0	0	+
Durable Goods	0	+*	0	0	0
New Home Sales	0	0	0	0	0*
Nonfarm Payrolls	+	+	+	+	+
Unemployment Rate	+	0	0	0	0
ISM	+	+	+	+	+
Leading Indicators	0	0	0	0	0
Federal Funds Rate	+*	0	0	0	-

Note: * indicates 90% confidence, else 95% confidence

Table 5.3: Correlation between surprises and BEIR changes

Announcement	2y	5y	10y	15y	20y
Consumer Confidence	0	0	0	-*	-*
Core PPI	0	0	+	+	0
Employment Cost Index	0	0	0	0	0
Retail Sales	0	0	0	0	0
GDP	0	0	+	0	0
Capacity Utilization	+	0	0	0	0
Core CPI	+	0	+	+	0
Durable Goods	0	0	0	0	0
New Home Sales	0	+	+	+*	0
Nonfarm Payrolls	+	0	0	0	0
Unemployment Rate	+*	0	0	0	0
ISM	+*	0	+	+	0
Leading Indicators	0	0	0	0	0
Federal Funds Rate	+	-	-	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.4:   Correlation between surprises and stock price changes

Announcement	Stock Prices
Consumer Confidence	0
Core PPI	0
Employment Cost Index	0
Retail Sales	0
GDP	0
Capacity Utilization	0
Core CPI	0
Durable Goods	0
New Home Sales	0
Nonfarm Payrolls	0
Unemployment Rate	0
ISM	0
Leading Indicators	0
Federal Funds Rate	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.5:   Correlation between surprises and stock-bond correlation changes

Announcement	2y	4y	7y	20y
Consumer Confidence	+*	+*	+*	0
Core PPI	0	0	0	0
Employment Cost Index	0	0	0	0
Retail Sales	0	0	0	0
GDP	0	-*	-	-
Capacity Utilization	0	0	0	0
Core CPI	0	0	0	0
Durable Goods	0	0	0	0
New Home Sales	+*	0	0	0
Nonfarm Payrolls	0	0	0	0
Unemployment Rate	0	0	0	0
ISM	0	0	0	0
Leading Indicators	0	0	0	0
Federal Funds Rate	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.6: Effects of surprises on nominal rates

Ann.	**Pos Shock, Exp**					**Neg Shock, Exp**					**Pos Shock, Rec**					**Neg Shock, Rec**				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Cons. Conf.	0	0	-	-	0	0	0	-	-	0	+*	+	+	+	+*	0	0	+	+	0
Core PPI	0	0	0	0	0	0	-*	-	-	-	0	0	0	0	0	0	0	0	0	0
Emp. Cost	+*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retail Sales	+	+	+	+	+*	0	0	0	0	+*	+	+	0	0	+*	0	0	0	0	-
GDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cap. Util.	0	0	0	0	0	0	0	-*	0	0	0	+*	+*	+*	+	-	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	0	+	+*	0	0	0	0	-	0	0	0
Dur. Goods	+	0	0	0	0	0	0	0	0	0	-	0	0	0	0	-*	0	-	-	-*
New Home	0	0	0	0	0	-	-	-	-	-	0	0	0	0	0	0	+*	0	0	0
Nonfarm Pay	+	+*	0	0	+*	-	-	-	-*	0	0	0	0	0	0	0	+*	0	0	0
Unemp. Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ISM	+	0	+	+	0	0	0	+	+	+	0	0	0	0	0	-	0	-	-	-
Lead. Ind.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fed. Funds	0	0	0	0	+	0	0	0	0	0	+	0	0	0	-	0	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

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Table 5.7: Effects of surprises on TIPS rates

Ann.	Pos Shock, Exp					Neg Shock, Exp					Pos Shock, Rec					Neg Shock, Rec				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Cons. Conf.	-*	-	0	-	-	-*	+*	0	0	0	+	+	0	+	+	0	-	0	0	0
Core PPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emp. Cost	+	0	0	0	0	0	0	-*	0	0	-	0	0	0	0	0	0	0	0	0
Retail Sales	0	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0
Cap. Util.	0	0	0	0	0	0	+*	0	0	0	+*	0	0	+*	+	0	-	-	0	0
Core CPI	0	0	0	0	0	0	0	0	+*	0	0	0	0	0	0	0	0	0	-	-
Dur. Goods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Home	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonfarm Pay	+	+	0	0	0	-	-	-*	0	0	-*	0	0	0	0	0	0	0	0	0
Unemp. Rate	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	-	-*	0
ISM	0	+	+	0	0	0	0	0	+	+	0	0	0	0	+*	-*	0	-	-	-
Lead. Ind.	+	0	+	+	+	0	0	0	0	0	-	0	0	0	0	0	+	0	0	0
Fed. Funds	0	0	0	0	+*	0	0	-	-*	0	0	0	0	-	-	0	0	0	+*	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.8: Effects of surprises on break-even inflation rates

Ann.	**Pos Shock, Exp**					**Neg Shock, Exp**					**Pos Shock, Rec**					**Neg Shock, Rec**				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Cons. Conf.	0	0	0	0	0	+	-	-	0	0	0	0	0	0	0	-*	+*	0	+*	0
Core PPI	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0
Emp. Cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0
Retail Sales	0	0	+*	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cap. Util.	0	0	0	0	0	+	0	0	0	0	0	+	0	0	0	-	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0
Dur. Goods	0	0	0	0	-	0	0	0	0	0	+*	-*	0	0	0	0	0	0	0	0
New Home	+*	0	0	0	0	0	-	0	0	0	0	+*	0	0	0	0	0	+*	0	0
Nonfarm Pay	0	0	0	0	0	-	0	-*	-	0	0	0	0	0	0	0	0	0	+	0
Unemp. Rate	0	0	0	0	0	0	0	-	-*	0	0	0	0	0	0	0	0	+	0	0
ISM	+	0	+	+	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead. Ind.	+	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0
Fed. Funds	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	-	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.9: Effects of surprises on stock prices

Announcement	Pos Shock, Exp	Neg Shock, Exp	Pos Shock, Rec	Neg Shock, Rec
Consumer Confidence	0	0	0	0
Core PPI	0	0	0	0
Employment Cost Index	-*	0	+*	0
Retail Sales	0	0	0	0
GDP	-*	0	+	0
Capacity Utilization	0	0	0	0
Core CPI	-*	0	0	0
Durable Goods	0	-*	+	0
New Home Sales	0	0	0	0
Nonfarm Payrolls	+	0	-	0
Unemployment Rate	0	0	0	0
ISM	0	0	0	0
Leading Indicators	-*	0	0	0
Federal Funds Rate	0	0	0	+

Note: * indicates 90% confidence, else 95% confidence

Table 5.10: Effects of surprises on stock-bond correlation

Announcement	Pos Shock, Exp				Neg Shock, Exp				Pos Shock, Rec				Neg Shock, Rec			
	2y	4y	7y	20y	2y	4y	7y	20y	2y	4y	7y	20y	2y	4y	7y	20y
Consumer Confidence	0	0	0	0	0	0	0	0	0	+	+	0	0	0	0	0
Core PPI	0	0	0	0	0	0	0	0	0	0	0	0	0	-*	-*	0
Employment Cost Index	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retail Sales	+*	+*	+*	0	0	0	0	0	0	0	0	0	0	0	0	0
GDP	+	+	0	0	0	+*	+*	+*	-	-	0	0	0	0	0	0
Capacity Utilization	+*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Durable Goods	0	0	0	0	0	0	0	0	0	+*	+*	+	0	0	0	0
New Home Sales	0	0	+*	+*	+	+	+	+	0	0	0	0	-	-*	-	-*
Nonfarm Payrolls	0	0	0	0	0	0	0	0	+	+	+	+*	0	0	0	0
Unemployment Rate	0	0	0	0	0	0	+*	+	0	-*	-*	0	0	0	0	0
ISM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leading Indicators	+*	0	0	0	0	0	0	0	0	+	+	+	0	0	0	0
Federal Funds Rate	0	0	0	0	-	-	-*	0	-*	-*	0	0	+	+*	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.11: State asymmetry in nominal rates

Announcement	$\beta_{Gexp} - \beta_{Grec}$					$\beta_{Bexp} - \beta_{Brec}$				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Consumer Confidence	0	-*	-	-	0	0	0	+	+	0
Core PPI	0	0	0	0	0	0	0	+*	+*	+*
Employment Cost Index	0	0	0	0	0	0	0	0	0	0
Retail Sales	0	+*	+	+	0	0	0	0	0	-*
GDP	0	0	0	0	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	0	0	0	0	0	0
Core CPI	0	0	0	0	0	0	-*	0	0	0
Durable Goods	+	0	0	0	0	0	0	0	-*	0
New Home Sales	0	0	0	0	0	+	+	0	0	+
Nonfarm Payrolls	+	0	0	0	0	+	+	+	0	0
Unemployment Rate	0	0	0	0	0	0	0	0	0	0
ISM	0	0	0	0	0	-*	0	-	-	-
Leading Indicators	0	0	0	0	0	0	0	0	0	0
Federal Funds Rate	-*	0	0	0	+	0	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.12: State asymmetry in TIPS rates

Announcement	$\beta_{Gexp} - \beta_{Grec}$					$\beta_{Bexp} - \beta_{Brec}$				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Consumer Confidence	-	-	0	-	-	+*	-*	0	0	0
Core PPI	0	0	0	0	0	0	0	0	0	0
Employment Cost Index	+	0	0	0	0	0	0	0	0	0
Retail Sales	0	+	+	+*	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	-*	0	-	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	-*
Durable Goods	0	0	0	0	0	0	0	0	0	0
New Home Sales	0	0	0	0	0	0	0	0	0	0
Nonfarm Payrolls	+	0	0	0	0	+*	+	0	0	0
Unemployment Rate	0	0	0	0	0	+	0	-*	-*	0
ISM	0	0	0	0	0	0	0	0	-	-
Leading Indicators	+	0	+	+	+*	0	+*	0	0	0
Federal Funds Rate	0	0	0	+	+	0	0	+*	+*	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.13: State asymmetry in BEIR rates

Announcement	$\beta_{Gexp} - \beta_{Grec}$					$\beta_{Bexp} - \beta_{Brec}$				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Consumer Confidence	0	0	0	0	0	-	+	0	+*	0
Core PPI	0	0	0	0	0	0	0	0	+*	0
Employment Cost Index	0	0	0	0	0	0	0	0	0	0
Retail Sales	0	0	0	0	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	0	-	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	0
Durable Goods	0	0	0	-*	-	0	0	0	0	0
New Home Sales	+*	0	0	0	0	0	+	0	0	0
Nonfarm Payrolls	0	0	0	0	0	0	0	+*	+	0
Unemployment Rate	0	0	0	0	0	0	0	+	+*	0
ISM	+	0	0	+*	0	0	-*	0	0	0
Leading Indicators	0	0	0	0	0	0	0	0	0	0
Federal Funds Rate	0	0	0	0	0	-	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.14: State asymmetry in stock prices

Announcement	$\beta_{Gexp} - \beta_{Grec}$	$\beta_{Bexp} + \beta_{Brec}$
Consumer Confidence	0	0
Core PPI	0	0
Employment Cost Index	-	0
Retail Sales	0	0
GDP	-	0
Capacity Utilization	0	0
Core CPI	0	0
Durable Goods	-	+*
New Home Sales	0	0
Nonfarm Payrolls	+	0
Unemployment Rate	0	0
ISM	0	0
Leading Indicators	0	0
Federal Funds Rate	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.15: State asymmetry in the stock-bond correlation

Announcement	$\beta_{Gexp} - \beta_{Grec}$				$\beta_{Bexp} - \beta_{Brec}$			
	2y	4y	7y	20y	2y	4y	7y	20y
Consumer Confidence	0	0	0	0	0	0	0	0
Core PPI	0	0	0	0	0	-*	0	0
Employment Cost Index	0	0	0	0	0	0	0	0
Retail Sales	0	0	0	0	0	0	0	0
GDP	+	+	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0
Durable Goods	0	0	0	0	0	0	0	0
New Home Sales	0	0	0	0	-	-	-	-
Nonfarm Payrolls	0	0	0	0	0	0	0	0
Unemployment Rate	0	0	0	0	0	0	-*	-*
ISM	0	0	0	0	0	0	0	0
Leading Indicators	0	0	0	-*	0	0	0	0
Federal Funds Rate	0	0	0	0	+	+	+*	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.16: Sign asymmetry in nominal rates

Announcement	$\beta_{Gexp} - \beta_{Bexp}$					$\beta_{Grec} - \beta_{Brec}$				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Consumer Confidence	0	-*	-	-	-*	0	+*	+	+	+*
Core PPI	0	0	0	-	0	0	0	0	0	0
Employment Cost Index	+*	0	0	0	0	0	0	0	0	0
Retail Sales	0	0	0	+	+	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	0	0	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	0
Durable Goods	0	0	0	0	0	-	-*	0	0	0
New Home Sales	-	-	0	0	0	0	+	0	0	0
Nonfarm Payrolls	0	0	0	0	0	0	0	+*	0	0
Unemployment Rate	0	0	0	0	0	0	0	0	0	0
ISM	+	0	+	+	0	0	0	0	-	0
Leading Indicators	0	0	0	0	0	0	0	0	0	0
Federal Funds Rate	0	0	0	0	0	+	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.17: Sign asymmetry in TIPS rates

Announcement	$\beta_{Gexp} - \beta_{Bexp}$					$\beta_{Grec} - \beta_{Brec}$				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Consumer Confidence	-	0	0	0	0	+	0	0	0	0
Core PPI	0	0	0	0	0	0	0	0	0	0
Employment Cost Index	+	0	-*	0	0	-	0	0	0	0
Retail Sales	0	0	0	0	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	0	0	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	-
Durable Goods	0	0	0	0	0	0	0	0	0	0
New Home Sales	0	0	0	0	0	0	0	0	0	0
Nonfarm Payrolls	0	0	0	0	0	0	0	0	0	0
Unemployment Rate	0	0	0	0	0	0	0	0	0	0
ISM	0	0	+	+*	0	0	0	0	0	0
Leading Indicators	0	0	0	0	0	0	0	0	0	0
Federal Funds Rate	0	0	0	0	0	0	0	0	0	-

Note: * indicates 90% confidence, else 95% confidence

Table 5.18: Sign asymmetry in BEIR rates

Announcement	$\beta_{Gexp} - \beta_{Bexp}$					$\beta_{Grec} - \beta_{Brec}$				
	2y	5y	10y	15y	20y	2y	5y	10y	15y	20y
Consumer Confidence	+	-*	-	-*	-	0	+*	+*	+*	0
Core PPI	0	0	-*	-	0	0	0	0	0	0
Employment Cost Index	0	0	0	0	0	0	0	-*	0	0
Retail Sales	0	0	+	0	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0	0	0
Capacity Utilization	+	0	0	0	0	-	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0	0	0
Durable Goods	0	0	0	0	0	0	0	0	0	0
New Home Sales	0	-	0	0	0	0	+	0	0	0
Nonfarm Payrolls	0	0	0	0	0	0	0	+	+*	0
Unemployment Rate	0	0	0	0	0	0	0	0	0	0
ISM	+	0	+	+	0	-*	0	0	0	0
Leading Indicators	0	0	0	0	0	+*	0	0	0	0
Federal Funds Rate	0	0	0	0	0	0	0	0	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.19:   Sign asymmetry in stock prices

Announcement	$\beta_{Gexp} - \beta_{Bexp}$	$\beta_{Grec} - \beta_{Brec}$
Consumer Confidence	0	0
Core PPI	0	0
Employment Cost Index	0	0
Retail Sales	0	0
GDP	0	0
Capacity Utilization	0	0
Core CPI	0	0
Durable Goods	-	+
New Home Sales	0	0
Nonfarm Payrolls	+*	0
Unemployment Rate	0	0
ISM	0	0
Leading Indicators	0	0
Federal Funds Rate	0	0

Note: * indicates 90% confidence, else 95% confidence

Table 5.20:   Sign asymmetry in stock-bond correlation

Announcement	$\beta_{Gexp} + \beta_{Bexp}$				$\beta_{Grec} + \beta_{Brec}$			
Consumer Confidence	0	0	0	0	+	+	+	0
Core PPI	0	0	0	0	0	0	0	0
Employment Cost Index	0	0	0	0	0	0	0	+*
Retail Sales	0	0	0	0	0	0	0	0
GDP	0	0	0	0	0	0	0	0
Capacity Utilization	0	0	0	0	0	0	0	0
Core CPI	0	0	0	0	0	0	0	0
Durable Goods	0	0	0	0	0	0	0	0
New Home Sales	0	0	0	0	+*	0	0	0
Nonfarm Payrolls	0	0	0	0	+	0	0	+*
Unemployment Rate	0	0	0	0	0	0	0	0
ISM	0	0	0	0	0	0	0	0
Leading Indicators	0	0	0	0	0	0	0	0
Federal Funds Rate	+	+	+	+*	-	-	-*	0

Note: * indicates 90% confidence, else 95% confidence

Chapter 6

Conclusions

6.1 Summary of Key Findings

Separating a broad set of macroeconomic announcements into four categories (price variables, production variables, monetary policy variables, and overall indicator variables), I examine a model accounting for business cycle asymmetries in order to determine the informational content of unexpected components of macroeconomic announcements. When examining real variables, I hypothesize that they can move both TIPS and break-even inflation rates, though absent changes in the inflation risk premium, shocks to price variables should not affect TIPS rates, only break-even inflation rates.

