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Market Response to News: Rationality and Conformism in an Euro-Dollar Exchange Rate Model. *

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Abstract — *This paper examines the determinants of the Euro/US Dollar exchange rate during the 2003-2011 period to investigate the possible effects of the financial crisis on dynamics of the Euro-Dollar rate. We use an EGARCH (3,1) news-type model with thrice-daily frequency data to represent three temporal trading zones with unscheduled news in addition to the traditional scheduled macroeconomic news. In line with some behavioral finance insights, we find that when comparing pre-crisis and post crisis periods there are noticeable differences in agents' attitudes across the three trading time zones in terms of asymmetric reactions, over/under-reactions to news, policies and fundamentals variables.*

Keywords: exchange rate, macroeconomic announcements, behavioural finance

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1. Introduction

The Euro/US Dollar rate is the youngest and the most traded among the major currency pairs¹: it started with a value of 1.17 on January 4, 1999, it reached a value of 0.82 on October 26, 2000, increased up to a maximum level of 1.59 on July 17, 2008, and fell back down below 1.20 in mid-2010. Values so far apart have pointed to a persistence of misalignment *vis-à-vis* the Dollar for long periods, and prompted alternative new theories to explain exchange rate fluctuations. Back in seventies and eighties, the dynamics of the exchange rate was traditionally investigated in terms of equilibrium relationships between currencies and their fundamentals, a group of macroeconomic variables such as economic activity, inflation, interest rates, monetary and financial aggregates. The break-through study by Meese and Rogoff (1983), casting serious doubts on the forecasting performance of these classes of models, generated a parallel reconsideration of equilibrium schemes in favor, among other schemes, of news models. The central idea of this latter approach, influenced by the efficiency market/rational expectation paradigm, is that the exchange rate dynamic is affected by the surprise in the fundamentals rather than by the fundamentals themselves, where the surprise is the unexpected *news*, i.e. the difference between published values and its expected values. The news approach has thus grown out of the empirical counterpart of the main macro-financial theories of exchange rate determination. In that initial phase, the lack (or the high cost) of data on market expectations led to generate macroeconomics and financial news by using econometric models, as in Edwards's (1982, 1983) pioneering work's. Later on Hoffman and Schlagenhauf (1985) made use of sampled forecasts to compute

¹ According to the 2010 Bank of International Settlements Eight Triennial Bank Survey of Foreign Exchange and Derivatives Market Activity (p.15, table B.6), at the end of 2010 the Euro-US Dollar exchange rate accounts for 28% of the global foreign exchange market turnover.

news and to estimate various versions of news-form equations. Since then, the foreign exchange market has become empirically richer and richer as various data providers started sampling the international financial market with tick data, while, at the same time, technology advances have enabled the main financial newswire services (e.g. Reuters, Bloomberg, Dow Jones Newswires, etc.) to follow the market continuously and to produce reports of events with time stamps during the entire global trading day, becoming in this way the main source of news.

The developments in data collection and communication have enabled academics and practitioners to analyze the exchange rate market at various frequencies² and to estimate directly the impact of a news-event on exchange rates, typically quoted against the US Dollar. As a result, the news literature has progressively adopted a more microstructure perspective in looking at the Forex market (Sarno and Taylor, 2003), a perspective that focuses on the traders' behaviours and reactions and hence on very high frequency data and on the microscope. A vast body of literature has analyzed and explained intraday dynamics of the exchange rate. Ederington and Lee (1993, 1995) in their studies argue that most of the Dollar/Deutsche Mark (USD/DEM) intraday price adjustment to new information occurs within the first minute of macroeconomic variables release and that market reaction is resolved in the first 40 seconds. Also Andersen et al. (2003) find that announcements produce a very short-term effect reaction of news and the occurrence of quick jumps. They also point out to the market's asymmetric reaction to positive and negative surprises, with more pronounced reaction to negative than to positive news.

² With a focus, among other rates, on the USD/EUR(DEM) exchange rate returns, at daily frequencies by Hardouvelis (1988); Aggarwal and Schirm (1992, 1998); Galati and Ho (2003); Ehrmann and Fratzscher (2005); Evans and Lyons (2005). At infra-daily frequencies using: hourly data by Tanner (1997); Evans and Lyons (2002); five-minute data by: Ederington and Lee (1993); Almeida et al. (1998); Andersen et al. (2003, 2007); Faust et al. (2007); Pearce and Solakoglu (2007); Evans and Lyons (2008); Conrad and Lamia (2012); 1-minute data by: Fair (2003); Love and Payne (2008); 10-second and tick-by-tick data by Ederington and Lee (1995); Carlson and Lo (2006).

Despite the abundance of empirical studies based on the news-based approach³, we limit our description here only to the above two contributions, because they contend that the response of exchange rates to news is a very short-term phenomenon whereas our findings indicate that news have an impact that goes far beyond a few seconds and traders may over-react or under-react to news, indicating that old surprises can still influence the market beyond their immediate impact effect.

In the light of the past theoretical and empirical contributions of the news models, largely used to study high frequency fluctuations of the Euro-Dollar rate over periods of relatively calmness, this paper aims to investigate the determinants of lower frequency intra-daily fluctuations of the same rate during rather turbulent times marked by the occurrence of the most serious international financial crises of the past seventy years. Our goal is to assess if and to what extent trading behaviour may have been affected by the crises epitomized with the collapse of Lehman. To this end we extend the news approach to take into account other factors influencing the Euro-Dollar rate such as the role of unscheduled news and that of geographical “trading styles”, hence providing some original contributions under different perspectives. Firstly, we employ an intra-day frequency that reflects a natural partition of the trading day into three geographical trading areas; secondly, the reactions of heterogeneous market participants is extended to qualitative surprises news and events; thirdly we include possible asymmetric effects (to positive and negative surprises) to stale news, that is the reactions to past events that occurred in previous trading areas and we interpret these over-reaction and under-reactions at the lights of some behavioural finance biases.⁴

³ We refer the interested reader to Neely and Dey (2010) who provide an excellent review of all contributions in this field.

⁴ Research in behavioral finance explains the presence of anomalies and price patterns that contrast with the standard EMH by investigating the relevance and the effects of investors’ psychology on asset pricing. The field of behavioral finance thus combines methods originated in psychology with the more traditional finance research methods. In doing so, it offers an alternative theoretical approach to the study of financial markets, taking impetus from the prospect theory (Kahneman and Tversky, 1979). For an overall overview in the stock markets see, for example, Barberis and Thaler (2003) and Shiller (2005). In

Our results are consistent with earlier studies on news-approach: macroeconomic news and unscheduled news increased volatility significantly, and news on the United States are the most important. The hypothesis of bad news having a greater impact on volatility was also re-confirmed in this study. Similarly to Ehrmann and Fratzscher (2005), who used daily data from 1993-2003 to study the Euro/DEM-US Dollar fluctuations, we find that the exchange rate responds more strongly to news in periods of large market uncertainty and when negative or large shocks occur. In their study, the larger importance of US macroeconomic news was in part explained by the earlier release time compared to corresponding German and Euro-area news. Due to our partition of the trading day, we were able to pair more accurately news releases and trading areas and we found that although many Euro-area news are actually released before American news, still American news (scheduled and unscheduled) play a major role, particularly after the crisis. We also confirm Fatum et al.'s (2012) previous results in founding that the exchange rate reaction to macro news depends on the state of the business cycle, on the type of news and on their content (good versus and bad news). However in this study we were able to show that also the conditional volatility of the Euro-Dollar rate also depends on the state of the cycle and that it responds asymmetrically to positive and negative unexpected surprises especially after the financial crisis. As in Hayo and Neuenkirch (2012) we found that the Euro-Dollar exchange rate responds more to shocks originating from the real economy than to price shocks and monetary policy news (interest rate) and that macro news that originating from the United States dominates but we also found that unscheduled news, particularly in the post financial crisis period are relevant. Finally, in line with Jansen and De Haan (2005), who used daily data of the Euro-Dollar rate from 1999 to 2002, we consider unscheduled news such as statements by European Central Bank and national central

the foreign exchange markets, among others, Oberlechner and Hocking (2004), De Grauwe and Grimaldi, (2006) and Oberlechner and Osler (2012).

bank officials and comments on monetary policy to study the reaction of the conditional mean and volatility of the rate. In their study they highlight that the Bundesbank dominated the news coverage and that the ECB statements have mainly influenced conditional volatility and in some circumstances the conditional mean of the Euro–Dollar exchange rates. Our results point out that after the crisis the events and comments originating from the American trading zones are the most influential in affecting the conditional mean and that positive Euro and negative Dollar news have larger impact on conditional volatility. The rest of the paper is organized as follows: in Section 2 the econometric methodology is introduced and explained, then in Section 3 the data are presented, while in Section 4 the specification and estimations issues are discussed. In Section 5 the results and limitations are presented and commented. Finally Section 6 concludes and indicates directions for further research.

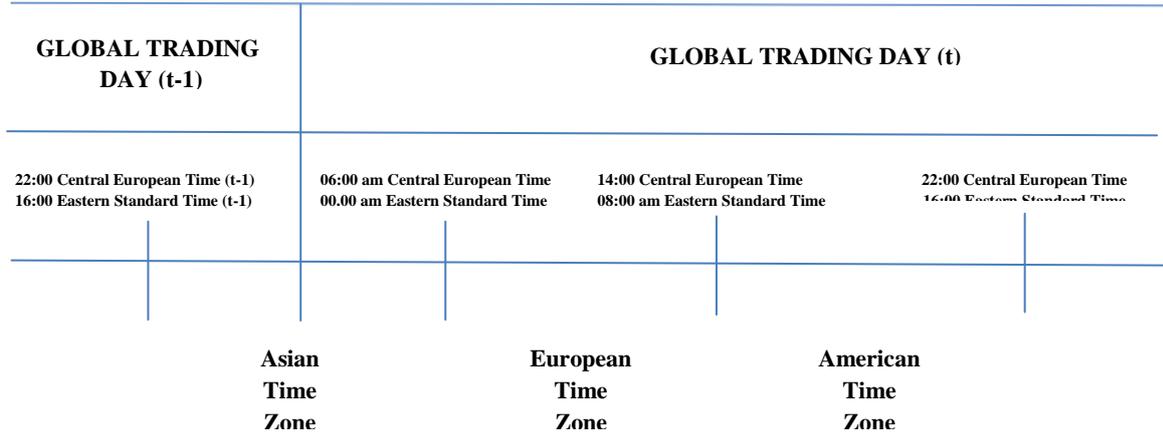
2. Methodology and econometric model

In our analysis we estimate a news equation of the Euro-Dollar exchange rate to assess the market reaction of investors following the release of different typologies of news (scheduled and unscheduled) at different times of the global trading day (GTD). Our econometric model captures the feature that the global trading day never stops and it runs through three main intervals or eight-hour time zones: Asian Time Zone (ASTZ), European Time Zone (ETZ), and an American Time Zone, (ATZ). The eight-hour time series have been built in the following order: the trading day starts in Asia (ASTZ), to continue in Europe (ETZ), and then in America (ATZ).

ASTZ goes from the closing of Wall Street at 4PM EST in the previous day (10PM in Central European Time, CET) to 6AM, CET. ETZ goes from 6AM to 2PM, CET, before the ECB Euro “fixing” and the publication of important macro news in the US (8:30AM EST, corresponding to 2:30PM, CET). The ATZ goes from 2PM, CET, to 10PM CET (4PM EST) of the current day. We thus see that our GTD does not

correspond to the astronomical 24-hour day as it begins two hours before midnight CET, on the previous day, and ends two hours before midnight CET, on the current day. The three values of the exchange rates are then placed at 6AM, 2PM and 10PM, CET. All the explanatory variables in our empirical relationships are recorded and coded according to a thrice-daily frequency and are placed within the three time zones. Therefore they can explain the Euro-Dollar returns at the corresponding three hours defined above. It is worth mentioning that this tri-partition of the GTD into three equal parts of eight hours is an absolute novelty in empirical modelling of exchange rates. In the literature of more dated equilibrium models time frequencies ranges from quarterly, to monthly and daily data. The most recent models typically use much higher frequencies (from hourly to five, one minutes and tick by tick) as a way to integrate more closely finance and economics and to provide a more microstructural explanation of currency fluctuations. The thrice-daily choice allows a finer attribution of policy events and news to a more homogeneous set of market participants (belonging to the same trading zones) and to differentiate across heterogeneous traders (belonging to different trading areas), without being disturbed by noisy data (in the ultra-high frequency) and to overcome the scarce heuristics of the empirical results, stemming from their use. Experience and common sense (enriched by countless discussions with Forex traders) has suggested that in order to meaningfully connect exchange rate movements and news, it is necessary to allow for some time to go after the news (be it scheduled or, most of all, unscheduled). The eight-hour time interval turned out to be heuristically and operationally the best, although some statistical purity is lost as in eight hours some other shock can hit the market.

Figure 1
Global Trading Day and Time Zones



Note: The 24 hours Global Trading Day is decomposed in three symmetric eight-hour time zones: the Asian Time Zone (ASTZ) goes from the closing of the US trading at 22:00 Central European Time (CET) of the previous day (t-1) to 06:00 am Central European Time in current day (t), the European Time Zone (ETZ) starts at 06:00 am Central European Time when the Asian foreign market is going to close and goes to 14:00 Central European Time. The American Time Zone (ATZ) goes from 14:00 Central European Time (equivalent to 08:00 am Eastern Standard Time, EST) to 22:00 Central European Time (or 16:00 Eastern Standard Time). Exchange rate closing quotes at 05:00 am, 13:00 and 21:00 Central European Time are taken by hourly series.

In order to shed some extra light on how news, expectations and market sentiment determines the wild swings of Euro-Dollar, this study uses – together with the traditional scheduled macro news - a relatively novel kind of news variables, called unscheduled news⁵, consisting of political news, policy statements, market news, interventions by Central Banks, unexpected monetary policy decisions and other events, all occurring somewhat randomly overtime or, even though expected to occur at a known time, having an unknown content or an ex-ante unpredictable impact on exchange rates, because of time-inconsistent decoding by heterogeneous traders.⁶

The general specification of our model is as follows:

$$\begin{aligned} \Delta S_t = & \alpha + (\mu_1 L^1 + \mu_2 L^2 + \mu_3 L^3) \Delta S_t + (\vartheta'_0 L^0 + \vartheta'_1 L^1 + \vartheta'_2 L^2 + \vartheta'_3 L^3) Y_t \\ & + (\beta'_0 L^0 + \beta'_1 L^1 + \beta'_2 L^2 + \beta'_3 L^3) [Z_t - E(Z)_t] \\ & + (\gamma'_0 L^0 + \gamma'_1 L^1 + \gamma'_2 L^2 + \gamma'_3 L^3) U_t + \epsilon_t \end{aligned} \quad (1)$$

Where $\Delta S_t = \log(S_t/S_{t-1})$ is the thrice-daily return between two consecutive time zone (t

⁵ This definition is proposed by Ederington and Lee (1996), Fornari and Mele (2001) and Tivegna and Chiofi (2004).

⁶ The same line of analysis is used by Fair (2002, 2003), Fatum and Hutchinson (2002), whose approach is probably the closest to the one in this paper. The most recent papers in this approach are by Fratzscher (2008a, 2008b).

and $t-1$) sampled at the end of each relevant time zone. The symbols μ , θ' , β' , and γ' are parameters or vectors of parameters to be estimated and ϵ_t is a stochastic error expected to be normally distributed with zero mean and constant variance. The letter L is the lag operator, and its exponential index indicates the number of times that the associated variable has been lagged. A three lags structure would cover the length of one global trading day.⁷ Lagged values of fundamentals and news variables should capture the reactions of traders operating in a specific trading area to past events and news originated in preceding trading areas meaning that an event can still exert some effect in a time zone different from the one when it occurred. The letter \mathbf{Y} indicates a vector of fundamentals, the letter \mathbf{Z} is used to indicate the vector of macroeconomic indicators and $\mathbf{E}(\mathbf{Z})$ is the vector of their respective expected values, so that their difference, in brackets, is the news or surprise that would move the exchange rate. The letter \mathbf{U} is used to indicate the unscheduled news, mentioned earlier on and explained more in detail in the next session of the paper. We also consider asymmetries⁸ in the Euro/Dollar exchange rate volatility produced by large swings of Euro-Dollar and unaccounted for in the mean part of the model using an exponential GARCH (EGARCH) specification (Nelson,1991). The conditional variance of error terms is modeled as:

$$\log(h_t) = \omega + \sum_{j=1}^m \theta_j \left[\frac{|\epsilon_{t-j}|}{\sqrt{h_{t-j}}} - E \left\{ \frac{|\epsilon_{t-j}|}{\sqrt{h_{t-j}}} \right\} \right] + \sum_{j=1}^m \varphi_j \left(\frac{\epsilon_{t-j}}{\sqrt{h_{t-j}}} \right) + \sum_{l=1}^k \delta_l \log(h_{t-l}) \quad (2.1)$$

where $\epsilon_t = \sqrt{h_t} z_t$ and $z_t = \epsilon_t / \sqrt{h_t} \sim N(0,1)$

assuming a Gaussian distribution for the innovation terms we obtain (Hamilton, 1994):

⁷ On estimation we also tried a fourth lag which represents the same time zone one day earlier. Lags longer than 3 periods were never statistically significant.

⁸ Andersen et al. (2003) show evidence of asymmetries in the UDS foreign exchange market returns versus Euro, DM, UKP and JPY while Fatum et al. (2012) document asymmetric (different) market reactions on the JPY/USD exchange rate for negative and positive surprise.

$$E \left\{ \frac{|\epsilon_{t-j}|}{\sqrt{h_{t-j}}} \right\} = E\{|z_{t-j}|\} = \sqrt{\frac{2}{\pi}} \quad (2.2)$$

and

$$\log(h_t) = \omega + \sum_{j=1}^m \theta_j \left[|z_{t-j}| - \sqrt{\frac{2}{\pi}} \right] + \sum_{j=1}^m \varphi_j z_{t-j} + \sum_{l=1}^k \delta_l \log(h_{t-l}) \quad (2.3)$$

The parameter φ is the asymmetry parameter. When $\varphi_j = 0$, then a positive unaccounted surprise has the same effect on volatility as a negative surprise of the same magnitude; if $-1 < \varphi_j < 0$ a positive unaccounted surprise increases volatility less than a negative surprise (negative leverage). The parameter θ indicates the sensitivity of volatility to large unaccounted news. A positive value implies that the large surprises of both sign will increase the volatility.

3. Data

The construction of thrice-daily time series of exchange rates and of other fundamental financial variables (stock indexes and interest rates) was carried out paying meticulous attention to the alignment and correct attribution of each observation to its correct time zones⁹, keeping also track of changes in Daylight-saving time between the ETZ and the ATZ. The same was true for the rest of the scheduled news and unscheduled news,

⁹ The task of assigning the stock indexes to time zones was easy as they start and end trading well within their respective time zones. The time zone assignment of interest rates was a little trickier. Contacts with the help desk of Thomson Reuters Datastream allowed us to use those time series of 10-Year interest rates, traded within their respective time zones (or approximately so). Scheduled news fell very well in our time zones and great care was employed to do the same for unscheduled news, as mentioned in the previous paragraph. Daylight-saving time (DST) differences on the two sides of the Atlantic required some attention. Corrections were needed when the time difference between the countries in the Eurozone plus UK and the United States (East Coast) moved away from the normal 6 span, going to 7 or 5 hours, according to permanence in DST in one geographical block but not in the other and viceversa. That was all the most important because a large bunch of US scheduled news, those released at 2:30PM (CET, in regular times), move from ATZ to ETZ, when the US is in DST but Europe is not. Other scheduled news were also affected. From 2003 to 2006, the problem had limited dimensions (but corrections had to be made, anyway), from 2007 it was absolutely necessary to cope with this issue. In fact, between 2003 and 2006 Europe moved into DST in the last weekend of March and USA used to follow suit one week later in April. Between the same years above, Europe and USA used to go back in October to solar time on the same day (last Sunday of October). Starting from 2007, however, the US started moving into DST three weeks earlier, in March, and hence before the European change into DST, occurring during the last week of March. Changes occurred also in October, when the US goes back into solar time a week later than Europe.

attributing the news to the time zone interval (ASTZ, ETZ, ATZ) during which the news was released.

3.1. Data: Dependent Variable and Fundamentals

Thrice-daily data on exchange rates, for the set-up shown in Fig. 1, were extracted from an hourly time series of Euro/US Dollar obtained from CQG Data and maintained with data controls overtime. The S_t time series begins in ASTZ on January 1, 2003 and ends in ATZ, 6849 8-hour periods later, on August 31, 2011. Traditional exchange rates empirics take into consideration also interest rates differentials and, in more recent times, also stock indexes. The same was done for the high frequency employed in this paper. Daily data for Dow Jones, DAX, Nikkei 225, FTSE All Shares, 10-Year Government bond yield for US, UK, Germany and Japan, were obtained from Thomson Reuters Datastream.¹⁰ The variation in ten years government bond yield is measured as the 24 hours variation in the yield of public debt of the US, Germany, UK and Japan, computed on the end of day annualized yields of the 10-year bonds. Daily returns for stock market indexes assuming reinvestment of dividends are computed as 24 hours (logarithmic) change of the *cum*-dividends values of the indices for national stock market.

3.2. Data: Scheduled news

The next set of explanatory variables in equation (1), is about scheduled news. These variables are “unexpected” values of main macroeconomic announcements made by Government statistical Agencies and Departments, Central Banks, Institutes or Centers of Economic Research, National or Supranational Institutions. Amongst the global area of the Euro-Dollar exchange rate, during our sample period, 2003–2011, United States,

¹⁰ In this paper we use 10-Year rates instead of very short-term interest rates as we are dealing with intraday movements of Euro/US Dollar. We made this choice as long-term rates have a much higher signalling effect on the entire yield curve, which is what matters for most traders. Besides that, short-term interest did not explain anything, as being moved by occasional and unpredictable liquidity swings in their money markets.

