

THE IMPACT OF ECONOMIC NEWS ON FINANCIAL MARKETS

by

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ABSTRACT

This paper analyzes the impact of economic news, that is, the difference between economic announcements and what was anticipated, on financial markets.

The three contributions of this paper are, first, the market expectation is derived from economic derivative prices that allow a full distribution for the market expectation to be derived. Economic derivatives data better predict financial market movements and also allow for testing whether there is information in the high moments of the distribution. Second, high frequency financial data allows us to test for the optimal window and discover how long it takes financial markets to digest and react to news. Finally, by using a U.S. and a European economic announcement and a wide range of financial markets, this paper compares announcements to show which are important for which markets.

I find that high frequency financial data leads to a much bigger and more significant news announcement effect over previous studies that used end-of day data. Further, financial markets react very quickly to news. Unlike other studies that have assumed a 25-30 minute window, I have demonstrated that the announcement window is often as little as just one minute. Using the richness of the economic derivatives-based expectations data I determine when higher moments of the expectations distribution are useful in determining the announcement effect. I also show in which markets, and for which announcements, good news and bad news have asymmetric effects; and, in which markets are most responsive to which announcements. Finally, I have highlighted some of the interesting results that traders or risk managers might want to delve into in more detail.

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INTRODUCTION

This paper analyzes the impact of economic news, that is, the difference between economic announcements and what was anticipated, on financial markets.

It is not news that news moves financial markets. Financial news is full of stories about how markets were surprised or anticipated an economic statistic and how the markets moved in response to this news.

Many people trade in financial markets around economic announcements. These traders like the volatility that surrounds the announcement, so some people bet on good news, others on bad, and there is much speculation on what the market sentiment is before a new economic statistic such as the U.S. employment situation that is embodied in the monthly non-farm payrolls release.

Those trading or interested in economic news announcements span the spectrum of individual day trades to large financial institutions. For example most foreign exchange traders¹ are interested in economic releases and their impact on currencies. One trader Tom Yeomans² teaches foreign exchange traders to trade the news. There is evidence that large banks such as HSBC³ have studied the impact of economic news announcements on financial markets.

Of course just as some want to profit from these market gyrations others see the market moves following news as a risk and would like to avoid them. Just as with speculators, risk managers are concerned with how their view, the “correct” view differs from the market view. If you are completely in agreement with what the market has priced into asset prices then there is no need to take any action. This paper aims to document the announcement effect of news on financial markets to better understand the markets for all participants.

In the past surveys have been done of market forecasters before economic announcements. These have been used to gauge market sentiment and the extent to which the actual number differs from the survey is taken as the news component that drives the market in the minutes following the announcement.

Recently two developments have occurred that have allowed us to quantify how much, when, and in what direction financial markets move in response to news.

¹ http://www.forex.com/forex_economic_indicators.html

² <http://tomyeomans.livejournal.com/>; <http://www.tradetime.ca/>; <http://fundamentalforex.com/index.html>

³ <http://www.occf.ox.ac.uk/seminars.html#abstract12>; <http://www.occf.ox.ac.uk/slides/Williams.pdf>

Firstly, economic derivatives, auctions of derivatives on economic releases allow us to get a much better read on market sentiment than comes from surveys. Participants in the economic derivatives market are putting their money where their mouth is and the resulting data is therefore more accurate and useful. Secondly, real-time financial markets data has allowed the effect of announcements to be isolated and separated from other influences.

This paper analyzes the impact of economic news on financial markets. The three contributions of this paper are, first, the market expectation is derived from economic derivative prices that allow a full distribution for the market expectation to be derived. Economic derivatives data better predict financial market movements and also allow for testing whether there is information in the high moments of the distribution. Second, high frequency financial data allows us to test for the optimal window and discover how long it takes financial markets to digest and react to news. Finally, by using a U.S. and a European economic announcement and a wide range of financial markets, this paper compares announcements to show which are important for which markets.

LITERATURE

Bernard Baumohl's (2004) book "The Secrets of Economic Indicators: Hidden Clues to Future Economic Trends and Investment Opportunities" provides a fascinating description the economic announcement process and how it affects financial markets. The secrecy, the regimented process of the "lock-up" all show how important the release of economic statistics. Economic announcements are usually published according to a release schedule that is published in advance⁴. Financial markets anticipate, speculate, and analyze the releases. Teams of economists spend their entire careers interpreting, dissecting, and forecasting these indicators of the economy's health. Legions of journalists report on the latest numbers, collect reactions of economists and traders, and endure the stress of release lock-ups to get their stories out with the numbers. The release of economic data is so important it is tightly controlled. Often, along with the journalists, governments will get a sneak preview, monetary and fiscal policy makers, politicians, and others who need advance access are granted it. The advanced release, as well as the release itself is always under tight security arrangements that stop agents from using the information for profit. And it should be noted that the literature proves that these arrangements work. The literature has not found any evidence of an anticipation effect (see for example Kim and Sheen (2001) for Australian bond futures market returns, volatilities and volumes before and after economic announcements).

A rather quaint anachronism is that releases in the U.S. are usually at 8:30am, "before the market opens". But these days the market never closes. Foreign exchange markets operate around the clock, futures markets likewise. Nonetheless, an attractive feature of economic announcements is that they are fair. The information is available to everyone, essentially without cost, at exactly, and Baumohl stresses it is exactly, the same time. So a hedge fund, and investment bank, day trader, risk manager, and you and I all learn about the news at the same time and all have the same opportunity to profit. The ability to profit or hedge though, comes from an investment in information and understanding about: i) what the economic statistic will be, ii) what the market expectation is (and perhaps an appreciation of the range and distribution of opinion), and iii) how our portfolio of asset holdings will change in response to the likely news, or surprise.

As Faust et. al. point out, the literature measuring the effects of macroeconomic announcements on asset prices at daily or intra-day frequency is vast. The reader is directed to their paper for a sample of the

⁴ A couple of examples of economic calendars can be found at: <http://www.bloomberg.com/markets/ecalendar/index.html>; <http://www.briefing.com/Investor/Public/Calendars/EconomicCalendar.htm>; <http://www.nasdaq.com/asp/econodayframe.asp?page=http://www.nasdaq.com/econoday/index.html>; <http://www.econoday.com/>.

contributions. Some of the papers cited also document a relationship between the announcements and the conditional variance of asset returns.

One of the earliest announcement effect studies is by Pearce and Roley (1985) who examine the daily response of stock prices to announcements about the money supply, inflation, real economic activity, and the discount rate. Roley had published articles earlier looking at the impact of monetary policy changes on asset prices. Pearce and Roley (1985), using survey data on market participants' expectations of these announcements, find that the unexpected component of the announcements, the surprise, moves stock prices. They also conclude that the surveys are more accurate, in the sense of having lower mean squared errors, than the forecasts from standard autoregressive time series models.

For the period 1985 to 2005 survey data was used for most studies. Gürkaynak and Wolfers (2006) introduced the concept of using derivative data to measure market expectations. There is more on this approach below.

Pearce and Roley (1985) used daily stock price data and found that there is only limited evidence of an impact from inflation surprises and no evidence of an impact from real activity surprises on the announcement days. There is also only weak evidence of stock price responses to surprises beyond the announcement day. Since 1985 there has been an increased use of intra-day data. For example, people have started to capture the quoted price for the exchange rates from Reuters or other data providers, recording, as an example, some 130,000 observations over an 8-week period (Goodhart, Hall, Pesaran (1993)).

Andersen, Bollerslev, Diebold and Vega (2002) use a high frequency exchange rate data set, 5-minute return series for U.S. dollar spot exchange rates versus German Mark, British Pound, Japanese Yen, Swiss Franc, and the Euro, to model announcement surprises (that is, divergences between expectations and actuals, or “news”). Andersen et. al. use their high frequency data to isolate the impact on financial markets around an announcement. They find that announcement surprises produce conditional mean jumps and they characterize the speed and path of adjustment. They find that the market reacts to news in an asymmetric fashion: bad news has greater impact than good news.

Andersen et. al. conclude that “Throughout, news exerts a generally statistically significant influence on exchange rates, whereas expected announcements generally do not. That is, only unanticipated shocks to fundamentals affect exchange rates, in accordance with the predictions of rational expectations theory. Many U.S. indicators have statistically significant news effects across all currencies, including payroll employment, durable goods orders, trade balance, initial unemployment claims, NAPM index, retail sales, consumer confidence, and advance GDP. The general pattern is one of very quick exchange rate conditional mean adjustment, characterized by a jump immediately following the announcement, and little movement thereafter. Favorable U.S. “growth news” tends to produce dollar appreciation, and conversely.” (pp. 9-10)

Faust, Rogers, Wang and Wright (2003) add to the announcement effects literature in two ways. First, they study the joint announcement effects across a broad range of assets - exchange rates and U.S. and foreign term structures. Also they use a longer span of high frequency data than has been common in previous announcement work. This allows them to explore the possibility that the effects of news on asset prices have varied over economic booms and busts. Faust et. al. conclude that: “Stronger than

expected real releases (e.g. nonfarm payrolls, retail sales, GDP) tend to appreciate the dollar and raise short and long-term interest rates in the U.S. and, to a lesser extent, overseas. Higher than expected inflation (CPI or PPI) is estimated to have little effect on the exchange rate, but to raise U.S. interest rates significantly. Tighter than expected monetary policy (i.e. a higher than expected target Fed Funds rate) is estimated to appreciate the dollar and to raise the term structure of U.S. interest rates.” (p. 4)

Gürkaynak and Wolfers (2006) use data from economic derivatives, which they show, is an improvement over survey data used almost universally by all other authors. Gürkaynak and Wolfers (2006) conclude that “The evidence presented ... shows that economic derivatives option prices are accurate and efficient predictors of the densities of underlying events” (p. 29). That “the option prices that we observe in this market are a reasonable approximation to the risk-neutral distribution” (p. 40). And finally, that “... positive shocks to non-farm payrolls, business confidence and retail trade are positive shocks to wealth, while higher initial claims is a negative shock. ... the non-farm payrolls surprise is easily the most important shock. The coefficient is also directly interpretable: a one standard deviation shock to nonfarm payrolls raises wealth (measured by the percentage change in the S&P 500 in a 30-minute window) by 0.37% and the 95% confidence interval extends from +0.17% to +0.54%.” (pp. 34-35)

Fair’s (2003) work also considers high frequency intra-day data on a range of asset prices over a long period (1982 to 1999). Using the reverse methodology to the above and previous authors who look at asset prices around announcements, Fair identifies occasions on which the five-minute change in asset prices exceeded 0.75 percentage points, and then does newswire searches to match to an event that occurred at that time. The events are often U.S. macroeconomic announcements.

Several studies have linked economic news to exchange rates jumps. One example, using one year of high frequency dollar-sterling exchange rates is Goodhart, Hall, Henry, and Pesaran (1993) who link the news of a U.S. trade figure announcement and a U.K. interest rate change to an exchange rate jump.

Bond markets research includes Balduzzi, Elton and Green (2001) who use intraday data from the inter-dealer government bond market to investigate macroeconomic announcements on prices, trading volume, and bid-ask spreads. They find that the surprise in 17 news releases has a significant impact on the price of at least one of the following: a three-month bill, a two-year note, a 10-year note, and a 30-year bond. Their estimated effects vary significantly according to maturity. The news can explain a substantial fraction of price volatility after the announcements, and the price adjustment to news generally occurs within one minute after the announcement. By contrast, they document significant and persistent increases in volatility and trading volume after the announcements. Bid-ask spreads, on the other hand, widen at the time of the announcements, but then revert to normal values after five to 15 minutes.

THEORY

DEFINITION OF NEWS

The announcement effect is defined as the impact of news on financial markets. News is defined as the difference between the market's expectation of the release and the actual release (before any revision):

News (N) or surprise at time t is the actual released data (A) at time t minus the market expectation ($E(A)$) close to, but before, time t ($\delta > 0$ but small, so the expectation is measured perhaps a few hours or at most a day or two before the announcement).

$$1) \quad N_t = A_t - E_{t-\delta}(A_t)$$

In the case of economic derivatives, since 2002 the auction data I have used has come from the same day as the announcement. So for example the auctions on U.S. GDP will take place on Friday, October 27th (from 7 - 8am Eastern Time) and the release will be the same day at 8:30am.

ESTIMATION OF THE EFFECT OF NEWS ON FINANCIAL MARKETS

The announcement effect literature focuses on the following regression:

$$2) \quad X_t = \beta N_t + \varepsilon_t$$

where X_t is the change in an asset return in a small time window around an announcement and N_t is the news or surprise component of the announcement. β measures the typical effect of the news or surprise. ε_t is assumed to be a random error. The regression reflects how the markets learn and react to news. Note that there is no constant as the mean return should be zero.

THE ANNOUNCEMENT WINDOW

Theory suggests that a narrow window be used. Recently intra-day data has allowed 20-minute or narrower windows to be used around the announcement. As Faust et. al. note, "The hope is that by focusing on a narrow time window, we get something like a natural experiment allowing us to learn the effects of a particular type of information."

However the theory on the transmission mechanism from news to market movement is murky at best. Faust et. al. do the best job and point out that while some authors have suggested that because other variables are fixed within the narrow announcement window, the movement in financial markets is due to the news, it can be due revisions in a market's view of these other variables.

A slight variant on this view would relate the changes in economic fundamentals to asset prices. The Arbitrage Pricing Theory (APT) suggests that the return on an asset is influenced by a number of market-wide variables or factors that are measured as changes or surprises. The APT model of Ross (1976) is usually estimated with monthly returns. The announcement effect can be viewed as the APT when the time step shrinks to minutes. In this case, as the time horizon is a minute or two around an announcement, the expected return on a portfolio is the individual returns from assets (which are expected to be zero over such a short time horizon) and that return that is due to the systematic risk from the economic news factors. Over the minutes following the announcement the systematic risk will dominate.

Different markets react at different speeds to the same announcements. The definition of the window will be crucial to good results. Faust et. al. (2003) use a 20-minute window (5-minutes before and 15-minutes after), Andersen et. al. (2002) (“ABDV”) use a 5-minute post announcement window, Gürkaynak and Wolfers (2006) use a 30-minute window (5-minute before and 25-minutes after). Faust et. al. (2003) note that “although ABDV find that the response of exchange rates to macroeconomic announcements is fast, for some announcement-currency pairs they find that the full effect on the conditional mean takes a little more than 5 minutes.” Also Andersen et. al. (2002) and Faust et. al. (2003) use data from Olsen and their data are based on interpolated quotes, the exchange rate data for 8:30am may incorporate a quote that came after an 8:30am release. For these authors, taking exchange rate returns from 8:25am to 8:45am avoids this problem. The data I use does not include data before 8:30am. I therefore calculate returns from the close of a minute before the announcement (that is I use the 8:29am close for a 8:30am announcement).

As a result I take the size announcement window as open to discovery from the data. I test windows from 1 to 30 minutes for minute-by minute and cumulative returns.