In analyzing movements in the stock-bond correlation, I note that a discount effect by which the main informational content of a macroeconomic announcement concerns future interest rates should increase the stock-bond correlation, while correlation decreases can only result if the main informational content concerns future economic growth or the equity risk premium (also described as a 'flight-to-quality' effect). Consistent with results present in the literature, I hypothesize that the discount effect dominates in expansions and the growth or 'flight-to-quality' effect dominates in recessions. Finally, studying the causes of business cycle asymmetries implies a hypothesis consistent with greater effect of expansionary over recessionary and negative over positive shocks to real variables.

Allowing for asymmetries is important, and I briefly summarize my findings.

- Price Variables (Core CPI, Core PPI)

    - **Equities**: For movements in equity markets, results are consistent with the 'proxy hypothesis' or the misvaluation of equity prices in expansions and a growth effect dominating in recessions.

– **Rates**: Price shocks mainly move nominal and break-even inflation rates, though in a couple of instances also affect TIPS rates. Some evidence shows that shocks to core PPI are characterized by the greater importance of expansionary over recessionary negative shocks, similar to results hypothesized for production variables, while negative shocks to core CPI tend to be of greater importance in recessions than expansions.

- Production Variables (Capacity Utilization, Durable Goods, GDP, ISM Manufacturing Survey, New Home Sales, Retail Sales)

  – **Equities**: Results provide evidence agreeing with the discount effect dominating for positive shocks in expansions for retail sales, capacity utilization, new home sales, and GDP. Additionally, there is evidence of the growth or 'flight-to-quality' effect dominating for positive recessionary shocks to GDP and for negative recessionary shocks to new home sales. The only production variable that clearly deviates from the hypothesis of the discount effect dominating in expansions and the growth or 'flight-to-quality' effect dominating in recessions is durable goods, as positive recessionary shocks raise the stock-bond correlation.

  – **Rates**: While shocks to retail sales, the ISM manufacturing survey, and capacity utilization move TIPS and break-even inflation rates at various horizons, shocks to durable goods only move break-even inflation rates, and for the most part shocks to new home sales also only move break-even inflation rates. There is mainly a positive correlation between production variable shocks and movements in nominal, TIPS, and/or break-even inflation rates at various horizons, with a few exceptions. Once again, shocks to the variable durable goods produce deviations in responses to shocks to other production variables, with positive recessionary shocks actually lowering some nominal and break-even inflation rates. With a couple of exceptions, evidence is present that expansionary shocks to production variables move rates more than recessionary shocks (once again durable goods deviates from this trend). Additionally, evidence is present that at least in some instances, negative shocks have greater effects than positive shocks (durable goods again deviates from this trend). There appears to be a clear separation in the response to durable goods shocks and other production variables.

- Employment Variables (Employment Cost Index, Nonfarm Payrolls, Unemployment Rate)

  - **Equities**: Evidence for both the unemployment rate and the employment cost index point to a discount effect dominating in expansions and a growth or 'flight-to-quality' effect dominating in recessions, while evidence for nonfarm payrolls indicate a reversal in the dominance of these effects.

  - **Rates**: Shocks to all three employment variables are generally positively correlated with movements in nominal, TIPS, and/or break-even inflation rates with a few exceptions which could point to changes in the inflation risk premium.

- Monetary Policy Variables (Federal Funds Target Rate)

  - **Equities**: The growth or 'flight-to-quality' effect seems to dominate for target rate shocks that move in the opposite direction of the expected path given the economic state (negative expansionary or positive recessionary shocks).

  - **Rates**: Expansionary shocks show long-run momentum in TIPS rates, while recessionary shocks show long-run reversals in TIPS rates, consistent with evidence of sharpness asymmetry (round expansionary peaks and sharp recessionary troughs).

- Overall Indicator Variables (Consumer Confidence, Leading Indicators)

  - **Equities**: Statistically significant movements in equity markets are limited for both consumer confidence and leading indicators shocks, though movements in the stock-bond correlation disagree with a growth or 'flight-to-quality' effect dominating in recessions.

  - **Rates**: Mixed results for movements in rates in response to consumer confidence shocks likely indicate the presence of multiple effects, while some evidence is present that recessionary shocks to leading indicators may move the inflation risk premium.

6.2 Directions for Future Research

While I provide a comprehensive examination of the informational content of macroeconomic announcements, some of my findings encourage the need for future examination. First, in looking at price variables, the occasional effect of a shock on a TIPS rate indicates that price variable shocks could influence the inflation risk premium or provide

expectations of future economic strength. Future work could shed more light on why and how price variables influence more than just break-even inflation rates. When examining production variables, there appears to be a clear deviation in market responses to durable goods shocks from responses to other production variables, pointing to the need for future research to determine the informational content of durable goods shocks that differs from similar production variables. Additionally, more work is needed to determine why negative expansionary shocks to the ISM manufacturing survey actually raise long term nominal and TIPS rates and a medium term break-even inflation rate. In examining employment variables, shocks to nonfarm payrolls differ from those to the unemployment rate or the employment cost index, consistent with a discount effect dominating in recessions and a growth or 'flight-to-quality' effect dominating in expansions. More work is needed to determine the root of this deviation. The result of a growth or 'flight-to-quality' effect dominating responses to monetary policy shocks that 'go against the grain' (negative expansionary or positive recessionary) is interesting and warrants further study, validation, and development of the theoretical underpinnings behind it. Finally, the mixed results present for the responses the consumer confidence shocks indicate the need for more in-depth analysis of the information conveyed by this news announcement.

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APPENDICES

Appendix A

Results Ignoring Asymmetry

Table A.1: Symmetric regression - nominal 2 year instantaneous forwards

Announcement	α	β	R^2
Consumer Confidence	-0.0019	0.0114*	0.0101
	-1.1865	1.7226*	
Core PPI		0.0042	
		0.6656	
Employment Cost Index		0.0184	
		1.3314	
Retail Sales		0.0295**	
		4.5858**	
GDP		0.0125	
		1.4814	
Capacity Utilization	-0.0014	0.0308**	0.0126
	-0.8656	3.2027**	
Core CPI		0.0228**	
		3.1391**	
Durable Goods	-0.0016	0.0113	0.0018
	-1.0234	1.0106	
New Home Sales		0.0105*	
		1.6690*	
Nonfarm Payrolls	-0.0008	0.0502**	0.0220
	-0.5238	4.2372**	
Unemployment Rate		0.0134	
		1.4848	
ISM	-0.0015	0.0506**	0.0194
	-0.9294	7.3243**	
Leading Indicators	-0.0015	-0.0039	0.0001
	-0.9406	-0.5770	
Federal Funds Rate	-0.0014	0.0111	0.0007
	-0.8719	0.6129	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.2: Symmetric regression - nominal 5 year instantaneous forwards

Announcement	α	β	R^2
Consumer Confidence	-0.0011	0.0126**	0.0089
	-0.8104	2.7750**	
Core PPI		0.0100**	
		2.0873**	
Employment Cost Index		0.0160**	
		2.0586**	
Retail Sales		0.0176**	
		3.2138**	
GDP		0.0083	
		1.3337	
Capacity Utilization	-0.0006	0.0171**	0.0075
	-0.4569	2.8259**	
Core CPI		0.0182**	
		2.7495**	
Durable Goods	-0.0008	0.0082	0.0021
	-0.6045	1.0346	
New Home Sales		0.0113**	
		2.0875**	
Nonfarm Payrolls	-0.0003	0.0293**	0.0101
	-0.2228	3.1828**	
Unemployment Rate		0.0039	
		0.4933	
ISM	-0.0007	0.0263**	0.0073
	-0.5390	3.0807**	
Leading Indicators	-0.0007	0.0010	0.0000
	-0.5247	0.1376	
Federal Funds Rate	-0.0008	-0.0061	0.0003
	-0.5824	-0.4168	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.3: Symmetric regression - nominal 10 year instantaneous forwards

Announcement	α	β	R^2
Consumer Confidence	-0.0009	0.0052	0.0052
	-0.7241	1.1196	
Core PPI		0.0115**	
		2.9455**	
Employment Cost Index		0.0102	
		1.4205	
Retail Sales		0.0114**	
		2.2924**	
GDP		0.0091	
		1.2734	
Capacity Utilization	-0.0005	0.0105	0.0047
	-0.4284	1.5057	
Core CPI		0.0150**	
		2.8276**	
Durable Goods	-0.0007	0.0058	0.0028
	-0.5626	1.0246	
New Home Sales		0.0136**	
		2.8724**	
Nonfarm Payrolls	-0.0004	0.0145**	0.0029
	-0.3007	2.2851**	
Unemployment Rate		0.0006	
		0.0931	
ISM	-0.0005	0.0297**	0.0109
	-0.4081	4.4402**	
Leading Indicators	-0.0006	0.0073	0.0007
	-0.4524	1.0645	
Federal Funds Rate	-0.0006	-0.0121**	0.0014
	-0.4923	-2.0286**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.4: Symmetric regression - nominal 15 year instantaneous forwards

Announcement	α	β	R^2
Consumer Confidence	-0.0014	0.0011	0.0041
	-1.2697	0.2590	
Core PPI		0.0115**	
		3.4424**	
Employment Cost Index		0.0063	
		0.9043	
Retail Sales		0.0088**	
		2.2545**	
GDP		0.0036	
		0.5278	
Capacity Utilization	-0.0010	0.0113*	0.0071
	-0.9770	1.7084*	
Core CPI		0.0156**	
		3.3304**	
Durable Goods	-0.0012	0.0037	0.0018
	-1.1097	0.8137	
New Home Sales		0.0095**	
		2.2497**	
Nonfarm Payrolls	-0.0010	0.0095*	0.0017
	-0.8967	1.9574*	
Unemployment Rate		-0.0001	
		-0.0158	
ISM	-0.0010	0.0226**	0.0086
	-0.9922	3.9237**	
Leading Indicators	-0.0011	0.0092	0.0014
	-1.0042	1.4830	
Federal Funds Rate	-0.0012	-0.0139**	0.0025
	-1.1022	-2.7722**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.5: Symmetric regression - nominal 20 year instantaneous forwards

Announcement	α	β	R^2
Consumer Confidence	-0.0017	0.0023	0.0031
	-1.5045	0.6248	
Core PPI		0.0112**	
		2.6012**	
Employment Cost Index		0.0048	
		0.7237	
Retail Sales		0.0061*	
		1.7123*	
GDP		-0.0031	
		-0.5058	
Capacity Utilization	-0.0014	0.0079	0.0049
	-1.3038	1.3341	
Core CPI		0.0145**	
		2.5042**	
Durable Goods	-0.0015	0.0021	0.0002
	-1.3993	0.4972	
New Home Sales		0.0026	
		0.6180	
Nonfarm Payrolls	-0.0013	0.0099**	0.0018
	-1.2175	2.1845**	
Unemployment Rate		-0.0020	
		-0.3390	
ISM	-0.0015	0.0021	0.0001
	-1.3988	0.1898	
Leading Indicators	-0.0015	0.0090	0.0013
	-1.3426	1.3718	
Federal Funds Rate	-0.0017	-0.0199**	0.0049
	-1.5565	-3.1033**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.6: Symmetric regression - TIPS 2 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	0.0012	-0.0020	0.0071	0.0075
	0.4586	-0.4027	1.2533	
Core PPI			0.0095**	
			2.1736**	
Employment Cost Index			-0.0012	
			-0.0711	
Retail Sales			0.0320**	
			2.9971**	
GDP			0.0201**	
			2.7648**	
Capacity Utilization	0.0010	-0.0020	0.0079	0.0008
	0.3935	-0.4058	0.7048	
Core CPI			-0.0056	
			-0.8345	
Durable Goods	0.0010	-0.0026	0.0166	0.0021
	0.3972	-0.5185	1.3717	
New Home Sales			0.0063	
			1.2246	
Nonfarm Payrolls	0.0016	-0.0022	0.0628**	0.0219
	0.6177	-0.4785	2.5787**	
Unemployment Rate			0.0276**	
			2.1706**	
ISM	0.0010	-0.0023	0.0290**	0.0060
	0.3894	-0.4605	3.7279**	
Leading Indicators	0.0009	-0.0022	-0.0041	0.0003
	0.3608	-0.4459	-0.5630	
Federal Funds Rate	0.0012	-0.0024	0.0183*	0.0025
	0.4637	-0.4874	1.7815*	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.7: Symmetric regression - TIPS 5 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	0.0003	-0.0018	0.0099**	0.0078
	0.1701	-0.7408	2.0202**	
Core PPI			0.0048	
			1.0204	
Employment Cost Index			0.0088	
			1.0732	
Retail Sales			0.0098	
			1.2469	
GDP			0.0160**	
			2.5830**	
Capacity Utilization	0.0003	-0.0018	0.0078	0.0021
	0.1570	-0.7641	1.0735	
Core CPI			0.0077	
			1.3519	
Durable Goods	0.0001	-0.0017	0.0104*	0.0017
	0.0706	-0.6948	1.9584*	
New Home Sales			0.0003	
			0.0670	
Nonfarm Payrolls	0.0003	-0.0014	0.0212**	0.0072
	0.1657	-0.5812	3.3408**	
Unemployment Rate			0.0004	
			0.0649	
ISM	0.0001	-0.0016	0.0213**	0.0065
	0.0616	-0.6609	3.6053**	
Leading Indicators	0.0000	-0.0015	-0.0059	0.0007
	0.0165	-0.6072	-1.1322	
Federal Funds Rate	0.0002	-0.0016	0.0119	0.0017
	0.1248	-0.6748	1.6398	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.8: Symmetric regression - TIPS 10 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0004	-0.0004	0.0033	0.0016
	-0.2548	-0.2306	0.7822	
Core PPI			0.0019	
			0.8072	
Employment Cost Index			0.0001	
			0.0248	
Retail Sales			0.0056	
			1.6345	
GDP			-0.0018	
			-0.3510	
Capacity Utilization	-0.0003	-0.0005	0.0111**	0.0033
	-0.1871	-0.2828	2.9571**	
Core CPI			-0.0015	
			-0.4353	
Durable Goods	-0.0004	-0.0004	0.0024	0.0003
	-0.2535	-0.2179	0.6100	
New Home Sales			-0.0016	
			-0.5646	
Nonfarm Payrolls	-0.0003	-0.0003	0.0123**	0.0046
	-0.1834	-0.1467	4.0137**	
Unemployment Rate			0.0005	
			0.1060	
ISM	-0.0004	-0.0004	0.0152**	0.0062
	-0.2546	-0.2075	4.6543**	
Leading Indicators	-0.0004	-0.0004	0.0019	0.0001
	-0.2435	-0.2129	0.5363	
Federal Funds Rate	-0.0004	-0.0004	0.0055	0.0007
	-0.2216	-0.2094	0.8534	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.9: Symmetric regression - TIPS 15 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0002	-0.0007	0.0101**	0.0065
	-0.1311	-0.3892	2.2523**	
Core PPI			0.0022	
			0.7941	
Employment Cost Index			-0.0003	
			-0.0608	
Retail Sales			0.0068	
			1.5176	
GDP			-0.0010	
			-0.1920	
Capacity Utilization	-0.0002	-0.0007	0.0087*	0.0022
	-0.1282	-0.3493	1.7858*	
Core CPI			0.0013	
			0.4658	
Durable Goods	-0.0003	-0.0006	0.0002	0.0002
	-0.1713	-0.3144	0.0666	
New Home Sales			0.0021	
			0.7866	
Nonfarm Payrolls	-0.0002	-0.0005	0.0114**	0.0039
	-0.1060	-0.2544	3.2572**	
Unemployment Rate			0.0023	
			0.5510	
ISM	-0.0003	-0.0006	0.0122**	0.0039
	-0.1671	-0.2988	3.3635**	
Leading Indicators	-0.0003	-0.0006	0.0019	0.0001
	-0.1558	-0.3062	0.5312	
Federal Funds Rate	-0.0003	-0.0005	-0.0037	0.0003
	-0.1936	-0.2724	-0.7636	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.10: Symmetric regression - TIPS 20 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	0.0003	-0.0017	0.0177**	0.0130
	0.1566	-0.7510	2.0704**	
Core PPI			0.0043	
			1.2497	
Employment Cost Index			0.0019	
			0.3346	
Retail Sales			0.0064	
			1.4115	
GDP			0.0051	
			0.8817	
Capacity Utilization	0.0002	-0.0014	0.0055	0.0022
	0.1058	-0.6295	0.9048	
Core CPI			0.0080**	
			2.1212**	
Durable Goods	0.0001	-0.0014	0.0013	0.0012
	0.0659	-0.6129	0.3118	
New Home Sales			0.0070*	
			1.8845*	
Nonfarm Payrolls	0.0002	-0.0013	0.0094**	0.0023
	0.1100	-0.5610	2.5827**	
Unemployment Rate			0.0042	
			0.7973	
ISM	0.0002	-0.0013	0.0086**	0.0015
	0.0702	-0.5810	2.0767**	
Leading Indicators	0.0001	-0.0013	-0.0004	0.0002
	0.0657	-0.5732	-0.0959	
Federal Funds Rate	0.0000	-0.0012	-0.0122**	0.0023
	0.0049	-0.5378	-2.0471**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.11: Symmetric regression - BEIR 2 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0035*	0.0060*	-0.0013	0.0026
	-1.7490*	1.7480*	-0.2619	
Core PPI			0.0063	
			0.9279	
Employment Cost Index			-0.0088	
			-0.7859	
Retail Sales			0.0042	
			0.4436	
GDP			-0.0013	
			-0.1319	
Capacity Utilization	-0.0030	0.0053	0.0201**	0.0249
	-1.5002	1.5448	2.0225**	
Core CPI			0.0310**	
			4.1175**	
Durable Goods	-0.0034*	0.0056	0.0024	0.0020
	-1.7225*	1.6346	0.2489	
New Home Sales			0.0054	
			0.9405	
Nonfarm Payrolls	-0.0031	0.0061*	0.0333**	0.0121
	-1.5596	1.8206*	5.0281**	
Unemployment Rate			0.0131*	
			1.8617*	
ISM	-0.0034*	0.0060*	0.0152*	0.0044
	-1.7180*	1.7475*	1.8452*	
Leading Indicators	-0.0035*	0.0061*	-0.0034	0.0018
	-1.7400*	1.7559*	-0.4218	
Federal Funds Rate	-0.0033	0.0059*	0.0151**	0.0044
	-1.6293	1.7037*	2.0370**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.12: Symmetric regression - BEIR 5 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0013	0.0017	0.0026	0.0030
	-0.9140	0.7645	0.5039	
Core PPI			0.0052	
			0.9655	
Employment Cost Index			0.0072	
			1.0626	
Retail Sales			0.0079	
			1.0774	
GDP			-0.0077	
			-1.0194	
Capacity Utilization	-0.0011	0.0022	0.0092	0.0038
	-0.7799	1.0135	0.9367	
Core CPI			0.0105	
			1.6215	
Durable Goods	-0.0013	0.0023	-0.0023	0.0021
	-0.8918	1.0470	-0.4546	
New Home Sales			0.0102**	
			2.0427**	
Nonfarm Payrolls	-0.0012	0.0024	0.0082	0.0017
	-0.8268	1.0941	1.5119	
Unemployment Rate			0.0035	
			0.6087	
ISM	-0.0013	0.0023	0.0048	0.0008
	-0.8773	1.0752	0.6275	
Leading Indicators	-0.0012	0.0022	0.0069	0.0011
	-0.8270	1.0320	1.1249	
Federal Funds Rate	-0.0014	0.0024	-0.0068**	0.0010
	-0.9298	1.1040	-2.0315**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.13: Symmetric regression - BEIR 10 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0007	0.0007	0.0018	0.0051
	-0.4383	0.3623	0.5731	
Core PPI			0.0096**	
			2.9234**	
Employment Cost Index			0.0100	
			1.5194	
Retail Sales			0.0057	
			1.4883	
GDP			0.0108**	
			2.0103**	
Capacity Utilization	-0.0006	0.0011	-0.0007	0.0051
	-0.4026	0.5650	-0.0795	
Core CPI			0.0166**	
			2.8373**	
Durable Goods	-0.0008	0.0012	0.0034	0.0045
	-0.5084	0.5926	0.8048	
New Home Sales			0.0148**	
			4.0671**	
Nonfarm Payrolls	-0.0007	0.0014	0.0022	0.0003
	-0.4852	0.6681	0.4450	
Unemployment Rate			0.0001	
			0.0176	
ISM	-0.0007	0.0013	0.0170**	0.0054
	-0.4965	0.6510	3.4469**	
Leading Indicators	-0.0007	0.0013	0.0054	0.0007
	-0.4605	0.6229	0.7486	
Federal Funds Rate	-0.0009	0.0015	-0.0142**	0.0030
	-0.6077	0.7165	-2.7101**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.14: Symmetric regression - BEIR 15 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0022	0.0025	-0.0090*	0.0067
	-1.2894	1.2172	-1.6939*	
Core PPI			0.0094**	
			2.7530**	
Employment Cost Index			0.0064	
			1.0255	
Retail Sales			0.0020	
			0.5186	
GDP			0.0045	
			0.8449	
Capacity Utilization	-0.0019	0.0024	0.0025	0.0051
	-1.1241	1.1876	0.2893	
Core CPI			0.0142**	
			3.1856**	
Durable Goods	-0.0021	0.0026	0.0034	0.0020
	-1.2418	1.2700	0.8023	
New Home Sales			0.0072*	
			1.9171*	
Nonfarm Payrolls	-0.0021	0.0027	-0.0018	0.0009
	-1.2490	1.3154	-0.5103	
Unemployment Rate			-0.0024	
			-0.6302	
ISM	-0.0021	0.0027	0.0119**	0.0035
	-1.2385	1.3052	2.4048**	
Leading Indicators	-0.0020	0.0026	0.0071	0.0018
	-1.1975	1.2650	1.0701	
Federal Funds Rate	-0.0022	0.0028	-0.0094	0.0021
	-1.3048	1.3584	-1.5859	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.15: Symmetric regression - BEIR 20 year instantaneous forwards