Euro-Area as a whole, Germany and United Kingdom have had a calendar of statistical releases of economic indicators made known well ahead (in fact at scheduled times), typically in the early hours of their respective trading zones, with a few exceptions, though. The scheduled macroeconomic “surprises” are computed by taking the difference between the actual value of the macroeconomic release, announced by the statistical authorities, and its expected value, collected by specialized organizations. The set of macroeconomic announcements and market consensus we used is from Bloomberg News Service.¹¹ Because these surprises have different units of account, we followed the convention to standardize them using the standard deviations of the entire sample period according to the Balduzzi et al.’s, 2001 procedure. Table 1 summarizes the main characteristics of the scheduled announcements we considered for our study. The total number of macroeconomic indicators is 68 (25 for the United States, 17 for the Euro-Area, 14 for the United Kingdom and 12 for Germany). For each country or area we first classify the announcements according to frequency of release (monthly, quarterly or weekly) and provide the unit of measure of the indicator. Echoing Andersen et al. (2003) and Ehrmann and Fratzscher (2005) each announcement is then ordered within its frequency group according to its temporal sequence in the calendar month of release.¹²

¹¹ Bloomberg provides results of a market survey conducted usually 48-72 hours prior to the release of important economic indicators. The survey polls economists across the industry for their estimate of a particular statistic. These estimates are then averaged to provide the Bloomberg Survey mean and median estimates.

¹² For most US indicators data are generally released in the subsequent month. Forward-looking indicators (Consumer Confidence Index, Philadelphia Manufacturing Index) refer to the same month of release. US GDP data deserve special attention as there are three monthly readings of GDP releases: Advance (about 30 days after the previous quarter ends), Preliminary (about 60 days after the previous quarter ends) and Final (about 90 days after the previous quarter ends). Since the Advance version is the earliest release of GDP one would expect, *a priori*, that the advanced data surprise should have the major impact in term of market reaction. The same temporal pattern is usually followed by the macro announcements for United Kingdom, Germany and the Euro-Area (more casually for these latter two entities).

Table 1
Summary of macroeconomic announcements

Name of announcement	Unit of announcement	Release coverage	Start date	Final Date	Source	Number of obs.	Announcement Time
Euro-Area Announcements ^a							
(European Time Zone)							
Monthly							
Business Climate Indicator	Index	Data are for same month as the release month	07-Jan-2003	30-Aug-2011	DG ECFIN	95	11:00 am CET/05:00 am EST
ECB Rate	% level	Data are for same month as the release month	09-Jan-2003	04-Aug-2011	ECB	105	13:45 am CET/07:45 am EST
Economic Confidence	Index	Data are for same month as the release month	31-Jan-2003	30-Aug-2011	DG ECFIN	101	11:00 am CET/05:00 am EST
Consumer Confidence	Index	Data are for same month as the release month	31-Jan-2003	30-Aug-2011	DG ECFIN	100	11:00 am CET/05:00 am EST
Industrial Confidence	Index	Data are for same month as the release month	31-Jan-2003	30-Aug-2011	DG ECFIN	101	11:00 am CET/05:00 am EST
CPI Flash	Y-Y% change	Data are for the previous month	03-Jan-2003	31-Aug-2011	ESTAT	105	11:00 am CET/05:00 am EST
CPI Final	Y-Y% change	Data are for the previous month	22-Jan-2003	17-Aug-2011	ETSAT	105	11:00 am CET/05:00 am EST
CPI	M-M% change	Data are for the previous month	22-Jan-2003	17-Aug-2011	ESTAT	105	11:00 am CET/05:00 am EST
M3	M-M% change	Data are for the previous month	28-Jan-2003	26-Aug-2011	ECB	102	10:00 am CET/04:00 am EST
Unemployment rate	% of labour force	Data are for two months prior to release month	07-Jan-2003	01-Aug-2011	ESTAT	105	11:00 am CET/05:00 pm EST
PPI	M-M% change	Data are for two months prior to release month	07-Jan-2003	02-Aug-2011	ESTAT	101	11:00 am CET/05:00 pm EST
Retail Sales	M-M% change	Data are for two months prior to release month	08-Jan-2003	03-Aug-2011	ESTAT	104	11:00 am CET/05:00 pm EST
Retail Sales	Y-Y% change	Data are for two months prior to release month	08-Jan-2003	03-Aug-2011	ESTAT	105	11:00 am CET/05:00 pm EST
Industrial Production	M-M% change	Data are for two months prior to release month	17-Jan-2003	12-Aug-2011	ESTAT	105	11:00 am CET/05:00 am EST
Quarterly							
GDP Real Advance	Q/Q% change	Data are for the prior quarter	06-Mar-2003	16-Aug-2011	ESTAT	34	11:00 am CET/05:00 am EST
GDP Real Preliminary	Q/Q% change	Data are for the prior quarter	09-Jan-2003	08-Jun-2011	ESTAT	36	11:00 am CET/05:00 am EST
GDP Real Final	Q/Q% change	Data are for the prior quarter	06-Feb-2003	06-Apr-2011	ESTAT	34	11:00 am CET/05:00 am EST
Total						1543	
a)except for EBC rate and M3, before March 20004, all the indicators were released at 12:00 am CET/06:00 am EST							
Germany Announcements							
(European Time Zone)							
Monthly							
ZEW Survey	Index	Data are for same month as the release month	21-Jan-2003	23-Aug-2011	ZEW	104	11:00 am CET/05:00 am EST
IFO Business Climate	Index	Data are for same month as the release month	28-Jan-2003	24-Aug-2011	IFO	104	10:00 am CET/04:00 am EST
IFO Current Assessment	Index	Data are for same month as the release month	28-Jan-2003	24-Aug-2011	IFO	104	10:00 am CET/04:00 am EST
IFO Expectation	Index	Data are for same month as the release month	28-Jan-2003	24-Aug-2011	IFO	104	10:00 am CET/04:00 am EST
CPI Preliminary	M-M% change	Data are for same month as the release month	26-Feb-2003	29-Aug-2011	DSTATIS	103	varies
Factory Orders	M-M% change	Data are for two months prior to release month	10-Jan-2003	04-Aug-2011	DB	103	12:00 am CET/06:00 am EST
Industrial Production	M-M% change	Data are for two months prior to release month	13-Jan-2003	05-Aug-2011	DSTATIS	105	12:00 am CET/06:00 am EST
Retail Sales	M-M% change	Data are for the previous month	07-Jan-2003	31-Aug-2011	DSTATIS	103	08:00 am CET/02:00 am EST
Unemployment Level ^b	M-M change level	Data are for the previous month	09-Jan-2003	31-Aug-2011	DSTATIS	105	08:55 am CET/02:55 am EST
Unemployment Rate ^b	M-M% change	Data are for the previous month	09-Jan-2003	31-Aug-2011	DSTATIS	105	08:55 am CET/02:55 am EST
PPI	M-M% change	Data are for the previous month	23-Jan-2003	19-Aug-2011	DSTATIS	104	08:00 am CET/02:00 am EST
Quarterly							
GDP Real Preliminary	Q-Q% change	Data are for the prior quarter	26-Feb-2003	16-Aug-2011	DSTATIS	35	08:00 am CET/02:00 am EST
Total						1179	
b)before July 2005, varies							

United Kingdom Announcements							
(European Time Zone)							
Monthly							
BOE Rate	% Level	Data are for same month as the release month	09-Jan-2003	04-Aug-2011	BOE	103	13:00 am CET/07:00 pm EST
GFK Consumer Confidence	Index	Data are for same month as the release month	30-Jan-2003	31-Aug-2011	GFK NOP	104	11:30 am CET/05:30 pm EST
PPI Output	Y-Y% change	Data are for the previous month	13-Jan-2003	05-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
Jobless Claim Change	M-M change level	Data are for the previous month	15-Jan-2003	17-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
RPI	Y-Y% change	Data are for the previous month	21-Jan-2003	16-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
RPI ex mort. Int. payment	Y-Y% change	Data are for the previous month	21-Jan-2003	16-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
Retail Sales ex auto fuel	Y-Y% change	Data are for the previous month	23-Jan-2003	18-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
Visible Trade	Y-Y% change	Data are for two months prior to release month	10-Jan-2003	09-Aug-2011	ONS	103	10:30 am CET/04:30 am EST
Industrial Production	Y-Y% change	Data are for two months prior to release month	14-Jan-2003	09-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
Manufacturing Production	Y-Y% change	Data are for two months prior to release month	14-Jan-2003	09-Aug-2011	ONS	104	10:30 am CET/04:30 pm EST
ILO Unemployment	M-M% change	Data are for two months prior to release month	15-Jan-2003	17-Aug-2011	ONS	104	10:30 am CET/04:30 am EST
Quarterly							
GDP Real Advance	Y-Y% change	Data are for the prior quarter	24-Jan-2003	26-Jul-2011	ONS	34	10:30 am CET/04:30 am EST
GDP Real Preliminary	Y-Y% change	Data are for the prior quarter	26-Feb-2003	26-Aug-2011	ONS	35	10:00 am CET/04:00 am EST
GDP Real Final	Y-Y% change	Data are for the prior quarter	27-Mar-2003	28-Jun-2011	ONS	34	10:30 am CET/04:30 am EST
Total						1246	
United States Announcements							
(American Time Zone)							
Monthly							
Philadelphia Manufacturing Index	Index	Data are for the same month as the release month	16-Jan-2003	18-Aug-2011	FP	104	12:00 am EST/18:00 pm CET
Consumer Confidence Index	Index (1985 = 100)	Data are for the same month as the release month	28-Jan-2003	26-Jul-2011	CF. B.	104	10:00 am EST/16:00 pm CET
ISM Index	Index	Data are for the previous month	02-Jan-2003	01-Aug-2011	ISM	103	10:00 am EST/16:00 pm CET
Average Hourly Earnings	USD per hour	Data are for the previous month	10-Jan-2003	05-Aug-2011	BLS	104	08:30 am EST/14:30 pm CET
Nonfarm Payrolls	Thousands	Data are for the previous month	10-Jan-2003	05-Aug-2011	BLS	104	08:30 am EST/14:30 pm CET
Unemployment Rate	% of Labour Force	Data are for the previous month	10-Jan-2003	05-Aug-2011	BLS	104	08:30 am EST/14:30 pm CET
Retail Sales	M-M% change	Data are for the previous month	14-Jan-2003	18-Aug-2011	CB	104	08:30 am EST/14:30 pm CET
Retail Sales less Autos Fuel	M-M% change	Data are for the previous month	14-Jan-2003	18-Aug-2011	CB	104	08:30 am EST/14:30 pm CET
Producer Price Index	M-M% change, Index(1982=100)	Data are for the previous month	15-Jan-2003	17-Aug-2011	BLS	104	08:30 am EST/14:30 pm CET
Producer Price Index (Core)	M-M% change, Index(1982=100)	Data are for the previous month	15-Jan-2003	17-Aug-2011	BLS	104	08:30 am EST/14:30 pm CET
Consumer Price Index (CPI)	M-M% change, Index(1982=100)	Data are for the previous month	16-Jan-2003	18-Aug-2011	BLS	104	08:30 am EST/14:30 pm CET
Industrial Production	M-M% change	Data are for the previous month	17-Jan-2003	16-Aug-2011	FRB	104	09:15 am EST/15:15 pm CET
Leading Indicators	M-M% change	Data are for the previous month	23-Jan-2003	18-Aug-2011	CF. B.	104	10:00 am EST/16:00 pm CET
Durable Goods Orders	M-M% change	Data are for the previous month	28-Jan-2003	24-Aug-2011	CB	104	08:30 am EST/14:30 pm CET
Personal Income	M-M% change	Data are for the previous month	31-Jan-2003	02-Aug-2011	BEA	103	08:30 am EST/14:30 pm CET
Personal (Consumer) Spending	M-M% change	Data are for the previous month	31-Jan-2003	02-Aug-2011	BEA	103	08:30 am EST/14:30 pm CET
Factory Orders	M-M% change	Data are for two months prior to release month	07-Jan-2003	03-Aug-2011	CB	104	10:00 am EST/16:00 pm CET
Trade Balance	USD Billions	Data are for two months prior to release month	17-Jan-2003	11-Aug-2011	BEA	104	08:30 am EST/14:30 pm CET
Quarterly							
GDP Real Advance	Q/Q% change	Data are for the prior quarter	30-Jan-2003	29-Jul-2011	BEA	35	08:30 am EST/14:30 pm CET
GDP Real Preliminary	Q/Q% change	Data are for the prior quarter	28-Feb-2003	26-Aug-2011	BEA	35	08:30 am EST/14:30 pm CET
GDP Real Final	Q/Q% change	Data are for the prior quarter	27-Mar-2003	24-Jun-2011	BEA	34	08:30 am EST/14:30 pm CET
GDP Deflator Advance	Q/Q% change	Data are for the prior quarter	30-Jan-2003	29-Jul-2011	BEA	35	08:30 am EST/14:30 pm CET
GDP Deflator Preliminary	Q/Q% change	Data are for the prior quarter	28-Feb-2003	26-Aug-2011	BEA	35	08:30 am EST/14:30 pm CET
GDP Deflator Final	Q/Q% change	Data are for the prior quarter	30-Jan-2003	29-Jul-2011	BEA	34	08:30 am EST/14:30 pm CET
Weekly							
Jobless Claims	Number of claims(thousands)	Week-ending Saturday before the release.	02-Jan-2003	25-Aug-2011	ETA	462	08:30 am EST/14:30 pm CET
Total						2539	

Note: This table presents the mean features of macroeconomic announcements issued between 01/01/2003 and 31/08/2011 for the United States, the Euro-Area, United Kingdom and Germany. Announcements are first classified by country or area and then by frequency of release (monthly, quarterly or weekly). The table reports the unit of measure of the announcements (column 2), the sequence of announcement date corresponding to data for month X (column 3), the chronological ordered starting date for each announcement according to its release coverage and frequency of release (column 4), the date of the last observation for the announcement (column 5), the total number of observations for each announcement (column 6) and the time schedule of the announcement release in Eastern Standard Time (EST) and Central European Time (CET). The global 24 trading hours day is decomposed in three consecutive 8-hour time-zone and each announcement is assigned to one the three time zone according to its time of release. M-M % change is the percent change from month to month, M-M level change is the change in level from month to month, Q/Q % change is the percent change quarter over quarter and Y/Y % change is percent change year over year. Actual values and median forecasts are collected from Bloomberg News Service, dates of release from Econoday Economic Calendar. The sources of announcements are: -for the Euro-Area: DG ECFIN, Directorate General for Economic and Financial Affairs-European Commission; ECB, European Central Bank; ESTAT, Eurostat-European Commission; -for Germany: BD, Deutsche Bundesbank; DSTATIS, Federal Statistical Office (*Statistisches Bundesamt*)-German Federal Ministry of the Interior; IFO, Institute of Economic Research (*Institut für Wirtschaftsforschung*); ZEW, Centre for European Economic Research (*Zentrum für Europäische Wirtschaftsforschung*); -for the United Kingdom: BOE, Bank of England; GfK NPO, GfK National Opinion Polls, London-based arm of GfK (*Gesellschaft für Konsumforschung*-Society for Consumer Research); ONS, Office for National Statistics-UK Statistics Authority; -for the United States: BEA, Bureau of Economic Analysis-U.S. Department of Commerce; BLS, Bureau of Labor Statistics-U.S. Department of Labor; CF. B, Conference Board; CB, Census Bureau-U.S. Department of Commerce; ETA, Labor's Employment and Training Administration-U.S. Department of Labor; FP, Federal Reserve of Philadelphia; FRB, Federal Reserve Board of Governors; ISM, Institute for Supply Management.

3.3. Data: *Unscheduled News*

The unscheduled news typology is less frequently used in the econometric estimation of exchange rates empirical models.¹³ This is due to their nature: interpretation is necessary as their definition and perception by traders is quite idiosyncratic and time-varying. The decoding process by traders is non-homogeneous overtime. Economic, financial, and policy evaluation schemes do change according to expectations and market situations. That makes quite hard to propose an unambiguous taxonomy of unscheduled news. In principle, unscheduled news consists of an economic, an institutional or a policy event, a declaration or a disclosure, which can be either totally unexpected or - even though expected to occur - has an unknown timing, or an unknown content or both and frequently producing weird and ex-ante unpredictable reactions from financial markets. This news typology, therefore, implies a process of expectation formation very different from that of scheduled news and most likely to be variable overtime. A taxonomy, a description and examples are reported, at length, in Appendix 2. Once identified, unscheduled news were coded as qualitative variables attributing them the value of (+1) or (-1) according to the following convention: unscheduled news were given a value of (+1) if their *a priori* effect was likely to strengthen the Euro-Dollar exchange rate -either because they had a content directly favourable to the Euro or because they had a content directly unfavourable to the Dollar. Alternatively, the surprises were coded with a value of (-1) if it was more likely that they would produce a weakening of the Euro-Dollar rate. This coding convention allowed us to test for asymmetric effects by separating the unscheduled news according to their sign and using an interaction term for the strengthening news.

¹³ For recent studies that used macroeconomic surprises and unscheduled news in stock and interest rates markets see, for example, Birz and Lott.(2011), Rosa (2011), Jiang et al. (2012) and Beetsmaa et al. (2013).

We stress again that every single unscheduled news was attributed to its own time zone¹⁴, often using Bloomberg time stamps, and that, to avoid “double counting” effects and correlation issues between scheduled and unscheduled news, a consistent criterion of “non-overlapping” recording was used. According to this criterion – violated only in exceptional circumstances¹⁵ – whenever a scheduled news was released in a specific time zone, any related or unrelated unscheduled news falling in the same time interval would not be recorded. Moreover, whenever several unscheduled news had occurred within the same time zone interval, only one would be recorded.

Those unscheduled news that conformed to the typologies described in Appendix 2, were extracted from a large archive of daily events dating from 1998 (and before, see Tivegna and Chiofi, 2004) until today. This unique hand-collected archive of news – called informally *Newsmetrics* – contains, each day, on average between ten and fifteen daily articles and extended newsflashes from the Financial Times, the Wall Street Journal, Bloomberg News, Reuters and Dow Jones Newswires. Within this group, there have always been the daily articles on the foreign exchange market and on the US stock market.¹⁶ The richness and completeness of *Newsmetrics* has helped to isolate the “main” news of each time zone (not “of the day”).¹⁷

In this paper, for each time zone ASTZ, ETZ, ATZ, the unscheduled news have been aggregated into a single vector. This decision of aggregating different typologies was

¹⁴ The assignment of this single aggregate unscheduled news group to the three time and trading zones (e.g. ASTZ, ETZ, ATZ) was carried out not on a nationality or area-pertinence basis but by the timing of the news.

¹⁵ When, for instance, an unscheduled surprise had an opposite a priori sign effect of a scheduled surprise released in the same time zone interval.

¹⁶ The above reliance mostly on newspaper articles deserves some extra speculation. In fact, the same idea of a tri-partition of the GTD is to a large extent due to the news search process employed in this and previous studies, Fornari et al. (2002), Tivegna and Chiofi (2004) and Cagliesi and Tivegna (2006).

¹⁷ So, for instance, in recent times, the communication of ECB council decisions on interest rates to financial markets (at or a little before 1PM, CET, well within ETZ) does not move Euro-Dollar that much. The ECB press conference, generally at 2:30PM CET, is in ATZ and assigned to this area, even though it is the most European event for financial markets, after the beginning of the Euro era in 1999. And the real reaction occurs there.

taken for two reasons: to reduce the number of explanatory variables and because some unscheduled news categories have somehow evolved.¹⁸ Given their qualitative nature and trinary/binary representation, unscheduled surprises have not been standardized.

4. Estimates

Before proceeding to estimating our model all news were tested for normality and white noise¹⁹ and tested for current and cross-correlations, to avoid - as best as possible - issues of collinearity and distortions. After this first statistical screening process, the initial phase of econometric procedure was carried out using a standard OLS estimates for the entire sample period -running from January 1th, 2003 and August 31st, 2011 - as a first exploration of the general specification of the news model and of the stability of coefficients. OLS estimates indicates that the relevant scheduled news were only a small subset of the originals ones (68) while all unscheduled were highly statistically relevant. We then began dealing with one of the main objective of our paper: to investigate the stability of the relationship between news and exchange rate dynamics, as determined by the unfolding of the financial crisis (subprime plus European sovereign debt) on policy-makers' and traders' behaviours. We divided our sample into two statistically determined sub-periods - before February 2008 and thereafter - to better catch the consequences on our equations originating from structural breaks due to the financial crisis.

¹⁸ The process of news collection has been a daily process between 1998 and today. So it is quite likely that decisions to include unscheduled news in one category, or rather in another one, somehow changed most of all because communication to and within financial markets evolved quite rapidly over the years.

¹⁹ Table A1.1 in Appendix1 (Supplementary Data) reports the main statistical features of the entire sample of news and the results of Jarque-Bera and Ljung-Box tests. In tables A1.2 to A1.9 of the Appendix1 (Supplementary Data) we show the results of the analyses for correlation between news and cross-correlation with lagged news.

We used the OLS specification reported in Table 3 to investigate the presence of a structural break around the financial crisis period. The table reports the value of the Hansen test and of the Chow test, while Figure 2 shows the analysis of recursive residuals. The Hansen test is a test for general parameter stability based on the behaviours of the partial sums of the regression's normal equations for the parameters and for the variance. We produce statistics and approximate p -values for the overall regression (coefficients and variance) as well as for each coefficient and for the variance individually. The test indicated the presence of a structural break in the parameter and in the variance. The Chow test, and historical hindsight, helped to position the structural break at the end of February 2008. Although the collapse of Lehman Brother on September 15, 2008 might have appeared to be a natural choice, the subprime crisis in the US had been mounting up from early 2007, with the accelerated deflation of house prices and the market started showing level of anxieties already at the beginning for 2008, as showed by the graph of the recursive residuals.

The indication in the Hansen test and the use of financial time series sampled in high frequency prompted us to take into account the possible issue of heteroschedasticity and to consider an ARCH-type of models. Given our research interests, we chose the exponential GARCH (EGARCH) models which enable to test for asymmetric response of the conditional volatility of the exchange rate to positive and negative values of the innovation term ϵ_t of the exchange rate equation, and to the order of magnitude of the innovation term itself. We quantify these effects in the analysis of the volatility curve which is presented in the final part of section 5.