TIMING OF ANNOUNCEMENTS

Timing of the announcements matter, some are more important than others. Andersen et. al. show that some announcements “... are to some extent redundant, and the market then only reacts to those released earlier.” (p. 13)

Andersen et. al. note that “although closely timed news events are highly correlated, the correlation does not create a serious multicollinearity problem except in a few specific instances. For example, industrial production and capacity utilization are released at the same time, and they are highly correlated (0.64). In general, however, the event that two announcements within the same category (e.g., real activity) are released simultaneously is rare.” (p. 11)

I investigate which announcements matter and confirm that some announcements matter a lot; some seem to have a marginal impact, while others do not matter. To do this it is helpful to follow Andersen et. al. and define standardized news (S) as the surprise divided the sample standard deviation of:

$$3) \quad N_t = A_t - E_{t-\delta}(A_t)$$

$$4) \quad S_t = \frac{A_t - E_{t-\delta}(A_t)}{\hat{\sigma}}$$

Standardized news allows for comparisons of responses of different asset prices to different news.

GOOD NEWS AND BAD NEWS

There is an effect that researchers have identified that suggests that bad news has a bigger impact than good news. I found for example that “The stock market is driven by news. Good news lifts the market. Bad news dampens growth. Good news does not lift the market as much as bad news depresses it. Also, bad news during a bear market has a bigger negative impact than bad news during a bull market.” Parker and Li (2005). Similarly, Andersen et. al. find that “the effect of macroeconomic news often varies with its sign. In particular, negative surprises often have greater impact than positive surprises” (p. 15).

I test whether it adds to the model to allow the news impact response coefficient β to be difference for positive and negative surprises.

GOOD TIMES AND BAD

In a preliminary piece of research, that the author has requested not be referenced yet, it was found that the market reaction to the announcement is different in economic expansions and recessions. The author uses the market survey data rather than the better derivatives-based expectation, but combining the survey with five minute returns from five futures contracts for currencies and U.S. Treasury bonds yields some good results. As an example, the author finds that retail sales announcements have a large impact on European currencies in expansion but not in recession.

The definition of a recession I will use is, not the standard two successive quarters of decline in GDP, but, as in Andersen et. al., three consecutive declines in nonfarm payrolls⁵. Separating good and bad times seems, from the preliminary results, to show that there is, in some cases, a strong and sometimes persistent effect of announcements on exchange rates and government bond prices. These results suggest that persistent bad news affects the announcement effect results.

⁵ I therefore create a dummy variable that takes on the value of 1 if the previous two announcements yielded negative surprises and 0 otherwise.

EXPLANATORY POWER

Andersen et. al. note that for regressions using survey expectations data and just data from around the announcement, R^2 values “are often around 0.3 and sometimes approaching 0.6” (p. 13). Gürkaynak and Wolfers find that one can improve upon this, “financial market responses to data releases are ... better captured by surprises measured with respect to market-based expectations than survey-based expectations, ... suggesting that they better capture investor expectations” (p. 1), and that “... the Economic Derivatives forecast dominates the survey forecast (although survey forecasts perform quite well) both in predicting outcomes and in predicting market responses to economic news” (p. 13).

The explanatory power of the regression can be interpreted as the effectiveness of the results for risk management purposes. The effectiveness of this regression is given by $\sqrt{1-R^2}$.

PARAMETER INSTABILITY

Market reactions to news can shift over time. While not a wide spread problem for exchange rates and interest rates, there are some cases in which a time-varying estimate has to be considered: “the effect of price surprises on interest rates has declined over our sample period and that the effect of trade balance surprises on exchange rates has also declined. We also find some evidence for time variation in the effects of surprises to nonfarm payrolls.” (Faust. et. al. p. 27).

REVISIONS

There is a commonly held opinion that revisions in economic data matter.

“Speaking of revisions, don't be too quick to pull that trigger should a particular economic indicator fall outside of market expectations. Contained in each new economic indicator released to the public are revisions to previously released data. For example, if durable goods should rise by 0.5% in the current month, while the market is anticipating them to fall, the unexpected rise could be the result of a downward revision to the prior month. Look at revisions to older data because in this case, the previous month's durable goods figure might've been originally reported as a rise of 0.5% but now, along with the new figures, is being revised lower to say a rise of only 0.1% Therefore, the unexpected rise in the current month is likely the result of a downward revision to the previous month's data.”⁶

Many analyses of data refer to revisions to data as being a driving force in the market's move. Here is a sample (emphasis added):

⁶ http://www.forex.com/forex_economic_indicators.html

1. The eagerly awaited US October Non-Farm Payroll numbers were released today. Coming in at +92K, below the mean of a very wide range of estimates, **it was eclipsed by revisions to the previous months:** from +51K to +148K in September and from +188K to +230K in August.⁷
2. Forex Mid-Day Technical Report - Dollar Sharply Higher after Payroll Revision and Unemployment Rate - The same story again. The headline Non-farm payroll is disappointing, adding 92k jobs in Oct only comparing to expectation of 125k. **However, prior month's data was revised sharply higher from 51k to 148k. Aug's data was further revised from 188k to 230k.**⁸
3. The markets are eagerly awaiting the October reading of non-farm payrolls following the massive revisions made to the August figures. Payrolls are expected to rise 120K this month, **but the focus may be on September revisions.** The paltry 51K report last month did little to curb enthusiasm for the US economy, due to the Labor Department's claim that the full revision for the year in March could be an astounding 810K.⁹
4. Although the September reading of US non-farm payrolls came in much weaker than expected at 51K, **news that the Labor Department upwardly revised August's figure by a whopping 188K offset any pessimism regarding the economy.**¹⁰
5. While markets were expecting a higher number of non-farm payroll employment for December, the strong revision on the November number should give some comfort to those that were expecting a stronger performance.¹¹
6. **US Non-Farm Payrolls (OCT)** (13:30 GMT, 08:30 EST) Actual: 92.0K Expected: 123.0K Previous: 148.0K...How Did the Markets React? US non-farm payroll is one of the most market moving pieces of economic data for the financial markets. as a reflection of the overall Health of the economy and a leading indicator for consumer spending, the NFP report usually overshadows any other news in the financial markets on the day that it is released. This was true for the Fx and bond markets today, but not for the stock market. Both the US dollar and bond yields shot up after the release of payrolls. Even though the Headline number fell short of expectations, the prior figure for September was revised from 51k to 148k, making the 2 month average a respectable 120k.¹²

⁷ http://www.actionforex.com/index.php?option=com_content&task=view&id=13092&Itemid=271

⁸ http://www.actionforex.com/index.php?option=com_content&task=view&id=13092&Itemid=271

⁹ http://www.dailyfx.com/story/special_report/special_reports/US_Non_Farm_Payrolls___What_1162505341553.html

¹⁰ http://www.dailyfx.com/story/special_report/special_reports/US_Non_Farm_Payrolls___What_1162505341553.html

¹¹ https://a248.e.akamai.net/7/248/1856/a79b68ebc1030e/www.wellsfargo.com/downloads/pdf/com/research/market_strategy/fms01092006.pdf

¹² <http://1-news.org/forex-news/US-Markets-Respond-To-NFPs/>

DATA

EXPECTATIONS DATA

Economic Derivatives

Since October of 2002 several companies¹³ have held auctions for Economic Derivatives, the name they give to options on scheduled macro-economic statistics. The auctions are held with the Chicago Mercantile Exchange (CME) and recent auction results are published on the CME web sites.

In these auctions, one can buy and sell options on economic data releases. In the past auctions have been held for releases such as employment, retail sales, industrial production, trade balance, inflation, consumer sentiment and economic growth. Now data is available on: U.S. Nonfarm Payrolls; U.S. Initial Jobless Claims; U.S. Retail Sales (excluding autos); and U.S. Core CPI (excluding food and energy). Derivatives data was available for seven series (now the CME only maintains the four listed above) with the longest history going back monthly to September 2002. Survey data is available for some 170 series with the longest history going back weekly to 1980.

The auctions typically last for about an hour and take place on the morning before or a few days before the release. To trade in the auctions one must have over \$10 million in assets. There are some 120 participants¹⁴ in these auctions. At any auction there are 40 or so participants, some 80% or so of these are large and small hedge funds. Large investment banks and a couple of corporations make up the rest. The investment banks, while accounting for less 20% of the participants make up for more than 20% of the auction volume. The participants are split almost equally between the U.S. and Europe (with the majority of European companies being U.K.-based).

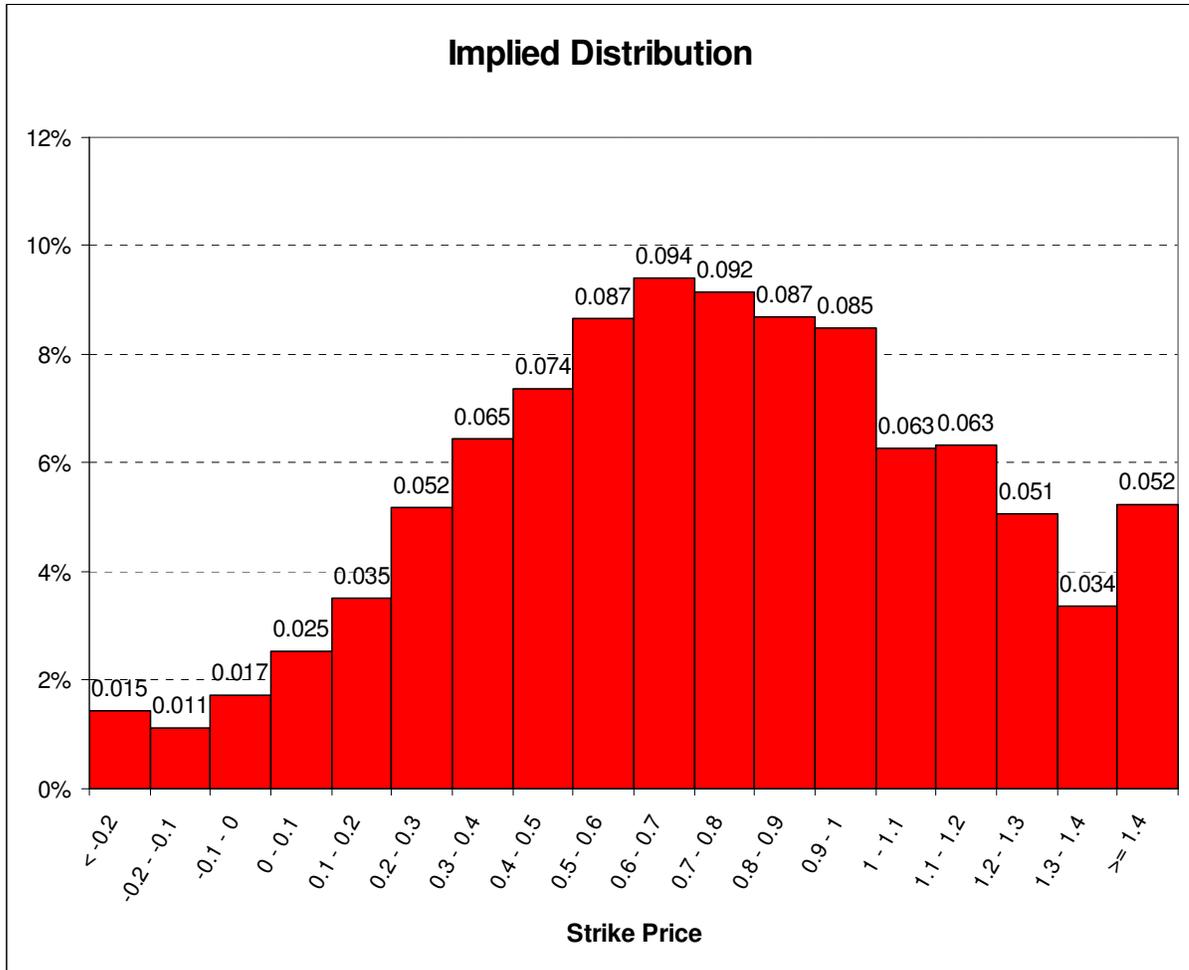
Economic Derivatives data provide an advantage over other expectations measures in that from the auction results one can construct a probability density function of the market's expectation for the economic release. On the left below is an example from the Retail Sales (excluding autos) auction of May 12, 2005 (for the April 2005 release). The implied distribution for the retail sales announcement can be

¹³ Goldman Sachs was responsible for starting and running the auctions. Deutsche Bank is also listed as originators of these auctions. Since around the end of 2006 Goldman Sachs exited the marketing of economic derivatives. The role now falls to the International Securities Exchange (ISE) (<http://www.iseoptions.com/index.aspx>); ICAP Energy LLC (<http://www.icapenergy.com/US/markets/Auctions.aspx>); and Longitude (<http://www.longitude.com/>).

¹⁴ Estimates from a conversation with Goldman Sachs Economic Derivatives Group on September 11th 2006.

generated from the reported auction clearing prices for the digital puts, calls, or digital ranges (reproducing Gürkaynak and Wolfers (2006) Figure 1, p. 4). This is shown in Figure 1 below:

FIGURE 1 – IMPLIED EXPECTATIONS DISTRIBUTION FOR MAY 12TH 2005 RETAIL SALES (EX. AUTOS)

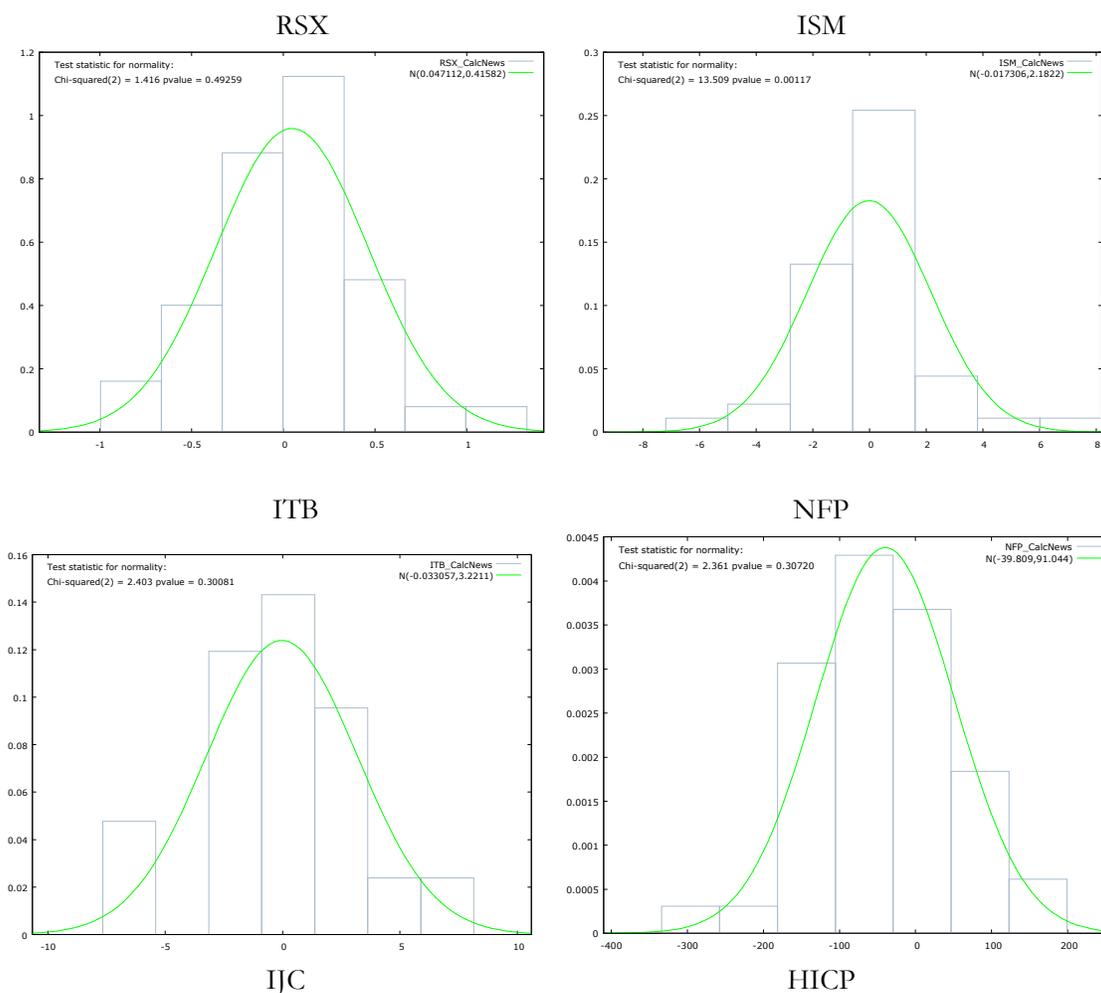


This distribution provides us with a lot of information about the market’s expectation for the Retail Sales (excluding automobiles) number that was released later that same day. The calculated mean of distribution is 0.72 (with the volatility, skewness and kurtosis being 0.40, -0.19, and -1.24). There is quite