Announcement	α	$dummy_{99-04}$	β	R^2
Consumer Confidence	-0.0037	0.0045*	-0.0154*	0.0088
	-1.5177	1.6790*	-1.7635*	
Core PPI			0.0070	
			1.5499	
Employment Cost Index			0.0026	
			0.4440	
Retail Sales			-0.0003	
			-0.0693	
GDP			-0.0084	
			-1.3929	
Capacity Utilization	-0.0033	0.0041	0.0023	0.0018
	-1.3440	1.5229	0.2454	
Core CPI			0.0064	
			1.1744	
Durable Goods	-0.0034	0.0043	0.0007	0.0015
	-1.4009	1.5861	0.1348	
New Home Sales			-0.0045	
			-1.0148	
Nonfarm Payrolls	-0.0034	0.0043	0.0005	0.0018
	-1.3967	1.5990	0.1559	
Unemployment Rate			-0.0063	
			-1.2154	
ISM	-0.0034	0.0043	-0.0075	0.0019
	-1.4067	1.5823	-0.6021	
Leading Indicators	-0.0033	0.0041	0.0092	0.0023
	-1.3605	1.5279	1.1546	
Federal Funds Rate	-0.0035	0.0044	-0.0065	0.0017
	-1.4351	1.6102	-0.6105	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.16: Symmetric regression - stock prices

Announcement	α	β	R^2
Consumer Confidence	-0.0168	-0.0716	0.0019
	-0.6205	-0.9031	
Core PPI		-0.1630	
		-1.4719	
Employment Cost Index		-0.1832	
		-1.0449	
Retail Sales		0.1397	
		1.1865	
GDP		0.0412	
		0.3625	
Capacity Utilization	-0.0130	0.1434	0.0018
	-0.4925	0.6373	
Core CPI		-0.2323	
		-1.1922	
Durable Goods	-0.0110	0.0589	0.0004
	-0.4144	0.6109	
New Home Sales		-0.1072	
		-1.4956	
Nonfarm Payrolls	-0.0150	-0.1912*	0.0011
	-0.5653	-1.6891*	
Unemployment Rate		-0.0118	
		-0.0894	
ISM	-0.0122	0.1224	0.0004
	-0.4627	0.9688	
Leading Indicators	-0.0120	0.0508	0.0001
	-0.4549	0.3204	
Federal Funds Rate	-0.0148	-0.3688	0.0026
	-0.5626	-1.0887	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.17: Symmetric regression - 2y stock-bond correlation

Announcement	α	β	R^2
Consumer Confidence	-0.0215**	0.0070*	0.0019
	-8.9139**	1.8113*	
Core PPI		-0.0127	
		-1.0946	
Employment Cost Index		0.0086	
		0.7408	
Retail Sales		0.0142	
		1.3180	
GDP		-0.0093	
		-1.4538	
Capacity Utilization	-0.0207**	0.0277	0.0027
	-8.9543**	0.7715	
Core CPI		0.0017	
		0.1494	
Durable Goods	-0.0208**	0.0090	0.0005
	-8.9246**	1.1308	
New Home Sales		0.0086*	
		1.6838*	
Nonfarm Payrolls	-0.0205**	0.0097	0.0004
	-8.8067**	0.9398	
Unemployment Rate		0.0007	
		0.0858	
ISM	-0.0207**	0.0141	0.0007
	-8.8846**	1.2398	
Leading Indicators	-0.0207**	0.0009	0.0000
	-8.8801**	0.0942	
Federal Funds Rate	-0.0208**	-0.0213	0.0011
	-8.9378**	-0.5470	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.18: Symmetric regression - 4y stock-bond correlation

Announcement	α	β	R^2
Consumer Confidence	-0.0403**	0.0141*	0.0015
	-8.8759**	1.8532*	
Core PPI		-0.0137	
		-0.8945	
Employment Cost Index		0.0148	
		1.0744	
Retail Sales		0.0254	
		1.4663	
GDP		-0.0176*	
		-1.6567*	
Capacity Utilization	-0.0386**	0.0460	0.0025
	-8.8323**	0.7370	
Core CPI		0.0155	
		0.5726	
Durable Goods	-0.0389**	0.0194	0.0005
	-8.8402**	1.3367	
New Home Sales		0.0095	
		1.1077	
Nonfarm Payrolls	-0.0384**	0.0235	0.0006
	-8.7178**	1.1363	
Unemployment Rate		0.0043	
		0.2706	
ISM	-0.0387**	0.0163	0.0003
	-8.8052**	0.5967	
Leading Indicators	-0.0386**	0.0297	0.0009
	-8.8064**	1.3716	
Federal Funds Rate	-0.0388**	-0.0093	0.0001
	-8.8629**	-0.1321	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.19: Symmetric regression - 7y stock-bond correlation

Announcement	α	β	R^2
Consumer Confidence	-0.0526**	0.0231*	0.0019
	-8.5017**	1.9425*	
Core PPI		-0.0143	
		-0.8666	
Employment Cost Index		-0.0015	
		-0.0717	
Retail Sales		0.0363	
		1.4163	
GDP		-0.0353**	
		-2.1553**	
Capacity Utilization	-0.0500**	0.0587	0.0029
	-8.3699**	0.8000	
Core CPI		0.0384	
		0.9476	
Durable Goods	-0.0504**	0.0271	0.0004
	-8.3902**	1.3967	
New Home Sales		0.0095	
		0.7442	
Nonfarm Payrolls	-0.0498**	0.0278	0.0005
	-8.2665**	1.0548	
Unemployment Rate		-0.0024	
		-0.1072	
ISM	-0.0502**	0.0076	0.0000
	-8.3556**	0.1702	
Leading Indicators	-0.0500**	0.0531	0.0015
	-8.3641**	1.4748	
Federal Funds Rate	-0.0501**	0.0215	0.0002
	-8.3985**	0.2313	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table A.20: Symmetric regression - 20y stock-bond correlation

Announcement	α	β	R^2
Consumer Confidence	-0.0869**	0.0337	0.0014
	-7.2071**	1.4325	
Core PPI		-0.0161	
		-0.5544	
Employment Cost Index		-0.0245	
		-0.4138	
Retail Sales		0.0562	
		1.2466	
GDP		-0.0704**	
		-2.0840**	
Capacity Utilization	-0.0821**	0.0914	0.0031
	-7.0491**	0.8105	
Core CPI		0.1064	
		1.1028	
Durable Goods	-0.0827**	0.0464	0.0003
	-7.0573**	1.2784	
New Home Sales		0.0070	
		0.2950	
Nonfarm Payrolls	-0.0818**	0.0368	0.0002
	-6.9595**	0.8904	
Unemployment Rate		-0.0059	
		-0.1501	
ISM	-0.0824**	-0.0094	0.0000
	-7.0336**	-0.1111	
Leading Indicators	-0.0819**	0.1380	0.0027
	-7.0558**	1.4468	
Federal Funds Rate	-0.0819**	0.0617	0.0004
	-7.0530**	0.4128	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Appendix B

Results Accounting for Asymmetry

Table B.1: Asymmetric regression - nominal 2y instantaneous forwards

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0019	-0.0275	-0.0085	0.0286*	0.0297	0.0152
	-1.1166	-1.1449	-0.2870	1.6932*	0.8879	
Core PPI		0.0107	0.0363	-0.0094	-0.0065	
		0.3375	0.9313	-0.3635	-0.2200	
Employment Cost Index		0.0934*	-0.0488	-0.0401	0.0459	
		1.6706*	-1.0183	-0.9142	1.4052	
Retail Sales		0.0616**	-0.0044	0.0285**	0.0223	
		2.2479**	-0.0923	3.0565**	0.7439	
GDP		-0.0206	-0.0116	0.0329	0.0460	
		-0.4805	-0.5951	1.0730	1.3304	
Capacity Utilization	-0.0011	0.0246	-0.0277	0.0097	0.0655**	0.0171
	-0.7023	1.1214	-0.7347	0.5789	1.9639**	
Core CPI		-0.0250	0.0138	0.0597**	0.0294	
		-0.7240	0.4888	2.1689**	1.1539	
Durable Goods	-0.0011	0.0957**	0.0197	-0.0568**	0.0324*	0.0086
	-0.6647	2.5153**	0.7330	-2.0202**	1.8228*	
New Home Sales		0.0060	0.1050**	0.0081	-0.0627	
		0.2270	2.9097**	0.2246	-1.4375	
Nonfarm Payrolls	-0.0016	0.1743**	0.1392**	-0.0009	-0.0388	0.0366
	-1.0368	3.2905**	3.1202**	-0.0226	-1.4390	
Unemployment Rate		0.0096	0.0321	0.0222	0.0100	
		0.2117	0.7127	0.6978	0.4928	
ISM	-0.0016	0.1004**	-0.0023	0.0077	0.0737**	0.0214
	-0.9893	3.7757**	-0.0866	0.2051	3.4816**	
Leading Indicators	-0.0016	0.0264	0.0321	-0.0151	-0.0309	0.0013
	-0.9775	1.2993	1.0927	-1.2798	-1.4766	
Federal Funds Rate	-0.0018	0.0012	0.1257	0.1513**	-0.0380	0.0066
	-1.1365	0.0195	1.0537	3.9952**	-0.8484	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.2: Asymmetric regression - nominal 5y instantaneous forwards

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0011	-0.0218	0.0231	0.0374**	0.0016	0.0140
	-0.7628	-1.0364	1.4827	2.4160**	0.1143	
Core PPI		0.0258	0.0504*	-0.0172	0.0000	
		0.7675	1.8477*	-0.6414	0.0006	
Employment Cost Index		0.0330	0.0066	-0.0020	0.0310	
		0.9941	0.1393	-0.0915	1.0556	
Retail Sales		0.0603**	0.0066	0.0123**	0.0066	
		2.4821**	0.1333	1.9664**	0.1699	
GDP		-0.0165	0.0053	0.0202	0.0166	
		-0.3837	0.3367	0.6218	0.7123	
Capacity Utilization	-0.0005	-0.0112	0.0138	0.0275*	0.0212	0.0103
	-0.3494	-0.4603	0.5651	1.7600*	1.0010	
Core CPI		-0.0103	-0.0316	0.0386*	0.0541**	
		-0.3599	-1.2186	1.7756*	2.2997**	
Durable Goods	-0.0004	0.0466	0.0039	-0.0282	0.0305	0.0061
	-0.3268	1.3803	0.1488	-1.2198	1.4993	
New Home Sales		-0.0100	0.0871**	0.0304	-0.0514*	
		-0.5166	3.2905**	1.3330	-1.7866*	
Nonfarm Payrolls	-0.0009	0.0836*	0.1137**	0.0281	-0.0477*	0.0225
	-0.6604	1.9233*	2.8301**	0.9354	-1.7183*	
Unemployment Rate		0.0133	0.0208	0.0044	-0.0009	
		0.3052	0.4712	0.1389	-0.0462	
ISM	-0.0011	0.0434	-0.0227	0.0279	0.0341	0.0091
	-0.8388	1.1784	-0.9204	0.9086	1.5482	
Leading Indicators	-0.0008	0.0289	0.0169	-0.0108	-0.0125	0.0007
	-0.5720	1.0752	0.4671	-0.4961	-0.4386	
Federal Funds Rate	-0.0008	0.0115	0.0693	0.0074	-0.0333	0.0012
	-0.6321	0.1933	0.5769	0.2695	-0.6600	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

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Table B.3: Asymmetric regression - nominal 10y instantaneous forwards