Table 3
OLS estimation and stability tests

Variable	Coeff.	Signif.	S.E.	p-value	Hansen Stat.	Signif.	p-value
ΔEuro-Dollar{1}	-0.0938	***	[0.0151]	(0.0000)	0.2280		(0.2100)
ΔEuro-Dollar{2}	-0.1320	***	[0.0139]	(0.0000)	2.1296	***	(0.0000)
ΔEuro-Dollar{3}	-0.0186		[0.0152]	(0.2220)	0.0806		(0.6700)
Δ10-Year US Treasury Bond	-0.2730	***	[0.0411]	(0.0000)	1.4420	***	(0.0000)
Δ10-Year US Treasury Bond{1}	-0.0294	*	[0.0165]	(0.0749)	0.2556		(0.1800)
Δ10-Year US Treasury Bond{2}	-0.0486	**	[0.0223]	(0.0290)	0.0538		(0.8500)
Δ10-Year JBG	-0.0736	***	[0.0147]	(0.0000)	1.0716	***	(0.0000)
Δ10-Year JBG{1}	0.0226		[0.0188]	(0.2286)	0.4656	*	(0.0500)
Δ10-Year JBG{2}	-0.0306		[0.0244]	(0.2101)	0.0774		(0.6900)
Δ10-Year Bund	-0.0256		[0.0228]	(0.2624)	1.3224	***	(0.0000)
Δ10-Year Bund{1}	0.1049	***	[0.0302]	(0.0005)	0.2777		(0.1500)
Δ10-Year Bund{2}	0.0248	*	[0.0145]	(0.0871)	0.0869		(0.6400)
ΔDow Jones	-0.1030	**	[0.0425]	(0.0153)	3.3244	***	(0.0000)
ΔNikkei	0.0199		[0.0203]	(0.3267)	0.6517	**	(0.0200)
ΔNikkei{1}	-0.0028		[0.0257]	(0.9120)	0.2519		(0.1800)
POS_NEG Euro-Dollar_ASTZ	1.0610	***	[0.0929]	(0.0000)	0.7120	**	(0.0100)
POS_NEG Euro-Dollar_ASTZ{1}	-0.3947	***	[0.0711]	(0.0000)	0.7090	**	(0.0100)
POS_NEG Euro-Dollar_ETZ	1.0025	***	[0.0415]	(0.0000)	6.6745	***	(0.0000)
POS_NEG Euro-Dollar_ETZ{3}	-0.0476		[0.0370]	(0.1987)	0.3798		(0.0800)
POS_NEG Euro-Dollar_ATZ	1.2647	***	[0.0572]	(0.0000)	1.3815	***	(0.0000)
POS_NEG Euro-Dollar_ATZ{1}	0.2054	***	[0.0353]	(0.0000)	1.5778	***	(0.0000)
POS_NEG Euro-Dollar_ATZ{2}	-0.1060	**	[0.0431]	(0.0140)	3.0419	***	(0.0000)
EUR_CPI Flash	0.2571	***	[0.0954]	(0.0070)	0.0554		(0.8300)
EUR_PPI	-0.0290		[0.1152]	(0.8010)	0.1215		(0.4700)
EUR_GDP Advance	0.1117		[0.1356]	(0.4102)	0.0313		(0.9700)
EUR_GDP Advance{1}	0.2783		[0.2442]	(0.2544)	0.1570		(0.3600)
EUR_GDP Advance{2}	0.2059	**	[0.0895]	(0.0213)	0.0280		(0.9800)
EUR_GDP Preliminary	0.2018	***	[0.0314]	(0.0000)	0.0194		(1.0000)
EUR_GDP Preliminary{1}	-0.0704		[0.0593]	(0.2353)	0.3531		(0.1000)
EUR_GDP Preliminary{2}	-0.0526		[0.0519]	(0.3110)	0.1128		(0.5100)
EUR_GDP Preliminary{3}	0.1687	**	[0.0767]	(0.0279)	0.2891		(0.1400)
GER_IFO Expectation	0.2659	***	[0.0913]	(0.0036)	0.1038		(0.5500)
GER_IFO Expectation{1}	0.0214		[0.1218]	(0.8602)	0.0945		(0.5900)
GER_IFO Expectation{2}	0.0628		[0.0476]	(0.1871)	0.3195		(0.1200)
GER_PPI	-0.1418		[0.1187]	(0.2322)	0.0405		(0.9300)
GER_PPI{1}	0.1851		[0.1472]	(0.2086)	0.2060		(0.2500)
GER_PPI{2}	-0.1782	*	[0.0984]	(0.0700)	0.1561		(0.3600)
UK_BOE Rate	0.1756	***	[0.0495]	(0.0004)	0.0557		(0.8300)
UK_BOE Rate{1}	-0.3636	**	[0.1665]	(0.0290)	0.1696		(0.3200)
UK_BOE Rate{2}	0.0930	**	[0.0369]	(0.0118)	0.3118		(0.1200)
UK_BOE Rate{3}	-0.0346		[0.1034]	(0.7383)	0.3596	*	(0.0900)
UK_GDP Advance	-0.0512		[0.1072]	(0.6332)	0.0504		(0.8700)
UK_GDP Advance {1}	-0.2032	**	[0.0997]	(0.0414)	0.0587		(0.8100)
UK_Visible Trade Balance	0.0910		[0.0832]	(0.2742)	0.0397		(0.9300)
UK_PPI Output	0.1247	*	[0.0695]	(0.0726)	0.1013		(0.5600)
UK_Unemployment Rate	0.0119		[0.0905]	(0.8952)	0.1168		(0.4900)
UK_Unemployment Rate{1}	-0.1300		[0.1261]	(0.3026)	0.0509		(0.8600)
UK_Unemployment Rate{2}	-0.0906		[0.0567]	(0.1101)	0.1321		(0.4300)
UK_Unemployment Rate{3}	0.0766		[0.0898]	(0.3938)	0.0824		(0.6600)
UK_Jobless Claims	-0.0168		[0.1335]	(0.8996)	0.0151		(1.0000)
UK_Jobless Claims{1}	-0.2367		[0.2019]	(0.2411)	0.0954		(0.5900)
UK_Jobless Claims{2}	-0.1891	**	[0.0960]	(0.0489)	0.0560		(0.8300)
UK_Jobless Claims{3}	0.0311		[0.1800]	(0.8630)	0.1317		(0.4300)
US_GDP Advance	-0.4826		[0.4118]	(0.2412)	0.1115		(0.5100)
US_GDP Advance{3}	0.1190		[0.1177]	(0.3120)	0.1936		(0.2700)
US_GDP Preliminary	-0.2100		[0.1661]	(0.2062)	0.1376		(0.4100)
US_GDP Preliminary{1}	0.0998		[0.0848]	(0.2395)	0.2039		(0.2500)
US_ISM Manufacturing Index	-0.4286	***	[0.1352]	(0.0015)	0.4863	**	(0.0400)
US_ISM Manufacturing Index{1}	0.0587		[0.0516]	(0.2556)	0.0459		(0.9000)

US_ISM Manufacturing Index{2}	-0.1204	*	[0.0627]	(0.0550)	0.0165	(1.0000)
US_ISM Manufacturing Index{3}	0.0875		[0.0922]	(0.3424)	0.1005	(0.5600)
US_Nonfarm Payrolls	-0.6740	***	[0.2568]	(0.0087)	0.0986	(0.5700)
US_Producer Price Index (Core)	0.2069	**	[0.0854]	(0.0154)	0.1882	(0.2800)
Constant	0.0085		[0.0103]	(0.4092)	0.2569	(0.1800)
R ²	0.3616					
Durbin Watson	1.9846					
Hansen stability test statistic						
Joint	29.6271	***		(0.0000)		
Variance	4.2251	***		(0.0000)		
Chow stability test statistic						
F (33, 6655)	5.3330	***		(0.0000)		

Note: This table presents the results of OLS regression of intra-daily Euro/US Dollar exchange rate variations ($\Delta S_{i,t}$) on interest rates yields ($\Delta y_{i,t}$), stock market indexes returns ($\Delta I_{i,t}$), macroeconomic scheduled news for Euro-Area, Germany, United States and United Kingdom, unscheduled news and relative lags between January 2003 and August 2011. The model is first regressed for the entire sample period. Only variables with significant coefficient are retained and then used in a second-stage regression. The variables, except for unscheduled news, are standardized using the sample period standard deviations. Standard errors for coefficients estimates are in brackets, p-values in parentheses and lags 1,2 and 3 for eight, sixteen and twenty-four hours intervals are in braces. To assess the stability of parameter estimates, we use the Hansen's stability test. The Hansen stability test is performed using a joint test statistic and individual test statistics for each parameter in the model. We also test the existence of a structural break using a Chow test. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

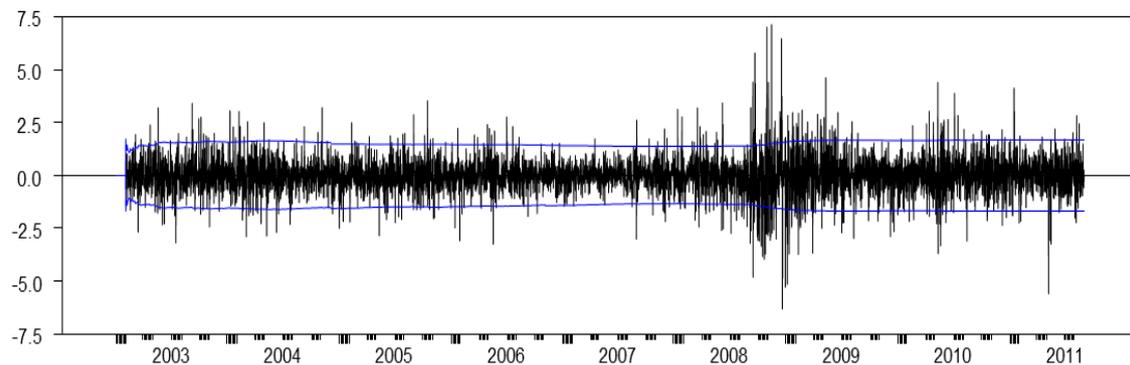
In addition to asymmetric reactions in volatility we also investigate, with the help of auxiliary variables, the presence of asymmetric reactions of the exchange rate to the scheduled or unscheduled news included in the linear part of the EGARCH. To distinguish between those (accounted for) news included in the mean and those (unaccounted for) news that are embedded in the innovation term and affect the conditional volatility, we shall refer to the latter ones as to “unaccounted surprises”.

EGARCH estimations are carried out in using the Broyden–Fletcher–Goldfarb–Shanno (BFGS) optimization method. Given the explorative nature of our study, we did not run any test to evaluate higher order EGARCH and the specification and choice of the models was based on criteria such as convergence, t-test values, and a parsimonious use of lags. Many empirical studies use basic GARCH(1,1) to model daily conditional volatility.²⁰ Based on this practice, and because our daily volatility is composed by three

²⁰ See for example Andersen et al. (2000) who point out the use of daily GARCH (1,1) as benchmark model in exchange rates volatility determination.

time intervals, we propose to use EGARCH with up to 3 lags.²¹ In discussing our results in the coming section we will generally make reference to the EGARCH(3,1) sub-period1 and sub-period2 to indicate the models we estimated prior and after the financial crisis.

Figure 2
Recursive Residuals and Standard Error Band



Note: This figure shows the recursive residuals and the upper and lower recursively generated standard error bands. The recursive residuals are obtained from recursive Least Squares estimations. If there is a break, the residuals will lie outside the band until the coefficients or the variance estimates adjust.

5. Estimations Results

The econometric results of EGARCH equations, are reported in Table 3.²² Before discussing results, we stress again the presence of lagged news. A statistically significant coefficient on a lagged news implies that a particular news produces its effect also in the following time zone(s). For instance, when American traders enter the market, they can still react to stale news that were released during the earlier European ETZ trading time, something which is frequently observed in practice. A reaction

²¹ For both sub-periods –prior and post financial crisis- we also tried lower order EGARCH but they did either not converge (EGARCH 1,1) or converge too soon (iterations number lower than number of estimated parameters indicates inaccurate values of estimates) so we accepted our initial choice of an EGARCH(3,1) structure.

²² Table A.10 in the Appendix1 (Supplementary Data) reports the results of the OLS regressions for the two sub-periods.

elicited by a past event can confirm or counteract the original reaction produced at the time when the news was released. In the case when subsequent traders reinforce the original under-reaction or over-reaction of previous traders, the exchange rate will trend. In the alternative case, when subsequent traders counteract the over-reaction or under-reaction of the previous traders, the exchange rate will revert back. Behavioural theories have provided several explanations for the occurrence of traders' under-reaction and over-reaction to news ranging from loss aversion and disposition effect, to overconfidence. This will be discussed later. In what follows we discuss results of different categories of explanatory variables from fundamentals to scheduled news. We end this section with the discussion of the volatility curve.

5.1. Results: Lagged exchange rate and fundamentals

We, first of all, observe in all estimation techniques that the autoregressive component of the exchange rates includes three lags, (the equivalent of a one day dynamics of the adjustment). This lag structure was to a large extent expected given the convention that we use to split of the Global Trading Day into three trading zones and the fluctuating profile of exchange rates in high frequency domain produced by day-traders, who represent today a large share of world currency markets. The coefficients of the autoregressive process have all negative signs indicating the presence of mean reverting behaviour of the exchange rate. In accordance to the results of the Hansen test (Table 2) the coefficients of the autoregressive components differ significantly before and after the financial crises and this is particularly noticeable for the coefficient of the second lag.

Table 3
EGARCH estimations of Euro-Dollar Exchange rate

PART A. EGARCH (3,1) Sub-Period1 01/01/2003-29/02/2008					PART B. EGARCH (3,1) Sub-Period2 29/02/2008-31/08/2011				
Variable	Coeff.	Signif.	S.E.	p-value	Variable	Coeff.	Signif.	S.E.	p-value
Constant	0.0112		[0.0081]	(0.1640)	Constant	0.0183	***	[0.0037]	(0.0000)
Δ Euro-Dollar{1}	-0.0772	***	[0.0108]	(0.0000)	Δ Euro-Dollar{1}	-0.1282	***	[0.0090]	(0.0000)
Δ Euro-Dollar{2}	-0.1133	***	[0.0111]	(0.0000)	Δ Euro-Dollar{2}	-0.0276	***	[0.0068]	(0.0000)
Δ Euro-Dollar{3}	-0.0262	**	[0.0106]	(0.0133)	Δ Euro-Dollar{3}	-0.0225	***	[0.0054]	(0.0000)
Δ 10-Year US Treasury Bond	-0.3093	***	[0.0199]	(0.0000)	Δ 10-Year US Treasury Bond	-0.1878	***	[0.0174]	(0.0000)
Δ 10-Year US Treasury Bond{1}	-0.0345	***	[0.0114]	(0.0024)	Δ 10-Year US Treasury Bond{1}	-0.0677	***	[0.0200]	(0.0007)
Δ 10-Year US Treasury Bond{2}	-0.0524	**	[0.0204]	(0.0103)	Δ 10-Year US Treasury Bond{2}	-0.0716	***	[0.0179]	(0.0001)
Δ 10-Year JGB	-0.0595	***	[0.0133]	(0.0000)	Δ 10-Year JGB	-0.0320	***	[0.0073]	(0.0000)
Δ 10-Year JGB{1}	0.0123		[0.0135]	(0.3640)	Δ 10-Year JGB{1}	-0.0305		[0.0227]	(0.1791)
Δ 10-Year JGB{2}	-0.0304	***	[0.0116]	(0.0085)	Δ 10-Year JGB{2}	-0.0601	**	[0.0251]	(0.0164)
Δ 10-Year Bund	-0.0194		[0.0178]	(0.2766)	Δ 10-Year Bund	0.1354	***	[0.0130]	(0.0000)
Δ 10-Year Bund{1}	0.1075	***	[0.0164]	(0.0000)	Δ 10-Year Bund{1}	0.1503	***	[0.0169]	(0.0000)
Δ 10-Year Bund{2}	0.0511	***	[0.0166]	(0.0021)	Δ 10-Year Bund{2}	0.0419	***	[0.0119]	(0.0004)
Δ Dow Jones	-0.0490	**	[0.0226]	(0.0298)	Δ Dow Jones	0.2992	***	[0.0195]	(0.0000)
POS_NEG Euro-Dollar_ASTZ	0.9329	***	[0.0514]	(0.0000)	Δ Nikkei	0.1284	***	[0.0116]	(0.0000)
POS_NEG Euro-Dollar_ASTZ{1}	-0.3628	***	[0.0343]	(0.0000)	POS_NEG Euro-Dollar_ASTZ	1.0026	***	[0.0122]	(0.0000)
POS_NEG Euro-Dollar_ETZ	1.0039	***	[0.0349]	(0.0000)	POS_NEG Euro-Dollar_ASTZ{1}	-0.2459	***	[0.0038]	(0.0000)
POS_NEG Euro-Dollar_ETZ{2}	0.0918	***	[0.0353]	(0.0092)	POS Euro-Dollar_ASTZ{1}	-0.1186	**	[0.0604]	(0.0496)
POS_NEG Euro-Dollar_ATZ	1.1824	***	[0.0362]	(0.0000)	POS Euro-Dollar_ASTZ{2}	-0.1836	***	[0.0537]	(0.0006)
POS_NEG Euro-Dollar_ATZ{1}	0.1431	***	[0.0372]	(0.0001)	POS_NEG Euro-Dollar_ETZ	1.3972	***	[0.0291]	(0.0000)
POS_NEG Euro-Dollar_ATZ{2}	-0.1199	***	[0.0319]	(0.0002)	POS_NEG Euro-Dollar_ETZ{2}	-0.0681	**	[0.0347]	(0.0496)
EUR_GDP Advance	0.0912		[0.1685]	(0.5884)	POS Euro-Dollar_ETZ	-0.0913		[0.0640]	(0.1538)
EUR_GDP Advance{1}	0.3432	**	[0.1646]	(0.0370)	POS Euro-Dollar_ETZ{2}	0.0845		[0.0678]	(0.2129)
GER_IFO Expectation	0.2615	***	[0.0733]	(0.0004)	POS_NEG Euro-Dollar_ATZ	1.2523	***	[0.0647]	(0.0000)
UK_BOE Rate	0.1028		[0.1250]	(0.4107)	POS_NEG Euro-Dollar_ATZ{2}	0.0629		[0.0579]	(0.2778)
UK_BOE Rate{1}	-0.4407	***	[0.1051]	(0.0000)	POS Euro-Dollar_ATZ	0.3557	***	[0.0881]	(0.0001)
UK_BOE Rate{2}	0.1000	***	[0.0164]	(0.0000)	POS Euro-Dollar_ATZ{2}	-0.0787		[0.0637]	(0.2167)
US_ISM Manufacturing Index	-0.4434	***	[0.0676]	(0.0000)	EUR_PPI	-0.0961		[0.1107]	(0.3852)
US_ISM Manufacturing Index{2}	-0.0995		[0.0786]	(0.2056)	EUR_CPI Flash	0.0258		[0.0970]	(0.7903)
US_Nonfarm Payrolls	-0.5810	***	[0.0688]	(0.0000)	EUR_CPI Flash{1}	-0.1471	*	[0.0798]	(0.0654)
US_Producer Price Index (Core)	0.1509	**	[0.0606]	(0.0128)	EUR_CPI Flash{2}	-0.0102		[0.0723]	(0.8874)
					EUR_CPI Flash_POS	0.1002		[0.1088]	(0.3569)
					GER_IFO Expectation	0.2348	**	[0.0957]	(0.0142)
					UK_BOE Rate	0.0742	***	[0.0038]	(0.0000)
					UK_BOE Rate{2}	-0.1020	***	[0.0192]	(0.0000)
					US_GDP Advance	-0.6660	***	[0.1920]	(0.0005)
					US_GDP Preliminary	-0.2401	***	[0.0363]	(0.0000)
					US_GDP Preliminary{1}	0.0907	***	[0.0075]	(0.0000)
					US_GDP Preliminary{2}	-0.2058		[0.1969]	(0.2959)
					US_Nonfarm Payrolls	-1.0362	***	[0.0768]	(0.0000)
					US_Producer Price Index (Core)	0.2253	**	[0.0887]	(0.0111)
ω	-0.1069	***	[0.0129]	(0.0000)	ω	-0.1775	***	[0.0226]	(0.0000)
γ {1}	0.1362	***	[0.0154]	(0.0000)	γ {1}	0.2391	***	[0.0538]	(0.0000)
δ {1}	-0.1855	***	[0.0239]	(0.0000)	δ {1}	-0.4512	***	[0.0196]	(0.0000)
δ {2}	0.2704	***	[0.0155]	(0.0000)	δ {2}	0.7257	***	[0.0440]	(0.0000)
δ {3}	0.9075	***	[0.0158]	(0.0000)	δ {3}	0.7120	***	[0.0089]	(0.0026)
φ {1}	0.0154	*	[0.0086]	(0.0752)	φ {1}	0.0268	***	[0.0226]	(0.0000)

Note: This table presents the results of exponential GARCH (EGARCH) estimations of intra-daily Euro/US Dollar exchange rate variations (ΔS_{it}) on interest rates yields (Δy_{it}), stock market indexes returns (ΔI_{it}), macroeconomic scheduled news for the Euro-Area, Germany, United States and United Kingdom, unscheduled news and relative lags between January 2003 and August 2011. Only variables with significant coefficient obtained in the entire sample period OLS regression model are retained and then used in second-stage EGARCH estimations. In the second step the model is computed for two consecutive sub-sample periods. Panel A and Panel B report the results for the EGARCH (3,1) models in the first sub-period (01 January 2003 22:00 CET to 29 February 2008 at 06:00 am CET; 4040 8-hourly observations) and in the second sub-period (29 February 2008 at 6:00 am to 31 August 2011 22:00 CET; 2744 8-hourly observations) respectively. The variables, except for unscheduled news, are standardized using the sample period standard deviations. The label *_POS* after the macroeconomic news name denotes variables computed only with realized positive surprises. The label *POS* before the unscheduled news denotes variables computed only with positive expected sign on the Euro/Dollar exchange rate. Standard errors for coefficients estimates are in brackets, p-value in parentheses and lags 1,2 and 3 for eight, sixteen and twenty-four hours intervals are in braces. In the conditional variance EGARCH models, ω is the intercept term, γ_j ($j=1$) is the magnitude parameter, δ_l ($l=1,2,3$) the GARCH parameters and φ_j ($j=1$) the asymmetry parameter. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

The change in value of this coefficient affects the shape of the lag profile and mean reversion in the following way: in the second sub-period the autoregressive component of the exchange rate shows a progressively declining profile, as it would be normal to expect. However, during the period prior the financial crisis the autoregressive component shows a quite unnatural humped shaped profile.²³

The sum of the lag coefficients indicates that, over a period of one day, the exchange rate is expected to revert back by about 20% (18% in the second sub period). The main differences between the period preceding and the period following the financial crisis is the time frame of the mean reversion which would occur mainly within the following 8 hours of trading (-0.128 after the 2008), rather than within the subsequent 16 hours of trading (-0.113 before the 2008) as shown in Table 3. One possible explanation of this phenomenon is that the uncertainty brought about by the financial crisis could have prompted day-traders having long positions to close them (and cash profits) more quickly than what they would have done prior to the crisis (16 hours)²⁴ when the Euro was appreciating and expected to keep strong.