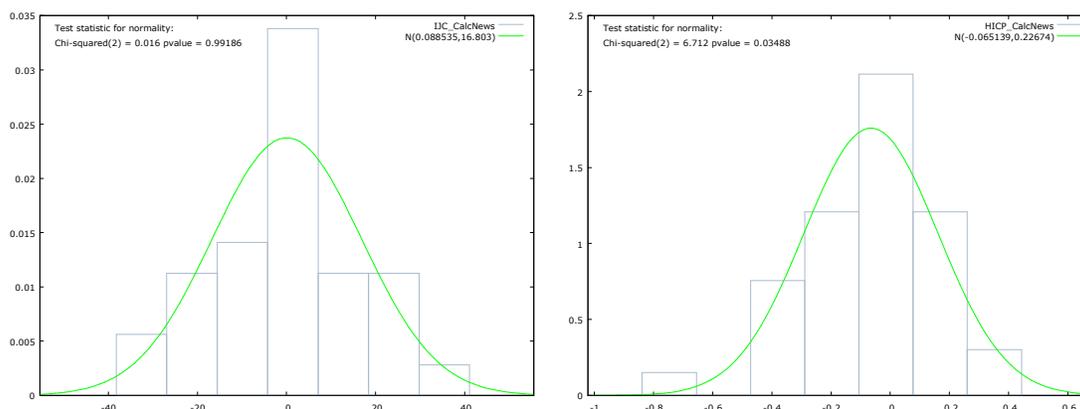
a weight of expectation for higher than the mean but there is also a longish tail representing a negative view. The actual release was 1.1, somewhat higher than the mean.¹⁵

The news or surprise variable (taking the actual release minus the mean expected value from the above distribution) for six of the seven announcements (there are too few observations for GDP) are plotted below on Figure 2:

FIGURE 2 – FREQUENCY DISTRIBUTIONS OF NEWS VARIABLES COMPARED TO THE NORMAL DISTRIBUTION



¹⁵ A quick view of the shape the distributions of recent auctions can be seen on the CME web site: <http://auctions.cme.com/auctions.html#>.



As discussed above the expectation is taken just before the announcement (the closer the better).

$$5) \quad E_{t-\delta}(A_t)$$

For the announcements considered here, if δ is measured in days, the on average $\delta = 0.1$ (excluding the HICP auctions which are 1 and 2 month options – as can be seen from Table 1 below I have access to the 1-month option results).

TABLE 1 – NUMBER OF ANNOUNCEMENTS AND AVERAGE TIME TO ANNOUNCEMENT

	RSX	ISM	ITB	GDP	NFP	IJC	HICP	All	All (excl. HICP)
Number of Announcements	40	45	19	7	46	32	38	227	
Average δ (days)	0.3	0.3	0.0	0.0	0.2	0.0	33.8	4.9	0.1
First Announcement	Sept. 04	Nov. 02	Feb. 05	Jan. 05	Nov. 02	Feb. 04	May 03		
Last Announcement	Aug. 06	Sept. 06	Aug. 06	Jul. 06	Aug. 06	Sept. 06	Aug. 06		

Survey

Since 1980 MMS International surveyed around 40 market participants weekly (in the U.S., 20 for the Canadian survey) for their forecasts of major economic indicators. The forecast medians are sold by Haver Analytics under a lease they signed with MMS. MMS no longer exists. MMS’s successor company is Action Economics¹⁶.

For the Retail Sales (excluding autos) April 2005 release the following information was available from the survey: mean (and median) 0.5, standard deviation 0.3986. The standard deviation and mean are from

¹⁶ <http://www.actioneconomics.com/>

Gürkaynak and Wolfers (2006). MMS published only the medians. Action Economics, from December 2003, provide mean, median, high, low, number of participants and standard deviation. Other surveys provide a consensus mean and a range.¹⁷

Survey data are available for the U.S. Canada Europe for a wide range of forecasts including: Policy Indicators; National Accounts Data: GDP, Consumption & Income; Industrial Production, Capacity Utilization; Housing Indicators; Consumer, Producer, Import, and Export Prices; Employment & Earnings; Manufacturing & Trade; International Trade; and Leading Indicators.

Summary – Expectations Data

Apart from providing more information the Economic Derivatives or market-based forecasts are found by Gürkaynak and Wolfers to outperform the survey data. They:

“... establish that the Economic Derivatives forecast dominates the survey forecast (although survey forecasts perform quite well) both in predicting outcomes and in predicting market responses to economic news.” (p. 13)

And,

· “... that central tendencies of market-based forecasts are very similar to, but more accurate than surveys. Further, financial market responses to data releases are also better captured by surprises measured with respect to market-based expectations than survey-based expectations, again suggesting that they better capture investor expectations. Some behavioral anomalies evident in survey-based expectations – such as forecastable forecast errors – are notably absent from market-based forecasts.” (p. 1)

The Federal Reserve Board of San Francisco (2006) (Wolfers) took data from the first 153 of these Economic Derivatives auctions and compared them with an alternative forecast aggregator: the survey of the expectations of financial market analysts taken on the Friday prior to the data release. They asked “which better predicts the actual data?” The Economic Derivatives forecasts were slightly (5%–10%) more accurate, although these differences were not statistically significant. They also found more interestingly, once one knows the Economic Derivatives forecast, there is no useful information in the survey-based forecast.

They also analyze the change in stock and bond prices from 5 minutes before the announcement to 25 minutes later for the two alternative measures of news. In each case, they confirm that the Economic Derivatives market better predicts financial market responses to economic data than does the alternative survey-based measure.

Gürkaynak and Wolfers (2006) compared the Consensus of Economists or survey-based forecasts with the economic derivatives or market-based forecast using data from Oct. 2002 to Jul. 2005 (33 NFP observations). The results shown are shown below (in the GW columns).

¹⁷ See for example: <http://www.nasdaq.com/asp/econodayframe.asp?page=http://www.nasdaq.com/econoday/index.html>

I have replicated their study using more, and overlapping, data from Oct. 2002 to Mar. 2007 (54 observations). My results are shown in the table by the JCP columns.

The conclusion? Again the economic derivatives or auction market-based forecast dominates the Economist survey or Consensus forecast. Details are found in the table below which looks at measures of forecast accuracy, the mean absolute error (MAE) and the root mean squared error (RMSE). There is also a correlation of each forecast with the actual (NFP release) and a regression-based test of the information content of each forecast using the Fair and Shiller method¹⁸.

As with the smaller sample in GW, the MAE and RMSE are lower for the economic derivatives forecast. The correlation with the actuals is also higher than the Consensus-based forecast. The coefficient in the regression should be unity for a good forecast. For the Derivatives or auction market-based forecast the test of the coefficient being equal 1 could not be rejected by GW. The evidence is not as strong now, as the test statistic is: $F(1, 51) = 0.235477$, with p-value = 0.62957.

The test that the Consensus or survey-based forecast is zero (that is that this forecast adds nothing to explanatory power of the other forecast, or conditioning on the market-based forecast renders the survey forecast uninformative) is: Test statistic: $F(1, 51) = 5.62732$, with p-value = 0.0214933. So the Consensus adds no information beyond the economic derivative forecast.

Not only that but the perverse negative coefficient found by GW persists with the longer data set.

Again, it seems “likely that the improved performance is due to the market effectively weighting a greater number of opinions, or more effective information aggregation as market participants are likely more careful when putting their money where their mouth is.”¹⁹

¹⁸ Fair-Shiller - Fair, Ray C. and Robert J. Shiller (1990), “Comparing Information in Forecasts from Econometric Models,” *American Economic Review*, 80(3), 375-89.

¹⁹ Gürkaynak and Wolfers, (2006) p.9.

**TABLE 2 – COMPARISON OF DERIVATIVES AND SURVEY-BASED EXPECTATIONS
MEASURES FOR NONFARM PAYROLLS**

	JCP	JCP	GW	GW
	Consensus	Economic Derivatives	Consensus	Economic Derivatives
Mean Absolute Error (MAE)	0.812	0.809	0.743	0.723
Root Mean Squared Error (RMSE)	1.036	1.023	0.929	0.907
Correlation of Forecast with Actual	0.7025	0.7026	0.677	0.700
Horse Race Regression (Fair-Shiller)	-0.42	1.26	-0.14	1.06
standard error	0.56	0.53	0.89	0.78
t-statistics	-0.75	2.38	-0.16	1.36
significant at 10% (*), 5% (**), or 1% (***) level		**		
R ²		0.50		0.46
Obs.		54		33
range of data	Oct. 2002 - Mar. 2007		Oct. 2002 - Jul. 2005	

Forecast errors normalized by historical (Oct. 2002 to Mar. 2007) standard deviation of survey-based forecasts of 90.31.

Derivatives data were available for 7 series with the longest history going back monthly to September 2002. Since January 2007 4 series are available. Survey data is available for some 170 series with the longest history going back weekly to 1980.

While the Economic Derivatives data is superior in terms of information content and usefulness for measuring the announcement effect, the survey data has a longer history and broader coverage. I use the economic derivatives data.

ANNOUNCEMENT DATA

The following describes the actual, unrevised data for which economic derivative data is available and the mnemonics used for them in the rest of the paper.

Retail Sales

The monthly percentage in retail sales not counting automobiles, as published by the U.S. Department of Commerce is denoted RSX (for retail sales ex-autos). RSX measures the dollar amount of spending at retail and food service establishments, adjusted for normal seasonal variations. RSX auction data is available from November 2002 but no auctions were held, and so no option prices were available for the six month period between March and August of 2004 and for March of 2003.

U.S. Initial Jobless Claims

The seasonally adjusted, initial Unemployment Insurance weekly claims over the week that ends on the Saturday immediately preceding the expiration date is published by the U.S. Department of Labor. Initial Jobless Claims (IJC) is a composite of the initial filings for state unemployment benefits, adjusted to reflect seasonal hiring patterns. IJC is available from February 2004. On average one auction is held for every four weekly releases although there have been between 1 and 6 releases between auctions.

U.S. Non-Farm Payrolls

The change in Non-Farm Payrolls as determined and published by the U.S. Department of Labor, Bureau of Labor Statistics, estimating the monthly change in the total number of employees on non-agricultural payrolls is designated NFP. NFP is available from October 2002. From October 2002 to July 2003, one auction was held for each release, then two auctions for each release until May 2005. Since June 2005 there have been three auctions for each release. In October 2006 the CME announced that a fifth economic derivative auction on the U.S. non-farm payroll was to be added. Summary statistics (mean and volatility) were available for all auctions but a complete set of option prices necessary to build a distribution was only available for the last auction before the release.

CPI

Derivatives on the U.S. Core Consumer Price Index (CPI). Core CPI, an average price level of a fixed basket of goods and services purchased by consumers, excluding food and energy prices. Monthly changes in the Core CPI represent the rate of inflation. Data have only been available since May 2006 and so are not included in all of the analysis that follows.

The following series since January 2007 are no longer available.

U.S. International Trade Balance

ITB is the monthly estimate of the balance of payments on U.S. International trade in goods and services, expressed in billions of current U.S. Dollars, for the calendar month which is two months prior to the month in which such estimate is scheduled by the U.S. Department of Commerce to be released. ITB is available from February 2005.

ISM Manufacturing PMI Index

ISM is the change in the Institute for Supply Management Purchasing Manager Index (PMI), an index constructed by surveying more than 400 purchasing agents on recent trends in their orders, production, employment, delivery speeds, inventories and prices for products purchased. ISM is available from October 2002 with two months missing, May and December of 2003.

Eurozone HICP Inflation Index

The monthly level of the Eurozone Harmonized Index of Consumer Prices Ex-Tobacco, as published by Eurostat is HICP. A measure of inflation designed for international comparison as required by the treaty establishing the European Monetary Union. HICP auctions have been held since April 2003 with June 2003 being the only release not covered by an auction.

U.S. Gross Domestic Product

GDP is the quarterly estimate of Real U.S. Gross Domestic Product expressed as a seasonally adjusted annual rate, for the calendar quarter ending in the month immediately preceding the release date, published by the U.S. Department of Commerce. There are three releases for GDP: advance, preliminary; and final. The derivatives auction is for the advance number. Advance GDP is available from January 2005.

– ANNOUNCEMENTS FOR WHICH AN ECONOMIC DERIVATIVE AUCTION IS HELD

Announcements	Source	Frequency	Units	Release Time (Zone)
Core CPI (Ex-Food and Energy)	BLS	Monthly	Index level	8:30am (ET)
GDP (Advance Release)	BEA	Quarterly	% change qoq ²	8:30am (ET)
Initial Jobless Claims (IJC)	ETA	Weekly	Thousands	8:30am (ET)
Non-farm Payrolls (NFP)	BLS	Monthly	Change in thousands	8:30am (ET)
Retail Sales Excluding Automobiles (RSX)	Census	Monthly	% change mom	8:30am (ET)
International Trade Balance (ITB)	BEA	Monthly	\$ billion	8:30am (ET)
Harmonized Indices of Consumer Prices (HICP)	ES	Monthly	Index	11:00am (CET)
Manufacturing PMI (ISM)	ISM	Monthly	Change in the index	10:00am (ET)

1: Acronyms are as follows: BEA (U.S. Department of Commerce Bureau of Economic Analysis), BLS (U.S. Department of Labor Bureau of Labor Statistics), Census (U.S. Census Bureau), ETA (U.S. Department of Labor Employment & Training Administration), ISM (Institute for Supply Management), PMI used to be an acronym for Purchasing Managers' Index, ES (European Union Eurostat), CET (Central European Time), ET (Eastern Time)

2: Expressed at an annualized rate.

FINANCIAL MARKETS DATA

Financial Return Data

Previous studies have tended to use short samples due to the limited availability of intra-day data. In estimating the effect of an announcement one wants a narrow window around the time of the announcement. This way the news available should be dominated by the announcement. As Faust et. al. point out, “Nonetheless, many papers in the literature on announcement effects use daily data instead because long spans of intradaily data were not available until recently.”