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0009	-0.0375**	0.0515**	0.0392**	-0.0340**	0.0172
	-0.7120	-2.1822**	3.0570**	2.9912**	-2.1697**	
Core PPI		0.0084	0.0693**	-0.0069	-0.0059	
		0.2926	2.6835**	-0.3079	-0.3205	
Employment Cost Index		-0.0021	0.0273	0.0099	0.0216	
		-0.0531	0.6449	0.4295	0.7542	
Retail Sales		0.0636**	-0.0179	0.0038	0.0108	
		2.9964**	-0.3813	0.8419	0.2825	
GDP		0.0037	0.0126	0.0099	0.0058	
		0.0632	0.8985	0.2944	0.3378	
Capacity Utilization	-0.0008	-0.0106	0.0293*	0.0371*	-0.0041	0.0066
	-0.5918	-0.4420	1.6973*	1.9054*	-0.2515	
Core CPI		0.0163	-0.0184	0.0175	0.0351	
		0.7107	-0.7638	1.0383	1.5485	
Durable Goods	-0.0002	-0.0080	-0.0158	0.0014	0.0397**	0.0057
	-0.1309	-0.2771	-0.8888	0.0756	2.0913**	
New Home Sales		-0.0037	0.0541**	0.0226	-0.0081	
		-0.1901	2.1986**	0.9873	-0.3197	
Nonfarm Payrolls	-0.0007	0.0373	0.0657**	0.0271	-0.0331	0.0082
	-0.5941	1.1494	2.1631**	1.3106	-1.4873	
Unemployment Rate		0.0065	0.0062	-0.0003	-0.0001	
		0.1729	0.1468	-0.0124	-0.0068	
ISM	-0.0012	0.0746**	-0.0675**	0.0169	0.0509**	0.0188
	-0.9669	3.6318**	-2.6846**	0.7144	4.0814**	
Leading Indicators	-0.0007	0.0031	-0.0342	0.0132	0.0277	0.0019
	-0.5496	0.1234	-0.8217	0.7250	0.7496	
Federal Funds Rate	-0.0006	0.0736	0.0455	-0.0418	-0.0320	0.0022
	-0.5169	1.0242	0.7411	-1.4725	-1.3126	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.4: Asymmetric regression - nominal 15y instantaneous forwards

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0013	-0.0380**	0.0402**	0.0344**	-0.0325**	0.0177
	-1.1842	-2.4594**	2.5161**	3.6210**	-2.1532**	
Core PPI		0.0002	0.0705**	0.0013	-0.0079	
		0.0116	2.7690**	0.1057	-0.4638	
Employment Cost Index		-0.0182	0.0249	0.0145	0.0190	
		-0.4458	0.6415	0.6220	0.6272	
Retail Sales		0.0485**	-0.0484	0.0027	0.0301	
		2.9268**	-1.4768	0.6628	1.3314	
GDP		0.0241	0.0076	-0.0145	0.0014	
		0.4254	0.5260	-0.3762	0.0676	
Capacity Utilization	-0.0012	-0.0066	0.0094	0.0337*	0.0064	0.0082
	-1.1066	-0.3347	0.4572	1.9297*	0.3204	
Core CPI		0.0241	-0.0058	0.0091	0.0305	
		1.3522	-0.2613	0.5846	1.5267	
Durable Goods	-0.0007	-0.0284	-0.0148	0.0106	0.0347**	0.0055
	-0.6165	-1.0972	-1.0890	0.7786	2.3123**	
New Home Sales		0.0021	0.0419**	0.0092	-0.0081	
		0.1138	1.9746**	0.4120	-0.3359	
Nonfarm Payrolls	-0.0011	0.0282	0.0462*	0.0067	-0.0225	0.0049
	-0.9934	1.2501	1.7710*	0.4033	-1.0086	
Unemployment Rate		-0.0027	0.0108	0.0022	-0.0001	
		-0.0794	0.2946	0.0893	-0.0063	
ISM	-0.0014	0.0472**	-0.0803**	0.0115	0.0637**	0.0173
	-1.3291	2.9518**	-4.8255**	0.6835	6.9388**	
Leading Indicators	-0.0012	0.0093	-0.0257	0.0131	0.0253	0.0026
	-1.1163	0.4148	-0.7030	1.0032	0.7618	
Federal Funds Rate	-0.0013	0.1028	0.0257	-0.0170	-0.0306	0.0042
	-1.2474	1.4847	0.4675	-0.5184	-1.4367	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.5: Asymmetric regression - nominal 20y instantaneous forwards

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0015	-0.0207	0.0142	0.0239*	-0.0105	0.0104
	-1.3086	-1.2979	1.1072	1.7907*	-0.9550	
Core PPI		0.0087	0.0655**	-0.0010	-0.0088	
		0.3343	2.8083**	-0.0578	-0.5088	
Employment Cost Index		-0.0248	0.0208	0.0156	0.0212	
		-0.7000	0.5564	0.7683	0.6792	
Retail Sales		0.0229*	-0.0585*	0.0054*	0.0334*	
		1.7890*	-1.7921*	1.6713*	1.7484*	
GDP		0.0391	0.0009	-0.0393	-0.0012	
		0.7590	0.0596	-0.8822	-0.0508	
Capacity Utilization	-0.0014	-0.0154	-0.0038	0.0328**	0.0073	0.0070
	-1.2696	-0.8789	-0.1738	2.1859**	0.3567	
Core CPI		0.0238	-0.0129	-0.0018	0.0421	
		1.5351	-0.4927	-0.1190	1.5271	
Durable Goods	-0.0013	-0.0230	-0.0037	0.0068	0.0204*	0.0023
	-1.1867	-1.0013	-0.2913	0.6133	1.6655*	
New Home Sales		0.0035	0.0392**	0.0048	-0.0372	
		0.1960	2.3186**	0.2399	-1.6259	
Nonfarm Payrolls	-0.0012	0.0373*	0.0326	-0.0155	-0.0091	0.0040
	-1.0872	1.7321*	1.4042	-0.7859	-0.4325	
Unemployment Rate		-0.0210	0.0287	0.0078	-0.0052	
		-0.6207	0.9447	0.3100	-0.3106	
ISM	-0.0014	-0.0093	-0.0581**	0.0038	0.0419**	0.0040
	-1.3017	-0.1957	-2.4993**	0.1449	3.2358**	
Leading Indicators	-0.0015	0.0188	0.0035	0.0053	0.0101	0.0014
	-1.3831	1.2539	0.0753	0.5780	0.3755	
Federal Funds Rate	-0.0018*	0.1187**	-0.0069	-0.0442**	-0.0265	0.0062
	-1.6643*	2.1065**	-0.0926	-2.0249**	-0.9485	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.6: Asymmetric regression - TIPS 2y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	0.0009	-0.0013	-0.0421*	0.0425*	0.0496**	-0.0254	0.0182
	0.3446	-0.2703	-1.8824*	1.8981*	2.6125**	-1.2135	
Core PPI			0.0157	0.0225	0.0056	0.0026	
			0.7364	0.5832	0.2665	0.0963	
Employment Cost Index			0.4214**	-0.0553	-0.5579**	0.0853	
			6.3983**	-0.7324	-6.4392**	0.8156	
Retail Sales			0.0258	-0.0265	0.0699	0.0501	
			0.5319	-0.4500	1.1685	0.9118	
GDP			0.0492	0.0152	-0.0181	0.0470**	
			0.5376	1.2902	-0.2418	2.1936**	
Capacity Utilization	0.0009	-0.0016	-0.0414	-0.0024	0.0519*	0.0108	0.0022
	0.3502	-0.3197	-1.2517	-0.0883	1.7971*	0.4028	
Core CPI			-0.0246	0.0178	0.0116	-0.0176	
			-0.9643	0.5721	0.3722	-1.0003	
Durable Goods	0.0006	-0.0012	0.0669	0.0887	-0.0469	-0.0392	0.0128
	0.2234	-0.2519	0.8060	1.4373	-0.7226	-0.5336	
New Home Sales			-0.1699	0.0687	0.2654	-0.0596	
			-1.2438	1.3310	1.3011	-0.9754	
Nonfarm Payrolls	0.0014	-0.0022	0.3497**	0.1833**	-0.2844*	-0.0348	0.0469
	0.5201	-0.4701	3.6085**	3.3768**	-1.8681*	-0.5284	
Unemployment Rate			0.0220	0.1021**	0.0829	0.0038	
			0.2864	3.0388**	0.8635	0.1936	
ISM	0.0014	-0.0026	0.0171	-0.0128	0.0173	0.0703*	0.0087
	0.5305	-0.5290	0.4624	-0.3638	0.3740	1.9426*	
Leading Indicators	0.0012	-0.0022	0.0308**	0.0199	-0.0466**	-0.0113	0.0023
	0.4446	-0.4439	1.9645**	0.8564	-3.4308**	-0.6475	
Federal Funds Rate	0.0007	-0.0019	-0.0056	0.3160	0.0761	-0.1126	0.0113
	0.2921	-0.3828	-0.0094	1.5158	0.4909	-1.1383	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.7: Asymmetric regression - TIPS 5y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	0.0008	-0.0018	-0.0235**	-0.0451*	0.0273**	0.0529**	0.0204
	0.4027	-0.7505	-2.0021**	-1.7356*	2.3632**	2.0109**	
Core PPI			-0.0029	0.0431	0.0043	-0.0105	
			-0.1585	1.2006	0.2636	-0.3359	
Employment Cost Index			0.0044	0.0430	0.0014	0.0133	
			0.1326	1.0308	0.0449	0.3926	
Retail Sales			0.0468**	0.0073	-0.0059	0.0235	
			2.9756**	0.2406	-0.7877	0.9056	
GDP			-0.0573	0.0193	0.0645	0.0073	
			-1.1580	1.2445	1.4497	0.3348	
Capacity Utilization	0.0005	-0.0020	-0.0093	-0.0243*	0.0009	0.0287**	0.0067
	0.2630	-0.8458	-0.4877	-1.6910*	0.0579	2.7417**	
Core CPI			-0.0227	-0.0226	0.0359	0.0245	
			-1.0689	-0.9793	1.4862	1.1016	
Durable Goods	0.0005	-0.0016	0.0210	0.0004	-0.0041	0.0311	0.0035
	0.2512	-0.6731	0.8873	0.0143	-0.2572	1.0018	
New Home Sales			0.0085	0.0202	-0.0162	-0.0056	
			0.3230	1.1752	-0.6198	-0.2624	
Nonfarm Payrolls	0.0003	-0.0015	0.0736**	0.0790**	0.0039	-0.0346	0.0149
	0.1426	-0.6403	2.5342**	2.8341**	0.1597	-1.5856	
Unemployment Rate			0.0242	0.0223	-0.0258	0.0083	
			0.6891	0.6941	-0.8811	0.4823	
ISM	-0.0001	-0.0016	0.0303**	0.0068	0.0209	0.0204	0.0069
	-0.0292	-0.6599	2.1162**	0.2366	1.2263	0.8176	
Leading Indicators	-0.0003	-0.0013	0.0237	0.0271	-0.0112	-0.0364**	0.0033
	-0.1334	-0.5288	1.3008	1.4829	-0.6288	-2.2971**	
Federal Funds Rate	0.0003	-0.0017	0.0574	0.0797	-0.0058	-0.0116	0.0027
	0.1289	-0.6904	1.1211	0.8035	-0.2095	-0.2698	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.8: Asymmetric regression - TIPS 10y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0004	-0.0004	-0.0201	0.0179	0.0220	-0.0106	0.0085
	-0.2468	-0.2143	-1.3466	0.6945	1.4607	-0.4241	
Core PPI			0.0169	0.0153	-0.0180	0.0025	
			0.9906	0.7849	-1.1188	0.2074	
Employment Cost Index			-0.0154	0.0571	0.0061	-0.0311	
			-0.6586	1.6293	0.3322	-1.3667	
Retail Sales			0.0310**	0.0269	0.0002	-0.0075	
			2.9929**	0.9801	0.0671	-0.3455	
GDP			0.0159	0.0010	-0.0144	-0.0067	
			0.3921	0.0648	-0.4264	-0.3393	
Capacity Utilization	-0.0002	-0.0007	-0.0117	0.0066	0.0164	0.0184**	0.0060
	-0.1341	-0.3631	-0.8412	0.7104	1.4050	2.8863**	
Core CPI			0.0027	-0.0304	0.0036	0.0107	
			0.2117	-1.4993	0.2694	0.5362	
Durable Goods	0.0000	-0.0005	-0.0054	-0.0198	-0.0037	0.0331	0.0039
	0.0093	-0.2499	-0.3626	-0.6780	-0.3847	1.0517	
New Home Sales			-0.0163	0.0060	0.0080	0.0036	
			-1.2359	0.4593	0.4584	0.2512	
Nonfarm Payrolls	-0.0003	-0.0004	0.0066	0.0280*	0.0076	0.0023	0.0077
	-0.1789	-0.1960	0.2977	1.9594*	0.5907	0.2751	
Unemployment Rate			0.0018	-0.0574	0.0032	0.0199**	
			0.0810	-1.5418	0.2275	2.6055**	
ISM	-0.0005	-0.0004	0.0288**	-0.0205	0.0039	0.0314**	0.0080
	-0.2914	-0.2141	2.3305**	-1.1489	0.3297	2.0903**	
Leading Indicators	-0.0006	-0.0003	0.0249**	0.0205	-0.0035	-0.0165	0.0022
	-0.3640	-0.1456	3.9635**	1.1603	-0.5958	-1.1497	
Federal Funds Rate	-0.0004	-0.0004	0.0396	0.0944**	-0.0010	-0.0258	0.0038
	-0.2336	-0.2229	1.0995	2.0929**	-0.0720	-1.3775	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.9: Asymmetric regression - TIPS 15y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	0.0002	-0.0009	-0.0321**	-0.0170	0.0359**	0.0325	0.0189
	0.1273	-0.4522	-2.0397**	-0.6236	2.1800**	1.1993	
Core PPI			0.0179	0.0156	-0.0144	0.0031	
			0.9601	0.7060	-0.7765	0.1896	
Employment Cost Index			-0.0192	0.0526	0.0067	-0.0278	
			-0.7637	1.3486	0.3564	-1.0940	
Retail Sales			0.0247**	-0.0272	0.0008	0.0296	
			2.0032**	-0.5009	0.2293	0.6604	
GDP			0.0359	-0.0010	-0.0333	0.0037	
			0.7939	-0.0545	-0.8502	0.2539	
Capacity Utilization	-0.0001	-0.0008	-0.0119	0.0022	0.0176*	0.0139	0.0039
	-0.0609	-0.4108	-1.1031	0.2180	1.6592*	1.2539	
Core CPI			0.0051	-0.0228*	-0.0006	0.0168	
			0.4595	-1.7114*	-0.0564	1.3065	
Durable Goods	-0.0002	-0.0006	0.0052	0.0198	-0.0066	-0.0110	0.0013
	-0.1299	-0.3282	0.2779	1.1592	-0.5162	-0.5979	
New Home Sales			-0.0148	0.0105	0.0213	-0.0038	
			-0.9942	0.6798	1.1008	-0.2220	
Nonfarm Payrolls	0.0000	-0.0006	0.0147	0.0149	0.0017	0.0077	0.0058
	-0.0166	-0.3001	0.7149	0.8430	0.1159	0.4817	
Unemployment Rate			-0.0157	-0.0280	0.0105	0.0190*	
			-0.7331	-1.3840	0.8906	1.8065*	
ISM	-0.0003	-0.0006	0.0061	-0.0383**	0.0165	0.0388**	0.0073
	-0.1974	-0.2943	0.3786	-2.1111**	1.0511	2.4848**	
Leading Indicators	-0.0005	-0.0005	0.0235**	0.0100	-0.0032	-0.0100	0.0015
	-0.2648	-0.2542	3.2420**	0.5519	-0.5661	-0.6326	
Federal Funds Rate	-0.0003	-0.0006	0.0794	0.0816*	-0.0451**	-0.0324*	0.0039
	-0.1667	-0.3094	1.6203	1.7514*	-2.6293**	-1.6569*	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.10: Asymmetric regression - TIPS 20y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	0.0013	-0.0019	-0.0375**	-0.0545	0.0423**	0.0800	0.0382
	0.6379	-0.8634	-2.2376**	-0.8416	2.5379**	1.2191	
Core PPI			0.0112	0.0258	-0.0031	-0.0011	
			0.5200	0.9315	-0.1326	-0.0569	
Employment Cost Index			-0.0089	0.0447	0.0021	-0.0130	
			-0.3397	0.9757	0.1065	-0.4034	
Retail Sales			0.0163	-0.0505	0.0016	0.0417	
			1.0257	-0.9064	0.4359	0.9261	
GDP			0.0259	0.0127	-0.0264	0.0111	
			0.5816	0.7877	-0.6838	0.7553	
Capacity Utilization	0.0005	-0.0016	-0.0181	-0.0051	0.0219**	0.0090	0.0052
	0.2223	-0.6888	-1.4444	-0.4355	2.1172**	0.6221	
Core CPI			0.0056	-0.0247	-0.0012	0.0408**	
			0.4987	-1.2667	-0.1106	2.4480**	
Durable Goods	0.0000	-0.0013	0.0261	0.0304	-0.0162	-0.0174	0.0032
	-0.0114	-0.5796	1.4028	1.1957	-1.4839	-0.6422	
New Home Sales			0.0115	0.0176	0.0098	-0.0123	
			0.6703	0.9010	0.5445	-0.5462	
Nonfarm Payrolls	0.0004	-0.0013	0.0343	0.0141	-0.0075	0.0010	0.0043
	0.1979	-0.5674	1.5444	0.7799	-0.4005	0.0620	
Unemployment Rate			-0.0265	0.0393	0.0157	0.0035	
			-1.1272	1.0876	1.2198	0.2013	
ISM	0.0000	-0.0013	-0.0087	-0.0433**	0.0250*	0.0342**	0.0043
	0.0188	-0.5698	-0.5122	-2.4920**	1.7688*	2.4748**	
Leading Indicators	-0.0001	-0.0012	0.0214**	0.0068	-0.0031	-0.0144	0.0014
	-0.0521	-0.5225	2.1388**	0.2818	-0.5165	-0.6891	
Federal Funds Rate	0.0002	-0.0014	0.1172*	-0.0142	-0.1010**	-0.0082	0.0051
	0.0819	-0.5911	1.7589*	-0.2159	-2.5861**	-0.3216	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.11: Asymmetric regression - BEIR 2y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0036*	0.0048	0.0199	-0.0447**	-0.0182	0.0332*	0.0153
	-1.7416*	1.3959	0.7912	-2.5655**	-0.6075	1.7595*	
Core PPI			0.0246	0.0336	-0.0211	-0.0052	
			0.6944	1.1234	-0.4665	-0.2138	
Employment Cost Index			-0.0274	-0.0616	0.0489	0.0378	
			-0.4729	-1.1005	0.6410	0.4587	
Retail Sales			-0.0326	0.0063	0.0428	0.0021	
			-1.0070	0.0958	0.9024	0.0314	
GDP			-0.0331	-0.0210	0.0831	0.0067	
			-0.3215	-0.9605	0.9034	0.1440	
Capacity Utilization	-0.0024	0.0045	0.0169	-0.0556**	-0.0243	0.0572**	0.0415
	-1.1777	1.3157	0.5171	-3.3828**	-0.9344	3.8651**	
Core CPI			0.0039	0.0227	0.0493	0.0486**	
			0.1224	1.1514	1.3836	2.3965**	
Durable Goods	-0.0031	0.0049	-0.0791	-0.0690	0.0894*	0.0720	0.0219
	-1.5366	1.4459	-1.6013	-1.2044	1.7939*	0.9476	
New Home Sales			0.2078*	0.0314	-0.2874	-0.0273	
			1.7282*	1.0041	-1.5686	-0.7429	
Nonfarm Payrolls	-0.0039*	0.0067**	0.0115	0.0668**	0.0990	0.0089	0.0175
	-1.8861*	1.9814**	0.2781	2.4011**	1.4948	0.2659	
Unemployment Rate			0.0485	0.0328	0.0174	-0.0070	
			1.4176	1.4113	0.4158	-0.9321	
ISM	-0.0033*	0.0056	0.1119**	0.0066	-0.0767	0.0148	0.0099
	-1.6473*	1.6138	2.6883**	0.2800	-1.5163	1.0737	
Leading Indicators	-0.0041**	0.0063*	0.0171**	-0.0129	0.0234**	-0.0188	0.0069
	-2.0401**	1.8320*	4.2116**	-0.5453	6.8363**	-0.8791	
Federal Funds Rate	-0.0035*	0.0057	0.4218	-0.1008**	0.0421	0.0575**	0.0125
	-1.7459*	1.6399	0.8469	-4.5404**	0.3276	10.8170**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.12: Asymmetric regression - BEIR 5y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0019	0.0018	0.0018	0.0673**	0.0101	-0.0510*	0.0175
	-1.2662	0.8407	0.0994	2.4067**	0.6342	-1.7849*	
Core PPI			0.0286	0.0073	-0.0215	0.0104	
			0.7885	0.2027	-0.6288	0.3153	
Employment Cost Index			0.0285	-0.0363	-0.0034	0.0177	
			0.8177	-0.8820	-0.1446	0.4902	
Retail Sales			0.0133	-0.0006	0.0182**	-0.0169	
			0.7299	-0.0136	2.9706**	-0.4325	
GDP			0.0409	-0.0140	-0.0443	0.0093	
			0.5337	-1.1306	-0.6406	0.5874	
Capacity Utilization	-0.0011	0.0022	-0.0019	0.0375	0.0265**	-0.0075	0.0055
	-0.7462	1.0154	-0.0754	1.3778	2.3593**	-0.2844	
Core CPI			0.0124	-0.0088	0.0026	0.0295	
			0.4102	-0.3584	0.2324	1.2443	
Durable Goods	-0.0014	0.0023	0.0241	0.0045	-0.0236*	-0.0014	0.0048
	-0.9309	1.0672	1.0357	0.1913	-1.8905*	-0.0723	
New Home Sales			-0.0180	0.0584**	0.0463*	-0.0417*	
			-0.8254	2.7839**	1.8165*	-1.9036*	
Nonfarm Payrolls	-0.0017	0.0024	0.0097	0.0348	0.0244	-0.0131	0.0063
	-1.1189	1.0933	0.3910	1.5217	1.4171	-0.6340	
Unemployment Rate			-0.0108	-0.0014	0.0301	-0.0094	
			-0.3355	-0.0513	1.0946	-0.7508	
ISM	-0.0016	0.0023	0.0126	-0.0349**	0.0074	0.0145	0.0020
	-1.0458	1.0782	0.3321	-2.0256**	0.2663	1.1683	
Leading Indicators	-0.0010	0.0021	0.0052	-0.0103	0.0004	0.0238	0.0019
	-0.7199	0.9978	0.3631	-0.2493	0.0326	0.6351	
Federal Funds Rate	-0.0014	0.0024	-0.0482	-0.0151	0.0129	-0.0042	0.0011
	-0.9496	1.1219	-0.7954	-0.5419	0.2578	-0.3705	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.13: Asymmetric regression - BEIR 10y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0008	0.0009	-0.0174	0.0331**	0.0172	-0.0233	0.0126
	-0.5185	0.4419	-1.0260	2.1046**	1.1106	-1.5817	
Core PPI			-0.0086	0.0539**	0.0111	-0.0082	
			-0.3994	2.1164**	0.7659	-0.5051	
Employment Cost Index			0.0133	-0.0300	0.0038	0.0529**	
			0.3972	-0.8744	0.1753	2.8453**	
Retail Sales			0.0326*	-0.0447	0.0036	0.0183	
			1.7818*	-1.4353	0.6794	0.7907	
GDP			-0.0125	0.0116	0.0244	0.0125	
			-0.3224	0.5425	1.1930	0.5946	
Capacity Utilization	-0.0009	0.0012	0.0012	0.0222	0.0207	-0.0225	0.0086
	-0.5893	0.6201	0.0512	1.1386	1.1243	-1.1917	
Core CPI			0.0135	0.0123	0.0139	0.0243	
			0.6589	0.3435	1.2676	0.6385	
Durable Goods	-0.0007	0.0013	-0.0036	0.0046	0.0054	0.0062	0.0052
	-0.4468	0.6151	-0.1553	0.1909	0.4452	0.2413	
New Home Sales			0.0130	0.0431	0.0143	-0.0093	
			0.8244	1.5512	0.8491	-0.3163	
Nonfarm Payrolls	-0.0011	0.0014	0.0303	0.0380*	0.0195	-0.0353*	0.0084
	-0.6933	0.6706	1.3337	1.7818*	1.3129	-1.9408*	
Unemployment Rate			0.0048	0.0637**	-0.0036	-0.0202**	
			0.1882	2.0858**	-0.1731	-2.0683**	
ISM	-0.0013	0.0013	0.0453**	-0.0283	0.0133	0.0167	0.0096
	-0.8299	0.6538	2.5758**	-1.3427	0.7167	0.9623	
Leading Indicators	-0.0006	0.0011	-0.0217	-0.0547	0.0166	0.0441	0.0057
	-0.3948	0.5405	-0.9940	-1.0829	1.1203	0.9467	
Federal Funds Rate	-0.0009	0.0014	0.0279	-0.0519	-0.0378*	-0.0006	0.0036
	-0.5782	0.6930	0.6306	-1.5509	-1.7744*	-0.0371	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.14: Asymmetric regression - BEIR 15y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0026	0.0027	-0.0061	0.0573*	-0.0015	-0.0652*	0.0249
	-1.5602	1.3431	-0.4203	1.7081*	-0.1075	-1.9552*	
Core PPI			-0.0176	0.0541**	0.0157	-0.0104	
			-0.7470	2.2389**	0.7059	-0.6526	
Employment Cost Index			0.0011	-0.0289	0.0075	0.0475**	
			0.0338	-0.7721	0.3468	1.9920**	
Retail Sales			0.0240	-0.0211	0.0017	0.0005	
			1.4264	-0.5859	0.3100	0.0187	
GDP			-0.0129	0.0085	0.0190	-0.0022	
			-0.3638	0.3508	0.8839	-0.0835	
Capacity Utilization	-0.0021	0.0025	0.0054	0.0072	0.0160	-0.0077	0.0064
	-1.2715	1.2287	0.2939	0.3167	0.9484	-0.3301	
Core CPI			0.0188	0.0175	0.0097	0.0133	
			1.1266	0.6172	0.9522	0.4570	
Durable Goods	-0.0017	0.0026	-0.0339	-0.0344	0.0174	0.0455	0.0071
	-0.9776	1.2854	-1.6051	-1.4137	1.6311	1.6323	
New Home Sales			0.0174	0.0298	-0.0127	-0.0039	
			0.9437	1.1734	-0.6596	-0.1330	
Nonfarm Payrolls	-0.0024	0.0028	0.0128	0.0317**	0.0053	-0.0301**	0.0058
	-1.3887	1.3509	0.9048	2.0085**	0.3791	-2.4180**	
Unemployment Rate			0.0133	0.0391	-0.0086	-0.0194**	
			0.5712	1.5489	-0.4275	-2.1002**	
ISM	-0.0023	0.0027	0.0407**	-0.0333	-0.0046	0.0236	0.0063
	-1.3748	1.2982	2.8714**	-1.4069	-0.3401	1.1139	
Leading Indicators	-0.0019	0.0024	-0.0140	-0.0357	0.0162	0.0349	0.0047
	-1.1623	1.2131	-0.6913	-0.7759	1.4496	0.7908	
Federal Funds Rate	-0.0023	0.0027	0.0137	-0.0574	0.0300	0.0031	0.0043
	-1.3868	1.3354	0.2025	-0.8528	0.8141	0.1042	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.15: Asymmetric regression - BEIR 20y instantaneous forwards