Talking about mean reverting coefficients, a further remark can be made. Fluctuation is the standard movement in world Forex markets. In accordance to that, our analysis indicates that this can be clearly observed at jumps of 8 hours. Besides, periods of swinging appreciations, depreciations and flat trends certainly come to an end, but the fluctuations around trends are much more frequent than the trend reversions. Therefore

²³ To study this result further, we introduced an interaction term to capture possible different asymmetric effects of appreciations and depreciations of the exchange rate and tested for asymmetric adjustments. This version of the model is reported in Table A.11 of the Appendix1 (Supplementary Data). We obtained the following results: keeping all the rest constant, an appreciating exchange rate (as observed in the first sub-period, prior to the financial crisis) will cause a progressively declining mean reverting effect, because traders will expect an ever appreciating Euro-Dollar. In the second sub-period the rate had wide fluctuations around a flat-to-declining trend so the lag distribution had its traditional declining shape.

²⁴ The main financial institutions typically work on two shifts for traders, across the three time zones. Most of them have an office on all three zones, allowing them to manage a trading positions opened in earlier time zones.

mean reverting trading protocols can impose an oscillating profile to Euro-Dollar and yield great money for day-traders.

The relationship between interest rates and exchange rates is confirmed here with the expected signs in both sub-periods: an increase in the long term German rate (the main Eurozone financial market) strengthens the Euro whereas an increase in long term US rates produces the opposite effects. Japanese interest rates do not belong directly to movements of our currency pair. They enter mostly with a negative sign in sympathy – and because of the much wider business – with the US rates. The effect of Japanese interest rates on the Dollar-yen exchange rate is probably much bigger than that on the Euro-Dollar rate. That is consistent with our results.

Looking at the lag structure of interest rates and comparing the magnitude of coefficients between sub-periods the following three observations can be drawn: firstly, all lagged reactions, all shorter than a day, are under-reactions meaning that traders of subsequent trading areas confirm reactions of the traders of the preceding area. Secondly, ranking the overall effect (the sum of the current impact and lagged effects) the USA rates exert the strongest effects (-0.328 in the second sub-period, -0.395 in the first sub-period), followed by German rates (0.327 in the second sub-period and 0.158 in the first sub-period) and Japanese rates (-0.092 in the second sub-period and -0.089 in the first sub-period). Thirdly, following the financial crisis, the overall effects of the German rate on the exchange rate almost double in magnitude (from 0.158 to 0.327) while the overall effect of the US rate is almost the same (from -0.395 to -0.328) but, interestingly its impact effects almost halve (from -0.309 to -0.188). The reduced impact sensitivity of the exchange rate to the US rate and the increased overall sensitivity to German rates can be a result of policies and growing fears about the stability of the Eurozone. After the financial crisis central banks of developed economies, led by the

Fed, have flooded the market with liquidity. Their massive purchases of government bonds, together with regulations forcing banks to hold safer and more liquid assets, and the flight to safety by investors fearing a breakdown of the Eurozone, have driven the UK, Germany and US government nominal costs of borrowing and yields to historical low while creating a government bond bubble. Expectation and implementation of Operation Twist led to a widespread lowering of yields on safer assets (government bonds) across developed economies.

At the same time, the sovereign debt difficulties in the Eurozone caused wide expectations of a break-up of the Euro which may have induced a reduction of the Euro-Dollar's immediate reactions to the US interest rate, as investors have most likely not been so interested into moving Dollars into Euros and may have also induced an increased attention of traders to the rate of the strongest of the Eurozone economies.

Another interesting result of Table 3 is the change in the relation between Dow Jones (DJ)²⁵ and the Euro-Dollar rate in the second sub-period, which is something in line with what traders around the world have come to realize. Our estimates indicate that prior to the financial crisis an increase in the DJ would mildly strengthen the Dollar (-0.049) by attracting financial flows into the US, the leading stock market in the world. In the second sub-period the effect of the DJ is much stronger and reverted in sign (0.299). As we said, this phenomenon has been a standard – and puzzling - feature in financial markets which has been partly explained by time-varying risk appetite.²⁶

²⁵ The European indexes such as the German DAX and British FTSE do not appear here because they turned out to be non-statistically significant or because of their high correlation with the DJ.

²⁶ This is connected with risk attitude and role of emerging markets, the primary beneficiary of the increased global liquidity, injected into world financial markets, as we recalled above, with increasing values in their assets and currencies. It has been frequently observed that the positive relation between Euro-Dollar and DJ holds even at tick frequency. And when Wall Street is closed, the relationship holds also with the DJ futures. We have many ad hoc explanations. The risk appetite is the most popular (Kumar and Persaud, 2002) in the post financial crisis period, when the DJ started trending upwardly back again a positive DJ signalled an increase in risk appetite favouring investment in Emerging Markets and higher yielding currencies (the Australian, New Zealand Dollars and also the Euro). So a short-term

This is also justified in terms of a behavioural loss aversion bias as proposed by Prospect Theory.²⁷

Another possible explanation is that the negative relationship between the DJ and the Dollar is a good hedging opportunity for short-term trading in both markets, so it is possible that some kind of a stable relationship has established itself after the uncertainty brought by the financial crisis. At a time of very low US yields it is possible that hedged trading in the stock market and currency market has been seen as good opportunity. But the issue of the causality direction from the stock market to the currency market – or viceversa - remains wide open. Here it rather seems to exist some kind of a signalling simultaneous relationship as for some quite long periods in the GTD the Dollar and the Dow Jones (jointly with other US stock indexes) move together at tick frequency. The Nikkei index becomes relevant in the second sub-period (0.128) and this is because of the nature of the Dollar-Yen rate: a better yield on yen-denominated assets, stimulates carry trade and depreciates the Dollar, causing its appreciation *vis-à-vis* the Euro, as the carry trade is stronger with the Dollar than with the Euro given the liquidity of the US Dollar market.

5.2. Results: *Unscheduled news*

Among the unscheduled news, the dominant ones in both first and second sub-period are those occurring in the ATZ trading zone –the American zone- and presumably these

upward swing of the DJ would weaken the Dollar, more than the Euro for its very nature of having a higher worldwide circulation than the Euro.

²⁷ An increased appetite for risk, in a period of uncertainty and of realized or expected financial losses seems a contradiction but it is actually much in line with the explanation offered by Prospect Theory (PT): loss aversion bias (an asymmetry in the value function between gain and losses which renders losses loom larger than corresponding gains) induces investors to become risk seeker on the loss domain so they tend to ride losses because in the attempt to avoid/reduce them or to regain profits, they engage in risk seeking behaviour, Kahneman and Tversky (2000), page 41.

types of unscheduled news are more likely to be directly Dollar-related.²⁸ Table 4 reports calculations of the effects of unscheduled news on the exchange rate, as derived from the estimated coefficients reported in Table 3. For each sub-period these effects are distinguished in impact, delayed and net effect (which is the algebraic sum of the impact and lag coefficients). We also introduced interaction terms to test for the presence of asymmetric reactions to the sign of the unscheduled news and asymmetric effects were present whenever the interaction terms of the positive unscheduled news were statistically relevant.²⁹ Four comments can be drawn from our results.

The first element to notice in Table 4 is the “time -zone bias”: as expected, for both sub-periods, traders in each area react more strongly to their own news than to news of other time zones. The ranking of the magnitude of the effects of unscheduled news for both sub-periods is as follows: ATZ³⁰, ETZ, ASTZ. The reason is clear enough: most of Euro-US Dollar trading occurs when London and New York are open at the same time. That occurs in ATZ. ETZ is the home of Euro trading. In ASTZ Euro-Dollar is mainly moved by other currency pairs and more rarely by events in this time zone (sometimes by events after ATZ closing, typically downgrades of European countries by US based rating agencies). The main movements in ASTZ come from foreign reserve diversification out of the Dollar by Asia central banks (China first).

²⁸ As to the US Dollar, it is worth remembering the famous “the Dollar is our currency and your problem”, pronounced by US Treasury Secretary John B. Connally, after the de-pegging of the Dollar from gold in 1971, at a time when international monetary relations were really tight. Solomon (1977, page 179) and Sparke (2013, chapter 5).

²⁹ The effect of a negative unscheduled news is given directly by the coefficient of the overall vector of unscheduled news which includes both positive and negative. However, the coefficient of the positive news would need to be computed by adding together the coefficient of the interaction term and the coefficient of the overall vector of unscheduled news (positive and negative). Asymmetric effects can also be computed for delayed reactions whenever the lag of the interaction term occurs to be statistically significant.

³⁰ This is true except for the “dollar positive” (euro negative) unscheduled news released in the in the ATZ area during the second sub-period. The coefficient of this ATZ unscheduled news is smaller than the coefficient of the ETZ unscheduled news.

The second observation is about over and under-reaction of traders operating in subsequent trading areas. An over-reaction occurs when subsequent traders counteract the reactions of previous traders (inducing a reverting behaviour of the exchange rate). Under-reactions occur whenever traders in subsequent areas reinforce and confirm the reactions of previous traders (inducing a drifting behaviour of the exchange rate). Tables 3 and 4 show that lagged reactions are more common in the first sub-period than in the second and this is especially noticeable for the ATZ unscheduled surprises which, in the second sub-period, do not elicit any lagged reaction in subsequent areas and that exerts a noticeable bigger impact effect on the exchange rate when their content is adverse to the dollar (the coefficient is 1.608). This finding, that will be confirmed later on in the analysis of the volatility curve, suggests that the uncertainty of the financial crisis, in the second period, may have prompted a “higher sensitivity” and a quicker response to unscheduled Dollar-content news, especially when these unscheduled surprises are unfavourable to the dollar. The situation is different for the Asian market unscheduled news. In both sub-periods the Asian news-induced movements, tend to be partially corrected in European time (ETZ). This action of European traders tends thus to offset the over-reaction of Asian traders to ASTZ unscheduled news. By looking at other delayed reactions, it is interesting to notice again, in the first sub-period, a tendency of Asian traders to act to increase rather than to reduce the effects of unscheduled news coming from other trading zones, showing a sort of herding behaviour. In fact, as showed in Table 4, in the first sub-period both ETZ and ATZ news produce under-reactions mainly coming from Asian trading area (0.092 to European news and 0.143 to American news). This can be due to the fact that Asian markets are closed when a new market-moving event occurs in Europe or in the US, so Asian traders react when their market re-opens the following day, confirming previous

traders' reaction and hence, under *ceteris paribus* conditions, producing a "drift" of the Euro-Dollar rate. This herding behaviour disappears in the second sub-period, which is characterized by abundant liquidity and frequent trading oscillations, and when actually Asian traders tend to correct European traders' reactions (-0.068).

The third observation is about asymmetric reactions to Euro or to Dollar positive/negative events. During the first sub-period there are no asymmetric reactions to ETZ or ATZ unscheduled news. In the second period, however, when markets were disturbed by the financial crisis and by the policy measures taken to contrast it, our results show a quite different picture. Asymmetric reactions are elicited by ASTZ and ATZ unscheduled news only (so presumably news refers more to Dollar-related events) mainly coming from American traders who correct more strongly Asian traders' immediate reaction to ASTZ unscheduled news when these news are weakening the dollar (-0.365 which is the sum of -0.119 and -0.246) than when these news are in favour of it (-0.119). Overall the reaction to Euro-favourable (or Dollar unfavourable) news released in the Asian trading zone, leads to an appreciation of the Euro which is smaller (0.454) than the depreciation resulting from Euro-negative (Dollar positive) news.

As explained earlier on, the second sub-period is characterized by the fact that unscheduled surprises occurring in the ATZ zone do not longer elicit any lagged reaction. However, these events provoke the asymmetric reactions of American traders who respond to ATZ dollar weakening unscheduled (ATZ) news more strongly than to ATZ dollar strengthening unscheduled. This asymmetric reaction can be interpreted as the working of a negativity bias, a well-documented bias in behavioural finance to indicate the human tendency to pay more attention to bad news about a reference point.

The availability bias (the tendency to weight more heavily most recent information) could also explain the reduced reaction to lagged information during sub-period 2. It is not unlikely in fact that these biases may have become stronger in the period following the world-wide financial crisis because of the higher expected or realized losses and overall increased uncertainty created by the crisis.

Table 4

Effects of Unscheduled News in the Time Zones

	Pre-crisis (Sub-period1) 01/01/2003-29/02/2008			Post -crisis (Sub-period2) 29/02/2008-31/08/2011				
	Asia	Europe	USA	Asia	Europe	USA	(1)	(2)
Impact Effect	0.9329	1.0039	1.1824	1.0026	1.0026	1.3972	1.6080	1.2523
Delayed reaction(s)	-0.3628	0.0918	0.0232	-	-	-0.0681		
Net effect	0.5701	1.0957	1.2056	0.5481	0.2459			
Type of effect	Over-reaction	Under-reaction	Under-reaction	Over-reaction	Over-reaction			

Note: This table shows the effect of EGARCH estimated parameters of unscheduled news according the time-zone of reference. (1) are Euro Positive/Dollar Negative news and (2) are Euro Negative/Dollar Positive news. Over-reaction occurs when the initial effect is subsequently partially reverted while under-reaction occurs when the initial effect is successively reinforced.

5.3. Results: Scheduled news

As reported already, out of the 68 variables we collected, only a few scheduled news appear to affect significantly the exchange rate. As market experience indicates, many of the scheduled news are popular in some phases of the Forex markets but without the continuity which would make them significant over the entire sample period. By virtue of standardization, coefficients of scheduled news can be compared across themselves³¹ and our results indicate that there are a group of surprises that are reliably relevant in

³¹ We cannot compare orders of magnitude of coefficients of unscheduled and scheduled news since the former ones are binary not continuous variables and the latter are standardized.

both sub-periods, and these are: the German IFO Business Climate Indicator, in ETZ, and the Nonfarm Payroll, and the Producer Price Index, net of food and energy, corrected to take into account of the differences in daylight saving time weeks between Europe and the US in ATZ. Some other news, such as the first two readings of GDP in the European Monetary Union (EMU) in the ETZ area and the Manufacturing Index in the ATZ area are relevant only during the first sub-period, while some others such as the first Consumer Price Index Flash in Europe (EMU) and the first two of readings of the US GDP, become relevant only in the second sub-period. In discussing their effects we would also attempt a justification of this finding.

The only non-Euro/Dollar variable, the surprise in the Bank of England rate, elicits some impact and lagged reaction. As indicated in Table 3, in the first sub-period the impact coefficient of this variable is positive but not statistically significant³² whereas its lagged coefficients indicate some effects. Thus for instance, an unexpected hike in the UK rate would likely lead to an immediate increase in demand for Pounds relative to Dollars and to Euros, which is recorded for a short period, till ETZ ends. In moving into the ATZ trading zone, the reaction of American traders in closing their positions in Dollars leads to a weakening of the euro (-0.441). Asian market (coming the following day) correct mildly this action (0.100) and the overall net effect is that an unexpected increase in the BOE rate leads to a depreciation of the Euro and vice versa mainly due to American action. In the second sub-period the situation is somehow different although the net effect of a positive surprise in the BOE rate is still to depreciate the Euro but the effect is much smaller (-0.028 after the crisis versus -0.340 of the first sub-

³² Possibly due to the fact that decisions are announced in late morning, almost at the end of the European trading time, prompting sharp and quick movements in the UK Pound-US Dollar rate.

period) and mainly due to a reverting Asian correction to the European traders' impact reaction. American reaction to BOE rate seems to disappear after the crisis.

Forward-looking business climate indicators, such as the German IFO and the US ISM manufacturing index, both very popular among traders, provide different information. Surprises of the IFO maintain very similar, stable and statistically relevant coefficients in both periods with no lags, whereas the US ISM Index is significant in the first sub-period only. The coefficients have the expected signs (positive for the IFO and negative of the ISM). Why this difference in the two periods for ISM? Careful and informed market observation shows that, in recent years, the appetite in the US for these business confidence forward- looking indicators has grown considerably. All the District Banks of the Federal Reserve System publish their own business index, as the main tool to write the Beige Book.³³ The Chicago, Philadelphia, Empire State (New York), Richmond, San Francisco indexes have all gained a national reputation. So, financial markets are well informed, when the ISM is published in the first day of the month and the resulting surprise (actual less expected values) very much "flattened".

It is interesting to note that as the surprises in this indicator lose power, the Nonfarm Payroll doubles in magnitude in the second period becoming the most powerful scheduled news to affect traders' behaviour, after the financial crisis (from -0.581 before the crisis to -1.036 after the crisis). This indicator is released in at the opening of the ATZ trading time when overlapping of ETZ and ATZ is at its peak. This contributes to explain partly the magnitude of its coefficient which captures the actions of European and American traders. The US Non-farm Payroll is published on the first Friday of each month and it is the most influential among all news in the financial world. The reason of

³³ This publication, assembled by the Board of Governors in Washington, gives a regional description of the economic situation in the various parts of the US.

its popularity resides in the very flexible nature of the US labour market, where hiring (when the economy is expected to pick up) and firing (in the opposite circumstance) is deemed to be a very simple process. As such, Nonfarm payroll is one of the most valuable indicator of the world.³⁴ Its coefficient has the expected sign (a positive surprise would strengthen the Dollar) and, as mentioned above, its effect almost doubles from the first sub-period (of buoyant growth) to the second sub-period, where uncertainty over the US business cycle looms larger.

US inflation has a small but important presence in our analysis. The Producer Price Index, net of food and energy, is a good forward looking indicator of future US CPI inflation. It keeps its positive, rather stable (slightly higher in the second sub-period) and significant coefficient in both sub-periods (0.225 post crisis versus 0.151 before the crisis). Interestingly, surprises in the EMU Consumer Price Flash index (an early estimate of the CPI) prompt only some lagged effects all coming from ATZ zone (0.026) and only after the crisis. Under normal circumstances, one would reasonably expect that higher than expected inflation would trigger a strengthening of the Euro via expectations of higher interest rates. However the liquidity trap and the European sovereign debt problems have possibly weakened this theoretical link, as indicated by the impact coefficient of the CPI flash which turns out to be not statistically relevant. The massive and widespread use of unconventional monetary tools to fight the “great recession” and to help a weak recovery has emptied the theoretical role of the CPI indicator in its own zone. In the second sub-period, central banks in developed economies, and the ECB in particular, have become noticeably less worried about their inflation targeting, more concerned to avoid choking off a feeble recovery and more

³⁴ That was all the most true at the time of the adage “when the US sneezes, the rest of the world takes a cold” was popular. It is to some extent true today as well, after the emersion of the “emerging” markets, because a sizable share of their production is drawn by US consumption. But beyond this situation, the Nonfarm payroll still represents a good and widely respected “excuse” to buy or sell financial assets.

willing to act unconventionally and do “whatever it takes”³⁵ to avoid the currency crisis. This new attitude is captured by the lag coefficient of the CPI: an increase in the index has an effect in the American zone, when European traders close their position, and it weakens the Euro. In other words, higher than expected CPI inflation is perceived as “more troubles” for the Euro, given the limited margin of manoeuvring left to the European Central bank in front of the urgency to help the recovery and avoid the Euro collapse.

The GDP readings in the US have always raised a lot of interest in financial markets, and not only there. Our results show that this indicator (in its advanced and preliminary versions) is never significant in the first sub-period (where the ISM Index is) but it is so in the second sub-period (when the ISM is not). Financial market experience suggests that in the first sub-period (2003-2007) the US economy has been growing quite fast and regularly, so it is possible that attention to GDP was smaller than in the second sub-period, when growth has been crippled by the sub-prime financial crisis. Probably politicians and market participants have been scanning GDP numbers much more anxiously and thus have probably recorded much sharper reactions to this type of scheduled news. The same explanation given for attention to the Nonfarm Payroll announcements is valid here: in bad times, important macro surprises produce much wider reactions.

If surprises in the USA GDP become particularly relevant in the post crisis period, surprises in the EMU GDP lose their role after the crisis. In fact, the EMU GDP first reading advance) news produced some effects only in the first sub-period and mainly because of American traders’ reactions (0.343). In the earlier years of the Euro, GDP

³⁵ ECB Governor Mario Draghi on July 26, 2012 in London. Adding: “ Believe me, it will be enough”. Financial Times, online edition, same day. This date is outside our estimation sample, but use of unconventional instruments by, ECB and the Fed, dates much earlier. One of the most unconventional for the ECB, namely the LTRO (Long Term Refinancing Operation), was taken in 2011.

numbers were computed more quickly by domestic statistical offices than by Eurostat. So European traders were in those years were well informed, ahead of the aggregate Eurozone data. It reasonable to imagine that American traders (from banks not represented in London) could most likely have been more reactive to aggregate European data, as they have traditionally done so to their own GDP releases for many years.

5.4. Analysis of the volatility curves

The estimated coefficients of the EGARCH volatility equations are:

$$\begin{aligned} \log(h_t) = & -0.1069 + 0.1362[|z_{t-1}| - \sqrt{(2/\pi)}] + 0.0154 (z_{t-1}) - 0.1855 \log(h_{t-1}) + \\ & + 0.2704 \log(h_{t-2}) + 0.9075 \log(h_{t-3}) \end{aligned} \quad (3.1)$$

$$\begin{aligned} \log(h_t) = & -0.1775 + 0.2391[|z_{t-1}| - \sqrt{(2/\pi)}] + 0.0268 (z_{t-1}) - 0.4512 \log(h_{t-1}) + \\ & + 0.7257 \log(h_{t-2}) + 0.7120 \log(h_{t-3}) \end{aligned} \quad (3.2)$$

The first observation to make is that for both sub-periods the conditional variance of each trading interval is affected by its past values up to a 24 hours delay because all coefficients of past volatility are statistically relevant up to three lags. The transmission is high and in the absence of any new “unaccounted“ surprise, the volatility would die out, although slowly, as it can be showed by summing up the coefficients of the lags of the conditional variance.

For the first sub-period the asymmetric coefficient (0.015) is barely statistically relevant (significant only at 10%) but it becomes relevant and substantially bigger (0.027) after the financial crisis. For both sub-periods the asymmetric coefficient is positive, meaning that a positive surprise (for instance large positive movements, not accounted for in the specification of the EGARCH mean and hence left in the error term, due, for instance, to trading positioning causing sharp swings in Euro-Dollar) increases the conditional

volatility of the Euro-Dollar rate more than a negative surprise of the order of magnitude would.

