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**Are Long-Run Inflation Expectations Anchored More Firmly in
the Euro Area than in the United States?**

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Are Long-Run Inflation Expectations Anchored More Firmly in the Euro Area than in the United States?

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Abstract: This paper compares the recent evolution of long-run inflation expectations in the euro area and the United States, using evidence from financial markets and surveys of professional forecasters. Survey data indicate that long-run inflation expectations are reasonably well-anchored in both economies, but also reveal substantially greater dispersion across forecasters' long-horizon projections of U.S. inflation. Daily data on inflation swaps and nominal-indexed bond spreads—which gauge compensation for expected inflation and inflation risk—also suggest that long-run inflation expectations are more firmly anchored in the euro area than in the United States. In particular, surprises in macroeconomic data releases have significant effects on U.S. forward inflation compensation, even at long horizons, whereas macroeconomic news only influences euro area inflation compensation at short horizons.

Keywords: Inflation compensation, euro area inflation, ECB, central bank communication.

JEL Codes: E31, E52, E58

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1. Introduction

The United States and the euro area are industrial economies of comparable size and openness; furthermore, the Federal Reserve and the European Central Bank (ECB) each have a legal mandate to maintain price stability. Nevertheless, these two central banks have distinct approaches in formulating and communicating their policy strategies. For example, in May 2003 the ECB publicly clarified that it would seek to maintain euro area consumer price inflation below but close to 2 percent over the medium run, whereas the Federal Reserve has not announced a quantitative inflation objective. However, no studies to date have compared the evolution of long-run inflation expectations in the United States to those in the euro area.

Building upon the work of Gürkaynak, Sack and Swanson (2005), we use daily U.S. and euro area financial market data to make inferences about the behavior of long-run inflation expectations. For each region we estimate the response of the compensation for expected inflation and inflation risk to the surprise component of macroeconomic news. Inflation compensation in the euro area is measured from the inflation-swaps market (a large and liquid market for hedging inflation exposures indexed to euro area consumer prices), while inflation compensation in the United States is measured from the spread between yields on nominal and real Treasury securities.¹

We find that the reaction of euro area inflation compensation to news from both the euro area and the United States is concentrated in the first few years of the term structure. At long horizons, inflation compensation is insensitive to data surprises, suggesting that inflation expectations are firmly anchored.² This result is supported by evidence from surveys that show stable expectations and very little disagreement among professional forecasters about likely

¹ An inflation-swaps market also exists in the United States but is smaller and less mature than that in the euro area.

² Our empirical findings echo those of Gürkaynak, Levin, and Swanson (2006) and Gürkaynak, Levin, Marder and Swanson (2006) who find a similar lack of sensitivity of inflation compensation in inflation-targeting countries.

long-run inflation outcomes for the euro area. Ehrman, Fratzscher, Gürkaynak and Swanson (2007) document the convergence of euro-area nominal bond yields since monetary union and similarly conclude that euro area inflation expectations have been firmly anchored over the past few years.

In contrast to the euro area, we find that U.S. long-run inflation compensation reacts to data surprises, even in our short sample starting in 2003, confirming the findings of Gürkaynak, Levin, and Swanson (2007). Furthermore, we show that these responses are not short lived and are thus unlikely to owe to temporary fluctuations in market liquidity following news events. Surveys of professional forecasters reveal a substantially greater degree of forecaster disagreement about long-run inflation outcomes in the United States than in the euro area.

Taken together, the empirical results from financial markets and survey evidence lead us to conclude that long-run inflation expectations are not as firmly anchored in the United States as in the euro area. Furthermore, given the differences in the communication practices of the ECB and the Federal Reserve, this evidence seems to suggest that a quantitative inflation target could help provide a firmer anchor for U.S. inflation expectations.

The remainder of the paper is structured as follows. Section 2 provides some evidence about long-run inflation expectations from surveys of professional forecasters in the context of recent monetary policy. Section 3 then outlines the methodology and data for the empirical financial market analysis. Section 4 presents the empirical results of the reaction of euro area nominal interest rates and inflation compensation to news and Section 5 compares those with results for the United States over the same sample. Section 6 addresses whether the results reflect transitory liquidity effects or long-lived adjustments of market expectations and Section 7 offers some concluding remarks.

2. Evidence from Surveys of Professional Forecasters

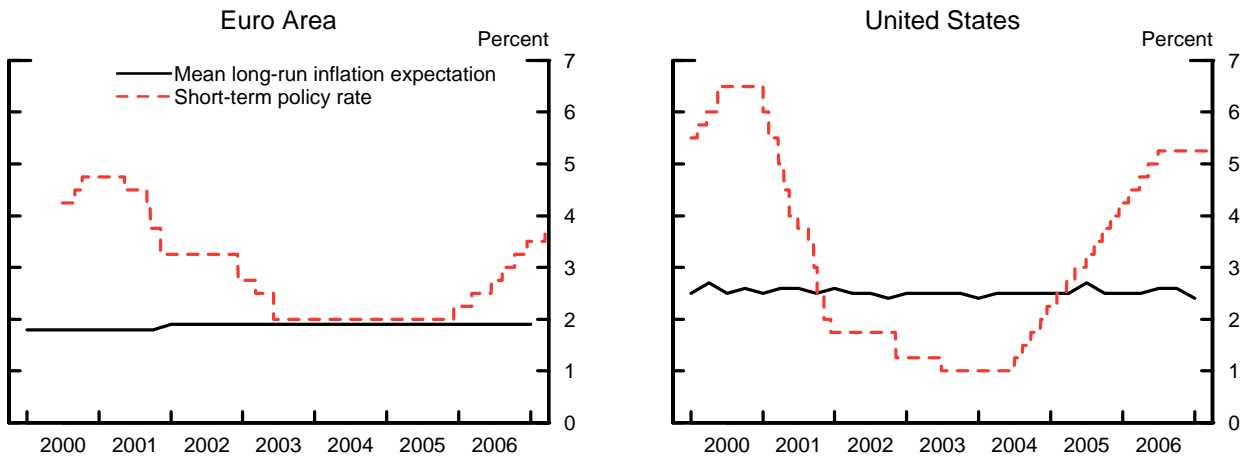
Before diving into the high-frequency data analysis, one can gain an impression of long-run inflation expectations from surveys of professional forecasters (SPF) conducted by the ECB and the Federal Reserve. In this section we present some evidence from those surveys in the context of the recent evolution of monetary policy. The two surveys have a similar number of respondents and are conducted at a quarterly frequency. The ECB solicits projections of inflation for the euro area harmonized index of consumer prices (HICP) whereas the Philadelphia Fed inquires about projected inflation for the U.S. consumer price index (CPI).

2.1 Euro Area

The Maastricht Treaty endowed the ECB with the primary objective to achieve inflation stability. In 1998, the Governing Council of the ECB interpreted this as a directive to maintain euro area consumer price inflation below two percent over the medium term. This definition was subsequently clarified in a public statement in May 2003, in which the ECB declared it would aim to keep inflation below *but close to* two percent over the medium term. Despite its quantitative inflation target, the ECB does not view itself as an inflation targeter.

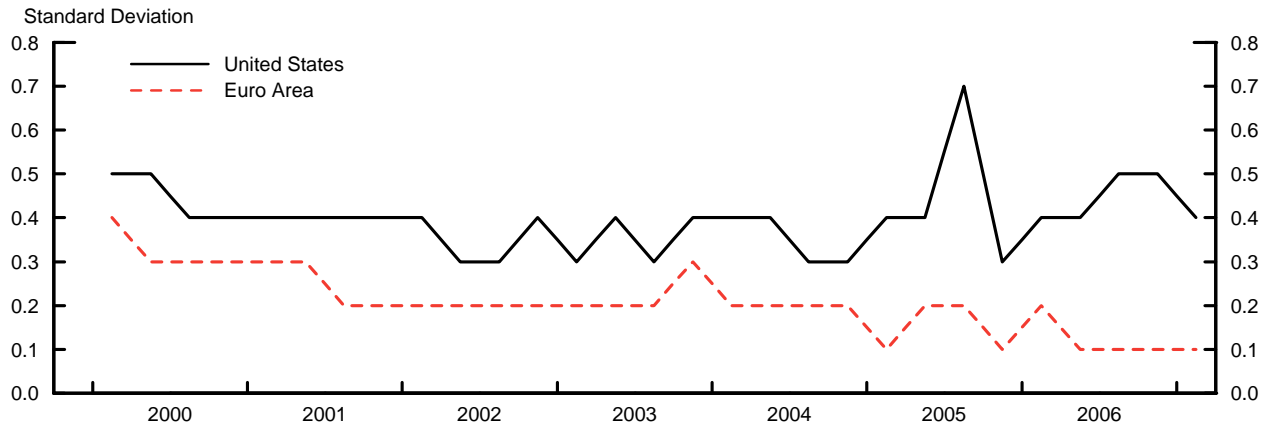
At the time the quantitative objective was clarified, the ECB was in the final stages of an easing cycle that had taken the minimum bid rate, the ECB's policy rate, to two percent, where it remained for the following two and a half years. The path of the policy rate is illustrated in Figure 1, alongside expected consumer price inflation five-years ahead, calculated as the average point forecast across respondents to the ECB's SPF. Mean five-year ahead expected inflation was 1.9 percent in mid 2003 and remained at that plateau thereafter, indicating very stable

Figure 1
Policy Rates and Long-Run Expected Inflation



Sources: ECB Survey of Professional Forecasters and Federal Reserve Bank of Philadelphia Survey of Professional Forecasters (SPF). Forecasts for the euro area pertain to five-year-ahead inflation in the euro area HICP. Forecasts for the United States pertain to CPI inflation over the coming ten years. The ECB publishes mean inflation expectations rounded to one decimal place, so the mean calculated from individual responses to the SPF have been rounded similarly.