Announcement	α	$dummy_{99-04}$	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0045*	0.0047*	0.0165	0.0692	-0.0182	-0.0909	0.0271
	-1.8646*	1.7718*	1.1606	1.0611	-1.4380	-1.3944	
Core PPI			-0.0023	0.0384	0.0021	-0.0068	
			-0.0739	1.4141	0.0791	-0.3287	
Employment Cost Index			-0.0158	-0.0256	0.0131	0.0352	
			-0.5510	-0.5082	0.7519	0.9332	
Retail Sales			0.0069	-0.0078	0.0036	-0.0084	
			0.3864	-0.1725	0.7066	-0.2426	
GDP			0.0117	-0.0119	-0.0127	-0.0121	
			0.4239	-0.5582	-0.7523	-0.3625	
Capacity Utilization	-0.0035	0.0042	0.0028	0.0019	0.0109	-0.0020	0.0022
	-1.4230	1.5469	0.1907	0.0756	0.8693	-0.0786	
Core CPI			0.0180	0.0123	-0.0007	0.0008	
			1.2840	0.3973	-0.0626	0.0252	
Durable Goods	-0.0031	0.0043	-0.0492**	-0.0341	0.0229*	0.0378	0.0048
	-1.2600	1.5850	-2.1906**	-1.0560	1.7336*	1.0914	
New Home Sales			-0.0074	0.0222	-0.0058	-0.0260	
			-0.4585	0.8861	-0.3373	-0.8714	
Nonfarm Payrolls	-0.0035	0.0044	0.0020	0.0191	-0.0076	-0.0100	0.0022
	-1.4237	1.6199	0.0765	1.3222	-0.3081	-0.9207	
Unemployment Rate			0.0061	-0.0103	-0.0082	-0.0092	
			0.2176	-0.2905	-0.3376	-1.4280	
ISM	-0.0033	0.0043	-0.0011	-0.0279	-0.0207	0.0096	0.0026
	-1.3567	1.5746	-0.0189	-1.5020	-0.8643	1.0198	
Leading Indicators	-0.0031	0.0040	-0.0024	-0.0033	0.0082	0.0238	0.0029
	-1.2819	1.5000	-0.1885	-0.0580	1.2014	0.5331	
Federal Funds Rate	-0.0037	0.0043	-0.0106	0.0079	0.0606	-0.0170	0.0038
	-1.5232	1.6058	-0.1710	0.0731	1.2365	-0.4134	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.16: Asymmetric regression - stock prices

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0200	-0.0924	0.0427	0.1471	-0.1757	0.0090
	-0.6986	-0.2168	0.1397	0.4662	-0.5201	
Core PPI		0.2383	-1.0420	-0.4379	0.5373	
		0.3708	-1.6007	-0.7149	1.1602	
Employment Cost Index		-1.2837*	-1.2561	0.9300*	0.6084	
		-1.9535*	-1.2023	1.9095*	0.8288	
Retail Sales		0.0709	-2.0453	0.0992	1.5144	
		0.1695	-1.5453	0.9553	1.4104	
GDP		-1.0551*	-0.3322	0.8173**	0.3800	
		-1.7685*	-1.5484	2.3905**	1.1320	
Capacity Utilization	-0.0095	0.3139	0.5921	0.3384	-0.2738	0.0068
	-0.3554	0.6619	0.7688	0.8618	-0.3848	
Core CPI		-1.2230*	-1.0050	0.0663	0.7460	
		-1.6992*	-1.0255	0.1835	0.7204	
Durable Goods	-0.0188	-0.3702	0.8182*	0.4206**	-0.6794	0.0027
	-0.6906	-1.3959	1.7608*	2.9288**	-1.6423	
New Home Sales		0.0959	-0.2274	-0.0748	-0.4020	
		0.2566	-0.7464	-0.1480	-1.2881	
Nonfarm Payrolls	-0.0153	1.1899**	-0.2589	-1.2645**	-0.3578	0.0039
	-0.5674	2.1181**	-0.5056	-2.3802**	-0.7739	
Unemployment Rate		-0.3653	-0.4089	0.0008	0.3850	
		-0.7104	-0.5811	0.0018	0.8804	
ISM	-0.0193	-0.0809	-0.8171	0.5795	0.3459	0.0020
	-0.7185	-0.2437	-1.4958	1.3813	0.7971	
Leading Indicators	-0.0112	-0.9375*	0.4037	0.6396	-0.1569	0.0020
	-0.4198	-1.8027*	0.4920	1.2134	-0.2017	
Federal Funds Rate	-0.0205	0.7992	2.3424	0.9270	-1.4981**	0.0074
	-0.7782	0.3659	1.1729	0.6034	-2.1426**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.17: Asymmetric regression - 2y stock-bond correlation

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0222**	-0.0217	-0.0113	0.0443	0.0157	0.0088
	-8.5845**	-0.8238	-0.7103	1.5504	0.9273	
Core PPI		0.0945	-0.0431	-0.0915	0.0214	
		1.2830	-1.1319	-1.1681	0.9154	
Employment Cost Index		0.0621	-0.0605	-0.0183	-0.0068	
		1.3971	-1.0933	-0.7809	-0.1818	
Retail Sales		0.0435*	-0.0994	0.0012	0.0941	
		1.7642*	-0.8627	0.1412	0.9537	
GDP		0.0872**	-0.0296	-0.0592**	0.0052	
		2.4570**	-1.6198	-2.4740**	0.2053	
Capacity Utilization	-0.0208**	0.0598*	-0.0760	-0.0250	0.0859	0.0072
	-8.9053**	1.6918*	-0.6023	-1.0408	0.6231	
Core CPI		-0.0014	0.0153	0.0206	-0.0211	
		-0.0262	0.2151	0.9702	-0.2601	
Durable Goods	-0.0209**	0.0022	-0.0119	0.0154	0.0198	0.0022
	-8.6998**	0.1224	-0.3524	1.1431	0.6341	
New Home Sales		0.0253	-0.0961**	-0.0050	0.1030**	
		1.3809	-2.3986**	-0.1918	1.9794**	
Nonfarm Payrolls	-0.0208**	-0.0374	-0.0161	0.1044**	0.0129	0.0024
	-8.7100**	-0.6158	-0.3730	2.5526**	0.3362	
Unemployment Rate		0.0450	-0.0451	-0.0508	0.0284	
		1.3027	-1.1806	-1.5955	1.4268	
ISM	-0.0203**	0.0251	-0.0716	-0.0186	0.0802	0.0032
	-8.6341**	1.0303	-1.2914	-0.5061	1.6040	
Leading Indicators	-0.0207**	0.0655*	-0.0646	-0.0422	0.0433	0.0020
	-8.7594**	1.8747*	-1.2363	-1.2018	0.8631	
Federal Funds Rate	-0.0202**	0.3286	0.3968**	-0.3937*	-0.1543**	0.0164
	-8.7484**	1.2461	2.9304**	-1.7778*	-2.3427**	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.18: Asymmetric regression - 4y stock-bond correlation