Studies on volatility of stock returns have found evidence of what they described as “leverage effect”: a negative (bad) surprise increased the volatility of stock prices more than positive (good) surprises of the same magnitude.³⁶ However, in dealing with exchange rate, one ought to remember that it is a relative price and that the Dollar holds the privileged status of being the international reserve currency. A positive “unaccounted” news in the Euro-Dollar rate equation is Euro-positive but at the same time Dollar-negative, because of our definition of this currency pair. Therefore, an asymmetric reaction to positive innovations implies the market becomes more “nervous” in terms of increased volatility in the immediate future when hit by “unaccounted” surprises that weaken the Dollar rather than to unaccounted surprise of the same magnitude that weaken the Euro. This is especially true after the occurrence of the financial crisis.

The coefficient associated with the size of the standardized innovation (i.e. the coefficient that multiplies the standardized absolute innovation) is statistically relevant and positive in both sub-periods and it becomes substantially bigger after the financial crisis (0.133 in sub-period1 and 0.239 in sub-period2). Again the financial crisis seems to have amplified the reaction of volatility to “big” surprises of both signs. In other words, the swing in the exchange rate triggered by a big unexplained surprise would be more pronounced after the crisis than before due perhaps the increased uncertainty brought by the crisis and fears of losses.

³⁶ The leverage effect is due to the fact that a bad news, by reducing the price of the stock, increases the risk of holding equity because of the reduced values of the stock relative to corporate debt.

Taking into account the combined effects of sign and size of unaccounted surprises, we can conclude that unaccounted news that weaken the Dollar and strengthen the Euro tend to increase the conditional volatility in the immediate future much more than same size news that strengthen the Dollar and weaken the Euro, a result similar to the “leverage effect” in the stock market literature.

To quantify the impact of positive and large “unaccounted” surprises on volatility, one ought to transform equations into a non-logarithmic form. This is because the quantification of the asymmetric and magnitude effects on volatility is made complicated by the fact that the EGARCH is a semi-log form with the regressand expressed in logs and the regressors expressed in both logarithmic and linear forms; and by the fact that the regressand is in variance term while part of the regressors are in volatility terms (standard deviations) terms.

We then compute the news impact curve coming from the EGARCH specification of each sub-period, and we compare the curves to see if and to what extent the financial crisis produced any effect on the behavior conditional volatility of the Euro-Dollar rate. The volatility curves are obtained by computing the square root of the anti-log transformation of the conditional variance (equations 3.1 and 3.2) for different values of the standardized and absolute standardized innovations (z -variable).³⁷ Table 5 reports the results. To understand the magnitude of the effects of unaccounted surprises on volatility we consider 3 different sizes of the “volatility” surprises: the small/medium positive surprises that fall in the interval between zero to 1 and that can occur with a probability of 34%; the larger positive surprises that range from 1 to 1.65 and that occur with a probability of 11%; and the big positive surprises that range between 1.26 and

³⁷ The probability of a positive standardized innovation falling between 0 and 1 is 34%, while the one associated with one falling between 0 and 1.65 is 45% and one falling between 0 and 2.33 is 49%. Negative innovations have same values of probabilities taken on the left side of the standardized curve.

2.33 and can occur with a probability of 4%. The same classification applies to negative surprise.³⁸ For each of these possible intervals we consider only one value: the value of each interval's upper bound. So we have 6 possible cases: 3 cases when (standardized) positive surprises take the value of 1, 1.65 and 2.33 and 3 cases when (standardized) negative surprises take the values of (-1), (-1.65) and (-2.33).

We can now quantify the post financial crisis increase in the reaction of volatility to unaccounted surprises of any sign and size: for instance a large Euro positive/Dollar negative surprise (+2.33) would increase the conditional volatility of about 36.32% after the crisis compared to an increase of 19.32% prior to the crisis. The same result is obtained when looking at negative surprises: for instance a large negative surprise (-2.33) increases the volatility by 28% compared to an increase of 15% prior to the crisis. Similar results hold for positive and negative medium (+1.65 and -1.65) surprises and for positive and negative smaller surprises (+1 and -1). Thus, as expected, the crisis brought along a general and pronounced increase in Euro/Dollar volatility. So, when we compare sizes of surprises we can see that with a probability of 4% (which is the probability of a surprise to fall between + 1.65 and +2.33) the volatility would increase between 24.53% and 36.32% in the second sub-period but only between 13.32% and 19.32% in the first sub-period.

It is also possible to quantify the second interesting result of our EGARCH estimates, namely the post financial crisis increase in the asymmetric reaction of the conditional volatility to positive and negative surprise. From the table above, we can see that, for instance, after the crisis the percentage impact on volatility of a large Euro positive (+2.33) and of a large Euro negative (-2.33) surprises are about 36.32% for positive and

³⁸ Small/medium negative surprises range between (-1) and zero with a probability of 34%. The larger negative range from (-1.65) to (-1) with a probability of 11%. The big negative surprises range between (-2.33) and (-1.65) with a probability of 4%.

about 28.06% for negative surprise. However, the volatility reaction to the same size of surprises before the crisis would have been smaller and less asymmetric with a percentage impact of 19% for large Euro positive surprises and of 15% for large Euro negative surprises. Thus the financial crisis brought not only an increase in volatility to any size and sign of surprises but also an increase in the “spread” of the asymmetric reactions to positive and negative surprises of any order of magnitude.

To summarize our results: after the financial crisis the market has become much more “nervous” and hence volatile in front of unaccounted surprises, particularly so when these surprises have been Dollar weakening and Euro strengthening. This is not surprising: although the financial crisis originated in the Dollar (with the subprime crisis), it moved later towards the Euro (with Europe’s sovereign debt problems), making the Dollar a “safer” option, especially if one considers its privilege of being the international reserve currency. Financial behavioral insights can also explain this finding: in a period of increased uncertainty, characterized by global economic recession or feeble recover and by acute political issues that threatened the very existence of the Euro, the traders’ behavior of increased sensitiveness to Dollar weakening surprises is in line with a human behavioral bias (negativity bias) that make us pay more attention and give more weight to negative rather than positive information about our reference point.

Table 5
Effects of EGARCH parameters on volatility

	Negative unaccounted surprises			Positive unaccounted surprises		
	\bar{x}_{t-1}			\bar{x}_{t-1}		
	-1	-1.65	2.33	+1	+1.65	+2.33
Sub-period1 01/01/2003-29/02/2008						
$\sqrt{e^{(0.0154 \pm 0.1362) \bar{x}_{t-1}}}$	0.9923	0.9874	0.9822	1.0077	1.0128	1.0181
(% effect on $\sqrt{h_t}$)	-0.77%	-1.26%	-1.78%	0.77%	1.28%	1.81%
$\sqrt{e^{(0.1362 \pm 0.0154) \bar{x}_{t-1}}}$	1.0705	1.1189	1.1720	1.0705	1.1189	1.1720
(% effect on $\sqrt{h_t}$)	7.05%	11.89%	17.20%	7.05%	11.89%	17.20%
$\sqrt{e^{(0.0154 \pm 0.1362) \bar{x}_{t-1}}}$	1.0623	1.1048	1.1511	1.0787	1.1332	1.1932
(% effect on $\sqrt{h_t}$)	6.23%	10.48%	15.11%	7.87%	13.32%	19.32%
Sub-period2 29/02/2008-31/08/2011						
$\sqrt{e^{(0.0268 \pm 0.2391) \bar{x}_{t-1}}}$	0.9867	0.9781	0.9693	1.0135	1.0224	1.0317
(% effect on $\sqrt{h_t}$)	-1.33%	-2.19%	-3.07%	1.35%	2.24%	3.17%
$\sqrt{e^{(0.2391 \pm 0.0268) \bar{x}_{t-1}}}$	1.1270	1.2181	1.3212	1.1270	1.2181	1.3212
(% effect on $\sqrt{h_t}$)	12.70%	21.81%	32.12%	12.70%	21.81%	32.12%
$\sqrt{e^{(0.0268 \pm 0.2391) \bar{x}_{t-1}}}$	1.1120	1.1914	1.2806	1.1422	1.2453	1.3631
(% effect on $\sqrt{h_t}$)	11.20%	19.14%	28.06%	14.22%	24.53%	36.31%

Note: This table shows the effects of EGARCH estimated parameters on the volatility of the error terms. The EGARCH (3,1) coefficients are taken from the estimated logarithmic equation of the conditional variance as reported in Table 3 for the two consecutive sub-sample periods. To quantify the effects of different sizes of unaccounted surprises we take the square root of the anti-log transformation of the conditional variance equations. In the EGARCH the absolute standardized innovation is centered at 0.79 (square root of $2/\pi$). The simplification used in the specification affect only the constant term as showed below. The base case is \bar{x}_{t-1} equal to zero and can be compared with the impact of the coefficient of the sign.

$$h_t = \exp \left(-0.1069 - 0.1362 \sqrt{\frac{2}{\pi}} + \{0.1362 [|\bar{x}_{t-1}|] + 0.0154 (\bar{x}_{t-1})\} (h_{t-1})^{-0.1362} (h_{t-2})^{0.2704} (h_{t-2})^{0.9071} \right)$$

$$h_t = \exp \left(-0.1775 - 0.2391 \sqrt{\frac{2}{\pi}} + \{0.2391 [|\bar{x}_{t-1}|] + 0.0268 (\bar{x}_{t-1})\} (h_{t-1})^{-0.4512} (h_{t-2})^{0.7257} (h_{t-2})^{0.7120} \right)$$

6. Summary and Conclusions

This study aimed to investigate the determinants of the Euro-Dollar exchange rate behaviour and to assess if the financial crisis had contributed to alter its dynamics. Our approach differs from previous contributions in several ways: firstly we employ a thrice-daily frequency that reflects a “natural” partition of the trading day into three geographical trading areas, namely Asian, European and American trading time

intervals; secondly we use both quantitative and qualitative news and events to ascertain the market reactions to different surprises that hit the market during the 24 hour trading day; thirdly we test for the presence of asymmetric effects to positive and negative surprises and for the presence of over-reaction and under-reaction to past news; lastly, we put trading behavior into an historical perspective and use some behavioural insights to study if and to what extent traders' behaviour may have been affected by the international financial crisis initiated in 2007-2008. We believe that this enriched approach can provide some useful insights to better understand differences across trading areas and structural changes triggered by the 2007-2008 events. We found that indeed the financial crisis affected the Euro-Dollar dynamics and its conditional volatility. Following the crisis we highlight that the Euro-Dollar displays a quicker and stronger mean reverting process as if traders would be more inclined to keep their position for shorter periods. We also observe an increased propensity to show asymmetric reactions, in the mean (via unscheduled news) and in the conditional volatility of the EGARCH to surprises and events weakening dollar *vis-à-vis* the euro, as if traders were affected by a sort of behavioural negativity bias to unfavourable news related to the dollar. Moreover, some changes in the fundamentals, noticeably the relevance and the sign of the DJ seems to suggest a "risk" reaction to policies and a more pronounced loss aversion attitude, which might have induced an appetite for risk during a period of higher realized or potential losses. Our results shows that there is an increased importance of unscheduled events, particularly those ones generated in the American trading zone. There is also difference in the pattern of over-reaction and under-reaction to past event and a clear reduced importance of lagged scheduled and unscheduled news, with a parallel stronger effects of current news (showing a possible availability bias effect), particularly the news of pro-cyclical leading (IFO, Nonfarm

Payroll) and coincident indicators (USA GDP) of the real economy. Although the use of the EGARCH (3,1) allowed us to account for asymmetries and lags of surprises, we recognize that one potential limitation of our study is that a multivariate EGARCH model specification that includes other currencies (UK Pound and Japanese Yen), and scheduled/unscheduled news related to alternative pairs could further improve our comprehension on how investors in different trading time zones react to a broader set of information. Another promising avenue of our research is to use the estimated models for day-trading decisions in two ways. First of all, for the information offered by the paper on the possible strategies by traders, across time zones, in response to news of the current zone or of the previous ones. Secondly, the models, by themselves, can be used - in forecasting mode - to give thrice-daily trading signals to go long or short on the Euro-Dollar.

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Appendix 1 - Supplementary Data

Table A1.1

Descriptive Statistics Macroeconomics News

	Mean	Std. Dev.	Skewness	Kurtosis	Positive Surprises	Negative Surprises	Zero Surprises	Jarque-Bera	p-value	Q(1)	p-value	Q(2)	p-value
<i>Euro-Area News</i>													
Business Climate Indicator	0.0087	0.2013	-0.1468	3.2703	49	46	0	1.11	(0.5727)	3.1476*	(0.0760)	8.9519**	(0.0114)
ECB Rate	0.0000	0.0004	1.8120	34.7951	2	1	102	85.83***	(0.0000)	0.0011	(0.9733)	0.0023	(0.9989)
Economic Confidence	0.0218	1.5208	-0.6649	5.2053	51	42	8	16.23***	(0.0003)	3.1466*	(0.0761)	8.8948**	(0.0117)
Consumer Confidence	-0.1150	1.1892	0.1812	6.8348	27	33	40	15.72***	(0.0004)	1.1305	(0.2877)	7.9700**	(0.0186)
Industrial Confidence	0.0188	1.3874	-0.4457	3.8333	35	33	33	6.44**	(0.0400)	5.9728**	(0.0145)	15.9307***	(0.0003)
CPI Y-Y Flash	0.0000	0.0012	0.1817	4.0513	29	29	47	4.62*	(0.0995)	1.5483	(0.2134)	1.6836	(0.4309)
CPI Y-Y Final	0.0000	0.0005	-0.0584	3.6099	12	17	76	2.08	(0.3528)	0.4045	(0.8169)	1.5483	(0.2134)
CPI M-M	-0.0001	0.0007	-0.5951	5.7601	16	21	68	17.67***	(0.0001)	0.0094	(0.9228)	3.6844	(0.1585)
M3	0.0002	0.0017	-0.1507	3.2686	45	37	20	1.170	(0.5576)	3.4351*	(0.0638)	7.526**	(0.0232)
PPI M-M	-0.0002	0.0016	-1.8898	12.806	26	33	46	65.95***	(0.0000)	5.627**	(0.0177)	14.2352***	(0.0008)
Retail Sales M-M	-0.0017	0.0055	-0.2445	2.9396	31	60	10	1.15	(0.5639)	0.3617	(0.5475)	2.0704	(0.3552)
Retail Sales Y-Y	-0.0023	0.0096	0.0145	2.8108	43	57	4	0.03	(0.9874)	10.48***	(0.0012)	10.706***	(0.0047)
Unemployment Rate	0.0000	0.0009	0.6360	5.9629	22	27	56	19.25***	(0.0001)	1.2445	(0.2646)	2.2597	(0.3231)
Industrial Production	-0.0008	0.0053	-0.3759	3.3287	45	55	5	3.58	(0.1672)	0.2808	(0.5962)	0.3495	(0.8397)
GDP Advance	0.0000	0.0018	-0.1456	3.7631	13	14	7	2.02	(0.3647)	3.4601	(0.1773)	3.4601	(0.1773)
GDP Preliminary	0.0000	0.0003	0.8800	11.8289	2	1	33	22.85***	(0.0000)	4.6806**	(0.0305)	4.6955*	(0.0956)
GDP Final	-0.0001	0.0005	-0.3982	4.6933	2	5	27	5.44*	(0.0658)	0.0607	(0.8054)	2.8168	(0.2445)
Total					450	511	582						
<i>Germany News</i>													
Zew Survey	-0.3625	8.1997	0.1665	2.7861	46	58	0	0.58	(0.7478)	14.7086***	(0.0001)	17.7065***	(0.0001)
Ifo Business Climate	0.3010	1.2942	0.0484	3.5087	63	39	2	1.64	(0.4395)	3.9087**	(0.0480)	3.9198	(0.1409)
Ifo Current Assessment	0.3904	1.5110	0.3431	2.9167	62	41	1	2.21	(0.3305)	0.1672	(0.6826)	4.2870	(0.1172)
Ifo Expectation	0.2971	1.4807	-0.3860	3.5700	64	35	5	4.60	(0.1005)	7.5347***	(0.0061)	11.4566***	(0.0033)
CPI Preliminary	-0.0001	0.0016	-0.3563	2.5604	39	36	28	3.14	(0.2078)	5.6592**	(0.0174)	6.9445**	(0.0310)
Factory Orders	0.0007	0.0262	-0.0730	2.4409	51	49	3	1.88	(0.3907)	0.5154	(0.4728)	0.8205	(0.6635)
Industrial Production	-0.0019	0.0149	-0.0327	3.2501	46	56	3	0.70	(0.7032)	1.7187	(0.1899)	2.8066	(0.2458)
Retail Sales	-0.0061	0.0156	0.5554	3.5960	30	68	5	7.29**	(0.0261)	4.3465**	(0.0371)	7.2296**	(0.0269)
Unemployment Level	-8486	3282	0.0612	3.8283	40	62	3	3.04	(0.2192)	6.5531**	(0.0105)	6.559**	(0.0376)
Unemployment Rate	-0.0003	0.0011	-0.5009	2.7811	26	39	40	4.56	(0.1021)	6.9332***	(0.0085)	8.5596**	(0.0138)
PPI	0.0006	0.0039	-0.6693	6.1370	54	39	11	20.43***	(0.0000)	0.9863	(0.3206)	7.9861**	(0.0184)
GDP Preliminary	0.0002	0.0034	0.56880	3.8176	13	16	6	4.31	(0.1162)	0.4580	(0.4985)	1.6326	(0.4421)
Total					534	538	107						
<i>United Kingdom News</i>													
BOE Rate	-0.0001	0.0012	-6.2659	54.2893	2	5	96	169.92***	(0.0000)	3.0419*	(0.0811)	3.0619	(0.2163)
GDP Real Advance	-0.0007	0.0024	-1.2958	5.6883	10	15	9	15.91***	(0.0004)	0.1607	(0.6885)	4.7395*	(0.0935)
GDP Real Preliminary	0.0000	0.0010	0.4687	4.6853	8	9	18	5.91*	(0.0521)	0.1587	(0.6904)	7.0439**	(0.0295)

GDP Real Final	-0.0003	0.0020	-1.0303	5.1393	11	13	10	11.80	(0.0027)	0.5265	(0.4681)	0.9529	(0.6210)
Gfk Consumer Confidence	0.0096	2.8778	0.7542	4.3329	37	48	19	14.46***	(0.0007)	0.0024	(0.9613)	0.6124	(0.7362)
Industrial Production	-0.0031	0.0071	-0.6876	3.9318	30	67	7	11.28***	(0.0036)	0.0776	(0.7806)	0.1999	(0.9049)
Jobless Claim Change	-1013	11880	0.4987	8.8012	46	58	0	25.94***	(0.0000)	0.1919	(0.6613)	0.4040	(0.8171)
Manufacturing Production	-0.0059	0.0438	-1.4951	5.0500	59	43	2	4.44	(0.1085)	0.0129	(0.9096)	0.0179	(0.9911)
PPI Output	0.0007	0.0032	0.6341	3.9830	52	35	17	10.47***	(0.0053)	5.624**	(0.0177)	5.8645*	(0.0533)
RPI	0.0003	0.0018	0.4476	4.4658	43	33	28	9.49***	(0.0087)	0.0779	(0.7802)	0.2333	(0.8899)
RPI ex mort. Int. payment	0.0004	0.0019	0.0481	3.9712	48	30	25	3.61	(0.1641)	0.3540	(0.5519)	0.3566	(0.8367)
Retail Sales ex auto fuel	0.0016	0.0095	0.2449	5.4538	60	39	5	11.34***	(0.0034)	5.282**	(0.0215)	6.4708**	(0.0393)
ILO Unemployment	0.0000	0.0009	0.2472	2.9387	26	29	49	1.20	(0.5496)	0.0637	(0.8008)	1.6710	(0.4337)
Visible Trade	-153	578	0.2379	2.8736	36	68	0	1.08	(0.5820)	3.6277*	(0.0568)	5.7692*	(0.0559)
Total					468	492	286						
United States News													
Philadelphia Manufacturing Index	-1.4192	9.2262	-0.6189	3.8249	47	56	1	9.48***	(0.0087)	0.0002	(0.9874)	0.7740	(0.6791)
ISM Index (formerly NAPM Survey)	0.2548	2.1441	0.2133	3.6352	53	47	4	2.99	(0.2246)	0.3588	(0.5492)	1.6676	(0.4344)
Consumer Confidence Index	-0.1476	5.1508	-0.2761	2.9778	52	50	1	1.51	(0.4711)	1.2524	(0.2631)	5.225*	(0.0734)
Average Hourly Earnings	-0.0125	0.1391	0.1375	2.7243	35	41	28	0.52	(0.7729)	3.6643*	(0.0556)	3.8985	(0.1424)
Nonfarm Payroll	-218367	83086	-0.1889	4.3252	37	66	1	5.90*	(0.0524)	0.8082	(0.3687)	0.8369	(0.6581)
Unemployment Rate	-0.0250	0.1531	0.0509	3.5874	27	48	29	1.97	(0.3742)	0.8632	(0.3529)	1.8328	(0.4000)
Retail Sales	-0.0298	0.5738	0.1595	4.1028	48	51	5	4.68*	(0.0963)	4.8637**	(0.0274)	4.9543*	(0.0840)
Retail Sales less Autos Fuel	-0.0010	0.5322	-0.0669	4.3672	42	49	13	5.49*	(0.0643)	3.805*	(0.0511)	3.8254	(0.1477)
Producer Price Index (PPI)	0.0712	0.5503	0.1283	3.6576	54	42	8	2.53	(0.2826)	6.3011**	(0.0121)	8.4364**	(0.0147)
PPI less food & energy (Core PPI)	0.0125	0.3036	-0.2619	6.0829	44	35	25	14.02***	(0.0009)	16.1593***	(0.0001)	22.0275***	(0.0000)
Consumer Price Index (CPI)	-0.0077	0.1405	-0.0950	3.4607	34	33	37	1.59	(0.4520)	2.6869	(0.1012)	3.9264	(0.1404)
Industrial Production	-0.0625	0.4202	-1.4467	9.6329	46	50	8	48.58***	(0.0000)	1.8861	(0.1696)	6.8173**	(0.0331)
Leading Indicators	-0.0058	0.2009	0.7870	4.1503	30	45	29	14.3***	(0.0008)	0.0831	(0.7732)	0.0845	(0.9586)
Durable Goods Orders	-0.3596	2.3466	-0.1161	4.0522	40	62	2	4.22	(0.1213)	4.8107**	(0.0283)	8.1387**	(0.0171)
Personal (Consumer) Spending	-0.0388	0.2102	-1.2050	7.3624	33	45	25	36.25***	(0.0000)	0.4732	(0.4915)	2.2548	(0.3239)
Personal Income	0.0515	0.3061	2.1941	10.738	43	39	21	67.66***	(0.0000)	0.0670	(0.7958)	3.5479	(0.1697)
Factory Orders	-0.0356	0.8445	-0.7210	4.1986	50	46	8	13.16***	(0.0014)	1.1343	(0.2869)	1.6548	(0.4372)
Trade Balance	-0.0538	3.4556	0.1992	3.7488	52	49	3	3.36	(0.1862)	2.6315	(0.1048)	3.1079	(0.2114)
GDP Real Advanced	-0.1400	0.6921	0.5109	3.3975	10	23	2	2.86	(0.2387)	0.1056	(0.7452)	1.4051	(0.4953)
GDP Real Preliminary	0.0029	0.3285	-0.3286	2.9504	15	15	5	0.98	(0.6124)	0.0348	(0.8521)	5.7463*	(0.0565)
GDP Real Final	-0.0588	0.2583	-0.2505	2.6863	10	13	11	0.47	(0.7918)	1.2557	(0.2625)	1.7691	(0.4129)
GDP Deflator Advanced	0.0229	0.1592	1.0391	2.7090	16	17	2	0.65	(0.7217)	0.3920	(0.5313)	1.4337	(0.4883)
GDP Deflator Preliminary	0.0229	0.1592	1.0391	6.5821	14	8	13	15.48***	(0.0004)	0.0496	(0.8238)	0.1275	(0.9383)
GDP Deflator Final	0.0235	0.1689	-0.2611	2.3763	16	11	7	0.92	(0.6313)	0.5282	(0.4674)	0.5818	(0.7476)
Initial Unemployment (Jobless)	1.1106	18.6400	0.1683	4.0092	233	218	11	12.74***	(0.0017)	4.3667**	(0.0366)	5.6362*	(0.0597)
Total					1081	1159	299						