I was able to purchase 1-minute data based on Eastern (New York) time for 35 foreign exchange rate pairs, 10 equity index symbols, and 60 continuous futures contracts. With 105 series and the intra-day day starting, on average, in 1998, the problem quickly becomes how to process the huge volumes of data that is over a hundred series for 8 years of 1-minute returns. Financial markets data is no longer the constraint.

The data used are:

Foreign Exchange Rates

- AUD/USD - Australian dollar
- USD/CAD - Canadian dollar
- USD/CHF - Swiss franc
- EUR/USD - Euro
- GBP/USD - British pound
- USD/JPY - Japanese yen

Continuous Futures Contracts (The data is constructed by recording the most active contract that is traded. Contracts with other expiry dates are monitored until one of them becomes the most active and then this is recorded.)

- Gold
- Heating oil
- Coffee
- Natural gas
- S&P 500
- Treasury Notes 2 year
- Treasury Notes 5 year
- Treasury Notes 10 year
- Treasury Bonds 30 year

Returns are defined as continuously compounded returns. From the spot prices S_t we define the 1-minute return as:

$$6) \quad X_t = \ln \frac{S_t}{S_{t-1}}$$

So that the return over T minutes is the sum of the 1-minute returns:

$$7) \quad X_T = X_1 + X_2 + \dots + X_T$$

In the majority of cases the announcement is at 8:30am Eastern Time. I use closing prices from 8:29am Eastern Time and calculate continuously compounded returns for each minute until 9:00am. I also calculate the cumulate returns from 8:29am until 9:00am. The exceptions are for the HICP and the ISM. The HICP is now released at 11:00am Central European Time (5:00am Eastern Time) and was, for 30 July 2004 and earlier, released at noon (6:00am Eastern Time). There are no announcements for HICP that are complicated by Daylight Savings Time being adopted in Europe at a different date or time than in North America, there is always a six hour time difference. The ISM is released at 10:00am Eastern Time.

Does intra-day financial markets data matter?

Yes. There is a significant improvement when using intraday data. Previous researchers found only some announcements were statistically significant. More recent work has demonstrated that with higher frequency data better results can be had. Compare the results of these two regressions, one using daily return data for the S&P 500 and the news component of the non-farm payrolls release, and the other, for the same news using intraday data (both use 33 releases between October 4 2002 and June 3 2005):

S&P 500 Index	News Coefficient	Standard Error	t-Statistic	R²
Daily Return Data	0.00002	0.00002	1.12	0.0380
Intraday Return Data	0.00311	0.00082	3.78	0.3091

The explanatory power of the regression is increased by a factor of 8 ($0.30911/0.037971 = 8.14$) and the significance level (derived from the t-statistic) of the news coefficient jumps from 27% to 0.1%.

Equity

Gürkaynak and Wolfers take “the stock price changes ... from S&P futures contracts as the stock market is not open at 8.30 a.m. (EST), when the three of the four macroeconomic data series we are interested in are released (ISM is a 10.00 a.m. release). In taking the market snapshots, if there is no trade in a given security 5 minutes before the event, we search back in time until we find a trade or a settlement price. If there is no trade exactly 25 minutes after the event we again search back in time, until the data release moment. If there are no trades in this 25 minute interval we mark a zero change, assuming that if there was a surprise in the data release that changed the shadow price of a security there would have been a trade over this time period. We do not search for a trade forward in time so as to ensure that the price change we observe is not due to another event that took place later in the same day” (pp. 11-12)

I have used 1-minute returns on futures contracts for various equity indices. Tick-by-tick data becomes too unwieldy to manipulate automatically and the gains over minute-by-minute data are not discernible in the preliminary investigations I did.

Foreign Exchange

Andersen et. al. and Faust et. al. use 5-minute exchange rate returns from Olsen Data. To construct these data, Olsen and Associates record all Reuters quotes, average the bid and ask, and then linearly interpolate the resulting series to get prices at exactly the required times. I started with 5-minute return data and found that while the results were good, often the reaction was in the first five minutes. As a result I used 1-minute return data.

Bond Market/Interest Rate

Faust et. al. construct zero-coupon yield curves from interest rate and government bond futures. They obtain “high frequency data on the first four eurodollar, euromark/euribor and sterling libor futures

contracts. These contracts are all cash-settled to 3-month interest rates on the settlement day. By combining the prices on these short-term interest rate contracts, we obtain 3-month and 1-year zero-coupon rates” (p. 28). Gürkaynak and Wolfers use the yields of on-the-run Treasury securities. I use futures contracts for U.S. Treasury bills and bonds. The data is constructed by recording the most active contract that is traded. Contracts with other expiry dates are monitored until one of them becomes the most active and then this is recorded.

Commodities

Commodities (gold, heating oil, natural gas, coffee) are, like the bond and equity data continuous futures contracts.

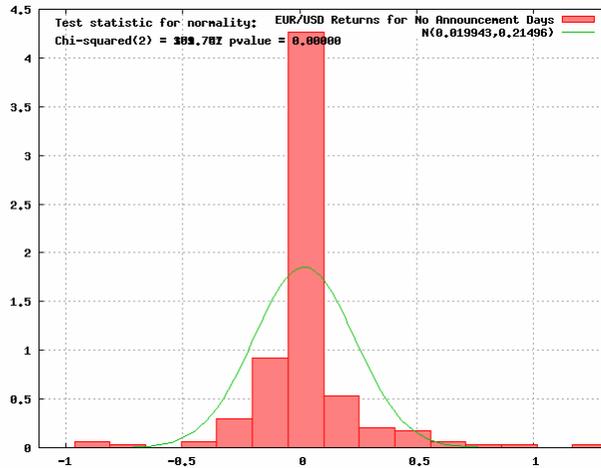
ANNOUNCEMENT DAYS ARE DIFFERENT

Announcement days are statistically different from non-announcement days. I looked at 946 days between 2/19/2004 and 9/21/2006. At 8:30am on those days I looked at the EURUSD exchange rate and calculated the one-minute return. I also calculated the absolute change in pips (traders use the movement in the fourth decimal place or the absolute change in price time 10,000).

Then I looked at just days on which one of five major announcements was made (retail sales ex-autos, non-farm payrolls, preliminary GDP, initial jobless claims, and the trade balance). All of these announcements are at 8:30am Eastern Time.

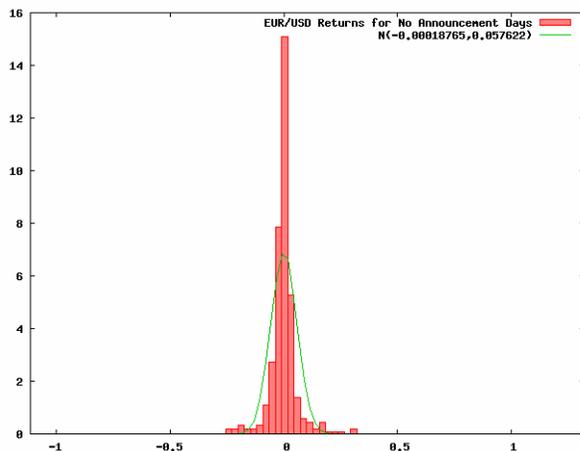
The returns (pips) for the announcement days was 106 times greater (109 times greater) than for non-announcement days. The range in pips was -101 to 151 versus -30 to 39.

FIGURE 3 – EUR/USD RETURNS ON ANNOUNCEMENT DAYS



Plotting non-announcement day returns using the same range as announcement days gives the following.

FIGURE 4 – EUR/USD RETURNS ON NON-ANNOUNCEMENT DAYS



GOOD & BAD NEWS DUMMY VARIABLES

I define good news as a positive surprise (actual above the mean of the expectation distribution), bad news as a negative surprise, and a string of bad news as when the last two announcements were negative. Andersen et. al. define three negative news surprises as bad times. To illustrate I show an example for the NFP releases in Table 3.

TABLE 3 – EXAMPLE OF NON-FARM PAYROLLS GOOD, BAD, AND A STRING OF BAD NEWS DUMMY VARIABLES

Release & Action Date	Release (A)	Mean of Expectation (E(A))	News N	Good News (N*)	Bad News (N)	String of Bad News (B)
April 7, 2006	211	197.0	14.0	14.0	0.0	0.0
May 5, 2006	138	213.5	-75.5	0.0	-75.5	0.0
June 2, 2006	75	185.7	-110.7	0.0	-110.7	0.0
July 7, 2006	121	213.5	-92.5	0.0	-92.5	-92.5
August 4, 2006	113	158.4	-45.4	0.0	-45.4	-45.4

RESULTS

HOW QUICKLY DO FINANCIAL MARKETS REACT TO NEWS?

Most researchers to date have taken a fixed window over which to measure the announcement effect. An exception is Kim and Sheen (2001) who calculate minute-by-minute returns for the Australian bond futures market. The size of the window is a testable hypothesis so I ran regressions using cumulative returns starting with the close one minute before an announcement up to half an hour after the announcement.

As an example, for non-farm payrolls, the ability of news to explain movements in the 5-Year Treasury Bond futures contract can be improved by 6% by changing the definition of the window from the 30 minutes (from 8:25am, 5 minutes before the announcement to 8:55am, as used by Gürkaynak and Wolfers (2006)) traditionally used in the academic literature to a 20-minute window (from 8:25am to 8:45am). The same change for the EUR/USD exchange rate results in a 25% improvement in explanatory power. For the S&P 500 futures contract, a movement from a 30-minute window to a 10-minute window yields a 37% improvement.

TABLE 4 – RESULTS, FOR THREE FINANCIAL MARKETS, FOR DIFFERENT ANNOUNCEMENT WINDOWS

	Interval Length (minutes)	Coefficient	t-Statistic	R²	R² improvement over 30-minute window
5Year Treasury	20	-0.00371	-7.983	0.589563	6%
	10	-0.00359	-7.865	0.583629	5%
	25	-0.00365	-7.629	0.566652	2%
	30	-0.00357	-7.328	0.55454	0%
	15	-0.00339	-7.178	0.538909	-3%
EUR	20	-0.00307	-6.065	0.456968	25%
	15	-0.00307	-6.065	0.456968	25%
	10	-0.00307	-6.065	0.456968	25%
	25	-0.00338	-5.04	0.373143	2%
	30	-0.00338	-4.998	0.366464	0%

S&P 500	10	0.002926	5.656	0.441865	37%
	20	0.002694	5.081	0.375972	17%
	15	0.002426	4.909	0.353967	10%
	25	0.002729	4.66	0.334129	4%
	30	0.002825	4.524	0.321928	0%

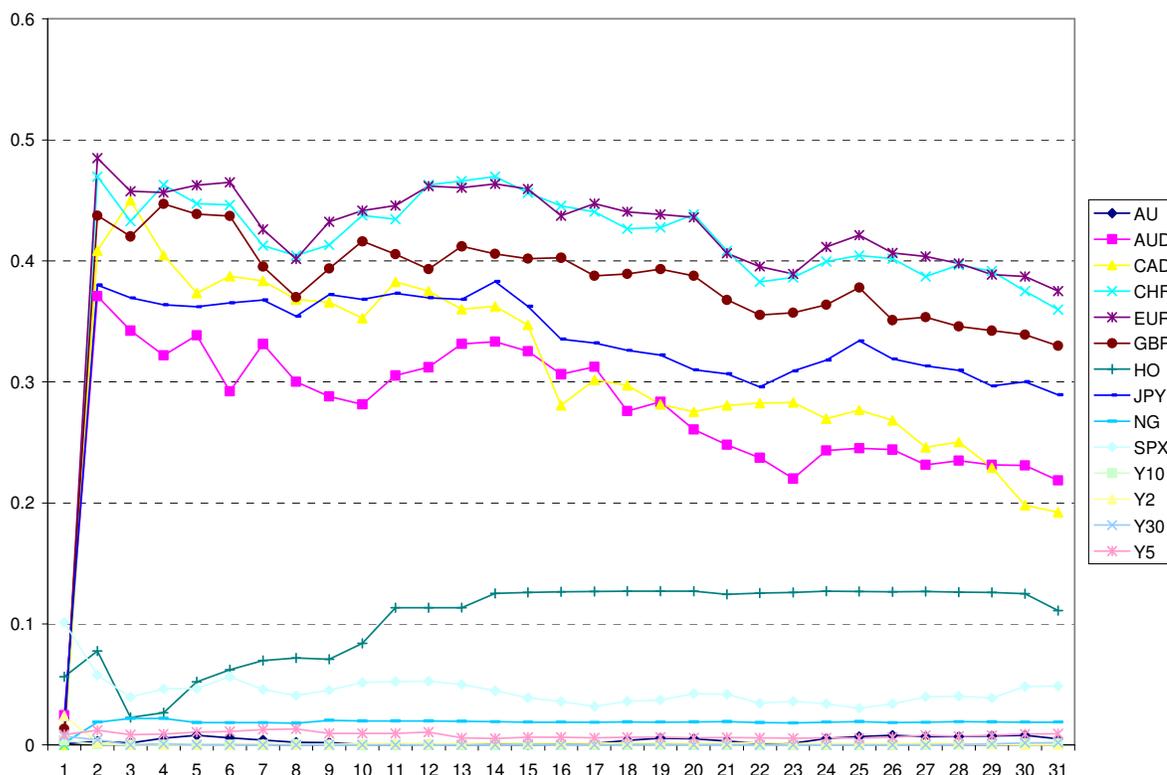
To investigate more fully, I started with the U.S. non-farm payrolls data as this was found by others to be a significant announcement. For a group of commodities, exchange rates, bond, and equity prices regressions were run of the form:

$$8) \quad X_{i,j,t} = \beta_{i,j} N_{jt} + \varepsilon_{i,j,t}$$

Where i is an index of how many periods are included in the cumulative return calculation from 1 to 31; j is an index of financial markets from 1 to 14 (where the markets are: Gold; AUD; CAD; CHF; EUR; GBP; Heating Oil; JPY; Natural Gas; S&P 500; 2-Year T-Bond; 5-Year T-Bond; 10-Year T-Bond; 30-Year T-Bond), N is, as above, the news or surprise.

Charting, in Figure 3, the Adjusted R^2 (which is the same as the R^2 in this case), a couple of findings become clear.