Figure 2
Cross-Sectional Dispersion in Long-Run Inflation Expectations



Sources: ECB Survey of Professional Forecasters and Federal Reserve Bank of Philadelphia Survey of Professional Forecasters. Dispersion is calculated as the cross-sectional standard deviation of responses to the respective survey questions. Forecasts for the euro area pertain to five-year-ahead inflation in the euro area HICP. Forecasts for the United States pertain to CPI inflation over the coming ten years. The ECB publishes standard deviations rounded to one decimal place, so standard deviations calculated from individual responses to the SPF have been rounded similarly.

inflation expectations. This impression is further reinforced by a measure of disagreement across forecasters, shown in Figure 2. The standard deviation of respondents' point forecasts halved between 2000 and 2003 and has continued to decline to its current low of one tenth of a percent; that is, forecasters have grown more in agreement that inflation in the euro area will be close to the ECB's target in the medium term.

2.2 United States

Among its several responsibilities, the Federal Reserve has a mandate to maintain price stability. In fulfilling that mandate, the Federal Open Market Committee (FOMC) has provided a qualitative definition of price stability but not a quantitative objective for inflation. A number of individual members of the Committee have expressed personal comfort zones for inflation, but the Committee as a whole has not made a commitment to a quantitative definition. Nonetheless, the Federal Reserve enjoys credibility among financial markets and the public in maintaining low and stable inflation.

During the period 2000 to 2006, the target federal funds rate moved through a wider policy cycle than the ECB's minimum bid rate (see the right panel of Figure 1). The timing of the easing phase in the United States corresponded closely to that in the euro area and was accompanied during 2000 to 2002 by concerns about deflation and the possibility that the Federal Open Market Committee would face the zero lower bound on its policy rate. At the trough of the monetary-policy cycle, the FOMC employed language aimed at reassuring financial market participants that monetary policy would remain accommodative for some time and, once tightening had begun, employed the "measured pace" language to indicate that the accommodative stance would not be removed unduly quickly.

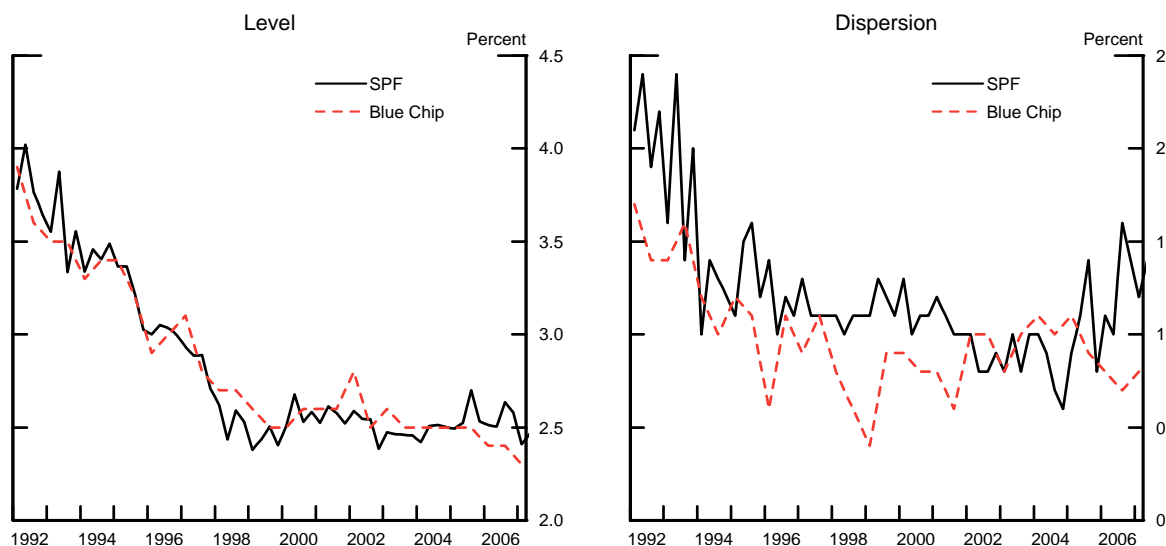
The mean expected rate of consumer price inflation over the coming ten years from the Federal Reserve Bank of Philadelphia's SPF is shown alongside the path of the federal funds rate in the left panel of Figure 1. It is worth noting that throughout the period marked by deflationary concerns, the FOMC's communication of a deliberately accommodative stance and subsequent tightening, inflation expectations hovered close to 2½ percent, suggesting that professional forecasters' inflation expectations were well anchored around that level. Mean inflation expectations for the United States exhibit a little more quarter-to-quarter variation than euro area inflation expectations, but overall, Figure 1 gives the impression of reasonably stable long-run inflation expectations.³

Despite this stability, professional forecasters in the United States disagree more about their predictions than forecasters in the euro area. Figure 2 shows the standard deviation of respondents' ten-year average inflation forecasts in the United States, alongside the standard deviation of five-year-ahead forecasts in the euro area. The standard deviation of responses has been higher in the United States than in the euro area since 2000. Moreover, the standard deviation of inflation expectations among euro area forecasters has trended down since 1999, while the standard deviation of point forecasts in the U.S. survey has not diminished, but rather increased, since 2004.

Additional information about movements in longer-term U.S. inflation expectations can also be obtained from the semi-annual long-range forecasts reported in the Blue Chip survey of professional forecasters. As shown in the left panel of Figure 3, the cross-sectional average of long-run inflation projections from the Blue Chip survey has generally been quite close to that in the Federal Reserve's SPF over the past fifteen years, even though these projections are defined

³ Indeed, the median point forecast from the Philadelphia Federal Reserve's survey was static at 2½ percent between 2000 and 2006, edging down slightly in the first quarter of 2007 (not shown).

Figure 3
Level and Dispersion of Long-Run Inflation Expectations in U.S. Surveys



Sources: Federal Reserve Bank of Philadelphia’s Survey of Professional Forecasters (quarterly) and the Blue Chip survey (semi-annual). The left panel plots the cross-sectional mean of responses to long-run inflation survey questions. The right panel plots a measure of dispersion calculated as the difference between the average response in the top and bottom quintiles.

over different time horizons. In particular, the SPF asks for the annual average rate of inflation expected over the next ten years, whereas the Blue Chip survey asks for the seven-year-ahead projection of the five-year average inflation rate. Indeed, this similarity highlights the extent to which most professional forecasters anticipate that inflation converges quite quickly to its longer-run level, and hence, short-horizon variability tends to have little influence on their ten-year-average projections.

The dispersion across long-run U.S. inflation projections in the Blue Chip survey is broadly similar to the dispersion apparent in the SPF. Unfortunately, the Blue Chip survey does not publish the individual responses to its long-range forecast questions and does not report standard deviation across forecasters, and hence the cross-sectional dispersion in this survey cannot be directly compared to that of the ECB SPF. However, the Blue Chip does indicate the difference between the average responses of the top and bottom quintiles, and the corresponding

statistic can be directly constructed from the individual responses in the Federal Reserve SPF. As shown in the right panel of Figure 3, both measures of dispersion declined markedly from 1992 to 1995, but have shown no systematic narrowing since then. Furthermore, the degree of dispersion exhibits remarkable variation from period to period, and this dispersion often differs substantially between the two surveys. This highlights the extent to which this measure of dispersion is strongly influenced by the projections in the tails of the distribution and hence is sensitive to small changes in the panel of respondents, an issue that would be much less relevant for an economy like the euro area in which the cross-sectional distribution of long-run inflation projections is relatively concentrated.⁴

Overall, the survey data point to greater dispersion of views about long-run inflation in the United States than in the euro area, suggesting that long-run inflation expectations may not be as firmly anchored as those in the euro area. To further address this question, we now turn to our empirical analysis of financial market data.

3. Methodology and Data for High-Frequency Analysis

The methodology used in this paper—regressing changes in interest rates against the surprise component of an event or data release—has been employed by several other researchers, including Dwyer and Hafer (1989), Fleming and Remolona (1999), Kuttner (2001), Ehrmann and Fratzscher (2005) and Gürkaynak, Sack and Swanson (2005). However, by focusing upon forward rates as dependent variables rather than yields, the approach taken here resembles more closely that of Gürkaynak, Sack and Swanson (2005), as it allows more intuitive inference about the dynamic response of inflation compensation to new information.