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0417**	-0.0199	-0.0365	0.0635**	0.0450	0.0052
	-8.4310**	-0.5948	-1.1678	2.0869**	1.2959	
Core PPI		0.0683	-0.1027*	-0.0722	0.0623*	
		0.7533	-1.6496*	-0.7322	1.8911*	
Employment Cost Index		0.0518	-0.1192	0.0083	0.0243	
		0.9902	-1.1720	0.3028	0.4399	
Retail Sales		0.0867*	-0.1498	-0.0019	0.1482	
		1.7403*	-1.2467	-0.1433	1.6178	
GDP		0.1363**	-0.0559*	-0.0922**	0.0039	
		2.5870**	-1.7586*	-2.1948**	0.0951	
Capacity Utilization	-0.0390**	0.1047	-0.1037	-0.0299	0.1243	0.0055
	-8.8214**	1.4131	-0.4650	-0.4866	0.5104	
Core CPI		0.0414	-0.0281	0.0227	0.0256	
		0.4629	-0.1387	0.5544	0.1145	
Durable Goods	-0.0396**	-0.0031	0.0167	0.0497*	-0.0044	0.0017
	-8.7043**	-0.0782	0.2991	1.6508*	-0.0913	
New Home Sales		0.0496	-0.1556**	-0.0167	0.1384*	
		1.4820	-2.6139**	-0.3628	1.9545*	
Nonfarm Payrolls	-0.0386**	-0.0623	-0.0510	0.1681**	0.0555	0.0032
	-8.5665**	-0.5180	-0.5582	2.2083**	0.6488	
Unemployment Rate		0.0908	-0.1123	-0.0970*	0.0687	
		1.3715	-1.4565	-1.8192*	1.3414	
ISM	-0.0376**	0.0449	-0.1523	-0.0745	0.1657	0.0040
	-8.5993**	0.8222	-1.1217	-0.8195	1.2991	
Leading Indicators	-0.0390**	0.0155	-0.2148	0.0411**	0.1668	0.0042
	-8.8065**	0.6334	-1.2813	2.2185**	1.0214	
Federal Funds Rate	-0.0378**	0.4959	0.8346**	-0.5580*	-0.2879*	0.0128
	-8.6961**	1.2747	2.5892**	-1.6680*	-1.7469*	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.19: Asymmetric regression - 7y stock-bond correlation

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0543**	-0.0062	-0.0481	0.0727**	0.0693	0.0042
	-8.0573**	-0.1608	-0.9843	2.0223**	1.2423	
Core PPI		0.0148	-0.1403	-0.0185	0.0701	
		0.1563	-1.6289	-0.1860	1.3969	
Employment Cost Index		-0.0699	-0.2355	0.0918	0.0894	
		-0.6323	-1.3198	1.1230	1.0061	
Retail Sales		0.1277*	-0.1438	-0.0084	0.1788*	
		1.6930*	-0.8945	-0.5155	1.6658*	
GDP		0.0784	-0.0928*	-0.0849	0.0060	
		0.6886	-1.7716*	-1.1368	0.1015	
Capacity Utilization	-0.0507**	0.1465	-0.1248	-0.0278	0.1443	0.0059
	-8.3779**	1.2702	-0.4702	-0.2926	0.5012	
Core CPI		0.1015	-0.0803	0.0196	0.1020	
		0.8694	-0.2647	0.3416	0.3071	
Durable Goods	-0.0517**	0.0016	0.0423	0.0693*	-0.0237	0.0018
	-8.3164**	0.0282	0.5687	1.7863*	-0.3756	
New Home Sales		0.0868*	-0.2084**	-0.0419	0.1627**	
		1.7845*	-2.6004**	-0.6497	2.0759**	
Nonfarm Payrolls	-0.0501**	-0.0876	-0.0650	0.2239**	0.0637	0.0029
	-8.1401**	-0.5241	-0.5890	2.0468**	0.6574	
Unemployment Rate		0.0950	-0.1847*	-0.1241*	0.0933	
		0.9774	-1.7399*	-1.6782*	1.3545	
ISM	-0.0487**	0.0602	-0.2244	-0.1322	0.2152	0.0040
	-8.2130**	0.7776	-1.1044	-0.9226	1.1225	
Leading Indicators	-0.0507**	0.0042	-0.3456	0.0847**	0.2787	0.0063
	-8.4234**	0.1083	-1.2332	2.9561**	1.0196	
Federal Funds Rate	-0.0491**	0.4907	0.9624*	-0.5368	-0.2905	0.0081
	-8.2421**	1.1160	1.9406*	-1.5247	-1.1610	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table B.20: Asymmetric regression - 20y stock-bond correlation

Announcement	α	$\beta_{P,exp}$	$\beta_{N,exp}$	$\beta_{P,rec}$	$\beta_{N,rec}$	R^2
Consumer Confidence	-0.0909**	0.0544	-0.0882	0.0695	0.0995	0.0033
	-6.9192**	0.7629	-0.8110	0.9466	0.8575	
Core PPI		-0.1216	-0.1629	0.1491	0.0015	
		-0.7956	-0.8277	0.9938	0.0118	
Employment Cost Index		-0.3446	-0.4797	0.2940	0.2665	
		-1.0013	-1.3340	1.1561	1.3342	
Retail Sales		0.2093	-0.1400	-0.0205	0.2213	
		1.4556	-0.3861	-0.7655	0.8460	
GDP		-0.0350	-0.1668*	-0.0550	-0.0094	
		-0.1136	-1.6700*	-0.3240	-0.1011	
Capacity Utilization	-0.0830**	0.2763	-0.2198	-0.0590	0.2186	0.0075
	-7.0383**	1.1190	-0.5194	-0.2495	0.4804	
Core CPI		0.2408	-0.3393	0.0057	0.4341	
		1.2000	-0.4660	0.0481	0.5453	
Durable Goods	-0.0859**	-0.0043	0.2133	0.1428**	-0.1739	0.0017
	-7.0784**	-0.0429	1.2542	2.3659**	-1.1769	
New Home Sales		0.1550*	-0.3034**	-0.0752	0.1717*	
		1.7017*	-2.2900**	-0.6519	1.7124*	
Nonfarm Payrolls	-0.0823**	-0.1401	-0.0921	0.3219*	0.0835	0.0020
	-6.8418**	-0.4971	-0.5408	1.7097*	0.6025	
Unemployment Rate		0.1469	-0.3816**	-0.1909	0.1734	
		0.8475	-1.9695**	-1.5527	1.3050	
ISM	-0.0788**	0.0961	-0.3931	-0.3028	0.3776	0.0039
	-6.8379**	0.6400	-1.0310	-1.0612	1.0424	
Leading Indicators	-0.0829**	-0.0470	-0.8860	0.2198**	0.7502	0.0116
	-7.1992**	-0.5087	-1.1868	2.7056**	1.0285	
Federal Funds Rate	-0.0809**	0.4785	1.6422	-0.4757	-0.4831	0.0048
	-6.9533**	0.8111	1.5070	-1.0939	-0.9538	

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Appendix C

Hypothesis Tests for State Asymmetry

Table C.1: State asymmetry test - nominal 2 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0561	-0.0382
	-1.5234	-0.6194
Core PPI	0.0200	0.0428
	0.3630	0.6455
Employment Cost Index	0.1336	-0.0947
	1.4597	-1.2519
Retail Sales	0.0331	-0.0268
	0.9887	-0.3955
GDP	-0.0535	-0.0576
	-0.7645	-1.1682
Capacity Utilization	0.0148	-0.0932
	0.4227	-1.3725
Core CPI	-0.0847	-0.0156
	-1.4572	-0.3106
Durable Goods	0.1525**	-0.0127
	2.4147**	-0.3059
New Home Sales	-0.0021	0.1677**
	-0.0349	2.1692**
Nonfarm Payrolls	0.1752**	0.1781**
	2.0350**	2.6259**
Unemployment Rate	-0.0126	0.0221
	-0.1729	0.3740
ISM	0.0927	-0.0759*
	1.4798	-1.7848*
Leading Indicators	0.0415	0.0630
	1.4738	1.3437
Federal Funds Rate	-0.1501*	0.1636
	-1.7367*	1.0282

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.2: State asymmetry test - nominal 5 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0592*	0.0215
	-1.7894*	0.7963
Core PPI	0.0430	0.0503
	0.7310	1.1303
Employment Cost Index	0.0350	-0.0244
	0.6712	-0.3292
Retail Sales	0.0479*	0.0000
	1.7071*	0.0002
GDP	-0.0367	-0.0113
	-0.5027	-0.3159
Capacity Utilization	-0.0387	-0.0074
	-1.0716	-0.1717
Core CPI	-0.0488	-0.0856*
	-1.0514	-1.8249*
Durable Goods	0.0748	-0.0266
	1.3917	-0.6075
New Home Sales	-0.0404	0.1386**
	-1.0092	2.6241**
Nonfarm Payrolls	0.0555	0.1614**
	0.7962	2.4920**
Unemployment Rate	0.0089	0.0218
	0.1230	0.3809
ISM	0.0156	-0.0569
	0.2552	-1.2706
Leading Indicators	0.0397	0.0293
	0.8644	0.4732
Federal Funds Rate	0.0041	0.1026
	0.0530	0.6105

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.3:   State asymmetry test - nominal 10 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0767**	0.0855**
	-2.8167**	2.7714**
Core PPI	0.0153	0.0752*
	0.3079	1.7380*
Employment Cost Index	-0.0121	0.0058
	-0.1923	0.0856
Retail Sales	0.0598**	-0.0287
	2.5432**	-0.3481
GDP	-0.0063	0.0068
	-0.0710	0.2394
Capacity Utilization	-0.0477	0.0334
	-1.2389	1.0414
Core CPI	-0.0012	-0.0534
	-0.0323	-1.1900
Durable Goods	-0.0094	-0.0555
	-0.2143	-1.5661
New Home Sales	-0.0263	0.0622
	-0.6503	1.2927
Nonfarm Payrolls	0.0102	0.0988**
	0.2060	1.9645**
Unemployment Rate	0.0068	0.0063
	0.1116	0.1241
ISM	0.0577	-0.1184**
	1.3607	-3.4893**
Leading Indicators	-0.0101	-0.0619
	-0.2486	-0.8036
Federal Funds Rate	0.1154	0.0775
	1.2972	0.9105

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.4: State asymmetry test - nominal 15 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0724**	0.0727**
	-3.2356**	2.4572**
Core PPI	-0.0011	0.0785*
	-0.0381	1.8896*
Employment Cost Index	-0.0326	0.0059
	-0.5132	0.0895
Retail Sales	0.0459**	-0.0785
	2.4825**	-1.5121
GDP	0.0386	0.0062
	0.4209	0.1905
Capacity Utilization	-0.0403	0.0030
	-1.2086	0.0766
Core CPI	0.0150	-0.0362
	0.4817	-0.9040
Durable Goods	-0.0390	-0.0495*
	-1.0560	-1.8028*
New Home Sales	-0.0071	0.0499
	-0.1800	1.1357
Nonfarm Payrolls	0.0215	0.0687
	0.5985	1.4671
Unemployment Rate	-0.0049	0.0109
	-0.0862	0.2433
ISM	0.0357	-0.1440**
	1.1620	-6.3047**
Leading Indicators	-0.0038	-0.0511
	-0.1151	-0.7458
Federal Funds Rate	0.1198	0.0563
	1.2945	0.7421

Note: First number is estimate, second is t-statistic

* indicates 90% confidence, ** indicates 95% confidence

Table C.5: State asymmetry test - nominal 20 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0446	0.0247
	-1.6411	1.1238
Core PPI	0.0097	0.0744*
	0.2312	1.8943*
Employment Cost Index	-0.0405	-0.0004
	-0.7364	-0.0058
Retail Sales	0.0174	-0.0919*
	1.2018	-1.9294*
GDP	0.0784	0.0021
	0.8273	0.0582
Capacity Utilization	-0.0482	-0.0111
	-1.6081	-0.2739
Core CPI	0.0257	-0.0550
	0.8858	-1.0635
Durable Goods	-0.0299	-0.0241
	-0.9424	-1.0298
New Home Sales	-0.0014	0.0764**
	-0.0377	1.9868**
Nonfarm Payrolls	0.0528	0.0417
	1.4058	0.9750
Unemployment Rate	-0.0288	0.0339
	-0.5053	0.8071
ISM	-0.0130	-0.1000**
	-0.1965	-2.9790**
Leading Indicators	0.0134	-0.0067
	0.6152	-0.0972
Federal Funds Rate	0.1629**	0.0196
	2.3595**	0.1936

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.6: State asymmetry test - TIPS 2 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0917**	0.0679
	-2.4465**	1.6354
Core PPI	0.0101	0.0199
	0.2541	0.3054
Employment Cost Index	0.9792**	-0.1406
	6.4336**	-0.8023
Retail Sales	-0.0441	-0.0766
	-0.4209	-0.6971
GDP	0.0673	-0.0318
	0.4189	-1.0355
Capacity Utilization	-0.0933	-0.0132
	-1.6174	-0.2574
Core CPI	-0.0362	0.0354
	-0.6713	0.7995
Durable Goods	0.1137	0.1279
	0.8160	0.9703
New Home Sales	-0.4353	0.1283
	-1.2801	1.1646
Nonfarm Payrolls	0.6341**	0.2181*
	2.5767**	1.8836*
Unemployment Rate	-0.0609	0.0983**
	-0.3588	2.0763**
ISM	-0.0002	-0.0832
	-0.0024	-1.2581
Leading Indicators	0.0774**	0.0312
	3.0916**	0.8374
Federal Funds Rate	-0.0817	0.4286
	-0.1100	1.3944

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.7: State asymmetry test - TIPS 5 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0508**	-0.0980*
	-2.3445**	-1.9039*
Core PPI	-0.0073	0.0536
	-0.2248	0.8076
Employment Cost Index	0.0030	0.0297
	0.0502	0.4167
Retail Sales	0.0527**	-0.0162
	2.5669**	-0.3087
GDP	-0.1219	0.0120
	-1.3158	0.3476
Capacity Utilization	-0.0102	-0.0531**
	-0.3077	-2.5452**
Core CPI	-0.0587	-0.0471
	-1.3616	-1.0815
Durable Goods	0.0251	-0.0307
	0.6676	-0.5186
New Home Sales	0.0247	0.0258
	0.4934	0.6918
Nonfarm Payrolls	0.0698	0.1137**
	1.3899	2.3902**
Unemployment Rate	0.0500	0.0140
	0.7952	0.3062
ISM	0.0094	-0.0136
	0.3307	-0.2628
Leading Indicators	0.0350	0.0636**
	1.0350	1.9717**
Federal Funds Rate	0.0632	0.0914
	0.8967	0.6426

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.8: State asymmetry test - TIPS 10 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0421	0.0284
	-1.4519	0.5686
Core PPI	0.0349	0.0128
	1.0743	0.4147
Employment Cost Index	-0.0215	0.0883
	-0.5359	1.6023
Retail Sales	0.0308**	0.0344
	2.6219**	0.7282
GDP	0.0303	0.0077
	0.4161	0.2297
Capacity Utilization	-0.0281	-0.0118
	-1.1729	-0.8473
Core CPI	-0.0009	-0.0410
	-0.0365	-1.0498
Durable Goods	-0.0017	-0.0529
	-0.0747	-0.8780
New Home Sales	-0.0243	0.0024
	-0.8205	0.0927
Nonfarm Payrolls	-0.0010	0.0257
	-0.0301	1.2120
Unemployment Rate	-0.0014	-0.0773*
	-0.0401	-1.8583*
ISM	0.0249	-0.0519
	1.0819	-1.6407
Leading Indicators	0.0284**	0.0370
	2.7390**	1.2145
Federal Funds Rate	0.0406	0.1203*
	0.9580	1.8929*

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.9: State asymmetry test - TIPS 15 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0680**	-0.0495
	-2.1862**	-0.9183
Core PPI	0.0322	0.0125
	0.8825	0.3341
Employment Cost Index	-0.0258	0.0804
	-0.6113	1.2914
Retail Sales	0.0239*	-0.0568
	1.7062*	-0.5804
GDP	0.0692	-0.0047
	0.8338	-0.1526
Capacity Utilization	-0.0296	-0.0117
	-1.4872	-0.6104
Core CPI	0.0057	-0.0397
	0.2831	-1.5699
Durable Goods	0.0118	0.0308
	0.3906	0.8911
New Home Sales	-0.0361	0.0143
	-1.0766	0.4508
Nonfarm Payrolls	0.0130	0.0072
	0.3969	0.2206
Unemployment Rate	-0.0262	-0.0470*
	-0.8090	-1.7562*
ISM	-0.0104	-0.0771**
	-0.3442	-2.3651**
Leading Indicators	0.0267**	0.0200
	2.4353**	0.6125
Federal Funds Rate	0.1245**	0.1139*
	2.2434**	1.7317*

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.10: State asymmetry test - TIPS 20 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0797**	-0.1346
	-2.5001**	-1.0339
Core PPI	0.0143	0.0269
	0.3242	0.5780
Employment Cost Index	-0.0110	0.0576
	-0.2511	0.7620
Retail Sales	0.0146	-0.0922
	0.8126	-0.9287
GDP	0.0523	0.0016
	0.6394	0.0581
Capacity Utilization	-0.0400*	-0.0141
	-1.9075*	-0.6038
Core CPI	0.0068	-0.0655*
	0.3341	-1.9085*
Durable Goods	0.0423	0.0479
	1.5141	0.9288
New Home Sales	0.0017	0.0299
	0.0510	0.7282
Nonfarm Payrolls	0.0418	0.0131
	1.1042	0.4028
Unemployment Rate	-0.0422	0.0358
	-1.1969	0.7356
ISM	-0.0336	-0.0775**
	-1.1505	-2.6529**
Leading Indicators	0.0245*	0.0212
	1.7559*	0.4944
Federal Funds Rate	0.2182**	-0.0060
	2.4525**	-0.0662