FIGURE 5 – R² FOR ANNOUNCEMENT EFFECT REGRESSIONS FOR VARIOUS FINANCIAL MARKETS FOR NON-FARM PAYROLLS – CUMULATIVE RETURNS



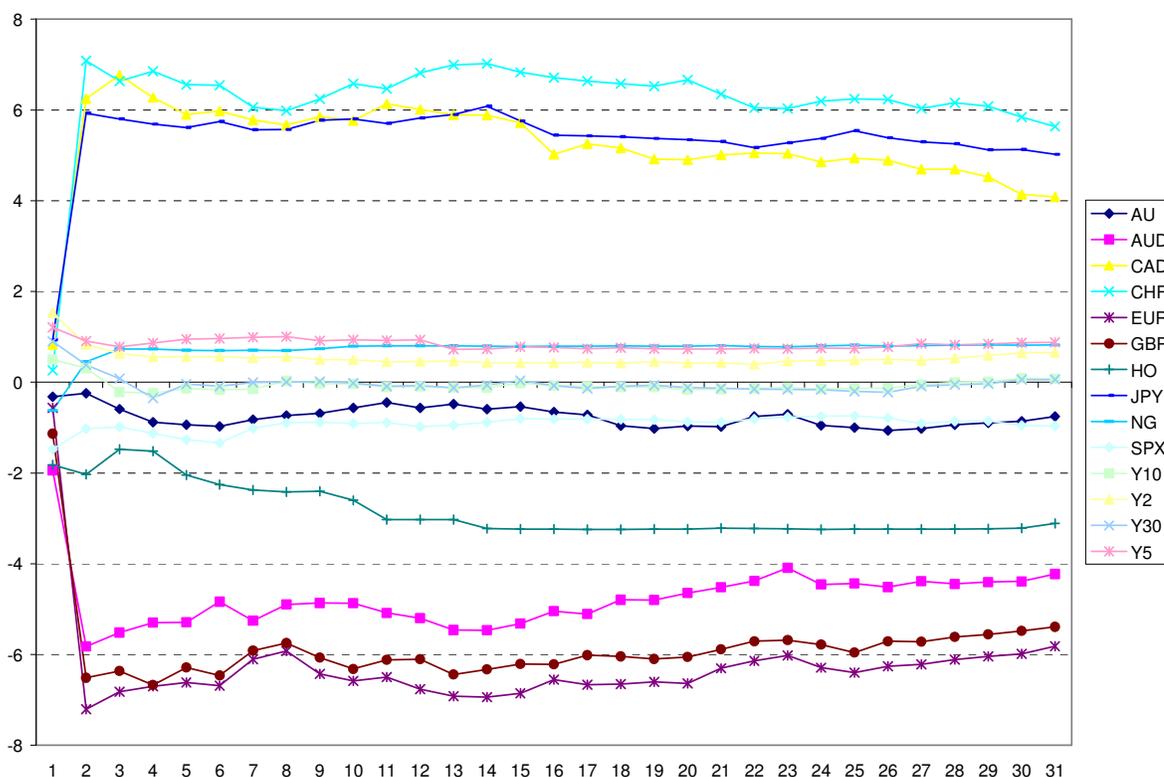
1. The maximum correlation is often immediate, one minute after the announcement at 8:31am. (Note that on the chart this corresponds to the interval 2 since 1 represents the cumulative return from the 8:29am close to the 8:30am close).
2. The markets group quite distinctly into:
 - a. Commodities (excluding Heating Oil) equities and bonds that have an R² of 0.1 or less. Heating Oil that rises to an R² of 0.12 after 15 minutes.
 - b. Foreign exchange rates that have R²'s that peak between 0.35 and 0.5 1 minute after the announcement and decline thereafter.

The 30-Year Treasury has the lowest correlation, the EUR/USD exchange rate the highest.

It is clear from the above that researchers using a 25-30 minute announcement window, or 5-minute returns, will find a relationship but that higher frequency data narrowing the window maximizes the news effect.

The news effect is often very significant in these regressions. This is shown in Figure 4 (as is the sign of the effect) by the t-statistics on the estimated parameters.

FIGURE 6 – T-STATISTICS FOR ANNOUNCEMENT EFFECT REGRESSIONS FOR VARIOUS FINANCIAL MARKETS FOR NON-FARM PAYROLLS – CUMULATIVE RETURNS



From this we can see:

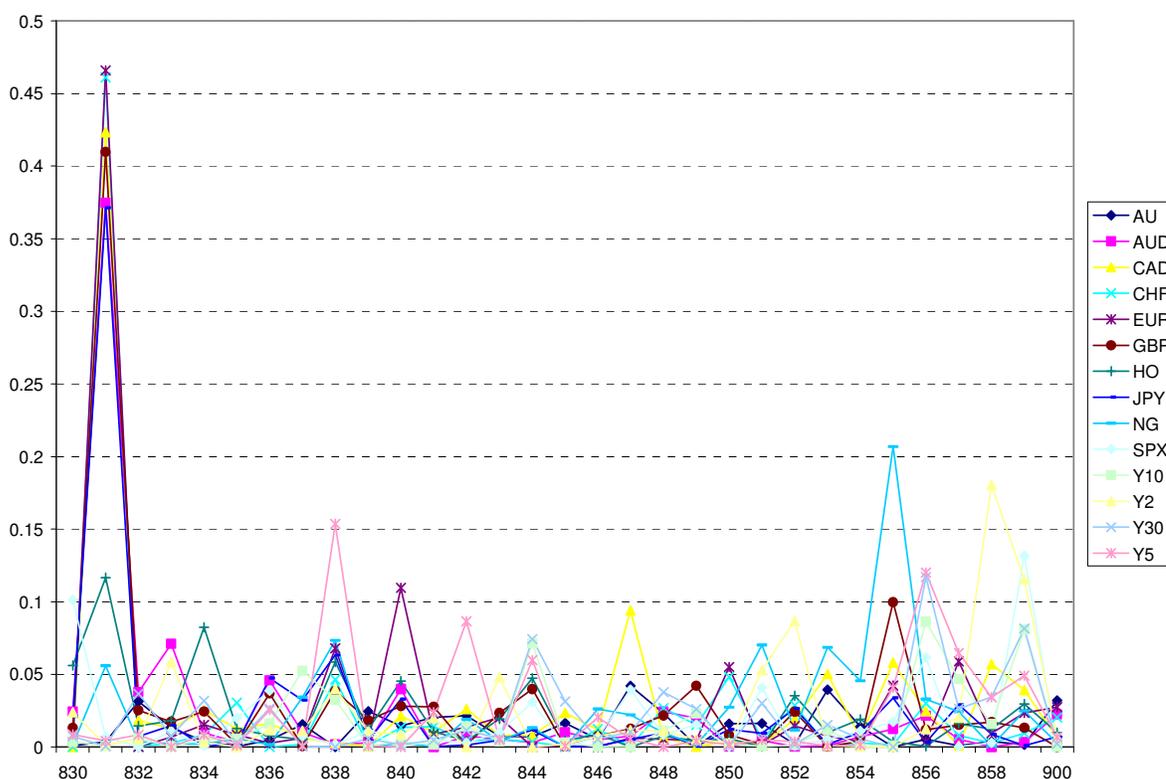
1. Statistically significant²⁰ positive effects are found for: CHF, JPY, and CAD.

²⁰ A $|t|$ of around 2.0 is required for 5% significance.

- Negative results are found for EUR, GBP, AUD, and Heating Oil to have statistically significant effects.

To confirm our findings about the appropriate announcement window, a similar set of tests was run using minute-by-minute returns. As expected the maximum R^2 is found at minute 1 (using the 8:31am close price and the 8:30am close price). This is shown in Figure 5, again for the non-farm payrolls announcement.

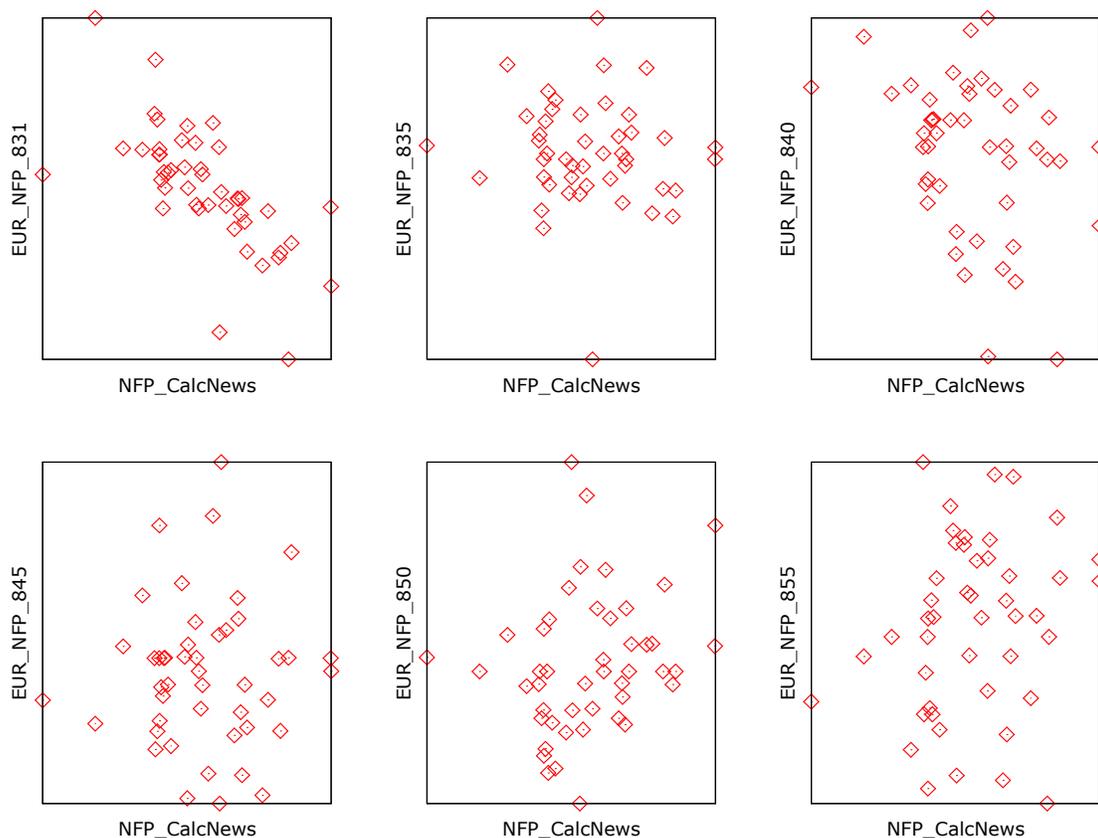
FIGURE 7 - R^2 FOR ANNOUNCEMENT EFFECT REGRESSIONS FOR VARIOUS FINANCIAL MARKETS FOR NON-FARM PAYROLLS – MINUTE-BY-MINUTE RETURNS



As before the EUR exchange rate leads the pack with its R^2 and the other exchange rates follow. The 1-minute impact is by far the most important.

This can also be seen by plotting financial variables at against the news component of the announcement 1, 5, 10, 15, 20, and 25 minutes after the announcement. This is done in Figure 6 for the EUR following the NFP announcement.

FIGURE 8 – EUR/USD RETURNS 1, 5, 10, 15, 20, AND 25 MINUTES VS. NEWS FOLLOWING NON-FARM PAYROLLS ANNOUNCEMENT



It is clear how the quite tight grouping of the observations around a negatively sloped line in the top left panel disappears as we move to the right and the time window expands. Finally in the bottom right panel, at 8:55am 25 minutes after the 8:30 announcement, the relationship has all but disappeared.

WHICH ANNOUNCEMENTS MATTER FOR WHICH FINANCIAL MARKETS?

Taking the announcement window that gives the highest R^2 we can now determine which announcements matter most for which markets. Using the standardized news variable defined above (the news divided the sample standard deviation of the news) we can find which announcement generates the biggest impact in which financial market.

The top 20 effects for foreign exchange rates (ranked by the absolute value of the t-statistic) are given in Table 5.

TABLE 5 – STANDARDIZED NEWS COEFFICIENTS FOR EXCHANGE RATES

Financial Market	Announcement	Coefficient	t-stat	Prob
EUR	NFP	-0.290158	-6.905	<0.00001
CHF	NFP	0.291584	6.904	<0.00001
CAD	NFP	0.132072	6.247	<0.00001
JPY	ITB	0.129244	6.159	<0.00001
GBP	NFP	-0.183745	-6.085	<0.00001
JPY	NFP	0.186403	5.862	<0.00001
AUD	NFP	-0.200389	-5.721	<0.00001
CHF	ITB	0.172315	5.486	0.00003
EUR	ITB	-0.156981	-4.995	0.00009
CAD	GDP	0.0420107	4.879	0.00277
GBP	ITB	-0.126142	-4.757	0.00016
AUD	ITB	-0.100971	-4.654	0.0002
CAD	ITB	0.119844	3.684	0.0017
JPY	HICP	-0.00887866	-3.46	0.00138
EUR	HICP	0.00910468	3.107	0.00362
JPY	RSX	-0.0146016	-2.946	0.00541
CAD	IJC	-0.0108788	-2.864	0.0077
CHF	RSX	0.0219421	2.785	0.00821
CHF	IJC	-0.0181483	-2.705	0.01133
JPY	GDP	0.021695	2.58	0.04176

A couple of comments on these results:

1. Non-farm payrolls (NFP) is a very important release for currencies.
2. The international trade balance (ITB) is also important.
3. The ISM Manufacturing PMI Index (ISM), which does not show up in this list, is still statistically significant for some currencies.
4. The combinations of: CHF/GDP; AUD/GDP; GBP/GDP; GBP_ISM; JPY_ISM; GBP/HICP; EUR/GDP are not statistically different from zero.
5. Only Andersen et. al. (2002) provide standardized news results for exchange rates. In Table 6 we compare the big impacts here for foreign exchange rates and the NFP. Here we see a much stronger effect being isolated as a result of using better data. We also see the GDP and EUR signs being different. It would appear as if these authors have defined their exchange

rates differently. In fact my exchange rates are USD/CHF and USD/JPY so these rates should have different sign Andersen et. al. (2002). So, unless Andersen et. al. (2002) have used

- a. USD/GBP instead of GBP/USD;
- b. USD/EUR instead of EUR/GBP;
- c. USD/JPY instead of JPY/USD; and
- d. USD/CHF instead of CHF/USD,

There is a discrepancy in our findings.

TABLE 6 - COMPARISON WITH ANDERSEN ET. AL. (2002) OF STANDARDIZED EXCHANGE RATE NEWS COEFFICIENTS

	$\beta_{\text{GBP/USD}}$	$\beta_{\text{JPY/USD}}$	$\beta_{\text{CHF/USD}}$	$\beta_{\text{EUR/USD}}$
Andersen et. al.	0.098	0.084	0.144	0.08
Parker	-0.184	0.186	0.291	-0.290

6. There may be some interesting profit maximizing strategies (or hedge opportunities depending on your perspective). For example look at the top two entries in the above table. The Swiss Franc and the Euro appear, on average, to move in opposite directions to the U.S. Dollar when non-farm payrolls are announced. Both these effects are large and statistically significant. Figures 7 and 8 shows initial returns of the two series just after the NFP announcement.