⁴ Interestingly, Gürkaynak *et al* (2007) analyse the Bank of England's quarterly survey of professional forecasters and find that the cross-sectional distribution of two-year-ahead U.K. inflation projections is also highly concentrated.

3.1 Empirical Strategy

To investigate the effect of macroeconomic news on the forward structure of inflation compensation, we estimate the parameters of the following regression:

$$f_{n,t} - f_{n,t-1} = \alpha_n + \beta_n X_t + \varepsilon_{n,t}, \quad (1)$$

where $(f_{n,t} - f_{n,t-1})$ represents the change from period $t-1$ to t of a one-year forward rate ending n -years ahead, X_t is a vector of the surprise components of macroeconomic data released on day t and $\varepsilon_{n,t}$ is a residual assumed to be *i.i.d.*. This is a reasonable assumption, as the regressors consist only of the unforecastable component of data releases, which should be uncorrelated with other information already incorporated in financial markets or released on the same day. The regressions are performed for one-year forward rates ending two to ten years ahead, yielding a term structure of response coefficients, β_n , for each data release.

We opt to estimate the regressions using daily data because of the scarcity of intraday data on U.S. and euro area inflation compensation. As a result, several data types may be released on the same day. However, the number of days on which this occurs is limited and the sample size is large enough to make us confident that coefficients are reasonably well identified. The sample runs from June 1, 2003, shortly after the ECB's announcement of its quantitative inflation goal, to December 31, 2006. Equation (1) is estimated for both the United States and the euro area, which requires financial data and macroeconomic news surprises for both regions.

Before turning to the details of the data sources, it is worth pausing to discuss the nature of inflation compensation. Inflation compensation at time t , $\pi_{n,t}^{comp}$, whether measured from an inflation-swaps market or as the gap between nominal and indexed bond markets, consists of expected inflation over a given horizon, $\pi_{n,t}^e$, plus a term premium $\phi_{n,t}$:

$$\pi_{n,t}^{comp} = \pi_{n,t}^e + \phi_{n,t}.$$

The term premium can be envisaged as an inflation risk premium, that is, the premium demanded for uncertainty about future inflation rates over the lifetime of the asset, plus other factors such as liquidity and default risk. The latter are unlikely to change on a day-to-day basis and, in line with our empirical strategy, we believe that expected inflation and inflation uncertainty are the components likely to respond systematically to macroeconomic news surprises. When inflation compensation reacts to news, it could be in either expected inflation or the inflation risk premium, or both. When inflation compensation is unresponsive, we infer that neither component moves systematically in response to news. From here on, we use this as our definition of anchored inflation expectations. It is a more demanding definition than stable long-run mean inflation expectations, as it also requires that the compensation for inflation risk be insensitive to today's news.

3.2 Euro Area Financial Data

We employ two kinds of financial data from euro area markets: inflation swaps and nominal interest rate swaps. Both markets are liquid and well developed. The nominal interest rate swap market developed dramatically after the introduction of the euro and is the preferred market for hedging ECB interest-rate movements, as euro area government securities markets are not fully integrated. Nominal swap contracts exchange pre-determined fixed-rate for floating six-month Euribor rates (interbank rates on unsecured euro deposits between prime banks), which are closely linked to market expectations of the ECB's policy interest rate. Thus the term structure of nominal swap rates provides a read on monetary policy expectations.

The inflation-swaps market, while characterized by smaller trading volume than the nominal interest rate market, is the most mature and largest volume inflation-swaps market in the world. Contracts are typically structured as zero-coupon bonds and at maturity exchange payments based on a pre-agreed annual fixed rate for a floating rate linked to the euro area (HICP). The fixed rate is known as the breakeven and compensates the holder of the contract for expected inflation over the life of the contract plus a premium for inflation risk. Unlike the United States, little inflation-indexed debt has been issued by euro area countries and, as a result, inflation swaps are a major market in which to hedge inflation outcomes. There is a healthy supply of both inflation payers and receivers; market participants include those with inflation-linked liabilities, particularly pension funds, and those with inflation-linked revenues such as semi-government utilities, as well as parties arbitraging between indexed government debt and swaps market.

The French government has issued just five bonds indexed to euro area HICP since 2002 and inflation-swap breakevens align closely with inflation compensation derived from yield curves of French nominal and indexed debt (Hurd and Relleen, 2006).⁵ However, a number of features make the inflation-swaps market more attractive to work with. Data on contracts spaced out over regular maturities from two to thirty years are available back to February 2003, and the availability of short-maturity contracts offers a better read on short-term inflation compensation than the outstanding set of indexed bonds. Directly observing breakeven rates also obviates the need to address differences in time-to-maturity and coupon-payment structures of nominal and real debt. The data for euro area nominal and inflation swaps are downloaded from Bloomberg.

⁵ There are also four outstanding issues from the Italian government and one by the Greek government, but differences in governments' credit ratings and tax conventions complicate estimation of a representative euro area inflation compensation curve.

Despite the regular maturity-spacing of the markets, some maturities are more heavily traded than others. To retrieve a smooth yield curve, we estimate fitted yield curves to the nominal and inflation-swaps yield curves, a straightforward task given the simplicity of the underlying contracts. One-year zero-coupon forward rates are then derived from the fitted zero-coupon yields. For details of the curve fitting, see Appendix A.

3.3 U.S. Financial Data

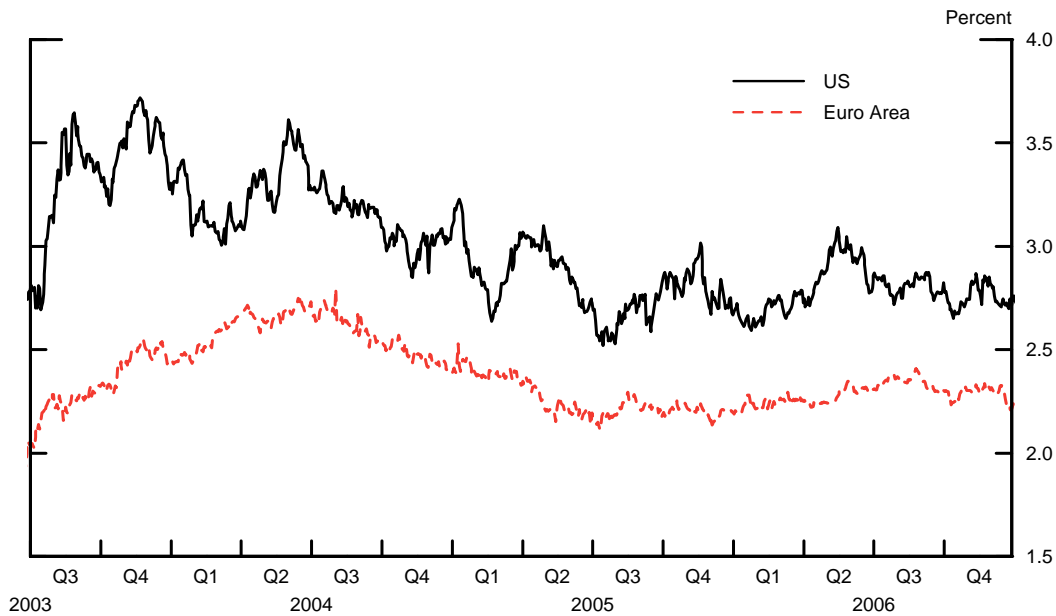
For the United States analysis, inflation breakevens are calculated as the difference between nominal and real forward rates derived from fitted Svensson zero-coupon yield curves of the nominal and indexed U.S. Treasury debt markets estimated at the Board of Governors of the Federal Reserve. Indexed debt in the United States (Treasury Inflation Protected Securities) is indexed to the headline CPI.⁶ Just as in the inflation-swaps market, inflation compensation is comprised of expected inflation over the life of the bond, an inflation risk premium, and a liquidity premium.⁷

An inflation-swaps market indexed to the U.S. CPI exists, but the market is younger than that of in the euro area and suffers from lower liquidity. In particular, a shortage of market participants willing to take the floating-rate end of an inflation swap contract creates a sizeable spread over bond-market based breakevens. Despite the difference in levels, movements in the

⁶ At maturity, indexed debt settles upon a two- and a half-month lagged observation of the CPI. However, this should have only a minor effect on the day-to-day changes in the forward rates in which we are interested. A similar indexation lag applies to the euro area's inflation swaps market.

⁷ Default risk is likely to be negligible for U.S. government debt. But early in the life of the U.S. TIPS market, liquidity premia were substantial. D'Amico, Kim and Wei (2007) estimate that between 1999 and 2002, the liquidity premium on TIPS averaged around 130 basis points, which would have been attributed to narrower inflation compensation. As issuance increased and turnover improved, however, liquidity premia appear to have declined substantially, to an average of 30 basis points over our sample. More importantly for our purposes, the liquidity premium seems to move gradually and is unlikely to move systematically in the direction of data surprises.