The variables are represented by news (positive, negative and null surprises) for Euro-Zone indicators, US indicators, Germany indicators, and UK indicators. News are obtained as the difference between the actual value of a macroeconomic announcement issued at day t and its expected value from Bloomberg. The table provides the mean, standard deviation, skewness, kurtosis of the news (surprises), the p -values for the Jarque-Bera test statistic of the null hypothesis of normal distribution and the p -values for the Ljung-Box test statistic for the null hypothesis that autocorrelation coefficients up to 2 lags are zero. The p -values are contained in parentheses. Data are from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.2

Correlations between US Macroeconomic News

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Consumer Confidence	1																				
(2) CPI	0.0000 (0.9976)	1																			
(3) Durable Goods	-0.0014 (0.9088)	-0.0001 (0.9916)	1																		
(4) Avg Hourly Earnings	-0.0001 (0.9961)	-0.0001 (0.9950)	-0.0002 (0.9863)	1																	
(5) Factory Orders	0.0049 (0.6834)	0.0000 (0.9977)	-0.0001 (0.9935)	-0.0411*** (0.0007)	1																
(6) GDP Deflator	-0.0065 (0.5912)	0.0000 (0.9978)	0.0003 (0.9801)	-0.0001 (0.9964)	0.0000 (0.9983)	1															
(7) GDP Real	0.0062 (0.6096)	-0.0001 (0.9923)	-0.0007 (0.9559)	-0.0002 (0.9875)	-0.0001 (0.9941)	-0.2824*** (0.0000)	1														
(8) Industrial Production	-0.0001 (0.9936)	-0.0310** (0.0103)	-0.0003 (0.9774)	-0.0002 (0.9867)	-0.0001 (0.9937)	-0.0001 (0.9644)	-0.0003 (0.9942)	1													
(9) Leading Indicators	0.0000 (0.9988)	0.0206* (0.0887)	-0.0001 (0.9956)	0.0000 (0.9974)	0.0000 (0.9988)	0.0000 (0.9989)	-0.0021 (0.8616)	0.0159 (0.1894)	1												
(10) ISM Index	0.0001 (0.9951)	0.0001 (0.9937)	0.0003 (0.9826)	-0.0118 (0.3303)	-0.0038 (0.7558)	0.0001 (0.9955)	0.0002 (0.9841)	0.0003 (0.9831)	0.0001 (0.9967)	1											
(11) Nonfarm Payrolls	-0.0002 (0.9889)	-0.0002 (0.9859)	0.0006 (0.9610)	-0.1734*** (0.0000)	0.0244** (0.0432)	-0.0002 (0.9899)	-0.0005 (0.9644)	-0.0006 (0.9621)	-0.0001 (0.9926)	-0.0128 (0.2892)	1										
(12) Jobless Claims	0.0015 (0.9044)	0.0167 (0.1669)	-0.0112 (0.3560)	0.0019 (0.8719)	-0.0251** (0.0378)	-0.0608*** (0.0000)	-0.0264** (0.0291)	-0.0061 (0.6139)	0.0072 (0.5499)	0.0036 (0.7674)	0.0006 (0.9573)	1									
(13) Consumer Spending	-0.0067 (0.5774)	-0.0001 (0.9908)	0.0065 (0.5922)	-0.0035 (0.7744)	0.0186 (0.1236)	0.0032 (0.7940)	-0.0004 (0.9768)	-0.0004 (0.9753)	-0.0023 (0.8476)	0.0298** (0.0135)	0.0028 (0.8149)	0.0166 (0.1687)	1								
(14) Personal Income	-0.0091 (0.4514)	0.0001 (0.9909)	-0.0188 (0.1194)	0.0002 (0.9851)	0.0232* (0.0554)	-0.0007 (0.9568)	0.0004 (0.9769)	0.0004 (0.9754)	0.0001 (0.9952)	0.0984*** (0.0000)	-0.0026 (0.8311)	0.0002 (0.9888)	-0.0391*** (0.0012)	1							
(15) Philadelphia Fed Survey	-0.0001 (0.9932)	-0.0572*** (0.0000)	-0.0004 (0.9761)	-0.0002 (0.9859)	-0.0001 (0.9934)	-0.0049 (0.6857)	0.0029 (0.8111)	0.1184* (0.0000)	-0.1195* (0.0000)	0.0003 (0.9821)	-0.0006 (0.9599)	-0.0394*** (0.0011)	-0.0004 (0.9739)	0.0004 (0.9740)	1						
(16) PPI (Core)	-0.0077 (0.5223)	0.0000 (0.9977)	0.0001 (0.9937)	0.0001 (0.9963)	0.0000 (0.9982)	0.0000 (0.9984)	0.0001 (0.9942)	-0.0150 (0.2160)	-0.0016 (0.8965)	-0.0001 (0.9953)	0.0002 (0.9894)	0.0002 (0.0599)	0.0227* (0.9931)	0.0001 (0.9931)	-0.0001 (0.2314)	1					
(17) PPI	-0.0148 (0.2211)	0.0001 (0.9929)	0.0003 (0.9803)	0.0002 (0.9884)	0.0001 (0.9945)	0.0001 (0.9949)	0.0003 (0.9820)	0.0098 (0.4192)	0.0001 (0.9963)	0.0005 (0.6736)	0.0005 (0.9670)	0.0005 (0.0463)	0.0241** (0.9785)	0.0003 (0.9786)	-0.0003 (0.0786)	-0.0213* (0.0000)	0.4761*** (0.0000)	1			
(18) Retail Sales	0.0000 (0.9977)	-0.0241** (0.0465)	-0.0010 (0.9920)	-0.0001 (0.9953)	0.0000 (0.9978)	0.0000 (0.9979)	-0.0010 (0.9927)	0.0070 (0.5601)	0.0000 (0.9985)	0.0001 (0.9940)	-0.0002 (0.9867)	0.0174 (0.1510)	-0.0001 (0.9913)	0.0001 (0.9913)	-0.0072 (0.5499)	0.0634*** (0.0000)	0.1642*** (0.0000)	1			
(19) Retail Sales (Net)	0.0000 (0.9999)	0.0181 (0.1332)	0.0000 (0.9997)	0.0000 (0.9998)	0.0000 (0.9999)	0.0000 (0.9999)	0.0000 (0.9997)	-0.0262** (0.0301)	0.0000 (0.9999)	0.0000 (0.9998)	0.0000 (0.9995)	0.0096 (0.4259)	0.0000 (0.9997)	0.0000 (0.9997)	-0.0058 (0.6339)	0.0468*** (0.0001)	0.1637*** (0.0000)	0.7921*** (0.0000)	1		
(20) Trade Balance	0.0000 (0.9993)	0.0018 (0.8827)	0.0000 (0.9976)	0.0014 (0.9087)	0.0000 (0.9993)	0.0000 (0.9994)	0.0000 (0.9978)	0.0089 (0.4618)	0.0080 (0.5101)	0.0000 (0.9982)	0.0000 (0.9990)	-0.0111 (0.3574)	0.0000 (0.9974)	0.0000 (0.9974)	0.0152 (0.2071)	-0.0586*** (0.0000)	-0.0167 (0.1676)	-0.0016 (0.8930)	-0.0051 (0.6750)	1	
(21) Unemployment Rate	-0.0001 (0.9930)	-0.0001 (0.9911)	-0.0004 (0.9753)	0.0222* (0.0664)	-0.0090 (0.4573)	-0.0001 (0.9936)	-0.0003 (0.9774)	-0.0004 (0.9760)	-0.0001 (0.9953)	0.0026 (0.8296)	0.2158*** (0.0000)	0.0059 (0.6247)	0.0025 (0.8358)	0.0004 (0.9731)	-0.0004 (0.9746)	0.0001 (0.9933)	0.0003 (0.9791)	-0.0001 (0.9915)	0.0000 (0.9997)	-0.0013 (0.9139)	1

This table shows the Pearson correlation coefficients between news (positive, negative and null surprises) for 25 US macroeconomic indicators: Consumer Confidence Index, Consumer Price Index (CPI), Average Hourly Earnings, Factory Orders, Durable Goods Orders, GDP Deflator, GDP Real, Industrial Production, Leading Indicators Index, ISM Index (formerly NAPM Survey), Nonfarm Payrolls, Initial Unemployment (Jobless) Claims, Personal (Consumer) Spending, Personal Income, Philadelphia Manufacturing Index (Fed Survey), Producer Price Index (PPI) Net of Food and Energy, Producer Price Index (PPI), Retail Sales, Retail Sales (Net) less Autos Fuel, Trade Balance, Unemployment Rate. GDP Deflator and GDP Real surprises are aggregated using the Advance, Preliminary and Final releases. News are obtained as the difference between the actual value of the macroeconomic variable and its expected value. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.3
Correlations between Euro-Area Macroeconomics News

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Business Climate Indicator	1																
(2) Consumer Confidence	0.1896*** (0.0000)	1															
(3) CPI M-M Final	0.0029 (0.8085)	0.0115 (0.3424)	1														
(4) ECB Rate	0.0000 (0.9985)	0.0000 (0.9972)	-0.0001 (0.9964)	1													
(5) Economic Confidence	0.5948*** (0.0000)	0.3834*** (0.0000)	0.0019 (0.8775)	0.0000 (0.9995)	1												
(6) CPI Y-Y Final	0.0048 (0.6905)	-0.0155 (0.2006)	0.5200*** (0.0000)	-0.0001 (0.9966)	0.0122 (0.3116)	1											
(7) CPI Y-Y Flash	0.0803*** (0.0000)	-0.1125*** (0.0000)	-0.0118 (0.3308)	0.0000 (1.0000)	0.0612*** (0.0000)	0.0000 (1.0000)	1										
(8) GDP Final	0.0001 (0.9954)	-0.0001 (0.9916)	-0.0002 (0.9893)	-0.0001 (0.9959)	0.0000 (0.9984)	-0.0002 (0.9899)	0.0000 (1.0000)	1									
(9) GDP Advance	0.0000 (0.9996)	0.0000 (0.9993)	0.0000 (0.9991)	0.0000 (0.9996)	0.0000 (0.9999)	0.0000 (0.9991)	0.0000 (1.0000)	0.0000 (0.9989)	1								
(10) GDP Preliminary	0.0000 (0.9976)	0.0001 (0.9957)	0.0001 (0.9945)	0.0000 (0.9979)	0.0000 (0.9992)	0.0001 (0.9948)	0.0000 (1.0000)	0.0001 (0.9937)	0.0000 (0.9995)	1							
(11) Industrial Confidence	0.7175*** (0.0000)	0.2311*** (0.0000)	0.0303** (0.0122)	0.0000 (0.9995)	0.5728*** (0.0000)	0.0134 (0.2674)	0.1101*** (0.0000)	0.0000 (0.9985)	0.0000 (0.9999)	0.0000 (0.9992)	1						
(12) Industrial Production	0.0001 (0.9940)	-0.0002 (0.9892)	0.0150 (0.2130)	-0.0001 (0.9947)	0.0000 (0.9980)	-0.0305** (0.0115)	0.0000 (1.0000)	-0.0071 (0.5566)	0.1217*** (0.0000)	0.0001 (0.9919)	0.0000 (0.9981)	1					
(13) M3	0.0026 (0.8300)	-0.0261** (0.0309)	0.0001 (0.9913)	0.0001 (0.9966)	0.0121 (0.3172)	0.0001 (0.9918)	-0.0097 (0.4242)	0.0002 (0.9899)	0.0000 (0.9991)	-0.0001 (0.9949)	0.0124 (0.3039)	0.0002 (0.9871)	1				
(14) PPI M-M	0.0007 (0.9547)	-0.0051 (0.6706)	-0.0001 (0.9902)	-0.0001 (0.9962)	-0.0016 (0.8963)	-0.0001 (0.9908)	0.0000 (1.0000)	0.0228* (0.0593)	0.0000 (0.9990)	0.0001 (0.9943)	-0.0022 (0.8576)	-0.0002 (0.9855)	0.0001 (0.9908)	1			
(15) Retail Sales M-M	-0.0564*** (0.0000)	0.0040 (0.7427)	-0.0004 (0.9713)	-0.0002 (0.9889)	-0.0223* (0.0648)	-0.0004 (0.9728)	0.0044 (0.7176)	-0.0005 (0.9668)	0.0000 (0.9971)	0.0003 (0.9831)	-0.0400*** (0.0009)	-0.0006 (0.9575)	0.0004 (0.9730)	-0.0036 (0.7644)	1		
(16) Retail Sales Y-Y	-0.0582*** (0.0000)	0.0064 (0.5980)	-0.0003 (0.9780)	-0.0001 (0.9915)	-0.0226* (0.0612)	-0.0003 (0.9792)	0.0017 (0.8893)	-0.0004 (0.9746)	0.0000 (0.9978)	0.0002 (0.9871)	-0.0440*** (0.0003)	-0.0005 (0.9674)	0.0003 (0.9794)	-0.0022 (0.8570)	0.7978*** (0.0000)	1	
(17) Unemployment Rate	-0.0234* (0.0533)	-0.0429*** (0.0004)	0.0000 (0.9990)	0.0000 (0.9996)	-0.0198 (0.1019)	0.0000 (0.9991)	0.1392*** (0.0000)	0.0000 (0.9989)	0.0000 (0.9999)	0.0000 (0.9994)	0.0000 (0.9999)	0.0000 (0.9985)	0.0000 (0.9991)	-0.0126 (0.2966)	0.0072 (0.5537)	0.0052 (0.6693)	1

This table shows the Pearson correlation coefficients between news (positive, negative and null surprises) for 17 Euro-Area macroeconomic indicators: Business Climate Indicator, Consumer Confidence, Consumer Price Index (CPI) Month-over-Month, ECB Rate, Economic Confidence, Consumer Price Index (CPI) Final Year-over-Year, Consumer Price Index (CPI) Flash Year-over-Year, GDP Final, GDP Advanced, GDP Preliminary, Industrial Confidence, M3 Money Supply, Producer Price Index (PPI), Retail Sales Month-over-Month, Retail Sales Year-over-Year, Unemployment Rate. News are obtained as the difference between the actual value of the macroeconomic variable and its expected value. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.4
Correlations between Germany Macroeconomics News

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) CPI	1											
(2) IFO Current Assessment	0.0485*** (0.0001)	1										
(3) IFO Expectations	-0.0088 (0.4652)	0.4200*** (0.0000)	1									
(4) Factory Orders	0.0000 (0.9991)	-0.0001 (0.9933)	-0.0001 (0.9943)	1								
(5) GDP Real Advance	0.0025 (0.8336)	0.0000 (0.9969)	0.0000 (0.9974)	0.0000 (0.9997)	1							
(6) IFO Business Climate	0.0279** (0.0209)	0.8305*** (0.0000)	0.8245*** (0.0000)	-0.0001 (0.9939)	0.0000 (0.9972)	1						
(7) Industrial Production	-0.0001 (0.9955)	0.0005 (0.9679)	0.0004 (0.9729)	0.0001 (0.9966)	0.0000 (0.9984)	0.0004 (0.9709)	1					
(8) PPI	0.0001 (0.9946)	-0.0146 (0.2261)	-0.0034 (0.7793)	0.0622*** (0.0000)	0.0000 (0.9981)	-0.0104 (0.3913)	0.0003 (0.9805)	1				
(9) Retail Sales	-0.0045 (0.7110)	0.0013 (0.9136)	0.0011 (0.9268)	-0.0024 (0.8408)	-0.0001 (0.9957)	0.0012 (0.9214)	0.0193 (0.1105)	0.0008 (0.9475)	1			
(10) Unemployment Rate	-0.0164 (0.1759)	0.0010 (0.9361)	0.0008 (0.9460)	-0.0286** (0.0180)	0.0000 (0.9968)	0.0009 (0.9420)	0.0117 (0.3314)	0.0006 (0.9612)	-0.0178 (0.1418)	1		
(11) ZEW	0.0000 (0.9984)	0.0002 (0.9889)	0.0001 (0.9906)	0.0000 (0.9988)	-0.0124 (0.3047)	0.0002 (0.9899)	-0.0112 (0.3535)	0.0029 (0.8087)	-0.0002 (0.9847)	-0.0002 (0.9887)	1	
(12) Unemployment Level	-0.0286** (0.0181)	0.0010 (0.9347)	0.0008 (0.9447)	-0.0255** (0.0346)	0.0000 (0.9968)	0.0009 (0.9406)	0.0097 (0.4199)	0.0006 (0.9603)	-0.0440*** (0.0003)	0.8563*** (0.0000)	-0.0002 (0.9884)	1

This table shows the Pearson correlation coefficients between news (positive, negative and null surprises) for 12 German macroeconomic indicators: Consumer Price Index (CPI), IFO Current Assessment, IFO Expectations, Factory Orders, GDP Real Advance, IFO Business Climate Indicator, Industrial Production, Producer Price Index (PPI), Retail Sales, Unemployment Rate, ZEW Survey, Unemployment Level. News are obtained as the difference between the actual value of a macroeconomic variable and its expected value. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.5
Correlations between UK Macroeconomics News

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) BOE Rate	1											
(2) GDP	-0.0003 (0.9810)	1										
(3) Gfk Consumer Confidence	0.0000 (0.9996)	0.0187 (0.1212)	1									
(4) Industrial Production	0.0019 (0.8735)	-0.0009 (0.9381)	0.0000 (0.9986)	1								
(5) Jobless Claims	-0.0002 (0.9879)	-0.0002 (0.9854)	0.0000 (0.9997)	-0.0122 (0.3122)	1							
(6) Manufactory Production	0.0051 (0.6759)	-0.0006 (0.9595)	0.0000 (0.9991)	0.8620*** (0.0000)	-0.0332*** (0.0060)	1						
(7) PPI Output	0.0004 (0.9727)	0.0005 (0.9672)	0.0000 (0.9993)	-0.0613*** (0.0000)	0.0003 (0.9790)	-0.0919*** (0.0000)	1					
(8) RPI (Net)	0.0004 (0.9755)	0.0004 (0.9705)	0.0000 (0.9993)	0.0012 (0.9202)	0.0003 (0.9811)	0.0008 (0.9478)	-0.0006 (0.9576)	1				
(9) RPI	0.0004 (0.9762)	0.0004 (0.9713)	0.0000 (0.9994)	0.0012 (0.9225)	0.0003 (0.9817)	0.0008 (0.9493)	-0.0006 (0.9589)	0.9019*** (0.0000)	1			
(10) Retail Sales (Core)	0.0003 (0.9789)	-0.0459*** (0.0001)	0.0077 (0.5242)	0.0010 (0.9314)	0.0002 (0.9838)	0.0007 (0.9551)	-0.0006 (0.9636)	-0.0005 (0.9673)	-0.0005 (0.9682)	1		
(11) Unemployment Rate	0.0000 (1.0000)	0.0000 (1.0000)	0.0000 (1.0000)	0.0112 (0.3539)	-0.0005 (0.9701)	0.0317*** (0.0087)	0.0000 (1.0000)	0.0000 (1.0000)	0.0000 (1.0000)	0.0000 (1.0000)	1	
(12) Visible Trade	-0.0005 (0.9668)	-0.0006 (0.9600)	0.0000 (0.9991)	0.0258** (0.0327)	-0.0242** (0.0453)	0.0333*** (0.0059)	0.0371*** (0.0022)	0.0127 (0.2918)	-0.0078 (0.5204)	0.0007 (0.9557)	0.0114 (0.3444)	1

This table shows the Pearson correlation coefficients between news (positive, negative and null surprises) for 12 UK macroeconomic indicators: BOE Rate, GDP Real, Gfk Consumer Confidence Survey, Industrial Production, Jobless Claim Change, Manufactory Production, Producer Price Index (PPI) Output no Seasonally Adjusted, Retail Price Index (RPI) ex Mort. Interest Payment, Retail Price Index (RPI Net), Retail Sales (Core) less Auto Fuel, Unemployment Rate, Visible Trade Balance. GDP Real surprises are aggregated using the Advance, Preliminary and Final releases. News are obtained as the difference between the actual value of a macroeconomic variable and its expected value. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.6

Correlations between US macroeconomics news and lagged news

	Consumer Confidence	CPI	Durable Goods	Avg. Hourly Earnings	Factory Orders	GDP Deflator	GDP Real	Industrial Production	Leading Indicators	ISM Index	Nonfarm Payroll	Jobless Claims	Consumer Spending	Personal Income	Philadelphia Fed Survey	PPI (Core)	PPI	Retail Sales	Retail Sales (net)	Trade Balance	Unempl. Rate	
L3 Consumer Confidence						0.0590*** (0.0000)	-0.0635*** (0.0000)						-0.0200* (0.0983)									
L3 CPI															-0.0425*** (0.0004)	0.0205* (0.0904)						
L3 Durable Goods						-0.0726*** (0.0000)	0.0216* (0.0740)															
L3 Factory Orders																						
L3 GDP Deflator																						
L2 GDP Real																						
L3 Real																						
L3 Industrial Production																						
L3 Leading Indicators																						
L3 ISM Index																						
L3 Jobless Claims																						
L3 Consumer Spending																						
L3 Personal Income																						
L3 Philadelph. Fed Survey																						
L3 PPI (Core)																						
L3 PPI																						
L3 Retail Sales																						
L3 Retail Sales (Net)																						
L3 Trade Balance																						
L3 Unempl. Rate																						