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.11: State asymmetry test - BEIR 2 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	0.0381	-0.0779**
	0.7080	-2.2177**
Core PPI	0.0458	0.0388
	0.5729	0.7296
Employment Cost Index	-0.0763	-0.0993
	-0.5697	-0.7240
Retail Sales	-0.0754	0.0042
	-0.9692	0.0321
GDP	-0.1162	-0.0276
	-0.6051	-0.4136
Capacity Utilization	0.0412	-0.1128**
	0.7371	-3.9958**
Core CPI	-0.0454	-0.0259
	-0.6993	-0.7075
Durable Goods	-0.1685*	-0.1410
	-1.7619*	-1.0633
New Home Sales	0.4953	0.0587
	1.6348	0.8715
Nonfarm Payrolls	-0.0875	0.0578
	-0.8266	0.9853
Unemployment Rate	0.0311	0.0397
	0.4345	1.4434
ISM	0.1886**	-0.0083
	2.0622**	-0.2582
Leading Indicators	-0.0062	0.0059
	-1.0816	0.1352
Federal Funds Rate	0.3797	-0.1582**
	0.6152	-6.2892**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.12:   State asymmetry test - BEIR 5 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0083	0.1182**
	-0.2630	2.1095**
Core PPI	0.0501	-0.0031
	0.7231	-0.0453
Employment Cost Index	0.0319	-0.0540
	0.5609	-0.7269
Retail Sales	-0.0049	0.0163
	-0.2275	0.1920
GDP	0.0852	-0.0233
	0.5904	-0.8742
Capacity Utilization	-0.0284	0.0450
	-0.8703	0.8734
Core CPI	0.0098	-0.0384
	0.2529	-0.8220
Durable Goods	0.0477	0.0059
	1.4228	0.1467
New Home Sales	-0.0643	0.1001**
	-1.4270	2.4090**
Nonfarm Payrolls	-0.0146	0.0479
	-0.3724	1.1466
Unemployment Rate	-0.0409	0.0080
	-0.7061	0.2245
ISM	0.0052	-0.0494*
	0.0860	-1.9335*
Leading Indicators	0.0049	-0.0340
	0.2211	-0.4400
Federal Funds Rate	-0.0611	-0.0109
	-0.5655	-0.2822

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.13: State asymmetry test - BEIR 10 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0347	0.0564*
	-1.1348	1.8981*
Core PPI	-0.0198	0.0622
	-0.5690	1.5167
Employment Cost Index	0.0095	-0.0829
	0.1769	-1.6194
Retail Sales	0.0290	-0.0630
	1.3525	-1.2054
GDP	-0.0369	-0.0009
	-0.6478	-0.0235
Capacity Utilization	-0.0195	0.0446
	-0.5263	1.2022
Core CPI	-0.0004	-0.0120
	-0.0138	-0.1643
Durable Goods	-0.0090	-0.0015
	-0.2743	-0.0311
New Home Sales	-0.0013	0.0523
	-0.0416	0.9362
Nonfarm Payrolls	0.0108	0.0733*
	0.3070	1.9456*
Unemployment Rate	0.0085	0.0839**
	0.1904	2.2627**
ISM	0.0320	-0.0450
	0.9240	-1.2192
Leading Indicators	-0.0383	-0.0988
	-1.1255	-1.0301
Federal Funds Rate	0.0656	-0.0513
	1.0877	-1.0553

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.14: State asymmetry test - BEIR 15 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0046	0.1225*
	-0.1755	1.8403*
Core PPI	-0.0333	0.0644*
	-0.7401	1.6594*
Employment Cost Index	-0.0064	-0.0764
	-0.1195	-1.2936
Retail Sales	0.0223	-0.0216
	1.0943	-0.3490
GDP	-0.0318	0.0107
	-0.5800	0.2264
Capacity Utilization	-0.0106	0.0149
	-0.3239	0.3350
Core CPI	0.0091	0.0041
	0.3633	0.0735
Durable Goods	-0.0512*	-0.0799
	-1.7258*	-1.5492
New Home Sales	0.0301	0.0337
	0.8318	0.6242
Nonfarm Payrolls	0.0075	0.0618**
	0.2860	2.3079**
Unemployment Rate	0.0219	0.0586*
	0.5189	1.8347*
ISM	0.0454*	-0.0569
	1.7618*	-1.2991
Leading Indicators	-0.0302	-0.0705
	-1.0389	-0.7894
Federal Funds Rate	-0.0162	-0.0605
	-0.1649	-0.6289

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.15: State asymmetry test - BEIR 20 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	0.0347	0.1601
	1.4082	1.2320
Core PPI	-0.0045	0.0452
	-0.0788	0.9806
Employment Cost Index	-0.0288	-0.0608
	-0.6493	-0.7165
Retail Sales	0.0034	0.0005
	0.1569	0.0068
GDP	0.0243	0.0002
	0.5712	0.0033
Capacity Utilization	-0.0081	0.0039
	-0.3219	0.0826
Core CPI	0.0187	0.0115
	0.8281	0.1892
Durable Goods	-0.0721**	-0.0718
	-2.1605**	-1.0975
New Home Sales	-0.0015	0.0482
	-0.0489	0.9014
Nonfarm Payrolls	0.0096	0.0291
	0.2061	1.2153
Unemployment Rate	0.0143	-0.0011
	0.2871	-0.0274
ISM	0.0197	-0.0375
	0.2679	-1.5392
Leading Indicators	-0.0106	-0.0271
	-0.5877	-0.2774
Federal Funds Rate	-0.0713	0.0249
	-0.6835	0.1699

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.16: State asymmetry test - stock prices

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.2395	0.2185
	-0.3523	0.3546
Core PPI	0.6762	-1.5793
	0.5498	-1.4664
Employment Cost Index	-2.2137**	-1.8646
	-2.0316**	-1.1193
Retail Sales	-0.0283	-3.5597
	-0.0575	-1.5353
GDP	-1.8725**	-0.7122
	-2.1645**	-1.3944
Capacity Utilization	-0.0245	0.8659
	-0.0306	0.6079
Core CPI	-1.2894	-1.7510
	-1.2585	-0.8795
Durable Goods	-0.7907**	1.4977*
	-2.2372**	1.8279*
New Home Sales	0.1707	0.1746
	0.1993	0.2992
Nonfarm Payrolls	2.4544**	0.0989
	2.3464**	0.1055
Unemployment Rate	-0.3661	-0.7939
	-0.4061	-0.7570
ISM	-0.6604	-1.1630
	-0.9305	-1.3406
Leading Indicators	-1.5771	0.5606
	-1.5630	0.3533
Federal Funds Rate	-0.1278	3.8405
	-0.0375	1.4650

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.17: State asymmetry test - 2y stock-bond correlation

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0661	-0.0270
	-1.2674	-0.8539
Core PPI	0.1860	-0.0645
	1.2347	-1.1325
Employment Cost Index	0.0804	-0.0537
	1.2095	-0.6574
Retail Sales	0.0423	-0.1934
	1.4267	-0.9268
GDP	0.1464**	-0.0348
	2.5710**	-0.8552
Capacity Utilization	0.0848	-0.1620
	1.5477	-0.6163
Core CPI	-0.0220	0.0364
	-0.3106	0.2404
Durable Goods	-0.0132	-0.0317
	-0.4662	-0.5492
New Home Sales	0.0303	-0.1991**
	0.6972	-2.1974**
Nonfarm Payrolls	-0.1418	-0.0290
	-1.4434	-0.3722
Unemployment Rate	0.0958	-0.0735
	1.5149	-1.4199
ISM	0.0437	-0.1518
	0.7345	-1.5593
Leading Indicators	0.1076	-0.1079
	1.5813	-1.0597
Federal Funds Rate	0.7223	0.5511**
	1.6132	2.7986**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.18: State asymmetry test - 4y stock-bond correlation

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0834	-0.0815
	-1.4261	-1.2922
Core PPI	0.1405	-0.1649*
	0.7503	-1.8256*
Employment Cost Index	0.0435	-0.1435
	0.5620	-0.9495
Retail Sales	0.0886	-0.2980
	1.5090	-1.5804
GDP	0.2286**	-0.0599
	2.5357**	-0.8824
Capacity Utilization	0.1346	-0.2279
	1.0535	-0.4910
Core CPI	0.0188	-0.0537
	0.1518	-0.1263
Durable Goods	-0.0528	0.0211
	-0.8214	0.2327
New Home Sales	0.0663	-0.2940**
	0.8565	-2.3154**
Nonfarm Payrolls	-0.2304	-0.1065
	-1.2073	-0.6244
Unemployment Rate	0.1878	-0.1810
	1.6448	-1.5501
ISM	0.1194	-0.3180
	0.8675	-1.2565
Leading Indicators	-0.0256	-0.3816
	-0.6917	-1.1560
Federal Funds Rate	1.0539	1.1225**
	1.5754	2.3608**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.19: State asymmetry test - 7y stock-bond correlation

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0789	-0.1174
	-1.1681	-1.1807
Core PPI	0.0332	-0.2104
	0.1746	-1.6139
Employment Cost Index	-0.1617	-0.3249
	-0.8658	-1.2402
Retail Sales	0.1361	-0.3225
	1.5538	-1.4418
GDP	0.1633	-0.0987
	0.9014	-0.9667
Capacity Utilization	0.1743	-0.2691
	0.8816	-0.4894
Core CPI	0.0819	-0.1824
	0.5020	-0.2875
Durable Goods	-0.0677	0.0659
	-0.7790	0.5480
New Home Sales	0.1287	-0.3711**
	1.1792	-2.4275**
Nonfarm Payrolls	-0.3115	-0.1286
	-1.1626	-0.6520
Unemployment Rate	0.2191	-0.2780*
	1.3436	-1.7344*
ISM	0.1924	-0.4396
	0.9402	-1.1614
Leading Indicators	-0.0805	-0.6244
	-1.3461	-1.1302
Federal Funds Rate	1.0275	1.2529*
	1.4251	1.7306*

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table C.20: State asymmetry test - 20y stock-bond correlation

Announcement	$\beta_{P,exp} - \beta_{P,rec}$	$\beta_{N,exp} - \beta_{N,rec}$
Consumer Confidence	-0.0151	-0.1878
	-0.1128	-0.8780
Core PPI	-0.2707	-0.1644
	-0.9140	-0.5242
Employment Cost Index	-0.6386	-0.7462
	-1.0942	-1.3869
Retail Sales	0.2298	-0.3613
	1.3920	-0.6382
GDP	0.0201	-0.1574
	0.0431	-0.8914
Capacity Utilization	0.3353	-0.4384
	0.7235	-0.5033
Core CPI	0.2351	-0.7735
	0.7931	-0.5082
Durable Goods	-0.1471	0.3873
	-1.0317	1.3260
New Home Sales	0.2302	-0.4751**
	1.1643	-2.1287**
Nonfarm Payrolls	-0.4620	-0.1756
	-1.0163	-0.6036
Unemployment Rate	0.3378	-0.5550*
	1.1960	-1.8354*
ISM	0.3989	-0.7707
	1.0071	-1.0577
Leading Indicators	-0.2667*	-1.6362
	-1.6472*	-1.1105
Federal Funds Rate	0.9541	2.1253
	1.0291	1.3626

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Appendix D

Hypothesis Tests for Sign Asymmetry

Table D.1: Sign asymmetry test - nominal 2 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0189	-0.0011
	-0.4906	-0.0282
Core PPI	-0.0256	-0.0029
	-0.5035	-0.0705
Employment Cost Index	0.1422*	-0.0860
	1.8710*	-1.5674
Retail Sales	0.0660	0.0061
	1.1852	0.1963
GDP	-0.0090	-0.0131
	-0.1840	-0.2834
Capacity Utilization	0.0522	-0.0558
	1.1825	-1.4455
Core CPI	-0.0388	0.0303
	-0.8609	0.7699
Durable Goods	0.0760	-0.0892**
	1.6101	-2.6866**
New Home Sales	-0.0990**	0.0708
	-2.1926**	1.2449
Nonfarm Payrolls	0.0351	0.0379
	0.4705	0.7469
Unemployment Rate	-0.0225	0.0123
	-0.3334	0.3061
ISM	0.1027**	-0.0660
	2.7529**	-1.5309
Leading Indicators	-0.0058	0.0158
	-0.1608	0.6575
Federal Funds Rate	-0.1245	0.1892**
	-0.9308	3.2282**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.2: Sign asymmetry test - nominal 5 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0448*	0.0359*
	-1.6995*	1.6900*
Core PPI	-0.0245	-0.0172
	-0.5608	-0.5189
Employment Cost Index	0.0263	-0.0330
	0.4555	-0.9072
Retail Sales	0.0536	0.0057
	0.9675	0.1437
GDP	-0.0218	0.0036
	-0.4764	0.0901
Capacity Utilization	-0.0250	0.0063
	-0.7169	0.2300
Core CPI	0.0213	-0.0155
	0.5474	-0.4609
Durable Goods	0.0428	-0.0587*
	0.9727	-1.8708*
New Home Sales	-0.0971**	0.0819**
	-2.8531**	2.1847**
Nonfarm Payrolls	-0.0301	0.0758*
	-0.4573	1.7376*
Unemployment Rate	-0.0076	0.0053
	-0.1113	0.1363
ISM	0.0662	-0.0063
	1.4873	-0.1657
Leading Indicators	0.0120	0.0017
	0.2667	0.0461
Federal Funds Rate	-0.0577	0.0407
	-0.4303	0.7089

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.3: Sign asymmetry test - nominal 10 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0890**	0.0732**
	-3.6457**	3.4898**
Core PPI	-0.0610	-0.0010
	-1.5655	-0.0354
Employment Cost Index	-0.0295	-0.0116
	-0.5055	-0.3196
Retail Sales	0.0815	-0.0070
	1.5804	-0.1788
GDP	-0.0089	0.0041
	-0.1500	0.1092
Capacity Utilization	-0.0399	0.0412
	-1.3166	1.5716
Core CPI	0.0347	-0.0175
	1.0269	-0.5916
Durable Goods	0.0077	-0.0383
	0.2206	-1.4316
New Home Sales	-0.0578*	0.0307
	-1.7890*	0.8833
Nonfarm Payrolls	-0.0285	0.0601*
	-0.5659	1.8219*
Unemployment Rate	0.0002	-0.0002
	0.0036	-0.0077
ISM	0.1422**	-0.0340
	4.3724**	-1.2676
Leading Indicators	0.0373	-0.0145
	0.7643	-0.3528
Federal Funds Rate	0.0281	-0.0098
	0.2974	-0.2612

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.4: Sign asymmetry test - nominal 15 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0783**	0.0668**
	-3.4848**	3.6886**
Core PPI	-0.0703**	0.0092
	-2.2576**	0.4432
Employment Cost Index	-0.0430	-0.0046
	-0.7644	-0.1200
Retail Sales	0.0969**	-0.0275
	2.6254**	-1.1801
GDP	0.0164	-0.0159
	0.2850	-0.3635
Capacity Utilization	-0.0160	0.0274
	-0.5413	1.0008
Core CPI	0.0299	-0.0214
	1.0239	-0.8079
Durable Goods	-0.0136	-0.0241
	-0.4553	-1.1736
New Home Sales	-0.0397	0.0173
	-1.3663	0.5186
Nonfarm Payrolls	-0.0180	0.0292
	-0.4714	1.0014
Unemployment Rate	-0.0136	0.0022
	-0.2456	0.0791
ISM	0.1276**	-0.0522**
	5.5182**	-2.7229**
Leading Indicators	0.0351	-0.0123
	0.8148	-0.3431
Federal Funds Rate	0.0771	0.0135
	0.8715	0.3456

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.5: Sign asymmetry test - nominal 20 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0349*	0.0344*
	-1.6833*	1.9534*
Core PPI	-0.0568	0.0078
	-1.6045	0.3044
Employment Cost Index	-0.0456	-0.0055
	-0.8782	-0.1467
Retail Sales	0.0813**	-0.0280
	2.3026**	-1.4175
GDP	0.0382	-0.0381
	0.7199	-0.7500
Capacity Utilization	-0.0116	0.0255
	-0.3956	0.9633
Core CPI	0.0367	-0.0439
	1.1506	-1.3169
Durable Goods	-0.0194	-0.0136
	-0.7209	-0.8124
New Home Sales	-0.0358	0.0420
	-1.4044	1.3568
Nonfarm Payrolls	0.0047	-0.0064
	0.1364	-0.2161
Unemployment Rate	-0.0497	0.0129
	-0.9920	0.4052
ISM	0.0488	-0.0381
	0.9210	-1.3169
Leading Indicators	0.0153	-0.0048
	0.3165	-0.1688
Federal Funds Rate	0.1256	-0.0177
	1.3447	-0.4974