Figure 4
Forward rates of inflation compensation nine-to-ten years ahead in
the United States and Euro Area



Sources: Forward rates derived from fitted nominal and real Treasury yield curves for the United States and from fitted inflation-swap breakeven curves for the euro area.

two markets parallel one another and, over a shorter sample from mid 2004, inflation swaps exhibit the same empirical properties as bond-market breakevens; specifically, far forward rates react to the surprise component of economic data releases.

Figure 4 plots the nine-to-ten-year ahead forward rates of inflation compensation used in the analysis. Two features are noteworthy. First, inflation compensation in the United States is on average about half a percentage point higher than in the euro area over the sample. The ECB's stated inflation goal is not dissimilar to the long-run inflation goal attributed by financial markets to the Federal Reserve, which raises the question of why U.S. rates of inflation compensation lie above those in the euro area. The second feature that stands out is that far-horizon inflation compensation in the two economies has traced out a similar trend over the past four years, but the U.S. data exhibit a greater degree of month-to-month fluctuation.

3.4 Macroeconomic News

The surprise component of a data release is measured as the actual release value less the median survey expectation, scaled by the standard deviation of surprises during our sample period. Scaling by the standard deviation means that the coefficients are interpreted as the response of forward rates to a one-standard deviation data surprise, making the coefficients comparable across macroeconomic announcements. For the euro area, we use macroeconomic announcements emanating from the three largest members of the currency bloc: Germany, France, and Italy. We focus on country-level data because most euro area aggregates have been released piecewise at earlier dates and typically elicit no reaction in financial markets. Both the real-time release values and median survey expectations have been collected from Bloomberg. Bloomberg's survey is based on a selection of professional economists who submit their forecasts to Bloomberg before or on the Friday prior to the data release.

For the news component of U.S. macroeconomic announcements, real-time announcements are based on data collected at the Board of Governors of the Federal Reserve and median survey expectations are recorded from the Money Market Services (MMS) survey, operated by Action Economics. This survey has the same structure as the Bloomberg survey for the euro area, recording professional economists' expectations submitted on or before the Friday prior to the data release. The monetary policy surprise is measured in the manner proposed by Kuttner (2001), as the change in the price of the current month federal funds futures contract in a window around FOMC policy announcements. A full listing of variables included in our regressions can be found in the full regression output tables in Appendix B.

4. Results for the Euro Area

We begin with empirical analysis for the euro area, first addressing the question of which news announcements move nominal interest rate markets and then proceeding to the results for inflation compensation.

4.1 Short-Run Policy Expectations

To evaluate the news content of data releases, we estimate equation (1) using forward rates from the euro area nominal swap curve. Because our estimation is carried out with daily data, news arriving from other time zones during the European trading day could affect identification of the response to euro area news. Thus, we include U.S. news surprises, released at about 2.30 pm central European time, as conditioning regressors to ensure that the estimated response coefficients to euro area news are not obscured by foreign data releases. The results for forward rates two- to four- years ahead are shown in Table 1 for a selection of euro area and U.S. variables, including all those with coefficients that are statistically significant at least at the five-percent level (the full set of regressors and results to two decimal places are shown in Table B1 in Appendix B).

The first feature that stands out in Table 1 is how few data releases emanating from the euro area elicit systematic responses in short- to medium-horizon nominal forward rates. Only two variables, the German business surveys, elicit a reaction. In comparison, seven high profile U.S. data releases affect swaps contracts linked to floating six-month Euribor. This finding is broadly in line with the results of other researchers who have examined different euro area financial markets, including money markets and bond futures markets (see Ehrmann and Fratzscher, 2005, and Andersson, Hansen, and Sebastyen, 2006). Various reasons have been put

Table 1
Macro News and Short-Run Policy Expectations in the Euro Area

	One- to two- years ahead
French News	
Business Confidence	0.1 (0.8)
CPI	0.7 (0.7)
Producer Price Index	-0.9 (0.8)
German News	
HICP	0.8 (0.9)
IFO Business Climate	2.7** (0.8)
Producer Price Index	0.9 (0.7)
ZEW Business Confidence	2.4** (0.7)
Italian News	
Business Confidence	-0.4 (0.7)
HICP	0.1 (0.7)
U.S. News	
Consumer Confidence	1.5* (0.7)
Core CPI	0.1 (0.7)
Initial Claims	-1.0** (0.4)
Monetary Policy	1.1** (0.4)
NAPM	2.3** (0.8)
Non-farm Payrolls	6.5** (0.8)
GDP Advance	2.0 (1.2)
Retail Sales	1.8* (0.7)
Unemployment	-2.2** (0.7)

Note: The table shows coefficient estimates and standard errors of the response of nominal one-year forward swap rates in the euro area to selected macroeconomic releases. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006. Results for the comprehensive list of regressors are shown in Appendix B, Table B1.

forward for this, such as the more timely nature of many U.S. data releases, the piecemeal or leaked release of some European variables, and the perception that conditions in the United States are highly influential for global growth (Goldberg and Leonard, 2003). That two national German business confidence surveys, released fairly early in the data calendar, are the only significant euro area variables testifies to the first two reasons.

The second notable feature of Table 1 is that there is little or no diminution in the size of the response coefficients between two and four years. This is not altogether unsurprising, as it corresponds to the expected horizon over which monetary policy might respond to changing economic conditions, particularly when monetary policy is characterized by a fair degree of inertia. The coefficients also have the expected sign throughout. Having established that several U.S. and some euro area data surprises prompt movement in short- to medium-term nominal interest rates, we are confident that data surprises have news content. We move on to ask how euro area inflation compensation reacts to news.

4.2 Forward Inflation Compensation

The analysis of inflation compensation is structured in the same manner as Section 4.1, estimating equation (1) over the term structure of one-year forward rates of inflation compensation two- to ten-years ahead. We include all available macroeconomic surprises in the United States and euro area in the regressions, although the results shown in Table 2 are for a subset of those (full set of results at higher precision are shown in Table B2 in Appendix B). Interestingly, none of the U.S. data releases that had statistically significant effects on nominal forward rates appear to move forward inflation compensation in the euro area at short or long horizons. Only the U.S. monetary policy surprise has a statistically significant effect at medium-term horizons. The sign indicates that unexpectedly tighter policy in the United States today is

associated with slightly higher inflation compensation in the euro area four- to five-years ahead. This could be consistent with tighter monetary policy signaling an unfavorable inflation forecast in the United States that contains information for future euro area inflation.

Primarily euro area news affects inflation compensation linked the euro area HICP. Three French data releases—business confidence, monthly consumer price inflation, and producer price inflation—have a statistically significant effect on near-term forward inflation compensation, as does the German ZEW business confidence survey. In each case, the response of inflation compensation is concentrated in near-term maturities and no releases systematically move forward inflation compensation nine- to ten-years ahead. Most of the coefficients are of the expected sign, with stronger-than-expected inflation or activity translating into higher rates of near-term inflation compensation.

Figure 5 displays the coefficient estimates along the term structure of forward rates two- to ten- year ahead for US non-farm Payrolls, French CPI, and the German ZEW and IFO business surveys. In each case, the coefficient estimates diminish farther out the term structure. French CPI and the ZEW survey appear to prompt a re-evaluation of expected inflation and/or the inflation risk premium over the horizon of two to four years but not at longer horizons, consistent with the definition of anchored inflation expectations discussed in Section 3.1. As we will see in Section 5, this contrasts with the United States where inflation compensation reacts at both short and long horizons to today's data surprises.