FIGURE 9 – USD/CHF AND EUR/USD 1-MINUTE RETURNS AFTER NFP ANNOUNCEMENTS

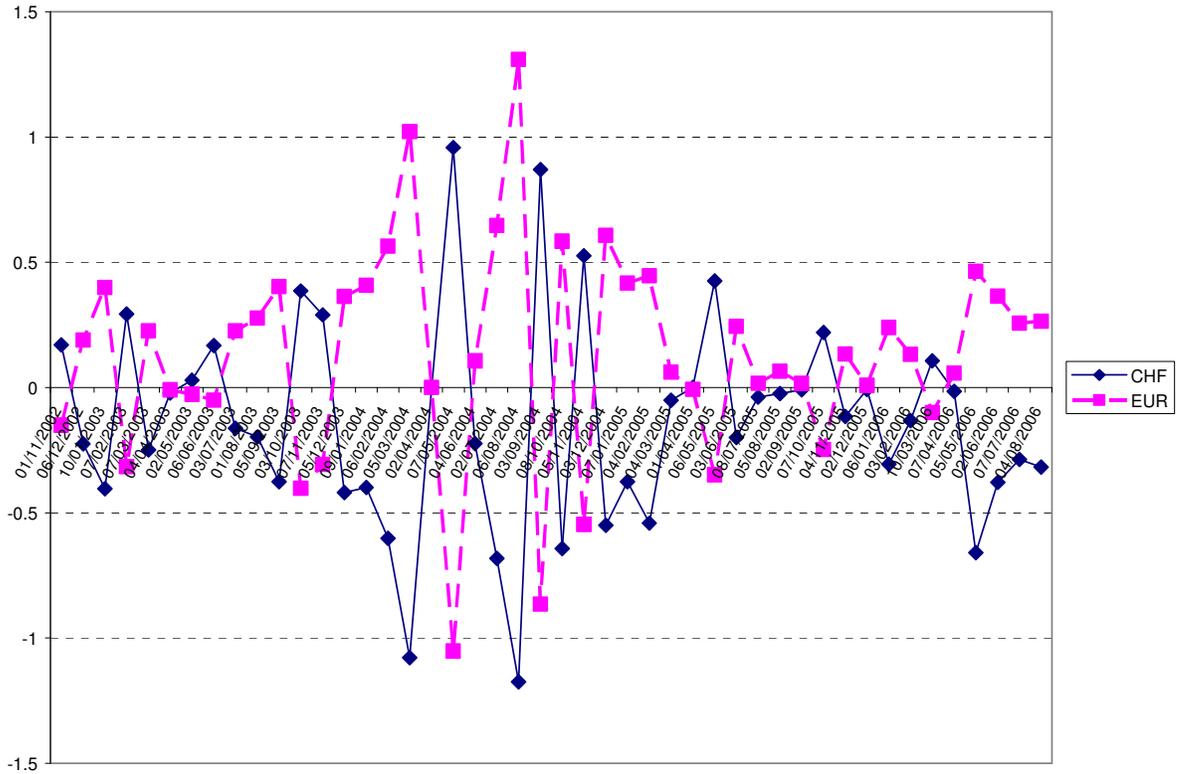
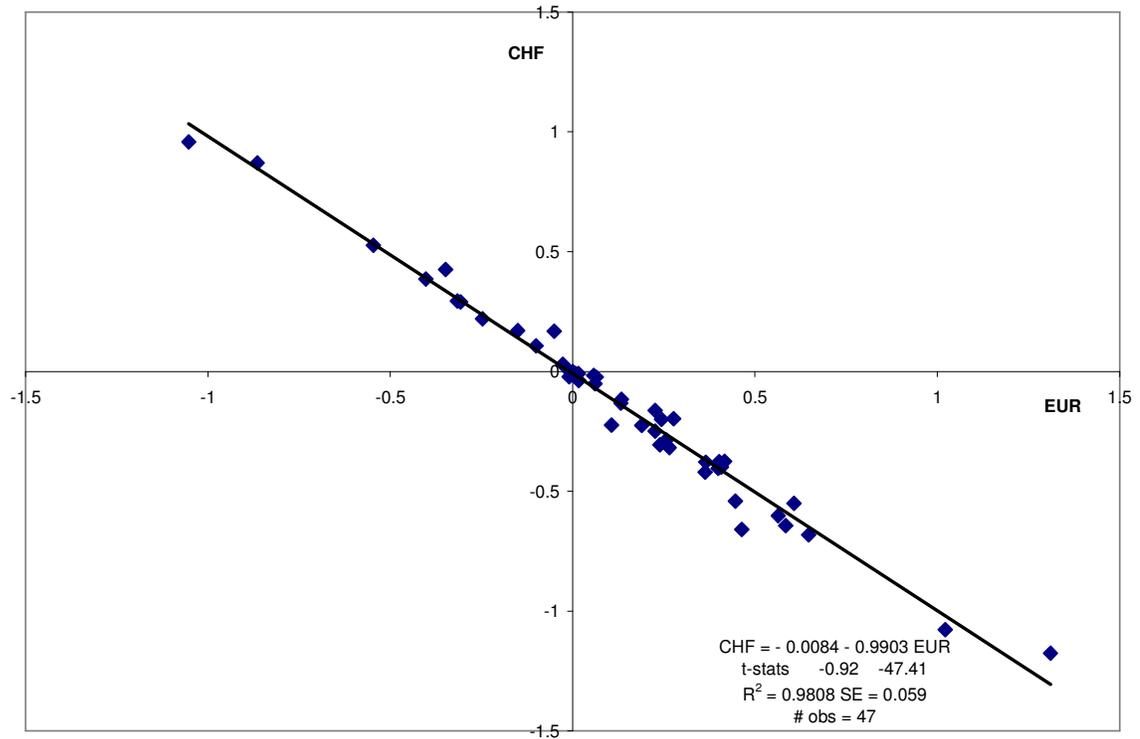


FIGURE 10 – USD/CHF VS. EUR/USD 1-MINUTE RETURNS AFTER NFP ANNOUNCEMENTS



To be clear about what the above two Figures show:

$$7. \quad EUR_t = \beta_{EUR} N_t + \varepsilon_t^{EUR}$$

And,

$$8. \quad CHF_t = \beta_{CHF} N_t + \varepsilon_t^{CHF}$$

So,

$$9. \quad EUR_t = \frac{\beta_{EUR}}{\beta_{CHF}} CHF_t + \varepsilon_t^{EUR} - \varepsilon_t^{CHF}$$

Or,

$$10. \text{EUR}_t = \gamma \text{CHF}_t + \varepsilon_t$$

Where,

$$11. \quad \gamma = \frac{\beta_{EUR}}{\beta_{CHF}}$$

$$\varepsilon_t = \varepsilon_t^{EUR} - \varepsilon_t^{CHF}$$

Where t = the date of NFP announcements in this case. So the announcement effect relationship, embodied in the β 's, can be subsumed in one estimate the γ , and assuming that the β 's are constant, so is γ .

Here are two more examples, Figure 9 from the ITB and Figure 10 from the NFP:

FIGURE 11 – USD/CHF VS. EUR/USD 1-MINUTE RETURNS AFTER ITB ANNOUNCEMENTS

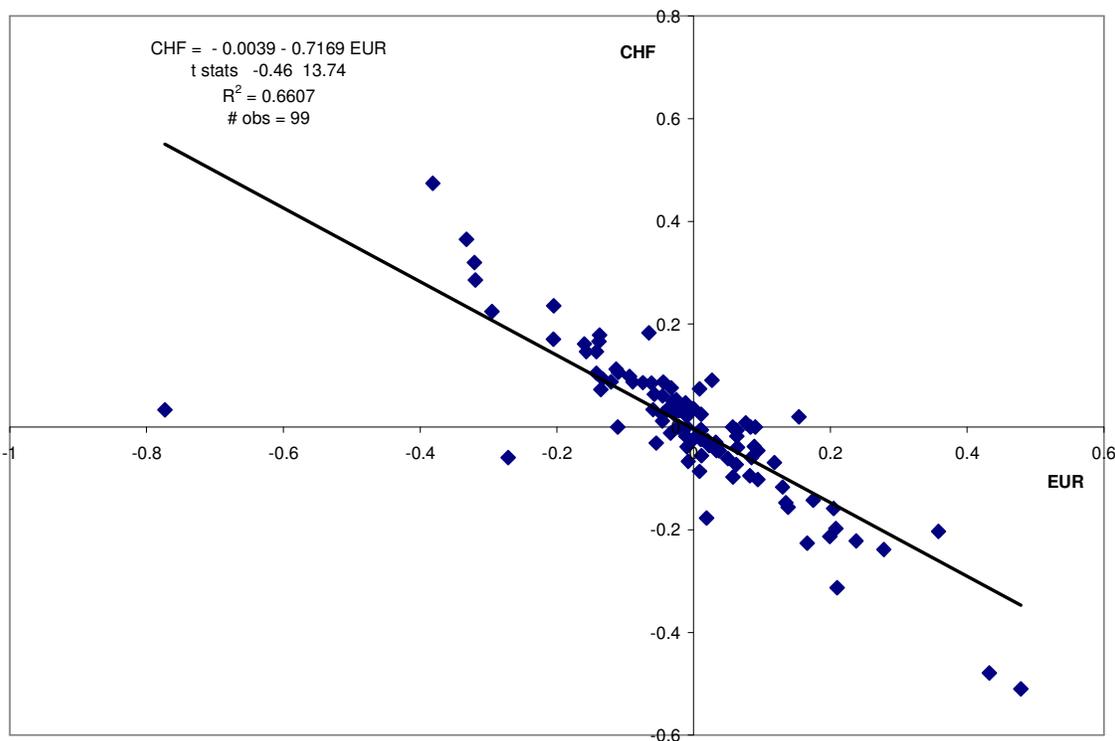
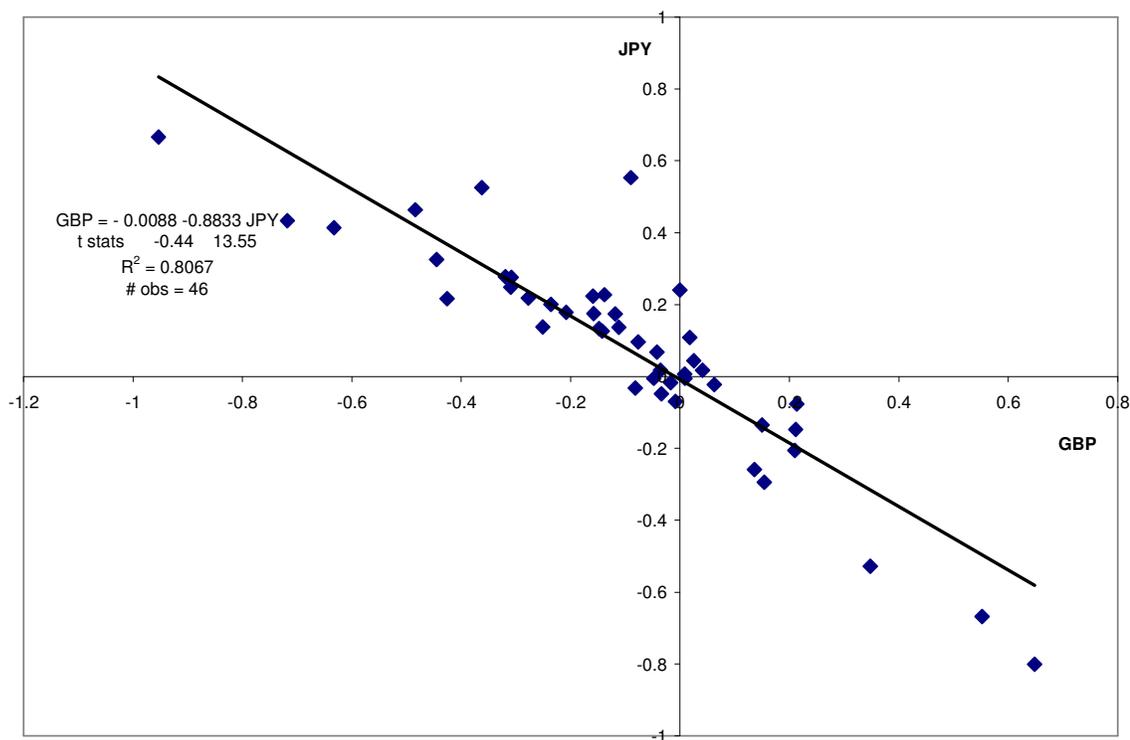


FIGURE 12 - USD/JPY VS. GBP/USD 1-MINUTE RETURNS AFTER NFP ANNOUNCEMENTS



Suppose you are a trader or a risk manager with exchange rates being a significant holding in, or a significant risk factor for, your portfolio. Which announcements should excite or worry you? Table 7 provides the answer. By showing the R^2 's in a heat map that defines strong correlations as $R^2 > 0.5$ (and shows them as red), medium correlations as $0.2 < R^2 < 0.5$ (yellow) and weak correlations as $R^2 < 0.2$ (green) we get a quick visual representation of a lot of data. It should be noted that being quarterly there are few observations for GDP announcements and so the results should be taken with caution.

TABLE 7 – HEAT MAP OF CORRELATIONS FOR EXCHANGE RATE RESPONSES TO ANNOUNCEMENTS

	GDP	HICP	IJC	ISM	ITB	NFP	RSX
AUD	0.811757	0.117526	0.105185	0.069334	0.681382	0.374762	0.104843
CAD	0.651669	0.146319	0.220371	0.145195	0.441962	0.423334	0.097685
CHF	0.761751	0.200686	0.206635	0.153005	0.794274	0.460984	0.166913

EUR	0.872986	0.236748	0.105185	0.115513	0.777053	0.465735	0.127539
GBP	0.401632	0.111224	0.102793	0.048589	0.759166	0.409769	0.08844
JPY	0.867679	0.219232	0.10504	0.048589	0.787711	0.371242	0.18905

The top 20 effects for foreign exchange rates (ranked by the statistically significant news effects – measured by the absolute value of the t-statistic) are given below:

TABLE 8 - TOP 20 EFFECTS FOR FOREIGN EXCHANGE RATES (RANKED BY THE STATISTICALLY SIGNIFICANT NEWS EFFECTS –MEASURED BY THE ABSOLUTE VALUE OF THE T-STATISTIC)

FX Rate	Announcement
EUR	NFP
CHF	NFP
CAD	NFP
JPY	ITB
GBP	NFP
JPY	NFP
AUD	NFP
CHF	ITB
EUR	ITB
CAD	GDP
GBP	ITB
AUD	ITB
CAD	ITB
JPY	HICP
EUR	HICP
JPY	RSX
CAD	IJC
CHF	RSX
CHF	IJC
JPY	GDP

Another way of showing this information is to rank the table by the biggest moves. Since all of the results are highly significant anyway, and the results are for standardized news, we can compare them. Here is the ranking of the other top results (again ranked by the size of the response to news):

TABLE 9 - TOP 20 EFFECTS FOR FOREIGN EXCHANGE RATES (RANKED BY THE NEWS EFFECTS –MEASURED BY THE ABSOLUTE SIZE OF THE COEFFICIENT)

Financial Market	Announcement
CHF	NFP
EUR	NFP
AUD	NFP
JPY	NFP
GBP	NFP
CHF	ITB
EUR	ITB
CAD	NFP
JPY	ITB
GBP	ITB
CAD	ITB
AUD	ITB
CAD	GDP
CHF	RSX
JPY	GDP
CHF	IJC
JPY	RSX
CAD	IJC
EUR	HICP
JPY	HICP

Comparing the size of the news impact with Faust et. al. (2003) the sign of the coefficients is the same. Coefficients are larger as are the R²'s (with the exception of those for Retail Sales²¹). I attribute this to the more precise announcement window and the better expectations data.

TABLE 10 – PARAMETER & R² COMPARISON WITH FAUST ET. AL. (2003)

	β EUR/DM for Faust et. al., EUR for Parker			β GBP Significance R²		
Faust et. al.		Significance	R²		Significance	R²
GDP	- 13.80	***	0.18	- 8.15	***	0.10
IJC[†]	- 0.16	***	0.04	- 0.09	***	0.02
NFP	- 0.13	***	0.21	- 0.10	***	0.21

²¹ Retail Sales that may suffer from a lack of expectations data as auctions were not held for a six month period between March and August 2004. The same may be the case for the GDP data in my study since there are only 7 auctions to date.