This table shows the Pearson cross-correlation coefficients between the lagged news (positive, negative and null surprises) up to three lags for each of the 25 US macroeconomic indicators. The announcements are: Consumer Confidence Index, Consumer Price Index (CPI), Average Hourly Earnings, Factory Orders, Durable Goods Orders, GDP Deflator, GDP Real, Industrial Production, Leading Indicators Index, ISM Index (formerly NAPM Survey), Nonfarm Payrolls, Initial Unemployment (Jobless) Claims, Personal (Consumer) Spending, Personal Income, Philadelphia Manufacturing Index (Fed Survey), Producer Price Index (PPI) Net of Food and Energy, Producer Price Index (PPI), Retail Sales, Retail Sales (Net) less Autos Fuel, Trade Balance, Unemployment Rate. GDP Deflator and GDP Real surprises are aggregated using the Advance, Preliminary and Final releases. News are obtained as the difference between the actual value of the macroeconomic variable and its expected value. Lagged news are computed considering the previous 8 hours (L1), 16 hours (L2) and 24 hours (L3) before the announcement. Only lagged news with statistically significant correlations coefficients are displayed. Correlations between a variable and its own 3 lags are not considered. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.7

Correlations between Euro-Area macroeconomics news and lagged news

	Business Climate Indicator	Consumer Confidence	CPI M-M	ECB Rate	Economic Confidence	CPI Y-Y Final	CPI Y-Y Flash	GDP Final	GDP Advance	Industrial Confidence	Industrial Production	M3	PPI	Retail Sales M-M	Retail Sales Y-Y	Unemployment Rate
L3 Business Climate Indicator							0.0829*** (0.0000)	-0.0599*** (0.0000)						-0.0283** (0.0190)		-0.0993*** (0.0000)
L3 Consumer Confidence							-0.0215* (0.0750)	0.0249** (0.0395)				-0.0989*** (0.0000)		-0.0204* (0.0907)		-0.0763*** (0.0000)
L3 CPI M-M											0.0252** (0.0369)					
L3 Economic Confidence							-0.0232* (0.0552)					-0.0447*** (0.0002)		-0.0351*** (0.0037)		-0.0907*** (0.0000)
L3 CPI Y-Y Final							0.0312*** (0.0099)									
L3 CPI Y-Y Flash													0.0918*** (0.0000)			-0.0522*** (0.0000)
L3 GDP Final														0.0389*** (0.0013)	0.0261** (0.0305)	
L3 GDP Advance						0.0549*** (0.0000)										
L3 GDP Preliminary														-0.0799* (0.0000)	-0.1214*** (0.0000)	
L3 Industrial Confidence							0.1058*** (0.0000)	-0.0545*** (0.0000)						-0.0212* (0.0792)		-0.1487*** (0.0000)
L3 Industrial Production			0.0303** (0.0122)													
L3 M3	0.0512*** (0.0000)	-0.0199* (0.0999)	0.0324*** (0.0074)				0.0483*** (0.0001)				0.0228* (0.0593)					-0.0477*** (0.0001)
L3 PPI M-M	0.1251*** (0.0000)	0.1808*** (0.0000)		-0.0230* (0.0568)	0.1638*** (0.0000)						0.1139*** (0.0000)			0.0839*** (0.0000)	0.0703*** (0.0000)	
L3 Retail Sales M-M				0.0261** (0.0309)												-0.0217* (0.0732)
L3 Retail sales Y-Y				0.0226* (0.0614)				0.0602*** (0.0000)								-0.0219* (0.0704)
L3 Unemployment Rate				0.0784*** (0.0000)									-0.0819*** (0.0000)			

This table shows the Pearson cross-correlation coefficients between the lagged news (positive, negative and null surprises) up to three lags for each of the 17 Euro-Area macroeconomic indicators. The announcements are: Business Climate Indicator, Consumer Confidence, Consumer Price Index (CPI) month-over-month, Economic Confidence, Consumer Price Index (CPI) Final year-over-year, Consumer Price Index (CPI) Flash year-over-year, GDP Final, GDP Advanced, GDP Preliminary, Industrial Production, M3 Money Supply, Producer price index (PPI), Retail Sales month-over-month, Retail Sales year-over-year, Unemployment Rate. News are obtained as the difference between the actual value of the macroeconomic variable and its expected value. Lagged news are computed considering the previous 8 hours (L1), 16 hours (L2) and 24 hours (L3) before the announcement. Only lagged news with statistically significant correlations coefficients are displayed. Correlations between a variable and its own 3 lags are not considered. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.8

Correlations between German Macroeconomics News and lagged News

	IFO Current Assessment	IFO Expectations	Factory Orders	Business Climate	Industrial Production	PPI	Retail Sales	Unemployment Rate	Unemployment Level
L3 CPI	0.0505*** (0.0000)			0.0391*** (0.0012)				0.1188*** (0.0000)	0.1063*** (0.0000)
L3 Factory Orders					0.3498*** (0.0000)		-0.0767*** (0.0000)		
L3 PPI	0.0548*** (0.0000)	0.0251** (0.0378)		0.0312*** (0.0098)	0.0809*** (0.0000)				
L3 Unemployment Rate			-0.0370** (0.0022)				0.0691*** (0.0000)		
L3 ZEW		0.0300** (0.0129)		0.0212* (0.0795)		-0.0870*** (0.0000)			
L3 Unemployment Level			-0.0210* (0.0829)				0.0428*** (0.0004)		

This table shows the Pearson cross-correlation coefficients between the lagged news (positive, negative and null surprises) up to three lags for each of the 12 German macroeconomic indicators. The announcements are: Consumer Price Index (CPI), IFO Current Assessment, IFO Expectations, Factory Orders, GDP, Business Climate Indicator, Industrial Production, Producer Price Index (PPI), Retail Sales, Unemployment Rate, ZEW Survey, Unemployment Level. News are obtained as the difference between the actual value of the macroeconomic variable and its expected value. Lagged news are computed considering the previous 8 hours (L1), 16 hours (L2) and 24 hours (L3) before the announcement. Only lagged news with statistically significant correlations coefficients are displayed. Correlations between a variable and its own 3 lags are not considered. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.9

Correlations between UK Macroeconomics News and lagged News

	BOE Rate	Jobless Claims	Manufactury Production	PPI Output	RPI (Net)	RPI	Retail Sales (Core)	Unemployment Rate	Visible trade Balance
L3 BOE Rate									0.0205* (0.0903)
L3 Industrial Production								0.0280** (0.0205)	
L3 Jobless Claims							0.0516*** (0.0000)		
L3 Manufacturing Production	0.0857*** (0.0000)							0.0274** (0.0236)	
L3 PPI Output					0.1306*** (0.0000)	0.1029*** (0.0000)			
L3 RPI (Net)		-0.1147*** (0.0000)						-0.0732*** 0.0000	
L3 RPI		-0.1643*** (0.0000)						-0.0792*** (0.0000)	
L3 Unemployment Rate							0.0542*** (0.0000)		
L3 Visible Trade			0.0379*** (0.0017)	-0.0265** (0.0285)				-0.0436*** (0.0003)	

This table shows the Pearson cross-correlation coefficients between the lagged news (positive, negative and null surprises) up to three lags for each of the 14 UK macroeconomic indicators: BOE Rate, GDP Real, Gfk Consumer Confidence Survey, Industrial Production, Jobless Claim Change, Manufactory Production, Producer Price Index (PPI) Output no Seasonally Adjusted, Retail Price Index (RPI) ex Mort. Interest Payment, Retail Price Index (RPI Net), Retail Sales (Core) less Auto Fuel, Unemployment Rate, Visible Trade Balance. GDP Real surprises are aggregated using the Advance, Preliminary and Final releases. Lagged news are computed considering the previous 8 hours (L1), 16 hours (L2) and 24 hours (L3) before the announcement. Only lagged news with statistically significant correlations coefficients are displayed. Correlations between a variable and its own 3 lags are not considered. The associated p-value is contained in parentheses below the correlation coefficient estimate. Data from 1-Jan-2003 to 31-Aug-2011. (***) = statistically significant at the 1% level; (**) = statistically significant at the 5% level; (*) = statistically significant at the 10% level.

Table A1.10
OLS estimations of Euro-Dollar Exchange Rate

Part A. Sub-Period1					Part B. Sub-Period2				
Variable	Coeff.	Signif.	S.E.	p-value	Variable	Coeff.	Signif.	S.E.	p-value
ΔEuro-Dollar{1}	-0.0949	***	[0.0153]	(0.0000)	ΔEuro-Dollar{1}	-0.1490	***	[0.0205]	(0.0000)
ΔEuro-Dollar{2}	-0.1410	***	[0.0148]	(0.0000)	ΔEuro-Dollar{2}	-0.0259		[0.0194]	(0.1821)
ΔEuro-Dollar{3}	-0.0288	*	[0.0149]	(0.0543)	Δ10-Year US Treasury Bond	-0.1630	***	[0.0610]	(0.0075)
Δ10-Year US Treasury Bond	-0.2754	***	[0.0411]	(0.0000)	Δ10-Year JGB	-0.0361		[0.0287]	(0.2085)
Δ10-Year US Treasury Bond{1}	-0.0308	*	[0.0165]	(0.0629)	Δ10-Year JGB{1}	-0.0784	**	[0.0346]	(0.0236)
Δ10-Year US Treasury Bond{2}	-0.0517	**	[0.0223]	(0.0205)	Δ10-Year Bund	0.0913	***	[0.0328]	(0.0054)
Δ10-Year JGB	-0.0664	***	[0.0131]	(0.0000)	Δ10-Year Bund {1}	0.0898		[0.0607]	(0.1391)
Δ10-Year JGB{1}	0.0222		[0.0169]	(0.1884)	ΔDow Jones	0.2293	***	[0.0515]	(0.0000)
Δ10-Year JGB{2}	-0.0296		[0.0241]	(0.2188)	ΔDow Jones{1}	-0.0532		[0.0331]	(0.1072)
Δ10-Year Bund	-0.0279		[0.0226]	(0.2171)	ΔDow Jones{2}	-0.0568		[0.0384]	(0.1395)
Δ10-Year Bund{1}	0.1041	***	[0.0302]	(0.0006)	ΔDow Jones{3}	0.1241	***	[0.0448]	(0.0056)
Δ10-Year Bund{2}	0.0352	**	[0.0148]	(0.0174)	ΔNikkei	0.1674	***	[0.0475]	(0.0004)
ΔDow Jones	-0.1026	**	[0.0429]	(0.0167)	ΔNikkei{1}	0.0985	**	[0.0468]	(0.0355)
POS_NEG Euro-Dollar_ASTZ	1.0590	***	[0.0930]	(0.0000)	ΔNikkei{2}	-0.1443	***	[0.0473]	(0.0023)
POS_NEG Euro-Dollar_ASTZ{1}	-0.4021	***	[0.0710]	(0.0000)	POS_NEG Euro-Dollar_ASTZ	1.1902	***	[0.0498]	(0.0000)
POS_NEG Euro-Dollar_ETZ	1.0050	***	[0.0415]	(0.0000)	POS_NEG Euro-Dollar_ASTZ{1}	-0.3310	***	[0.0662]	(0.0000)
POS_NEG Euro-Dollar_ETZ{2}	0.0977	***	[0.0315]	(0.0019)	POS_NEG Euro-Dollar_ETZ	1.5420	***	[0.0613]	(0.0000)
POS_NEG Euro-Dollar_ATZ	1.2621	***	[0.0571]	(0.0000)	POS_NEG Euro-Dollar_ATZ	1.7432	***	[0.1094]	(0.0000)
POS_NEG Euro-Dollar_ATZ{1}	0.1835	***	[0.0357]	(0.0000)	EUR_CPI Flash{1}	-0.0020	*	[0.0012]	(0.0988)
POS_NEG Euro-Dollar_ATZ{2}	-0.1047	**	[0.0415]	(0.0116)	EUR_PPI	-0.0026	***	[0.0007]	(0.0004)
EUR_CPI Flash	0.0022	**	[0.0009]	(0.0226)	EUR_PPI_POS	0.0023	**	[0.0011]	(0.0450)
EUR_GDP Advance	0.0010		[0.0013]	(0.4654)	EUR_GDP Advance	0.0012		[0.0020]	(0.5648)
EUR_GDP Advance{2}	0.0019	**	[0.0010]	(0.0431)	EUR_GDP Advance{1}	-0.0018		[0.0026]	(0.4930)
EUR_GDP Preliminary	0.0025	***	[0.0001]	(0.0000)	EUR_GDP Advance{2}	0.0021	**	[0.0010]	(0.0421)
EUR_GDP Preliminary{3}	0.0028	***	[0.0001]	(0.0000)	EUR_GDP Preliminary	0.0017	***	[0.0003]	(0.0000)
EUR_GDP Preliminary_POS	-0.0008	**	[0.0004]	(0.0335)	EUR_GDP Preliminary{1}	-0.0064	***	[0.0005]	(0.0000)
EUR_GDP Preliminary_POS{3}	-0.0018	***	[0.0003]	(0.0000)	EUR_GDP Preliminary{2}	-0.0020	***	[0.0002]	(0.0000)
GER_IFO Expectation	0.2678	***	[0.0917]	(0.0035)	EUR_GDP Preliminary{3}	0.0007	**	[0.0003]	(0.0204)
GER_PPI	-0.0015		[0.0012]	(0.1943)	GER_IFO Expectation	0.3204	*	[0.1705]	(0.0603)
GER_PPI{1}	0.0019		[0.0015]	(0.2007)	GER_IFO Expectation {1}	0.1036		[0.1464]	(0.4791)
GER_PPI{2}	-0.0017	*	[0.0010]	(0.0800)	GER_IFO Expectation {2}	0.1825	**	[0.0928]	(0.0492)
UK_BOE Rate	0.0017	***	[0.0005]	(0.0006)	GER_PPI	-0.0002		[0.0024]	(0.9386)
UK_BOE Rate{1}	-0.0034	**	[0.0015]	(0.0237)	GER_PPI{1}	-0.0036	***	[0.0009]	(0.0000)
UK_BOE Rate{2}	0.0017	***	[0.0005]	(0.0011)	GER_PPI_POS	-0.0004		[0.0027]	(0.8858)
UK_BOE Rate_POS{2}	-0.0016	***	[0.0006]	(0.0089)	GER_PPI_POS{1}	0.0051	**	[0.0026]	(0.0451)
UK_GDP Advance	-0.0006		[0.0011]	(0.5999)	UK_BOE Rate	0.0003		[0.0003]	(0.3776)
UK_GDP Advance {1}	-0.0021	**	[0.0010]	(0.0358)	UK_BOE Rate{1}	-0.0013	***	[0.0004]	(0.0007)
UK_PPI Output	0.0013	*	[0.0007]	(0.0699)	UK_BOE Rate{2}	-0.0009	***	[0.0001]	(0.0000)
UK_Jobless Claims	-0.0084		[0.1282]	(0.9479)	UK_BOE Rate{3}	-0.0007	***	[0.0001]	(0.0000)
UK_Jobless Claims {2}	-0.2009	**	[0.0936]	(0.0318)	UK_PPI Output	0.0033		[0.0029]	(0.2534)
US_ISM Manufacturing Index	-0.4308	***	[0.1349]	(0.0014)	UK_PPI Output{1}	0.0095	***	[0.0026]	(0.0003)
US_ISM Manufacturing Index{2}	-0.1232	*	[0.0632]	(0.0512)	UK_PPI Output_POS	-0.0025		[0.0031]	(0.4210)
US_Nonfarm Payrolls	-0.6683	***	[0.2543]	(0.0086)	UK_PPI Output_POS{1}	-0.0103	***	[0.0038]	(0.0064)
US_Producer Price Index (Core)	0.2216	***	[0.0822]	(0.0070)	UK_Unemployment Rate	0.0013		[0.0008]	(0.1132)
Constant	0.0105		[0.0104]	(0.3138)	UK_Jobless Claims	-0.0182		[0.1152]	(0.8747)
					UK_Jobless Claims{3}	0.2534	**	[0.1234]	(0.0400)
					US_GDP Advance	-0.4885	*	[0.2684]	(0.0688)
					US_GDP Advance{1}	-0.0533		[0.1206]	(0.6584)
					US_GDP Advance{2}	-0.1308		[0.1928]	(0.4974)
					US_GDP Advance{3}	0.3585	*	[0.2172]	(0.0988)
					US_GDP Preliminary_US	-0.5105	***	[0.1811]	(0.0048)
					US_GDP Preliminary_US{1}	0.2065	**	[0.0910]	(0.0232)
					US_ISM Manufacturing Index	-0.1836		[0.3307]	(0.5787)
					US_ISM Manufacturing Index {1}	-0.1751		[0.1086]	(0.1069)
					US_ISM Manufacturing Index	0.4631		[0.3920]	(0.2375)
					US_ISM Manufacturing Index_POS{1}	0.3239	**	[0.1451]	(0.0256)
					US_Nonfarm Payrolls	-0.5523	*	[0.3032]	(0.0685)
					Constant	0.0251		[0.0181]	(0.1659)

R² = 0.36; D-W Stat = 1.9986

R² = 0.42; D-W Stat = 1.9943

This table presents the results of OLS regression of intra-daily Euro/US Dollar exchange rate variations ($\Delta S_{i,t}$) on interest rates yields ($\Delta y_{i,t}$), stock market indexes returns ($\Delta I_{i,t}$), macroeconomic scheduled news for Euro-Area, Germany, United States and United Kingdom, unscheduled news and relative lags between January 2003 and August 2011. The model is first regressed for the entire sample period. Only variables with significant coefficient are retained and then used in second-stage regressions for two consecutive sub-sample periods. Panel A and Panel B report the results for the first sub-period (01 January 2003 22:00 CET to 29 February 2008 at 06:00 am CET; 4040 8-hourly observations) and the second sub-period (29 February 2008 at 6:00 am to 31 August 2011 22:00 CET; 2744 8-hourly observations) respectively. The label *POS* after the macroeconomic news name denotes variables based on realized positive surprises. Standard errors for coefficients estimates are in brackets, p-values in parentheses and lags 1,2 and 3 for eight, sixteen and twenty-four hours intervals are in braces.(***) = statistically significant at a 1% level, (**) = statistically significant at a 5% level, (*) = statistically significant at 10% level.

Table A1.11
OLS and EGARCH estimations with positive effects

Panel A. OLS regression

Variable	Coeff.	Signif.	S.E.	p-value
ΔEuro-Dollar{1}	-0.1088	***	[0.0234]	(0.0000)
ΔEuro-Dollar{2}	-0.0934	***	[0.0240]	(0.0001)
ΔEuro-Dollar{3}	-0.0300	**	[0.0149]	(0.0445)
ΔEuro-Dollar_Pos{1}	0.0266		[0.0319]	(0.4048)
ΔEuro-Dollar_Pos{2}	-0.0880	***	[0.0327]	(0.0072)
Δ10-Year US Treasury Bond	-0.2758	***	[0.0411]	(0.0000)
Δ10-Year US Treasury Bond{1}	-0.0309	*	[0.0166]	(0.0622)
Δ10-Year US Treasury Bond{2}	-0.0499	**	[0.0223]	(0.0251)
Δ10-Year JBG	-0.0655	***	[0.0131]	(0.0000)
Δ10-Year JBG{1}	0.0215		[0.0168]	(0.1994)
Δ10-Year JBG{2}	-0.0292		[0.0242]	(0.2267)
Δ10-Year Bund	-0.0288		[0.0225]	(0.2011)
Δ10-Year Bund{1}	0.1039	***	[0.0301]	(0.0006)
Δ10-Year Bund{2}	0.0355	**	[0.0147]	(0.0157)
ΔDow Jones	-0.1031	**	[0.0427]	(0.0159)
POS_NEG Euro-Dollar_ASTZ	1.0610	***	[0.0926]	(0.0000)
POS_NEG Euro-Dollar_ASTZ{1}	-0.4040	***	[0.0710]	(0.0000)
POS_NEG Euro-Dollar_ETZ	1.0051	***	[0.0416]	(0.0000)
POS_NEG Euro-Dollar_ETZ{2}	0.0941	***	[0.0315]	(0.0028)
POS_NEG Euro-Dollar_ATZ	1.2627	***	[0.0570]	(0.0000)
POS_NEG Euro-Dollar_ATZ{1}	0.1814	***	[0.0357]	(0.0000)
POS_NEG Euro-Dollar_ATZ{2}	-0.1035	**	[0.0414]	(0.0123)
EUR_CPI Flash	0.0023	**	[0.0009]	(0.0144)
EUR_GDP Advance	0.0009		[0.0013]	(0.4691)
EUR_GDP Advance{2}	0.0020	**	[0.0009]	(0.0313)
EUR_GDP Preliminary	0.0025	***	[0.0001]	(0.0000)
EUR_GDP Preliminary{3}	0.0028	***	[0.0001]	(0.0000)
EUR_GDP Preliminary_POS	-0.0010	**	[0.0004]	(0.0226)
EUR_GDP Preliminary_POS{3}	-0.0018	***	[0.0003]	(0.0000)
GER_IFO Expectation	0.2708	***	[0.0908]	(0.0029)
GER_PPI	-0.0014		[0.0012]	(0.2259)
GER_PPI{1}	0.0018		[0.0015]	(0.2108)
GER_PPI{2}	-0.0017	*	[0.0010]	(0.0847)
UK_BOE Rate	0.0015	***	[0.0006]	(0.0091)
UK_BOE Rate{1}	-0.0033	**	[0.0015]	(0.0255)
UK_BOE Rate{2}	0.0017	***	[0.0006]	(0.0018)
UK_BOE Rate_POS{2}	-0.0017	***	[0.0006]	(0.0079)
UK_GDP Advance	-0.0004		[0.0011]	(0.7172)
UK_GDP Advance {1}	-0.0021	**	[0.0010]	(0.0340)
UK_PPI Output	0.0012	*	[0.0007]	(0.0887)
UK_Jobless Claims	0.0007		[0.1277]	(0.9955)
UK_Jobless Claims {2}	-0.1962	**	[0.0959]	(0.0407)
US_ISM Manufacturing Index	-0.4276	***	[0.1366]	(0.0017)
US_ISM Manufacturing Index{2}	-0.1221	*	[0.0634]	(0.0542)
US_Nonfarm Payrolls	-0.6649	***	[0.2541]	(0.0089)
US_Producer Price Index (Core)	0.2205	***	[0.0815]	(0.0068)
Constant	0.0281		[0.0174]	(0.1051)
R ²	0.3604			
Durbin-Watson	1.9975			