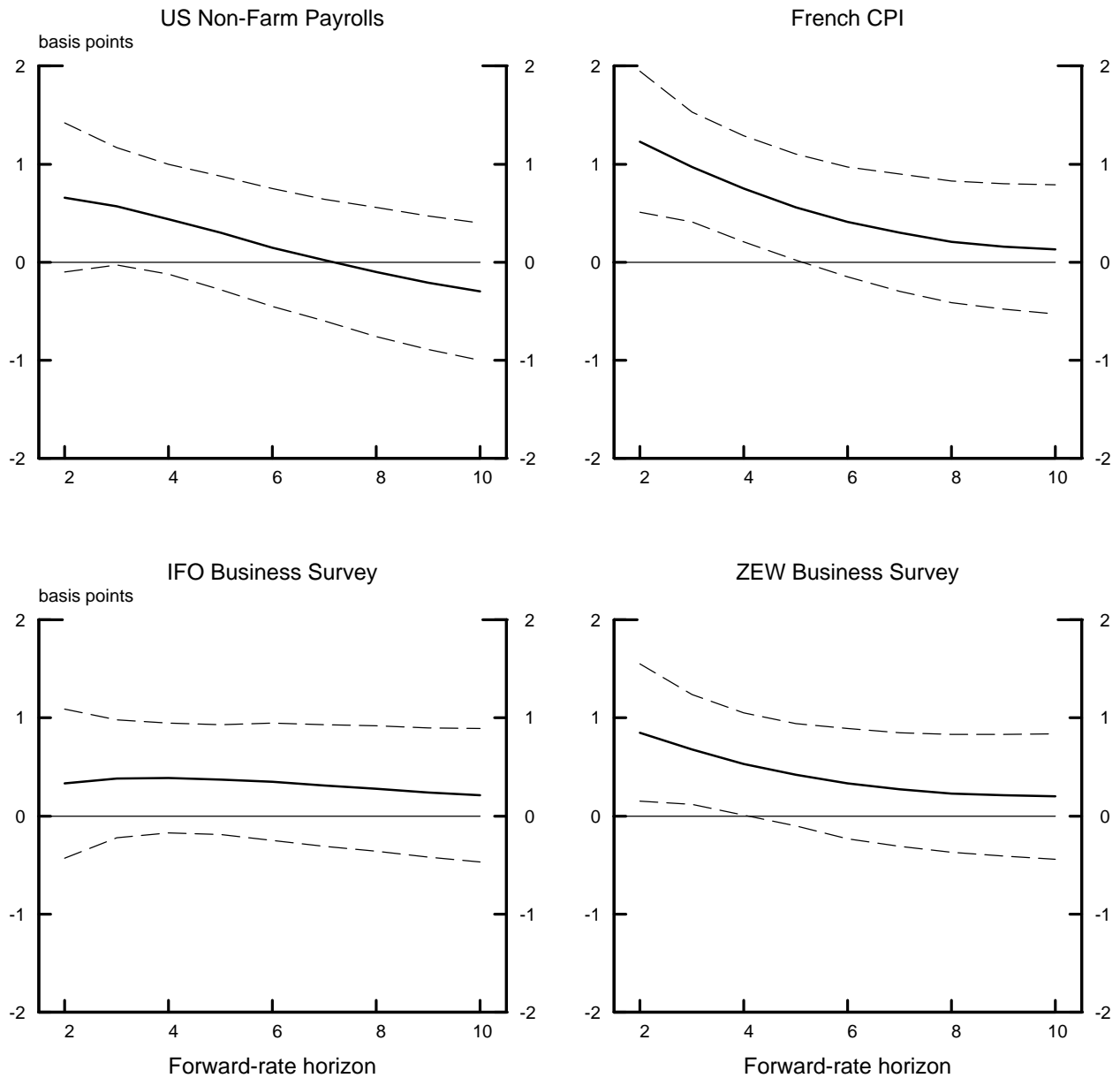
The ECB's statement in May 2003 of its inflation objective, while not a major shift in operating policy, was nonetheless an important step in communicating its goals. Despite this, extending the sample back by four months to February 1, 2003 (the limit of our available data) leaves the results broadly unchanged; coefficient estimates are roughly the same, as are their

Table 2
Macro News and Forward Inflation Compensation in the Euro Area

	One- to two- years ahead	Four- to five- years ahead	Nine- to ten- years ahead
French News			
Business Confidence	0.8* (0.4)	0.6 (0.3)	0.2 (0.4)
CPI	1.2** (0.4)	0.6* (0.3)	0.1 (0.3)
Producer Price Index	-1.0** (0.4)	-0.2 (0.3)	-0.2 (0.4)
German News			
HICP	0.2 (0.5)	-0.1 (0.3)	0.1 (0.4)
IFO Business Climate	0.3 (0.4)	0.4 (0.3)	0.2 (0.3)
Producer Price Index	-0.1 (0.3)	0.2 (0.2)	0.1 (0.3)
ZEW Business Confidence	0.9* (0.4)	0.4 (0.3)	0.2 (0.3)
Italian News			
Business Confidence	0.2 (0.4)	0.3 (0.3)	0.3 (0.3)
HICP	-0.2 (0.4)	-0.0 (0.3)	0.3 (0.3)
U.S. News			
Consumer Confidence	-0.6 (0.4)	-0.2 (0.3)	0.2 (0.3)
Core CPI	-0.0 (0.4)	0.3 (0.3)	0.5 (0.3)
Initial Claims	-0.0 (0.2)	0.2 (0.1)	0.3 (0.2)
Monetary Policy	0.2 (0.2)	0.3* (0.1)	0.3 (0.2)
NAPM	0.5 (0.4)	0.5 (0.3)	0.4 (0.4)
Non-farm Payrolls	0.7 (0.4)	0.3 (0.3)	-0.3 (0.3)
GDP Advance	0.8 (0.6)	0.5 (0.5)	-0.3 (0.5)
Retail Sales	0.0 (0.4)	0.1 (0.3)	0.1 (0.3)
Unemployment	-0.2 (0.4)	0.1 (0.3)	0.5 (0.3)

Note: The table shows coefficient estimates and standard errors of the response of one-year forward rates of inflation compensation in the euro area for selected macroeconomic releases. Forward rates are computed from inflation-swap data. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006. Results for the comprehensive list of regressors are shown in Appendix B, Table B2.

Figure 5
Are Long-Run Inflation Expectations Firmly Anchored in the Euro Area?



Note: Solid lines are estimated coefficients and dashed lines are ± 2 standard error bands for regressions of one-year forward rates of euro area inflation compensation ending two- to ten-years ahead. All regressions estimated June 1, 2003 to December 31, 2006.

standard errors, and the finding that data surprises fail to elicit reactions in euro area long-horizon forward rates is preserved. While it would be interesting to investigate the reaction pattern of euro area inflation compensation for a longer sample prior to the ECB's quantitative objective, data for neither inflation swaps nor French indexed bonds are available far enough back to permit such analysis.

5. Comparison with the United States

One question that arises from the previous results is whether the insensitivity of far forward rates of inflation compensation in the euro area is simply due to shortness of the sample. Thus, we turn to the United States to investigate how inflation compensation behaves in a similarly short time frame. Gürkaynak, Levin, and Swanson (2006) showed that macroeconomic news announcements elicit reactions in U.S. inflation compensation far out along the term structure of forward rates in a sample starting in 1999. We find that the same continues to be true for a shorter sample starting in June 2003. First we demonstrate that news affects short-run policy expectations in the United States, as measured by the response of a near-term nominal forward rate (results shown in Table 3). Next we move on to inflation compensation, results for which are shown in Table 4.⁸

Forward inflation compensation two-years ahead responds significantly to the surprise component of several data releases: non-farm payrolls, the unemployment rate, NAPM, core CPI and the monetary policy surprise. Each have the expected sign in the sense that a stronger-than-expected data release raises inflation compensation two-years ahead, presumably because of a rise in inflation expectations at that horizon. Unexpectedly tighter monetary policy lowers inflation compensation, presumably through the same mechanism.

⁸ Unlike Gürkaynak, Levin and Swanson (2006), the standard errors shown in Table 4 are OLS standard errors. Given our short sample, heteroskedasticity-consistent estimates of standard errors suffer from considerable downward bias (see White, 1980, and Chesher and Jewitt, 1987, for discussion).

Three of these variables (non-farm payrolls, the unemployment rate and NAPM) go on to affect ten-year ahead inflation compensation, and their coefficients diminish only slightly with time. The response to non-farm payrolls surprises is illustrated in the left panel of Figure 6; a one-standard deviation surprise in non-farm payrolls is associated with a four basis point increase at two years and a two and a half basis point increase at ten years. At the short horizon, this likely reflects a revision of inflation expectations, but at longer horizons could be due to revision of long-run inflation expectations or an increase in the inflation risk premium.

Three new variables also appear as significant determinants of daily movements in ten-year ahead inflation compensation. One of these, real GDP (advance) is illustrated in the right panel of Figure 6. At a short horizon, where inflation expectations are likely to account for much of the movement in inflation compensation, the surprise component of real GDP does not evoke a reaction in market rates. Rather, its effect is concentrated after six years. This is suggestive that some data releases might not prompt revision of inflation expectations but may nonetheless cause affect inflation risk premia demanded for longer horizons. Augmenting the regression to include the euro area regressors does not materially affect the coefficients on U.S. data surprises, although French business confidence and French CPI are found to have a statistically significant effect on U.S. inflation compensation far out along the term structure (shown in Table B3 in Appendix B).