RSX	-	14.16	***	0.15	-	12.12	***	0.19
ITB	-	10.09	***	0.24	-	7.13	***	0.20
Parker								
GDP	-	29.53		0.87	-	523.47		0.25
IJC†	-	5.07	*	0.11	-	5.61	*	0.10
NFP	-	31.87	***	0.47	-	20.18	***	0.41
RSX	-	340.10	**	0.13	-	665.93	*	0.09
ITB	-	487.35	***	0.78	-	391.61	***	0.76

† As per Faust et. al. the signs of the announcement surprises have been reversed.

As per Faust et. al. exchange rate returns are continuously compounded and multiplied by 10,000. The elements of the table can be interpreted as the effect of a one unit surprise on the exchange rate in basis points. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

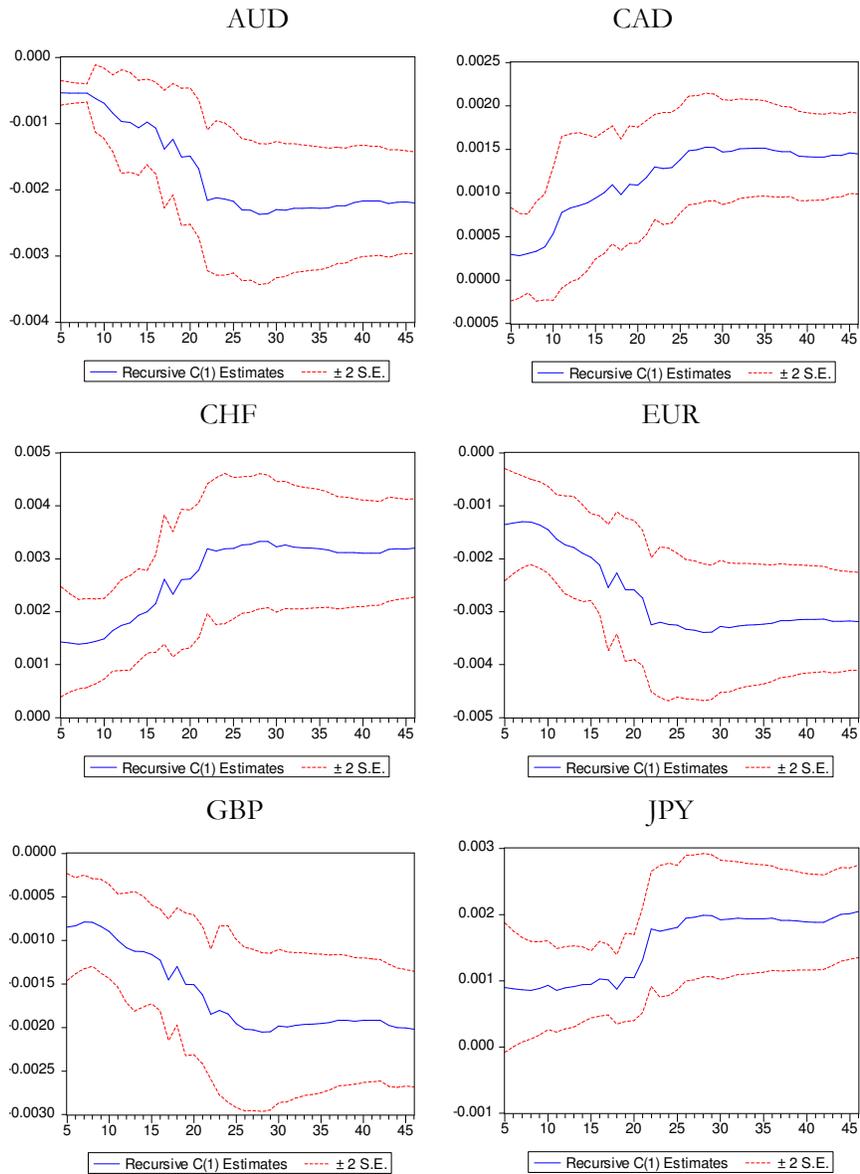
So if one is concerned with the size of the impact, one gets one view of which announcements matter for which currencies. And if one is concerned with the strength of the relationship a slightly different answer emerges to the question “which announcements matter for which financial markets?”

1. The Advance GDP release is obviously very important in the foreign exchange market. The international trade balance (ITB) also has a very strong influence.
2. Notice the size of the R²s calculated here. They go as high as 0.87. This is extremely high for financial markets data. Contrast this with the findings of Andersen et. al. using 5-minute returns and survey expectations for exchange rates. They find “R² values that are often around 0.3 and sometimes approaching 0.6” (p. 14). My analysis provides a significant improvement. In fact Andersen et. al. have an average R² for currency NFP announcements of 0.23. Faust et. al.’s is 0.21. The results above show an average of 0.42. Unfortunately Gürkaynak and Wolfers (2006) do not have any results for foreign exchange rates for comparison, but their average R²s across bonds, Treasuries and the S&P 500 for the NFP was 0.5089 (maximum 0.6264, minimum 0.3280) which is quite consistent with the results shown in Figure 1. It appears therefore that the economic derivative expectations data and high frequency financial data are accountable for the improved results.
3. The R²s give a hedge effectiveness of up to 36%, ($\sqrt{1-R^2}$ where R² is 0.87).

ARE THE RESULTS STABLE OVER TIME?

One way to assess stability is to calculate the results using a recursive method that calculates the coefficient of the simple regression with an expanding sample size. The results for exchange rates following the non-farm payroll announcements are plotted in Figure 11.

FIGURE 13 – RECURSIVE COEFFICIENTS FROM NON-FARM PAYROLLS NEWS IN FOREIGN EXCHANGE MARKETS



The CUSUM or cumulative sum of the recursive residuals and the CUSUM of squares also provide indications of parameter stability. Figure 12 shows the CUSUM test and 5% confidence levels and no indication of parameter instability.

FIGURE 14 - CUSUM OR CUMULATIVE SUM OF THE RECURSIVE RESIDUALS FOR EXCHANGE RATES FOLLOWING NON-FARM PAYROLL ANNOUNCEMENTS

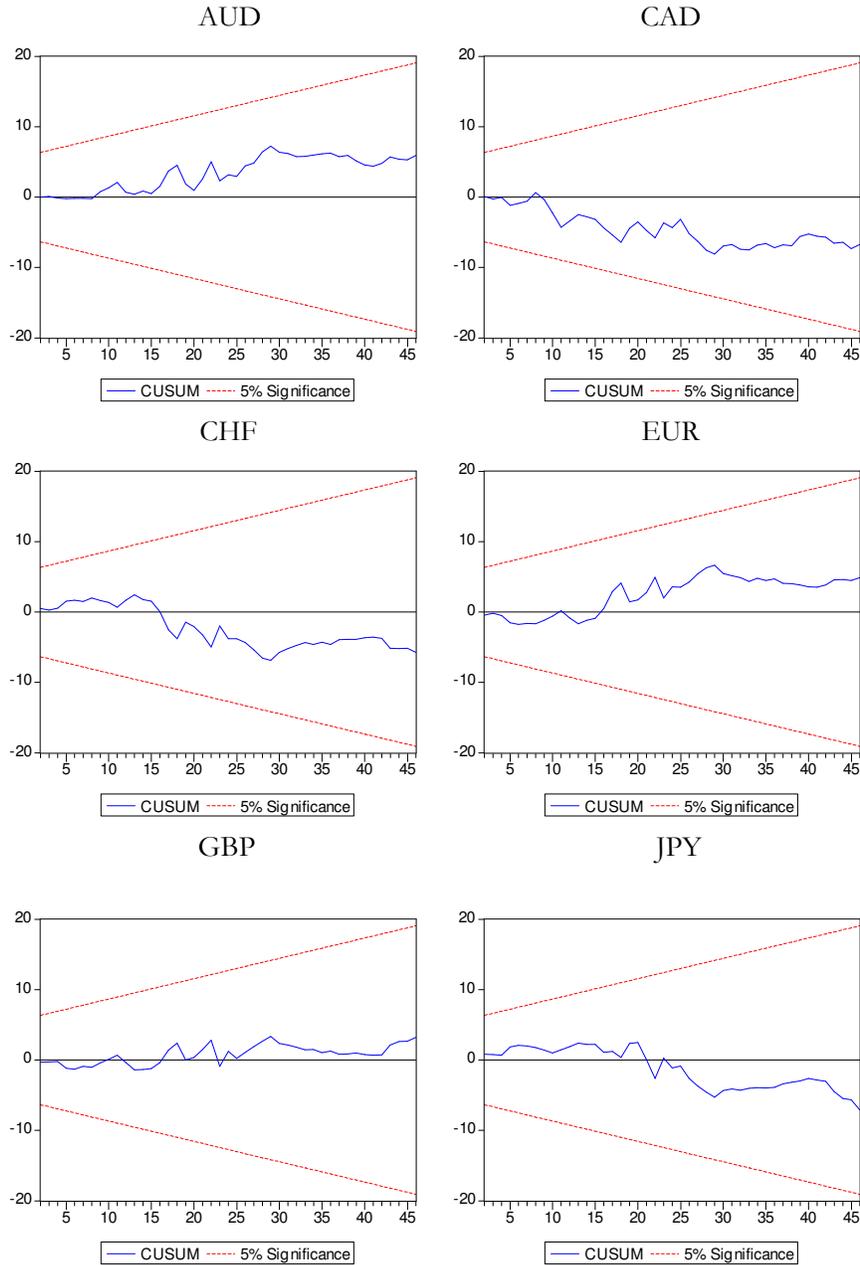
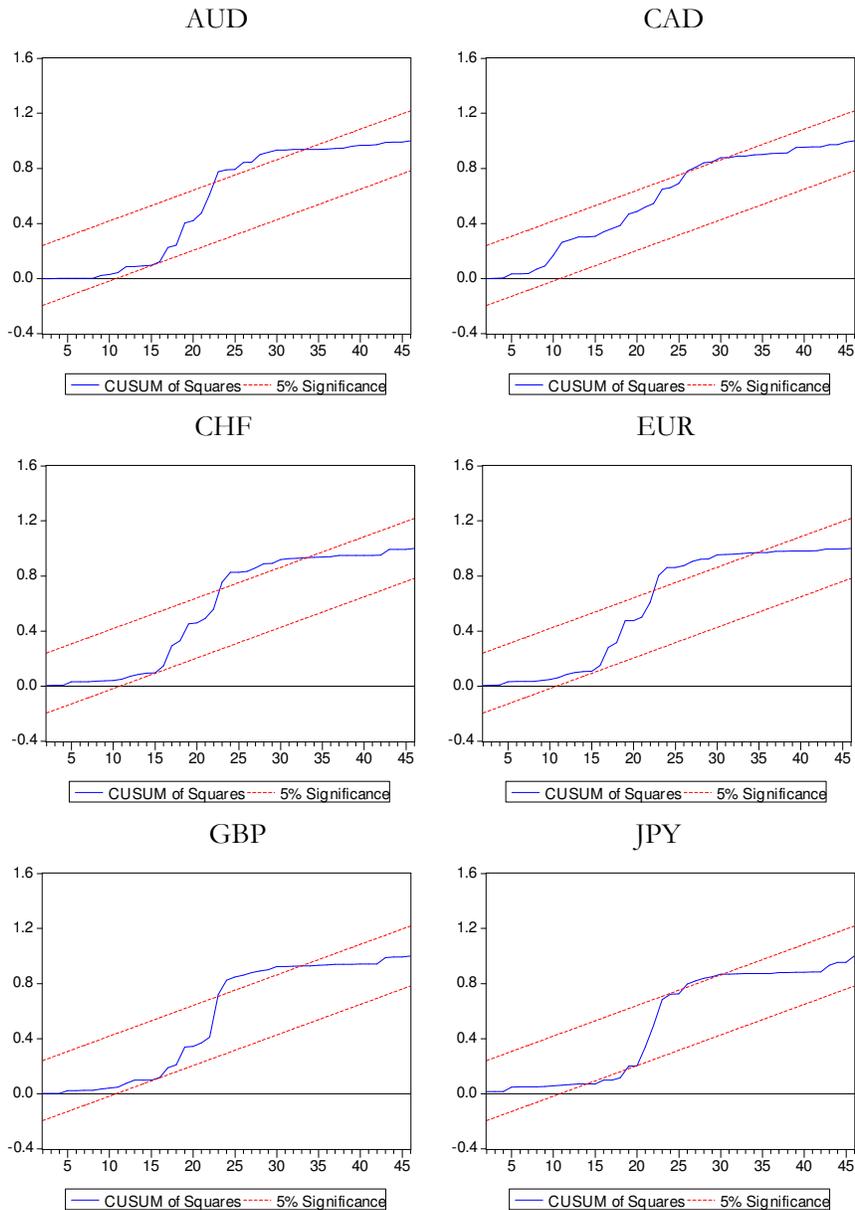


Figure 13 shows the cumulative sum of squares test and 5% significance level and the “S” shape reflects what is shown in the recursive coefficients in Figure 9, that is that there is some change in the exchange rate news coefficients around 15 observations and at 25 whence the coefficients become stable.

FIGURE 15 - CUMULATIVE SUM OF SQUARES OF THE RECURSIVE RESIDUALS FOR EXCHANGE RATES FOLLOWING NON-FARM PAYROLL ANNOUNCEMENTS



The U.S. International Trade Balance relationship was found by Faust et. al. to be potentially one that has shifted over time. For our sample this does not appear to be an issue, probably because there are only 19 observations from February 2005 to August 2006. As above recursive residuals were calculated (for observations numbered 84-99). There is some violation of the 5% confidence interval for the CUSUM of

squares test but because this does not show up in the CUSUM or recursive coefficients tests it may be due to the error variance not being constant rather than the parameter.

In summary, it appears that the news coefficient stabilizes at around 25 observations. This suggests that with the exception of GDP, there is sufficient expectations data from the derivatives auctions²² to estimate the news impact.

ARE SIMILAR RESULTS OBTAINED FROM DIFFERENT DATA SOURCES?

I tried a different data set. The Forex Resource Guide²³ for a time published an analysis of how a couple of currencies have moved in response to several economic announcements. While a slightly less rigorous dataset than I usually use, it is an interesting comparison. This data uses a market expectation from surveys and the change in the exchange rate is a subjective measure. The data is also a bit sparse and so there are fewer questions that can be answered from it. Nonetheless, it provides an interesting comparison to my other results. The data was in a spreadsheet²⁴. I think this site and spreadsheet is due to Tom Yeomans but I am not sure as the site does not credit him. I took the EUR/USD moves and modelled the move measured in pips²⁵. I explained the move in the EUR with the actual minus expected number for the announcement²⁶.

Note: the expectation here is a market expectation, that is, a survey, not the usual derivative auction-based data that I usually use.

I then included a set of variables to identify which announcement had taken place. Out of a universe of 22 announcements only a few were significant. The statistically significant announcements for the EUR were:

- GDP Annualized
- Change in Nonfarm Payrolls
- Existing Home Sales
- PPI Ex Food and Energy

²² Observations to August 2006 for each series are: RSX 40; ISM 45; ITB 19; GDP 7; NFP 46; IJC 32; HICP 38.