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.6: Sign asymmetry test - TIPS 2 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0846**	0.0750**
	-2.6584**	2.6417**
Core PPI	-0.0068	0.0030
	-0.1529	0.0865
Employment Cost Index	0.4767**	-0.6432**
	4.7021**	-4.7228**
Retail Sales	0.0523	0.0198
	0.6635	0.2353
GDP	0.0340	-0.0651
	0.3663	-0.8262
Capacity Utilization	-0.0390	0.0411
	-0.8926	1.0295
Core CPI	-0.0423	0.0293
	-1.0489	0.8069
Durable Goods	-0.0218	-0.0077
	-0.1958	-0.0733
New Home Sales	-0.2386	0.3249
	-1.5795	1.4985
Nonfarm Payrolls	0.1664	-0.2496
	1.2941	-1.3195
Unemployment Rate	-0.0801	0.0791
	-0.9132	0.7674
ISM	0.0299	-0.0530
	0.5847	-0.9024
Leading Indicators	0.0109	-0.0353
	0.3859	-1.5882
Federal Funds Rate	-0.3216	0.1887
	-0.5074	1.0262

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.7: Sign asymmetry test - TIPS 5 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	0.0216	-0.0256
	0.7482	-0.8719
Core PPI	-0.0460	0.0148
	-1.1267	0.4153
Employment Cost Index	-0.0386	-0.0119
	-0.7068	-0.2540
Retail Sales	0.0395	-0.0294
	1.1401	-1.0715
GDP	-0.0766	0.0572
	-1.4432	1.1468
Capacity Utilization	0.0151	-0.0278
	0.5995	-1.3512
Core CPI	-0.0001	0.0115
	-0.0044	0.3327
Durable Goods	0.0206	-0.0352
	0.5356	-0.9980
New Home Sales	-0.0117	-0.0107
	-0.3656	-0.3113
Nonfarm Payrolls	-0.0054	0.0385
	-0.1214	1.1131
Unemployment Rate	0.0019	-0.0341
	0.0366	-0.9614
ISM	0.0234	0.0005
	0.7258	0.0150
Leading Indicators	-0.0034	0.0252
	-0.1307	1.0552
Federal Funds Rate	-0.0223	0.0058
	-0.2006	0.1146

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.8: Sign asymmetry test - TIPS 10 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0380	0.0326
	-1.2548	1.0905
Core PPI	0.0017	-0.0205
	0.0618	-0.9523
Employment Cost Index	-0.0725*	0.0372
	-1.6563*	1.2429
Retail Sales	0.0041	0.0078
	0.1409	0.3466
GDP	0.0149	-0.0078
	0.3340	-0.1972
Capacity Utilization	-0.0182	-0.0019
	-1.0372	-0.1347
Core CPI	0.0331	-0.0071
	1.3231	-0.2802
Durable Goods	0.0144	-0.0368
	0.4313	-1.1065
New Home Sales	-0.0223	0.0044
	-1.1707	0.1951
Nonfarm Payrolls	-0.0213	0.0054
	-0.7256	0.3363
Unemployment Rate	0.0592	-0.0167
	1.2447	-0.9919
ISM	0.0494**	-0.0275
	2.2711**	-1.4343
Leading Indicators	0.0044	0.0131
	0.2350	0.8405
Federal Funds Rate	-0.0548	0.0248
	-0.9505	1.0663

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.9: Sign asymmetry test - TIPS 15 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0151	0.0034
	-0.4712	0.1053
Core PPI	0.0023	-0.0174
	0.0774	-0.6821
Employment Cost Index	-0.0718	0.0345
	-1.4807	1.0568
Retail Sales	0.0519	-0.0288
	0.9297	-0.6300
GDP	0.0369	-0.0370
	0.7409	-0.8773
Capacity Utilization	-0.0141	0.0038
	-0.9119	0.2324
Core CPI	0.0280	-0.0174
	1.5494	-0.9960
Durable Goods	-0.0146	0.0044
	-0.5634	0.1915
New Home Sales	-0.0253	0.0252
	-1.1446	0.9504
Nonfarm Payrolls	-0.0002	-0.0060
	-0.0078	-0.2649
Unemployment Rate	0.0124	-0.0084
	0.3878	-0.5126
ISM	0.0444*	-0.0223
	1.8323*	-1.0086
Leading Indicators	0.0136	0.0068
	0.6955	0.4031
Federal Funds Rate	-0.0022	-0.0128
	-0.0328	-0.4927

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.10: Sign asymmetry test - TIPS 20 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	0.0171	-0.0378
	0.2514	-0.5442
Core PPI	-0.0146	-0.0020
	-0.3905	-0.0597
Employment Cost Index	-0.0536	0.0151
	-0.9885	0.3921
Retail Sales	0.0668	-0.0401
	1.1503	-0.8719
GDP	0.0132	-0.0375
	0.2724	-0.9015
Capacity Utilization	-0.0130	0.0129
	-0.7464	0.6815
Core CPI	0.0303	-0.0420**
	1.3163	-2.0030**
Durable Goods	-0.0043	0.0013
	-0.1328	0.0432
New Home Sales	-0.0061	0.0221
	-0.2306	0.7542
Nonfarm Payrolls	0.0202	-0.0085
	0.6560	-0.3297
Unemployment Rate	-0.0659	0.0122
	-1.4109	0.5302
ISM	0.0346	-0.0092
	1.4237	-0.4671
Leading Indicators	0.0146	0.0113
	0.5584	0.5202
Federal Funds Rate	0.1314	-0.0928**
	1.4036	-1.9868**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.11: Sign asymmetry test - BEIR 2 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	0.0646**	-0.0514
	2.1042**	-1.4502
Core PPI	-0.0089	-0.0159
	-0.2002	-0.3205
Employment Cost Index	0.0342	0.0111
	0.4182	0.0979
Retail Sales	-0.0389	0.0407
	-0.5393	0.5150
GDP	-0.0121	0.0764
	-0.1146	0.7306
Capacity Utilization	0.0726**	-0.0815**
	1.9677**	-2.6987**
Core CPI	-0.0188	0.0007
	-0.5030	0.0158
Durable Goods	-0.0100	0.0174
	-0.1263	0.1806
New Home Sales	0.1764	-0.2601
	1.3789	-1.3667
Nonfarm Payrolls	-0.0553	0.0900
	-0.9431	1.0108
Unemployment Rate	0.0157	0.0243
	0.3628	0.5459
ISM	0.1053**	-0.0915*
	2.2011**	-1.7453*
Leading Indicators	0.0300	0.0422*
	1.2470	1.9434*
Federal Funds Rate	0.5226	-0.0153
	1.0483	-0.1192

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.12: Sign asymmetry test - BEIR 5 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0655*	0.0611*
	-1.9382*	1.8197*
Core PPI	0.0213	-0.0319
	0.4076	-0.6577
Employment Cost Index	0.0648	-0.0211
	1.1829	-0.4744
Retail Sales	0.0139	0.0351
	0.2764	0.8850
GDP	0.0549	-0.0536
	0.7010	-0.7490
Capacity Utilization	-0.0394	0.0340
	-1.0800	1.1718
Core CPI	0.0212	-0.0269
	0.5546	-0.9802
Durable Goods	0.0196	-0.0222
	0.5693	-0.9637
New Home Sales	-0.0764**	0.0880**
	-2.4252**	2.5680**
Nonfarm Payrolls	-0.0251	0.0374
	-0.6590	1.2432
Unemployment Rate	-0.0094	0.0395
	-0.2077	1.2633
ISM	0.0475	-0.0071
	1.1373	-0.2354
Leading Indicators	0.0155	-0.0234
	0.3542	-0.6016
Federal Funds Rate	-0.0331	0.0171
	-0.4963	0.3332

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.13: Sign asymmetry test - BEIR 10 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0506**	0.0405*
	-2.1420**	1.8425*
Core PPI	-0.0625*	0.0194
	-1.8280*	0.8467
Employment Cost Index	0.0433	-0.0491*
	0.8888	-1.7275*
Retail Sales	0.0772**	-0.0148
	2.1189**	-0.6234
GDP	-0.0241	0.0119
	-0.5423	0.4036
Capacity Utilization	-0.0210	0.0432
	-0.6829	1.5536
Core CPI	0.0012	-0.0103
	0.0293	-0.2469
Durable Goods	-0.0082	-0.0008
	-0.2386	-0.0283
New Home Sales	-0.0301	0.0236
	-0.9161	0.6855
Nonfarm Payrolls	-0.0077	0.0548**
	-0.2186	2.0758**
Unemployment Rate	-0.0589	0.0165
	-1.3440	0.6705
ISM	0.0736**	-0.0034
	2.6807**	-0.1339
Leading Indicators	0.0330	-0.0275
	0.5989	-0.5622
Federal Funds Rate	0.0797	-0.0372
	1.4386	-1.4023

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.14: Sign asymmetry test - BEIR 15 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0634*	0.0637*
	-1.7085*	1.7300*
Core PPI	-0.0717**	0.0261
	-2.0578**	0.9144
Employment Cost Index	0.0300	-0.0400
	0.5887	-1.2434
Retail Sales	0.0451	0.0012
	1.1324	0.0417
GDP	-0.0214	0.0211
	-0.4949	0.6233
Capacity Utilization	-0.0018	0.0238
	-0.0601	0.8010
Core CPI	0.0013	-0.0036
	0.0394	-0.1118
Durable Goods	0.0005	-0.0281
	0.0157	-0.9245
New Home Sales	-0.0124	-0.0088
	-0.3831	-0.2448
Nonfarm Payrolls	-0.0189	0.0354*
	-0.8198	1.7848*
Unemployment Rate	-0.0258	0.0108
	-0.6964	0.4568
ISM	0.0741**	-0.0282
	2.6809**	-1.1196
Leading Indicators	0.0217	-0.0187
	0.4304	-0.4115
Federal Funds Rate	0.0712	0.0269
	0.7447	0.5701

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.15: Sign asymmetry test - BEIR 20 year instantaneous forwards

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.0526	0.0727
	-0.7774	1.0687
Core PPI	-0.0407	0.0089
	-0.9359	0.2465
Employment Cost Index	0.0098	-0.0221
	0.1700	-0.5350
Retail Sales	0.0148	0.0119
	0.3018	0.3355
GDP	0.0236	-0.0006
	0.6822	-0.0151
Capacity Utilization	0.0009	0.0129
	0.0309	0.4342
Core CPI	0.0057	-0.0015
	0.1627	-0.0416
Durable Goods	-0.0151	-0.0148
	-0.3721	-0.3935
New Home Sales	-0.0295	0.0202
	-0.9563	0.5739
Nonfarm Payrolls	-0.0171	0.0023
	-0.5342	0.0883
Unemployment Rate	0.0163	0.0009
	0.3289	0.0354
ISM	0.0268	-0.0303
	0.4541	-1.1772
Leading Indicators	0.0009	-0.0156
	0.0157	-0.3460
Federal Funds Rate	-0.0185	0.0777
	-0.1490	1.2142

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.16: Sign asymmetry test - stock prices

Announcement	$\beta_{P,exp} - \beta_{N,exp}$	$\beta_{P,rec} - \beta_{N,rec}$
Consumer Confidence	-0.1351	0.3228
	-0.2470	0.6542
Core PPI	1.2803	-0.9752
	1.3425	-1.1939
Employment Cost Index	-0.0275	0.3216
	-0.0228	0.3704
Retail Sales	2.1162	-1.4153
	1.5037	-1.3133
GDP	-0.7229	0.4374
	-1.1545	0.9146
Capacity Utilization	-0.2782	0.6122
	-0.2993	0.7080
Core CPI	-0.2181	-0.6797
	-0.1742	-0.5844
Durable Goods	-1.1884**	1.1000**
	-2.1393**	2.4834**
New Home Sales	0.3233	0.3271
	0.6495	0.5441
Nonfarm Payrolls	1.4488*	-0.9067
	1.7851*	-1.2056
Unemployment Rate	0.0436	-0.3842
	0.0464	-0.5771
ISM	0.7362	0.2336
	1.1493	0.3871
Leading Indicators	-1.3412	0.7965
	-1.3788	0.8481
Federal Funds Rate	-1.5432	2.4251
	-0.5210	1.4368

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.17: Sign asymmetry test - 2y stock-bond correlation

Announcement	$\beta_{P,exp} + \beta_{N,exp}$	$\beta_{P,rec} + \beta_{N,rec}$
Consumer Confidence	-0.0330	0.0600**
	-1.2394	2.1824**
Core PPI	0.0515	-0.0701
	0.6660	-0.9293
Employment Cost Index	0.0016	-0.0251
	0.0235	-0.5683
Retail Sales	-0.0559	0.0953
	-0.4833	0.9589
GDP	0.0576	-0.0540
	1.4056	-1.5470
Capacity Utilization	-0.0163	0.0609
	-0.1300	0.4627
Core CPI	0.0139	-0.0005
	0.1639	-0.0065
Durable Goods	-0.0097	0.0352
	-0.2532	1.0105
New Home Sales	-0.0708	0.0980*
	-1.6101	1.6772*
Nonfarm Payrolls	-0.0535	0.1173**
	-0.7477	2.2320**
Unemployment Rate	-0.0001	-0.0223
	-0.0024	-0.6188
ISM	-0.0465	0.0616
	-0.7699	0.9913
Leading Indicators	0.0008	0.0011
	0.0128	0.0176
Federal Funds Rate	0.7254**	-0.5480**
	2.4469**	-2.3723**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.18: Sign asymmetry test - 4y stock-bond correlation

Announcement	$\beta_{P,exp} + \beta_{N,exp}$	$\beta_{P,rec} + \beta_{N,rec}$
Consumer Confidence	-0.0564	0.1085**
	-1.2971	2.5559**
Core PPI	-0.0344	-0.0099
	-0.3250	-0.1004
Employment Cost Index	-0.0674	0.0326
	-0.5915	0.5278
Retail Sales	-0.0631	0.1463
	-0.4928	1.5857
GDP	0.0804	-0.0883
	1.3297	-1.5092
Capacity Utilization	0.0010	0.0944
	0.0047	0.4033
Core CPI	0.0133	0.0483
	0.0636	0.2300
Durable Goods	0.0136	0.0453
	0.2032	0.7905
New Home Sales	-0.1060	0.1217
	-1.5715	1.4449
Nonfarm Payrolls	-0.1132	0.2236**
	-0.7888	2.0845**
Unemployment Rate	-0.0214	-0.0283
	-0.2142	-0.4058
ISM	-0.1075	0.0912
	-0.7358	0.5806
Leading Indicators	-0.1993	0.2079
	-1.1784	1.2641
Federal Funds Rate	1.3305**	-0.8459**
	2.6347**	-2.2685**

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.19: Sign asymmetry test - 7y stock-bond correlation

Announcement	$\beta_{P,exp} + \beta_{N,exp}$	$\beta_{P,rec} + \beta_{N,rec}$
Consumer Confidence	-0.0543	0.1420**
	-0.8939	2.2282**
Core PPI	-0.1255	0.0516
	-0.9999	0.4784
Employment Cost Index	-0.3054	0.1812
	-1.4233	1.4716
Retail Sales	-0.0161	0.1703
	-0.0918	1.5814
GDP	-0.0144	-0.0789
	-0.1106	-0.8314
Capacity Utilization	0.0217	0.1165
	0.0802	0.4174
Core CPI	0.0211	0.1216
	0.0688	0.3892
Durable Goods	0.0439	0.0457
	0.4838	0.6166
New Home Sales	-0.1215	0.1209
	-1.3274	1.2003
Nonfarm Payrolls	-0.1526	0.2875**
	-0.8131	2.1298**
Unemployment Rate	-0.0898	-0.0308
	-0.6565	-0.3323
ISM	-0.1641	0.0830
	-0.7566	0.3458
Leading Indicators	-0.3415	0.3634
	-1.2088	1.3212
Federal Funds Rate	1.4531**	-0.8272*
	2.1945**	-1.9153*

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence

Table D.20: Sign asymmetry test - 20y stock-bond correlation

Announcement	$\beta_{P,exp} + \beta_{N,exp}$	$\beta_{P,rec} + \beta_{N,rec}$
Consumer Confidence	-0.0338	0.1690
	-0.2690	1.2859
Core PPI	-0.2845	0.1506
	-1.1673	0.7880
Employment Cost Index	-0.8243	0.5604*
	-1.5991	1.6917*
Retail Sales	0.0693	0.2008
	0.1801	0.7676
GDP	-0.2018	-0.0645
	-0.5772	-0.3275
Capacity Utilization	0.0565	0.1596
	0.1284	0.3512
Core CPI	-0.0985	0.4398
	-0.1387	0.5874
Durable Goods	0.2091	-0.0311
	1.1073	-0.1974
New Home Sales	-0.1483	0.0965
	-0.9584	0.6445
Nonfarm Payrolls	-0.2323	0.4054*
	-0.7658	1.9118*
Unemployment Rate	-0.2347	-0.0175
	-0.9870	-0.1087
ISM	-0.2970	0.0748
	-0.7265	0.1617
Leading Indicators	-0.9330	0.9700
	-1.2421	1.3205
Federal Funds Rate	2.1207*	-0.9587
	1.7142*	-1.4357

Note: First number is estimate, second is t-statistic
* indicates 90% confidence, ** indicates 95% confidence