Table 3
Macro News and Short-Run Policy Expectations in the United States

	One- to two- years ahead
United States	
Capacity Utilization	-1.2 (1.5)
Consumer Confidence	0.2 (1.1)
Core CPI	3.2** (1.0)
Industrial Production	0.2 (1.5)
Initial Claims	-1.3** (0.5)
Leading Economic Indicators	-0.8 (1.1)
Monetary Policy	1.4** (0.5)
NAPM	4.8** (1.1)
New Homes	0.9 (1.1)
Non-farm Payrolls	12.7** (1.1)
GDP Advance	4.0* (1.7)
Retail Sales	2.4* (1.0)
Unemployment	-3.5** (1.0)

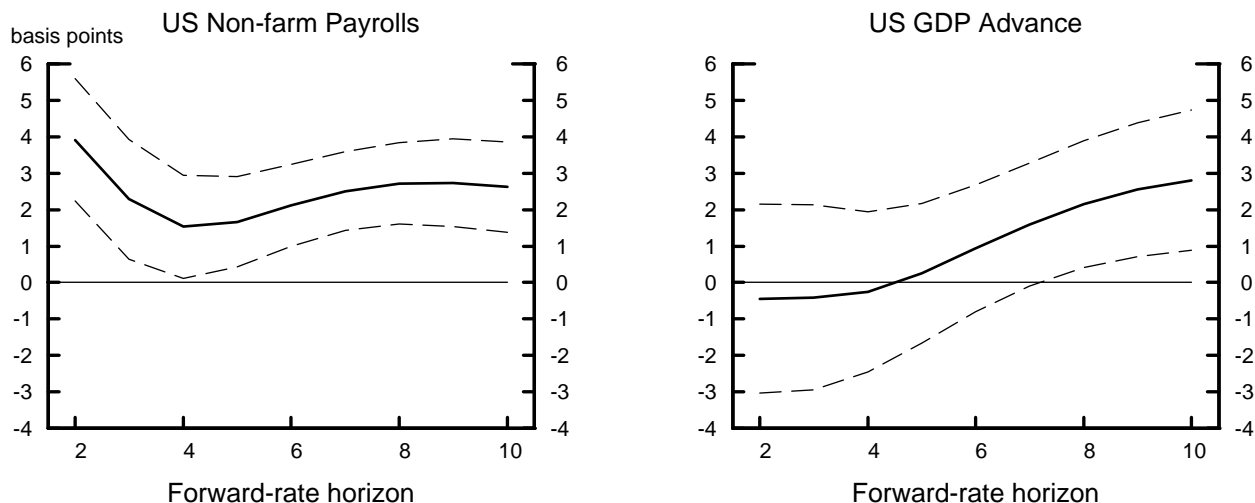
Note: The table shows coefficient estimates and standard errors of the response of one-to-two-year-ahead nominal forward rates in the United States to selected macroeconomic releases. Forward rates are computed from fitted yield curves of U.S. nominal government debt markets. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006.

Table 4
U.S. Macro News and U.S. Forward Inflation Compensation

	One- to two- years ahead	Four- to five- years ahead	Nine- to ten- years ahead
Capacity Utilization	-0.7 (1.1)	0.8 (0.8)	0.0 (0.8)
Consumer Confidence	0.2 (0.8)	0.5 (0.6)	0.1 (0.6)
Core CPI	4.3** (0.8)	1.4* (0.6)	1.2 (0.6)
Industrial Production	-1.0 (1.1)	-1.3 (0.8)	-0.5 (0.8)
Initial Claims	-0.3 (0.4)	0.2 (0.3)	-0.4 (0.3)
Leading Econ. Indicators	-0.2 (0.8)	1.2* (0.6)	-1.7** (0.6)
Monetary Policy	-1.7** (0.4)	-0.3 (0.3)	-0.3 (0.3)
NAPM	2.0* (0.9)	-0.9 (0.6)	1.4* (0.6)
New Homes	0.8 (0.8)	0.3 (0.6)	1.6** (0.6)
Non-farm Payrolls	3.9** (0.8)	1.7** (0.6)	2.6** (0.6)
GDP Advance	-0.4 (1.3)	0.3 (1.0)	2.8** (1.0)
Retail Sales	-0.4 (0.8)	-0.3 (0.6)	-0.0 (0.6)
Unemployment	-2.0* (0.8)	0.5 (0.6)	-1.7** (0.6)

Note: The table shows coefficient estimates and standard errors of the response of one-year forward rates of inflation compensation in the United States to selected macroeconomic releases. Forward rates are computed from U.S. nominal and indexed government debt markets. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006. Results for the comprehensive list of regressors are shown in Appendix B, Table B2.

Figure 6
Are Long-Run Inflation Expectations Firmly Anchored in the United States?



Note: The solid lines are estimated coefficients and the dashed lines ± 2 standard error bands for regressions of one-year forward rates of U.S. inflation compensation ending two- to ten-years ahead. All regressions estimated from June 1, 2003 to December 31, 2006.

6. The Role of Market Liquidity

In this section we address whether the empirical results, particularly those for the United States, represent long-lived changes in market rates or transitory responses. The estimated reaction to news may be unwound quickly if the immediate response owes to market liquidity conditions rather than to investors' re-evaluation of the outlook for inflation. We test this in two ways, first, by considering the cumulative market reaction over several days to an announcement, and second, by estimating the market reaction to announcements from prior days. We find that reactions are not unwound; rather the magnitude of the responses generally persists for at least five days. Moreover, when there is significant market reaction on days subsequent to an announcement, the direction serves to amplify, not unwind, the initial reaction.

We estimate regressions similar to equation (1) but modify the dependent variable to be the cumulative daily change in a forward rate in order to test whether the estimated market reaction

that occurs between $t-1$ and t is still present in the data five days later. That is, for forward rates ending n -years ahead, we estimate

$$f_{n,t+j} - f_{n,t-1} = \alpha_{n,j} + \beta_{n,j}X_t + \varepsilon_{n,j,t} \quad (3)$$

for $j = 0, 1, 2, 3, 4, 5$. When $j = 0$, this corresponds to equation (1). If liquidity effects primarily drive the initial reaction on day t , we would expect to see most of the market reaction unwound in subsequent days and the coefficients $\beta_{n,j}$ quickly diminish to zero for higher j . In contrast, if news prompts revisions to inflation expectations and risk premia, the effect should remain embodied in market rates.

Turning first to inflation compensation in the United States, we estimate equation (3) using the change in one-year forward rates ten-years ahead and all available U.S. regressors. Coefficient estimates and confidence intervals for four releases that move long-horizon inflation compensation are shown in Figure 7. In general, the coefficients persist through the following business week, indicating that the first day's movement is not unwound over that horizon. In the case of the non-farm payrolls release, the coefficient estimates are large, stable and statistically significant for the subsequent five days. For new home sales, advance GDP, and leading economic indicators, point estimates are broadly stable over the estimation window but the standard error bands widen quickly.⁹ Because the regressions do not condition upon subsequent data releases, the relationship between the cumulative change in inflation compensation and day t news becomes harder to identify as more days pass and more news arrives.

To overcome this problem, we modify the approach to control for all incoming data. The specification we consider is as follows:

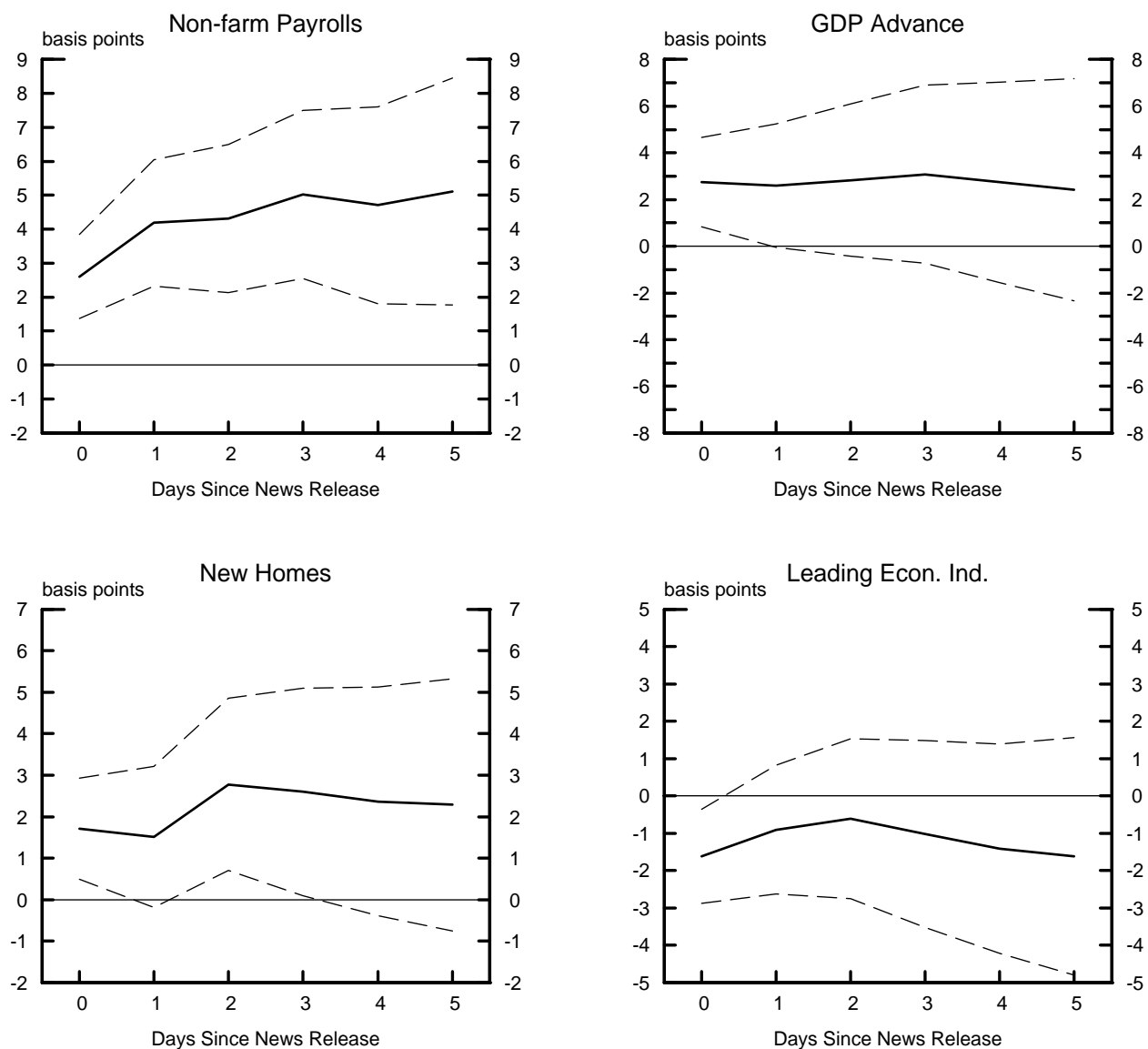
$$f_{n,t} - f_{n,t-1} = \alpha_n + \beta_n X_t + \beta_n \gamma X_{t-1} + \varepsilon_{n,t}, \quad (4)$$