²³ This was available for a time at: <http://www.forexresourceguide.com/index.htm>

²⁴ The url, no longer active, was <http://www.forexresourceguide.com/newshistory/newshistory.htm>

²⁵ One pip is the smallest measure of Price move used in forex trading. Traders use this term for the movement in the fourth decimal place or the absolute change in price times 10,000. For instance, if the currency pair EUR/USD is currently trading at 1.3000 and then the exchange rate changes to 1.3010, the pair did a 10 pips move. The pip is the smallest measure regardless of the fractional representation of the currency exchange rate. Thus, 1.3000 to 1.3010 is the same move in pips terms as 110.00 to 110.10. Pip is an acronym which stands for Percentage in Point (pip).

²⁶ The Forex Resource Guide author warns that: "The 'Move Pips' only represent the maximum length of the move based on my best judgment of what happened because of the economic report numbers."

Here are the regression results, sorted by the most significant variable and then by the size of the coefficient:

VARIABLE	COEFFICIENT	STDERROR	T STAT	P-VALUE	SIG LEVEL	ABS(T)
Diff	-0.203241	0.0438242	-4.638	<0.00001	***	4.638
GDP Annualized	37.7114	13.1587	2.866	0.00485	***	2.866
Change in Nonfarm Payrolls	25.098	10.8746	2.308	0.02258	**	2.308
Existing Home Sales	-24.8642	10.8074	-2.301	0.023	**	2.301
PPI Ex-Food and Energy	19.8623	11.3957	1.743	0.08371	*	1.743

The variable News is the actual minus expected release and is, as expected, very significant. The coefficient on the announcement gives the average size of move from the announcement. So, the EUR moves, on average, 37 pips when the GDP comes out, and 25 pips when the nonfarm payrolls are announced, etc. The data covers a large number of releases, but there is not a lot of history for each release, thus limiting what can be done with it. However, pooling the announcements together gives a decent number of observations (135 for the above analysis) and so allows us to sort the wheat from the chaff for the 22 announcements. It gives traders a tool to help them determine which announcements to focus on. It also might be useful in determining triggers for trading opportunities.

Unlike the EUR where a lot of announcements are statistically significant, for these currencies, there is only one significant announcement. For both GBP and CAD the news from the announcement itself (measured as actual minus expected) was significant in both cases.

For GBP the average move was 17 pips (t-stat 3.9, R2 0.24), but none of the announcements were important in explaining the currency moves after the announcements. Those included:

- CPI
- Current Account Balance (Quarter)
- GDP q/q
- Industrial Production
- PMI Manufacturing
- PPI Input s.a.
- Retail Sales
- Trade Balance (Visible)

The only announcement that was significant was the Trade Balance in the CAD model. The effect of the announcement was a move in the CAD of 24.6 pips (t-stat 1.9, R2 0.39). The effect of the news in this model was -1.42 (t-stat -4.3). Other announcements that were tested for the CAD were:

- Consumer Price Index (MoM)
- CPI ex Core 8 (MoM)
- GDP m/m
- Net Change in Employment
- Retail Sales
- Retail Sales (Ex Auto)

- Trade Balance

For this dataset, the important announcements by currency:

- GBP – none more than another. Average news effect move 17 pips.
- CAD – Trade Balance (24.6 pips); Average news effect move -1.4 pips.
- EUR - GDP Annualized (37.7 pips); Change in Nonfarm Payrolls (25.1 pips); Existing Home Sales (-24.9 pips); PPI Ex Food and Energy (19.9 pips); Average news effect move -0.2 pips.

DOES BAD NEWS MATTER MORE THAN GOOD?

Bad news tends to have a bigger impact than good. Running a regression of the returns from futures on the S&P 500 index for 5 minutes before to 25 minutes after the data release on the derivatives-based non-farm payroll news gives:

S&P 500 Index	News Coefficient	Standard Error	t-Statistic	R²
Derivatives-Based News	0.00311	0.00082	3.78	0.3091

The same intraday regression as above is run but splitting the news effect into two (one when the news is a positive surprise and the other when the released number is less than expected):

S&P 500 Index	News Coefficient	Standard Error	t-Statistic	R²
Negative News	0.00331	0.00110	3.01	0.3108
Positive News	0.00285	0.00128	2.22	

There is a slight overall improvement in fit (although the standard error increases and adjusted R² falls). Depending on the application of the results the difference in the estimated average effect for positive and negative of 0.00311 and the 0.00331 for good and 0.00285 for bad may be enough to justify the differentiation.

A regression, over NFP announcements and all variables was run to find where a differentiation between good and bad news mattered. The regression was of the form:

$$9) \quad X_{i,j,t} = \beta_{1,i,j} N_{j,t}^+ + \beta_{2,i,j} N_{j,t}^- + \varepsilon_{i,j,t}$$

Where N^+ is the news variable if positive (or zero) and N^- is the news variable if negative.

1. With positive and negative news differentiated, for non-farm payrolls, there was an improvement in fit for just 4 of the 14 financial markets. Those with improved Adjusted R²s were the commodities (Gold, Heating Oil, and Natural Gas) and 10-Year Treasury futures.
2. The reason so few models improve is that in some markets positive news matter, in others it is negative news. In the next section we allow either positive or negative news to be chosen (rather than both being chosen over a symmetric news impact).

DOES A STRING OF BAD NEWS AFFECT FINANCIAL MARKETS?

Andresen et. al. (2002) use a definition of bad news as news exceeding the median for the last announcement. They find that this is related to the standard deviation of the survey expectations data they use. The survey dispersion is higher following bad news than at other times

Following the suggestion of Andersen et. al. (2002) of three negative surprises we define a variable B that takes the value of the news variable if the last two news releases were negative surprises.

DO VOLATILITY, SKEWNESS, AND KURTOSIS OF EXPECTATIONS AFFECT FINANCIAL MARKETS?

To test whether higher moments of the expectations distribution affect the results the following regression was run:

$$10) \quad X_{i,j,t} = \beta_{1,i,j}N_{j,t}^+ + \beta_{2,i,j}N_{j,t}^- + \beta_{3,i,j}V_{j,t} + \beta_{4,i,j}S_{j,t} + \beta_{5,i,j}K_{j,t} + \beta_{6,i,j}B_{j,t} + \varepsilon_{i,j,t}$$

Where the notation is as before which the addition of V for the volatility or standard deviation, S for the skewness, K as the kurtosis of the distribution.

1. I expected a priori that the skewness would carry the most information since it shows that the market is leaning one way rather than another. The results to not uphold this however and it is the string of bad news (B) that is most important rather than the higher moments.
2. In most cases, a divergence of opinion appears not to matter²⁷, neither does a bias in the opinion.
3. Differentiating between good and bad news is important now that either positive or negative news can affect the market (only JPY and SPX perform better with a symmetric news response).

Here are a couple of examples where higher moments matter:

²⁷ Kurtosis is only significant in the Natural Gas equation and the ITB equation shown below.

Dependent variable: EUR; Nonfarm Payrolls

VARIABLE	COEFFICIENT	STDERROR	T STAT	P-VALUE
News	-0.00326664	0.000477900	-6.835	<0.00001 ***
Expectation Volatility	0.00101872	0.000696329	1.463	0.15074
Expectation Skewness	-0.120370	0.0599535	-2.008	0.05098 *

Dependent variable: CAD; International Trade Balance

VARIABLE	COEFFICIENT	STDERROR	T STAT	P-VALUE
News	0.0411925	0.00860055	4.790	0.00017 ***
Expectation Kurtosis	-0.0354948	0.0202471	-1.753	0.09760 *

DO REVISIONS MATTER?

Markets react to the initial news and not the revision.

NFP estimates “are presented as soon as sufficient data have been collected to meet standards of accuracy and reliability so that they can be used to guide policy decisions. Aggregate level estimates are published with the first release of preliminary data, usually 3 Fridays after the survey reference week. At this point, about 65 percent of the sample have been collected and used in the estimates. This is the number that the market reacts to. One month later, when over 80 percent of the sample has been collected, estimates are published for the first time for all of the detailed industries, and the second set of preliminary estimates are published for the aggregate levels. The "first final" estimates are published the following month, when over 90 percent of the sample reports have been collected.”

I took the two month lag of the revised data and included it with the initial news to see whether these revisions have any statistical effect on the EURUSD exchange rate returns one minute after the release.

The revision was not significant.

44 observations 2002:12-2006:07; EUR; Nonfarm Payrolls

VARIABLE	COEFFICIENT	STDERROR	T STAT	P-VALUE
Positive News	-0.00360365	0.000987034	-3.651	0.00075 ***
Negative News	-0.00155766	0.000735169	-2.119	0.04037 **
Two Negatives	-0.00265945	0.00102404	-2.597	0.01310 **
Revision	0.000284441	0.000323234	0.880	0.38412

Adjusted R-squared = 0.554791

FOREIGN EXCHANGE CORRELATIONS

As mentioned above there are some interesting correlations that can be observed around economic announcements. Correlations can be useful tools. FX Traders often use them to confirm movements

following an announcement. For example, if a trader is expecting the EUR to appreciate following a retail sales announcement and the EUR has a negative correlation with the CHF and a positive relationship with the GBP then these currencies might be tracked to make sure the movement in the EUR is one to take advantage of.

Correlations are useful but can change in stressful times. In times of extreme financial stress correlations head toward 1 and -1. This is the contagion effect, when safe harbours disappear.

When economic news affects financial markets correlations strengthen as volatilities rise. It is important then that market participants use the right correlation for the right situation.

Some currency pairs move together, while others move in opposite directions. Whether you are looking to hedge, diversify your positions, or find alternate pairs to leverage your view, it is important to account for the correlation between various currency pairs.

Tables of correlations²⁸ (Currencies Price Provided by the Swiss broker RealtimeForex) give correlation of currencies in more normal times. According to the website:

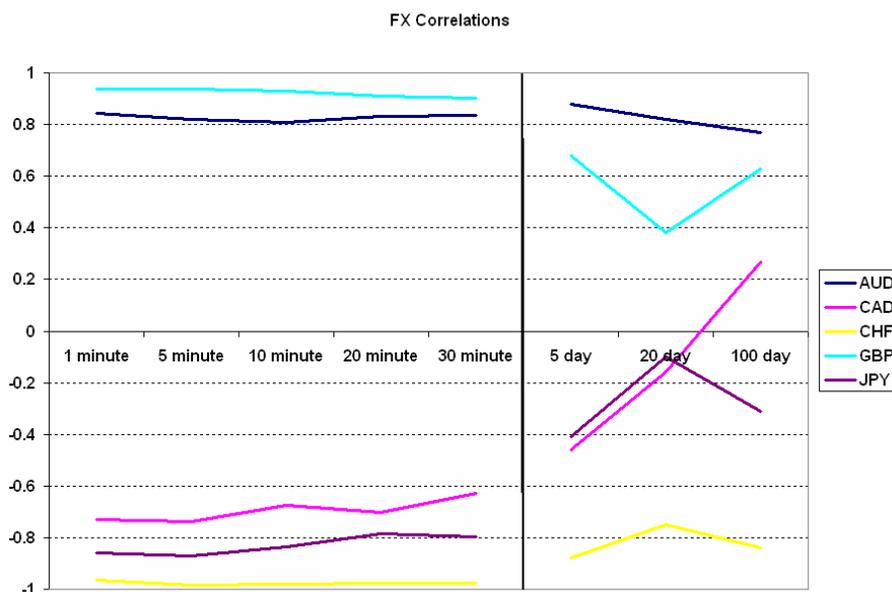
- If the correlation is high (above 0.8) and positive then the currencies move in the same way.
- If the correlation is high (above 0.8) and negative then the currencies move in the opposite way.
- If the correlation is low (below 0.6) then the currencies don't move in the same way.

These correlations for 5, 20 and 100 day periods will tend to average out the extremes that are experienced during announcement days and so will tend to be lower.

So correlations tend to be higher at times of stress and following economic announcements. Here is the proof. I have taken the average correlations (currency pairs of currencies shown below with the USD vs. EUR/USD) following four major U.S. economic announcements: CPI, initial jobless claims, nonfarm payrolls, and retail sales. The correlations are plotted for data 1, 5, 10, 20, and 30 minutes following these announcements. Using the mataf.net data I also plot the 5, 20, and 100 day correlations alongside:

²⁸ www.mataf.net

FIGURE 16 – FOREIGN EXCHANGE CORRELATIONS OVER 5, 20 AND 100 DAYS COMPARED WITH THOSE CLOSE TO NFP ANNOUNCEMENTS



The correlations on the right hand side of the chart are for more "normal" times.

The correlations on the left hand side of the chart are for more "stressful" times.

Notice how currencies that tend not to move together at the daily frequency do move together after announcements. Also there is a trend towards greater positive or negative correlation the closer one gets to the announcement.

The NFP relationship can be encapsulated in a correlation matrix for foreign exchange returns right after the news. Here is the NFP return correlation matrix 1 minute after the announcement:

Announcement NFP						
Minute 1						
	AUD	CAD	CHF	EUR	GBP	JPY
AUD	1	-0.8692	-0.925	0.9432	0.9136	-0.8767
CAD	-0.8692	1	0.8232	-0.8417	-0.832	0.7753
CHF	-0.925	0.8232	1	-0.9901	-0.9688	0.8832
EUR	0.9432	-0.8417	-0.9901	1	0.9655	-0.889
GBP	0.9136	-0.832	-0.9688	0.9655	1	-0.9016
JPY	-0.8767	0.7753	0.8832	-0.889	-0.9016	1

As mentioned above, the Swiss Franc and the Euro appear, on average, to move in opposite directions to the U.S. Dollar when non-farm payrolls are announced. This can be seen in the correlation above. But as one can see, there are other interesting leverage/hedging opportunities. Note that all of these correlations are significant. The 5% critical value (two-tailed) = 0.2787 for 50 observations (monthly data from Nov 1 2002 i.e. October 2002 release to Dec 8 2006 i.e. November 2006 release).²⁹

²⁹ If anyone would like a spreadsheet of my calculation of the 1, 5, 10, 20 and 30 minute return correlation matrices for the U.S. announcements of nonfarm payrolls, initial jobless claims, retail sales, and CPI, they can email me at the following address: john.parker@relevanteconomics.com

CONCLUSIONS

This paper has,

- As demonstrated by Andersen et. al. (2002) and Faust et. al. (2003), that high frequency financial data leads to a much bigger and more significant news announcement effect over previous studies that used end-of day data.
- Verified the results of Kim and Sheen (2001) that financial markets react very quickly to news. Unlike other studies that have assumed a 25-30 minute window, I have demonstrated that the announcement window is often just one minute.
- Used the richness of the economic derivatives-based expectations data, which was demonstrated by Gürkaynak and Wolfers (2006) to be superior to survey-based expectations data, to determine when higher moments of the expectations distribution are useful in determining the announcement effect. Further, that there is generally found that there is, for most announcements, enough data to estimate stable news effects.
- Shown in which markets, and for which announcements, good news and bad news have asymmetric effects.
- Shown in which markets are most responsive to which announcements.
- Highlighted some of the interesting results that traders or risk managers might want to delve into in more detail.

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