⁹ Two other data surprises move ten-year ahead inflation compensation on the release day, NAPM and the unemployment rate, but neither exhibits similarly persistent effects in the five days following release. Market revisions induced by these releases may be swamped by subsequent arriving data, at least over our short sample.

which regresses the day- t change in forward rates on all contemporary and lagged regressors. As before, β_n is a vector of coefficients measuring the market response to news on the day of the release. The coefficient vector γ measures the response of day- t forward rate movements to day- $(t-1)$ news, while conditioning upon the arrival of subsequent news. Equation (4) is parameterized in such a way to test relevant hypotheses: if $\gamma = 0$, there is no further market reaction to data beyond the release day, but if $\gamma = -1$, there is perfect unwinding of the first day's reaction to data. Additional lags of X_t could be included in the regression, but we find no evidence for further market reaction beyond the second day. Equation (4) is estimated with non-linear least squares and the results of a two-sided test of the null hypothesis that $\gamma = 0$ are shown in Table 5, alongside an indication of the sign of the coefficient for each regressor.

There is little evidence that markets continue to respond to news after the impact day, with the day-after effects mostly insignificantly different from zero. Only non-farm payrolls and the monetary policy surprise continue to elicit a response the following day and in both cases, the direction of the movement amplifies the initial response. Market responses to news are not systematically unwound the following day and, combined with the persistence of the point estimates using cumulative daily changes, support the view that reactions to data surprises are not an artifact of short-lived liquidity effects but reflect revisions to beliefs about inflation expectations and inflation risk premia.

Figure 7
Does Macro News have Persistent Effects on U.S. Forward Inflation Compensation?



Note: The solid lines plot the estimated response coefficients of the cumulative t to $t+5$ change in the forward rate to data surprises and the dashed lines are ± 2 standard error bands. Regressions include all available U.S. regressors and are estimated from June 1, 2003 to December 31, 2006.

Table 5
Is the reaction of U.S. Inflation Compensation to news unwound the following day?

Testing the null hypothesis that $\gamma = 0$		
	P-value	Sign of coefficient
Capacity Utilization	0.82	+
Consumer Confidence	0.54	+
Core CPI	0.85	+
Industrial Production	0.96	-
Initial Jobless Claims	0.43	-
Leading Indicators	0.23	-
Monetary Policy	0.00	+
NAPM Survey	0.39	-
New Homes	0.59	-
Nonfarm Payrolls	0.03	+
Real GDP (advance)	0.73	-
Retail Sales	0.22	-
Unemployment Rate	0.73	-

Note: Probability values are reported for a two-sided test of the null hypothesis that $\gamma = 0$ as estimated by equation (4). Negative values of γ indicate some unwinding of the initial reaction, positive values amplification of the initial reaction.

7. Concluding Remarks

The recent history of long-run inflation expectations of professional forecasters in the United States and euro area paints a picture of reasonably well-anchored expectations in both regions. But is there scope for inflation expectations to be anchored more firmly? In this paper we address the question by taking a more detailed look at disagreement amongst forecasters about long-run inflation outcomes and pair that with evidence about the high-frequency behavior of inflation compensation in financial markets.

In the euro area, we observe that disagreement about likely long-run inflation outcomes is low and has declined over the past half decade. In contrast, disagreement among forecasters in the United States has shown no signs of diminishing and remains above that of the euro area. Turning to financial market data, we find that inflation compensation—the compensation required for expected inflation and inflation risk over the life of a financial contract—responds differently to news in the two regions. Inflation compensation linked to long-horizon developments in euro area consumer prices does not respond significantly to today’s news, whereas compensation linked to long-horizon U.S. consumer price inflation displays systematic sensitivity to today’s data surprises.

Taken together, the evidence leads us to conclude that long-run inflation expectations are not as firmly anchored in the United States as in the euro area. These results are consistent with the hypothesis that the ECB’s policy communications strategy—which includes an emphasis on the goal of price stability and a fairly specific definition of the medium-term inflation objective—has contributed to the firm anchoring of inflation expectations in the euro area.

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Appendix A: Fitting Yield Curves to Euro Area Financial Data

To replicate the curve-fitting methodology used for our U.S. data, we fit a Svensson yield curve to the each day's nominal and inflation compensation data for the euro area. While the Svensson parameterization permits more curvature, we find that in the first half of the sample the estimation attributes an implausibly steep curve to the inflation-swaps breakeven curve for maturities less than two years and exaggerates day-to-day movements in the shortest forward rate (see Table A1).¹⁰ Thus prior to September 2004, we revert to the more parsimonious Nelson-Siegel parameterization, which nevertheless has similar properties to the Svensson fit for longer maturities. Regardless of parameterization, the standard deviation of day-to-day changes in the fitted data is less than that in the raw data. The additional volatility in the raw data, particularly at the long end, does not seem to be systematically related to macroeconomic data surprises.

Table A1: Standard deviation of daily changes in euro area inflation swap forward rates June 1, 2003 to Dec 31, 2006

	One-year forward rate ending -years ahead				Five-year forward rate ending 30-years ahead
	2*	3	5	10	30
Raw data	--	3.7	4.2	5.5	4.6
Fitted curves					
NS (pre Sep 2004)	2.5	2.0	2.0	2.7	4.6
NS (post Sep 2004)	2.2	2.6	2.5	1.7	3.7
Svensson (pre Sep 2004)	22.3	3.4	2.6	3.5	3.7
Svensson (post Sep 2004)	4.1	2.9	2.0	1.9	3.5
Combined fitted data	3.7	2.6	2.0	2.2	3.9

Note: The raw data begins with a two-year yield so a one-year forward rate ending two-years ahead can not be constructed. However, the fitted curves can be used to infer that forward rate.

¹⁰ The extra day-to-day movement induced at the short end by the Svensson estimation largely seems to be noise, as the significance of variables which show up at the short end for the raw or fitted Nelson Siegel data vanishes when the Svensson fitted data is used for the entire sample.

Appendix B: Detailed Results

Table B1: Response of one-year forward nominal interest rates in the euro area 2003-2006

	One-year forward rate ending					
	2 years ahead		3 years ahead		4 years ahead	
French News						
Business Confidence	0.08	(0.81)	-0.06	(0.88)	-0.04	(0.85)
CPI	0.67	(0.72)	0.69	(0.78)	0.49	(0.75)
GDP	1.35	(1.24)	1.80	(1.34)	1.88	(1.30)
Industrial Production	-0.18	(0.66)	-0.22	(0.72)	-0.22	(0.70)
Producer Price Index	-0.88	(0.79)	-1.11	(0.86)	-1.16	(0.83)
Unemployment Rate	-0.29	(0.70)	-0.28	(0.76)	-0.26	(0.74)
German News						
Current Account	0.62	(0.74)	0.66	(0.80)	0.54	(0.78)
HICP	0.76	(0.93)	0.93	(1.01)	0.97	(0.98)
IFO Business Climate	2.74**	(0.75)	2.81**	(0.82)	2.44**	(0.79)
Industrial Production	0.72	(0.70)	0.90	(0.76)	0.85	(0.74)
Producer Price Index	0.94	(0.66)	1.11	(0.71)	1.12	(0.69)
Unemployment	-0.52	(0.78)	-0.65	(0.85)	-0.63	(0.82)
ZEW Business Conf.	2.43**	(0.70)	2.87**	(0.77)	2.85**	(0.74)
Italian News						
Business Confidence	-0.37	(0.72)	-0.43	(0.78)	-0.39	(0.76)
HICP	0.15	(0.75)	0.48	(0.81)	0.70	(0.79)
Industrial Production	1.14	(0.69)	1.35	(0.75)	1.36	(0.73)
Producer Price Index	1.13	(0.78)	1.35	(0.85)	1.44	(0.82)
Real GDP	0.84	(1.27)	1.00	(1.38)	0.94	(1.34)
U.S. News						
Capacity Utilization	0.56	(1.00)	0.71	(1.08)	0.65	(1.05)
Consumer Confidence	1.50*	(0.72)	1.47	(0.78)	1.26	(0.76)
Core CPI	0.10	(0.72)	-0.03	(0.78)	-0.06	(0.76)
Industrial Production	-0.29	(0.99)	-0.57	(1.08)	-0.72	(1.05)
Initial Jobless Claims	-0.99**	(0.35)	-1.27**	(0.38)	-1.31**	(0.37)
Leading Indicators	0.18	(0.75)	0.01	(0.82)	-0.22	(0.79)
Monetary Policy	1.13**	(0.37)	1.17**	(0.40)	1.09**	(0.39)
NAPM Survey	2.30**	(0.79)	2.25**	(0.85)	1.81*	(0.83)
New Homes	0.04	(0.71)	0.09	(0.78)	0.07	(0.75)
Nonfarm Payrolls	6.55**	(0.75)	6.94**	(0.82)	6.24**	(0.79)
Real GDP (advance)	1.98	(1.20)	2.81*	(1.30)	3.33**	(1.26)
Retail Sales	1.80*	(0.71)	2.23**	(0.77)	2.33**	(0.75)
Unemployment Rate	-2.17**	(0.72)	-2.21**	(0.78)	-1.81*	(0.76)

Notes: The table shows coefficient estimates and standard errors of the response of one-year forward rates from the euro area nominal interest rate swap market to selected macroeconomic releases. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006.

Table B2: Response of one-year forward inflation compensation in the euro area 2003-2006

	One-year forward rate ending					
	2 years ahead		5 years ahead		10 years ahead	
French News						
Business Confidence	0.84*	(0.40)	0.59	(0.30)	0.23	(0.37)
CPI	1.23**	(0.36)	0.56*	(0.27)	0.13	(0.33)
GDP	0.35	(0.62)	-0.09	(0.46)	-0.40	(0.56)
Industrial Production	0.16	(0.34)	0.05	(0.26)	0.03	(0.31)
Producer Price Index	-1.05**	(0.40)	-0.24	(0.30)	-0.23	(0.36)
Unemployment Rate	-0.34	(0.35)	-0.50	(0.27)	-0.16	(0.32)
German News						
Current Account	-0.28	(0.37)	-0.35	(0.28)	-0.31	(0.33)
HICP	0.18	(0.46)	-0.08	(0.35)	0.05	(0.42)
IFO Business Climate	0.33	(0.38)	0.37	(0.28)	0.21	(0.34)
Industrial Production	0.16	(0.35)	0.24	(0.26)	0.21	(0.32)
Producer Price Index	-0.09	(0.33)	0.17	(0.25)	0.07	(0.30)
Unemployment	0.22	(0.39)	0.33	(0.29)	0.18	(0.35)
ZEW Business Conf.	0.85*	(0.35)	0.42	(0.26)	0.20	(0.32)
Italian News						
Business Confidence	0.21	(0.36)	0.29	(0.27)	0.29	(0.33)
HICP	-0.20	(0.38)	-0.04	(0.28)	0.33	(0.34)
Industrial Production	0.34	(0.36)	0.18	(0.27)	-0.39	(0.33)
Producer Price Index	0.27	(0.39)	0.26	(0.29)	0.19	(0.36)
Real GDP	0.18	(0.63)	0.23	(0.48)	0.35	(0.58)
U.S. News						
Capacity Utilization	-0.18	(0.50)	-0.29	(0.38)	-0.53	(0.46)
Consumer Confidence	-0.61	(0.36)	-0.24	(0.27)	0.18	(0.33)
Core CPI	-0.04	(0.36)	0.32	(0.27)	0.53	(0.32)
Industrial Production	0.05	(0.50)	0.15	(0.38)	0.31	(0.46)
Initial Jobless Claims	-0.04	(0.18)	0.18	(0.13)	0.27	(0.16)
Leading Indicators	0.17	(0.38)	-0.04	(0.28)	-0.32	(0.34)
Monetary Policy	0.18	(0.18)	0.31*	(0.14)	0.31	(0.17)
NAPM Survey	0.45	(0.40)	0.51	(0.30)	0.35	(0.36)
New Homes	-0.32	(0.36)	-0.29	(0.27)	-0.25	(0.32)
Nonfarm Payrolls	0.66	(0.38)	0.30	(0.29)	-0.30	(0.35)
Real GDP (advance)	0.82	(0.60)	0.47	(0.45)	-0.31	(0.54)
Retail Sales	0.05	(0.35)	0.11	(0.27)	0.12	(0.32)
Unemployment Rate	-0.16	(0.37)	0.07	(0.28)	0.49	(0.34)

Notes: The table shows coefficient estimates and standard errors of the response of one-year forward rates from the euro area inflation-swap market to selected macroeconomic releases. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006.

Table B3: Response of one-year forward inflation compensation in the United States 2003-2006

	One-year forward rate ending					
	2 years ahead		5 years ahead		10 years ahead	
U.S. News						
Capacity Utilization	-0.63	(1.25)	0.82	(0.86)	0.04	(0.83)
Consumer Confidence	-0.04	(0.89)	0.45	(0.62)	-0.12	(0.59)
Core CPI	4.33**	(0.89)	1.36*	(0.62)	1.08	(0.59)
Industrial Production	-1.07	(1.25)	-1.37	(0.86)	-0.66	(0.83)
Initial Jobless Claims	-0.41	(0.44)	0.15	(0.30)	-0.43	(0.29)
Leading Indicators	-0.11	(0.93)	1.12	(0.65)	-1.82**	(0.62)
Monetary Policy	-1.72**	(0.43)	-0.26	(0.29)	-0.25	(0.28)
NAPM Survey	1.95*	(0.97)	-0.94	(0.67)	1.34*	(0.65)
New Homes	0.61	(0.91)	0.15	(0.63)	1.42*	(0.60)
Nonfarm Payrolls	3.94**	(0.94)	1.71**	(0.65)	2.59**	(0.62)
Real GDP (advance)	-0.38	(1.49)	0.29	(1.03)	2.54*	(0.99)
Retail Sales	-0.34	(0.88)	-0.40	(0.61)	-0.10	(0.59)
Unemployment Rate	-2.04*	(0.89)	0.49	(0.62)	-1.73**	(0.60)
French News						
Business Confidence	2.62**	(0.98)	0.71	(0.68)	1.62*	(0.66)
CPI	-0.48	(0.89)	0.88	(0.61)	1.48*	(0.59)
GDP	-0.19	(1.53)	-0.19	(1.06)	1.69	(1.02)
Industrial Production	0.18	(0.82)	0.04	(0.57)	0.42	(0.55)
Producer Price Index	0.42	(0.98)	-0.41	(0.68)	-0.24	(0.65)
Unemployment Rate	0.64	(0.86)	0.22	(0.59)	-0.73	(0.57)
German News						
Current Account	-0.63	(0.96)	-0.14	(0.67)	0.25	(0.64)
HICP	0.14	(1.42)	0.02	(0.98)	0.44	(0.95)
IFO Business Climate	1.33	(0.97)	0.56	(0.67)	0.80	(0.65)
Industrial Production	-0.48	(0.89)	0.60	(0.61)	-0.01	(0.59)
Producer Price Index	0.30	(0.91)	-1.33*	(0.63)	0.70	(0.61)
Unemployment	-0.16	(0.97)	-0.42	(0.67)	-0.58	(0.65)
ZEW Business Conf.	0.91	(0.87)	0.78	(0.60)	0.83	(0.58)
Italian News						
Business Confidence	-0.04	(0.90)	-0.65	(0.62)	-0.78	(0.60)
HICP	-0.03	(1.20)	0.80	(0.83)	1.06	(0.80)
Industrial Production	0.91	(0.87)	0.18	(0.60)	0.14	(0.58)
Producer Price Index	1.17	(1.01)	0.60	(0.70)	1.06	(0.67)
Real GDP	0.51	(1.58)	0.30	(1.09)	-0.09	(1.05)

Notes: The table shows coefficient estimates and standard errors of the response of one-year forward rates of inflation compensation in the United States to selected macroeconomic releases. * Indicates statistical significance at the 5 percent level, ** at the 1 percent level. Sample period is June 1, 2003 to December 31, 2006.