Panel B. EGARCH(3,1)

Variable	Coeff.	Signif.	S.E.	p-value
Constant	0.0331	**	[0.0134]	(0.0136)
Δ Euro-Dollar{1}	-0.0941	***	[0.0202]	(0.0000)
Δ Euro-Dollar{2}	-0.0567	***	[0.0183]	(0.0019)
Δ Euro-Dollar{3}	-0.0254	**	[0.0111]	(0.0228)
Δ Euro-Dollar{1}_POS	0.0326		[0.0274]	(0.2342)
Δ Euro-Dollar{2}_POS	-0.1029	***	[0.0275]	(0.0002)
Δ 10-Year US Treasury Bond	-0.3129	***	[0.0221]	(0.0000)
Δ 10-Year US Treasury Bond{1}	-0.0372	**	[0.0183]	(0.0416)
Δ 10-Year US Treasury Bond{2}	-0.0538	***	[0.0194]	(0.0055)
Δ 10-Year JGB	-0.0594	***	[0.0128]	(0.0000)
Δ 10-Year JGB{1}	0.0113		[0.0144]	(0.4304)
Δ 10-Year JGB{2}	-0.0285	*	[0.0148]	(0.0538)
Δ 10-Year Bund	-0.0215		[0.0181]	(0.2348)
Δ 10-Year Bund{1}	0.1081	***	[0.0199]	(0.0000)
Δ 10-Year Bund{2}	0.0496	***	[0.0173]	(0.0042)
Δ Dow Jones	-0.0486	**	[0.0244]	(0.0463)
POS_NEG Euro-Dollar_ASTZ	0.9365	***	[0.0452]	(0.0000)
POS_NEG Euro-Dollar_ASTZ{1}	-0.3614	***	[0.0545]	(0.0000)
POS_NEG Euro-Dollar_ETZ	1.0028	***	[0.0322]	(0.0000)
POS_NEG Euro-Dollar_ETZ{2}	0.0816	***	[0.0289]	(0.0047)
POS_NEG Euro-Dollar_ATZ	1.1817	***	[0.0365]	(0.0000)
POS_NEG Euro-Dollar_ATZ{1}	0.1408	***	[0.0374]	(0.0002)
POS_NEG Euro-Dollar_ATZ{2}	-0.1210	***	[0.0353]	(0.0006)
EUR_GDP Advance	0.0838		[0.1950]	(0.6674)
EUR_GDP Advance{1}	0.3261	*	[0.1824]	(0.0738)
EUR_GDP Preliminary	0.1817		[0.1444]	(0.2082)
EUR_GDP Preliminary{1}	-0.2525	*	[0.1505]	(0.0935)
GER_IFO Expectation	0.2661	***	[0.0818]	(0.0011)
UK_BOE Rate	0.1409		[0.1080]	(0.1922)
UK_BOE Rate{1}	-0.3943	***	[0.1034]	(0.0001)
UK_BOE Rate{2}	0.0913	***	[0.0198]	(0.0000)
US_ISM Manufacturing Index	-0.4378	***	[0.0700]	(0.0000)
US_ISM Manufacturing Index{2}	-0.0839		[0.0750]	(0.2632)
US_Nonfarm Payrolls	-0.5752	***	[0.0717]	(0.0000)
US_Producer Price Index (Core)	0.1836	***	[0.0587]	(0.0018)
ω	-0.1083	***	[0.0112]	(0.0000)
γ {1}	0.1379	***	[0.0135]	(0.0000)
δ {1}	-0.1850	***	[0.0197]	(0.0000)
δ {2}	0.2683	***	[0.0125]	(0.0000)
δ {3}	0.9088	***	[0.0138]	(0.0000)
ϕ {1}	0.0167	*	[0.0087]	(0.0558)

This table presents the results of OLS regression and EGARCH (3,1) estimations of intra-daily Euro/US Dollar exchange rate variations ($\Delta S_{i,t}$) on interest rates yields ($\Delta y_{i,t}$), stock market indexes returns ($\Delta I_{i,t}$), macroeconomic scheduled news for Euro-Area, Germany, United States and United Kingdom, unscheduled news and relative lags between January 2003 and February 2008. The model is first regressed for the entire sample period. Only variables with significant coefficient are retained and then used in second-stage estimations. The variables, except for unscheduled news, are standardized using the sample period standard deviations. The label *_POS* after the macroeconomic news name denotes variables based on realized positive surprises. Standard errors for coefficients estimates are in brackets, p-values in parentheses and lags 1,2 and 3 for eight, sixteen and twenty-four hours intervals are in braces. The models include positive variations in lags 1 and 2 for the Euro/Dollar exchange rate. In the conditional variance equation of EGARCH models, γ_j ($j=1$) is the magnitude parameter, δ_l ($l = 1,2,3$) the GARCH parameters and ϕ_j ($j=1$) the asymmetry parameter. (***) = statistically significant at a 1% level, (**) = statistically significant at a 5% level, (*) =statistically significant at 10% level.

APPENDIX 2

The taxonomy of unscheduled news changes through time, as market-moving news appear and disappear quite swiftly. A good example is the recent (second half of 2013) fuss about the “tapering” issue of the quantitative easing by the Fed. Sharp movements of exchange rates, bonds and stocks occurred in response to expected or unexpected hints of tapering, or lack of them, in any FOMC communiqué or talks and statements by FOMC members or by Governor Bernanke. What is relevant on this topic is the frequently inconsistent and unpredictable reactions by financial markets. A reasonably complete taxonomy, at this time (as the future can bring some more), could be the following one, with examples in two tables, later on.

A) Scheduled policy statements (like the press conferences of ECB Governors, or the Humphrey-Hawkins testimonies by US Fed Chiefs) of uncertain content on US or internationally sensitive issues. In most recent times, the reactions to these generally unequivocal messages (at least in the “packaging”) have become highly volatile. Delayed effects in the following days are frequent.

B) Unscheduled policy statements or simple opinions in interviews or in question and answer sessions at the end of formal press conferences (other than those by ECB, Fed, BoJ, etc., in this latter case).

C) Uncertain interpretations of monetary policy decisions already taken or about the wording used in official press releases (typically those by the Fed) or in the FOMC minutes.

D) Terrorist events deemed to be influential on policy decisions, commodities price developments (especially oil) or international mobility of factors of production.

E) Institutional or personality events (Government or Parliamentarian, central bank officials, etc.) involving leading policy makers, potentially able to cause policy changes.

F) Events or sequence of events which may lead – or actually leading – to important policy shifts or to unwelcome market developments, or polarization of expectations of them for the future.

G) Occasional or short term market positioning produced by market sentiment or by ambiguous interpretation of future events.

H) Public interventions by Central Banks in the foreign exchange market or statements announcing or threatening them (Japanese Monetary Authorities are a good example). Simple discussions about exchange rates or even mentions of them in official statements or interviews, by central banks’ Governors or high-ranking officials, belong to this group.

I) Unexpected – or moderately so - changes of official interest rates or strong expectations about their changes whenever they remain invariant.

J) Communication to the markets of economic indicators considered to be occasionally important in particular situations, in relation to macroeconomic or

market trends; these are generally amongst statistically non-significant scheduled news, getting suddenly and briefly popular; German scheduled news typically belong to this lot.

K) A contemporaneous - or sequential in the very short term - publication by the US and the Eurozone of minor macroeconomic indicators, typically statistically non-significant scheduled news, when arriving in isolation, but able to produce effects when they arrive in clusters.

L) Unexpected – or moderately so - upgrading or downgrading by Rating Agencies of official financial Institutions or of the entire public debt issued by sovereign countries. Typical events in the recent Eurozone financial crisis.

M) Market or policy events connected to the post-2007 international financial crises generated by the subprime mortgages defaults (connected to derivative products) and Eurozone sovereign debt problems.

The unscheduled events³⁹, used in this paper are described by the A-M typology above. They were extracted from a large archive of daily events dating from 1998 (and before, see Tivegna and Chiofi, 2004) until today. This unique hand-collected archive of news – called informally *Newsmetrics* – contains, each day, on average between ten and fifteen daily articles and extended newsflashes from the Financial Times, the Wall Street Journal, Bloomberg News, Reuters and Dow Jones Newswires⁴⁰. The richness and completeness of *Newsmetrics* has helped to isolate the “main” news of each time zone (not “of the day”)⁴¹.

Tables A.1 and A.2 contain examples of the kind of unscheduled news used in this paper. Table A.1 makes reference to a period of two months in 2003 (May and June). Table A.2 covers eleven months in 2013, till November. *Newsmetrics* has grown up out of a daily collection of events. This latter table has a few items which are not coded as unscheduled news. Their role is to reinforce the decision to propose an event as an unscheduled news and give more clue on it. So they are indicated with a “CONN”, meaning they are connected with the coded unscheduled news immediately following them. Besides, they help establishing more accurately the

³⁹ Here again we stress the unscheduled nature of these news does not originate from being unexpected on the basis of a calendar of events. The random occurrence is an important factor. But not only that. The content of unscheduled news is generally unknown and the reaction – once this content appears – can be totally unpredicted and even unpredictable. It happens frequently, with this kind of events, that the content of an unscheduled news, occurring at a scheduled time, is strongly expected. If this content deviates from expectation, the market reaction can be wild and – again – totally unpredictable.

⁴⁰ The above reliance mostly on newspaper articles deserves some extra speculation. In fact, the very idea of a tri-partition of the GTD came about by the news search process employed here and in previous studies, Fornari et al. (2002), Tivegna and Chiofi (2004) and Cagliesi and Tivegna (2006). An important issue remains open: the exact allocation of an event to one of the three time zones (ASTZ, ETZ, ATZ). The articles are dated but generally make reference to the entire day. Some external information, some experience was used to make the time allocation of the news. In a few case it was necessary to make reference to the time stamp of Bloomberg newsflashes.

⁴¹ So, for instance, in recent times, the communication of ECB council decisions on interest rates to financial markets (at or a little before 1PM, CET, well within ETZ) does not move Euro-Dollar that much. The ECB press conference, generally at 2:30PM CET, is in ATZ and assigned to this area, even though it is the most European event for financial markets, after the beginning of the Euro era in 1999. And the real reaction occurs there.

sign of the news. Some effort was made to keep the collection criteria as homogeneous as possible through time.

The basic selection criterion was:

- 1) compute an eight-hour standardized €-\$ rate of change of the 6AM value (with respect to 10PM in the previous day, for ASTZ), of the 2PM value (with respect to 6AM, for ETZ) and of the 10PM value (with respect to 2PM, for ATZ), all at Central European Time (CET), exchange rates;
- 2) spot the time zones where this standardized rate of variation exceeds 1.2 – 1.5;
- 3) look – in *Newsmetrics* - whether an explanation exists, within one of the items of the A – M taxonomy reported above;
- 4) if an explanation is found, then an unscheduled news - Euro-positive or Euro-negative - code is assigned to the event: ASTZ/P(N), ETZ/P(N), ATZ/P(N);
- 5) no explanation, no news.

Needless to say various borderline situations occurred, especially for the news typologies G, J and K. In this respect some “subjective bias” in the selection process could be present. With some experience insight, it can be said that the overall market and policy situation - and the connected “mood” - play an important role in the assignment of the unscheduled news typology to an event.

Table A2.1

Description of unscheduled news (05/2003-06/2003)

This table contains a sample of unscheduled news collected from various newspapers sources between May 2003 and June 2003. The first two columns indicate the date and weekday of release. The text of the news is contained in column 3. Each news is assigned to one of the three time zones (ASTZ, ETZ, ATZ) and associated with the expected impact on the €-\$ exchange rate, Euro-positive, P, Euro-negative, N (column 4). The reference to the A-M taxonomy, written above, is reported in column 5, the sources are in column 6. They are: WSJ: *Wall Street Journal* , BLO: *Bloomberg News*, FT: *Financial Times*.

Date	Weekday	Text	Category/Sign	Typology	Source
06/05/2003	Tuesday	The dollar fell sharply against the euro Tuesday, after the Federal Reserve kept interest rates intact.	ATZ/P	(C)	WSJ
12/05/2003	Monday	The dollar fell to \$1.16 against the euro for the first time in more than four years after Treasury Secretary John Snow suggested (ABC Television, on Sunday) the U.S. isn't concerned with the currency's 21 percent slide in the past year.	ATZ/P	(B,H)	BLO
14/05/2003	Wednesday	The German economy, Europe's biggest, shrank in the first quarter of 2003 by 0.2 per cent, according to official data released on Thursday. The news raises the prospect that Germany will slip into recession - as defined by two successive quarters of contraction - this year.	ETZ/N	(J)	FT
15/05/2003	Thursday	The Eurozone economy teetered on the brink of recession in the first three months of the year, according to figures released on Thursday that will intensify pressure on the European Central Bank to cut interest rates.	ETZ/N	(K,J)	FT
16/05/2003	Friday	After range-trading early in the European session, the greenback began sliding across the board. The foreign exchange markets appear to be going through one of their occasional regime changes. Strategists said there their occasional regime changes. Strategists said there was no one reason to explain the dollar's renewed weakness, but noted sentiment towards the currency had remained bearish	ATZ/P	(G)	FT
19/05/2003	Monday	The dollar fell to a series of lows across the board on Monday after weekend comments by John Snow, the US Treasury secretary, were seen as underlining the US administration's relaxed attitude towards the dollar's fall. After the G7 and G8 meetings ended on Sunday, Mr Snow described the dollar's fall as a "modest realignment".	ETZ/P	(B,H)	FT
20/05/2003	Tuesday	The dollar fell late Tuesday on news that the U.S. government decided to raise the nation's terror alert level back to orange, or "high," from yellow, or "elevated".	ATZ/P	(D)	WSJ
23/05/2003	Friday	The euro rose above its 1999 launch levels on Friday as the dollar tumbled on a combination of rising risk aversion on fresh terrorist fears and thin markets ahead of the long weekend in both the UK and the US. Its sudden move higher surprised traders, who said the speed was exacerbated by stop-loss selling - automated orders triggered when a currency pair reaches a particular level, above the euro's previous high. (in ETZ)	ETZ/P	(D,G)	FT
23/05/2003	Friday	The euro continued its upward march against the dollar Friday, finishing within striking distance of its historical high just under \$1.19. Thin market conditions could hinder further progress until full-scale global trading resumes on Tuesday after the long weekend in both the U.S. and the UK. (in ATZ)	ATZ/P	(G)	WSJ
27/05/2003	Tuesday	The euro reached a lifetime high against the dollar and hit fresh record highs against the yen and sterling on Tuesday as negative sentiment towards the US currency prompted investors to turn to the euro.	ETZ/P	(G)	FT
28/05/2003	Wednesday	The euro on Wednesday eased off Tuesday's lifetime highs against the dollar and sterling as investors booked profits on the single currency's recent sharp gains. The euro was at \$1.173 against the dollar by midsession in New York after hitting a lifetime high at \$1.1932 on Tuesday	ETZ/N	(G)	FT

29/05/2003	Thursday	The dollar's rally appeared to have come to an abrupt halt on Thursday after investors shrugged aside an upwards revision to US growth data and focused instead of soft labour market figures.	ATZ/P	(G)	FT
30/05/2003	Friday	The dollar rose the most in eight weeks against the euro in New York trading after President George W. Bush said he will express support for a 'strong dollar' at a weekend meeting of the leaders of the largest industrial nations.	DUSN	(B,E,H)	BLO
02/06/2003	Wednesday	The dollar eased up after strengthening sharply against the euro in early Monday trading on supportive comments from President Bush over the weekend. Growing speculation of a more aggressive rate cut by the European Central Bank also fueled the dollar's early strength.	JTZ/N	(B,E,G,H)	WSJ
05/06/2003	Thursday	The euro was the market's main focus and it rallied sharply after the ECB cut interest rates by half a percentage point, meeting analyst's expectations. (in ETZ)	ETZ/P	(I)	FT
05/06/2003	Thursday	The dollar plummeted across the board Thursday after the European Central Bank cut its short-term interest rates half a percentage point and weak U.S. data pointed to future pitfalls ahead of a keenly-awaited U.S. employment report. (in ATZ)	ATZ/P	(I)	WSJ
10/06/2003	Tuesday	The German Bundesbank has downgraded its growth forecast for 2003, in a move likely to create further embarrassment for the government.	ATZ/N	(L)	FT
11/06/2003	Wednesday	The euro gained against the dollar on Wednesday as Eurozone officials played down the likelihood of further rate cuts	ETZ/P	(B)	FT
11/06/2003	Wednesday	The dollar softened against its trans-Atlantic counterparts on continued expectations of a U.S. interest-rate cut. Recent comments by Federal Reserve officials have fueled speculation of a rate cut at the central bank's June 24-25 policy meeting, with the market looking for additional indications Wednesday.	ATZ/P	(B)	WSJ
13/06/2003	Friday	The dollar dipped to its lowest levels of the day against the euro after a fall in consumer confidence took the market by surprise and sparked further speculation of a rate cut by the Federal Reserve later this month.	ATZ/P	(F)	FT
18/06/2003	Wednesday	The dollar advanced steadily on Wednesday as investors lowered expectations of the likelihood of a half-point interest rate cut by the Federal Reserve next week following strong data on Monday and Tuesday	ATZ/N	(K)	FT
19/06/2003	Thursday	The dollar rose to a month high against the euro on Thursday as fears that the US Federal Reserve will cut interest rates by a half point eased.	ATZ/N	(I)	FT
20/06/2003	Friday	The dollar rallied broadly against its rivals Friday on profit-taking and adjustments of positions as some investors shifted back to expectations that the Federal Reserve may cut interest rates by 25 basis points at next week's meeting.	ATZ/N	(I)	WSJ
23/06/2003	Monday	The dollar rallied to its strongest in a month against the euro and made ground against other currencies as investors began to price in a smaller rate cut and a relatively positive statement from the Federal Reserve when it announces its policy decision on Wednesday	ATZ/N	(I,G)	FT
26/06/2003	Thursday	The dollar rocketed higher to finish the day around its session peaks after the Fed Reserve's smaller-than-expected interest-rate cut and more-upbeat comment.	ATZ/N	(I)	WSJ
30/06/2003	Monday	European central bankers, via the Bank for International Settlements, on Monday backed U.S. acceptance of a weaker dollar to stimulate the U.S. economy.	ATZ/P	(A)	WSJ

Table A2.2**Description of unscheduled news (12/2012-11/2013)**

This table contains a sample of unscheduled news collected from various newspapers sources between December 2012 and November 2013. The first two columns indicate the date and weekday of release. The text of the news is contained in column 3. Each news is assigned to one of the three time zones (ASTZ, ETZ, ATZ) and associated with the expected impact on the €-\$ exchange rate, Euro-positive, P, Euro-negative, N (column 4). The reference to the A-M taxonomy, written above, is reported in column 5, the sources are in column 6. They are: WSJ: *Wall Street Journal*, BLO: *Bloomberg News*, FT: *Financial Times*.

Date	Weekday	Text	Category/ Sign	Typology	Source
30/12/2012	Sunday	Last-ditch talks in Congress over the US budget have faltered a day before the deadline for a deal, leaving financial markets facing the prospect of entering the new year in a highly unstable economic environment.	CONN	(F)	FT
02/01/2013	Wednesday	The last-minute deal over the US fiscal cliff triggered a lift in equity markets around the world as the threat of sharp tax rises and spending cuts tipping the world's biggest economy into a new recession receded. But the rally in the wake of the deal may not last long, as the White House and Republicans are already positioning themselves for a series of even greater confrontations over the budget in the early months of the year.	CONN	(F)	FT
02/01/2013	Wednesday	Perceived riskier currencies like the Canadian and Australian dollars climbed Wednesday, a day after the U.S. Congress reached a deal to avert the so-called fiscal cliff. Investors poured into various risk assets on the hopes that Tuesday's last-minute deal in the U.S. would help the world's largest economy avoid a recession in 2013. The yen and to a lesser extent the U.S. dollar—the markets' perceived safe havens—were hurt by the early-year trading.	ASTZ/N	(F)	WSJ
03/01/2013	Thursday	Officials at the US Federal Reserve are split on whether to keep buying assets until the end of 2013, according to the minutes of their December meeting. The minutes show the new front line for debate on the rate-setting Federal Open Market Committee and give the first indication of how big the Fed's third round of quantitative easing – so-called QE3 – may be in total.	ATZ/N	(C)	WSJ
03/01/2013	Thursday	The dollar rose broadly against other currencies after comments from the Federal Reserve suggested central bank officials may halt bond-buying programs that have been crucial in buoying the economy as early as this year. Minutes of the Fed's Dec 11-12 policy meeting revealed that some officials supported an immediate halt to the program—in which the central bank pumps \$85 billion per month into the economy through securities purchases—while others pushed to continue the buying until year end. The Fed has previously said it would continue the asset purchases, known as quantitative easing, until the unemployment rate improves, without specifying any period of time.	ATZ/N	(C)	FT
10/01/2013	Thursday	The European Central Bank hailed a “normalisation” in financial market conditions on Thursday as its governing council voted unanimously to keep rates on hold, signalling confidence that the eurozone would stage a gradual recovery from recession later in the year. The euro rallied against the US dollar, gaining 1 per cent on the day to touch \$1.3195 as Mario Draghi, ECB president, spoke at a regular monthly press conference after its decision to leave its main refinancing rate unchanged at 0.75 per cent. While cautioning that risks to growth “remain on the downside” in the eurozone, Mr Draghi started the year in upbeat mood, checking off a list of indicators of financial stress that had improved since the middle of last year when fears of a euro break-up peaked.	CONN	(A)	FT
10/01/2013	Thursday	The euro rose above \$1.32 against the dollar after the European Central Bank kept interest rates on hold and signalled a more positive outlook for the eurozone. The single currency gained 1.2 per cent to touch \$1.3224 after Mario Draghi, ECB president,	ATZ/P	(A)	FT

12/01/2013	Saturday	forecast that the eurozone would return to growth this year and said the decision to keep the eurozone's main refinancing rate steady at 0.75 per cent had been unanimous. While the ECB had not been expected to lower rates, investors and analysts had focused on the policy statement from the ECB for indications of a cut. Greece's parliament approved fresh tax reforms early on Saturday after a noisy session in which opposition lawmakers claimed the coalition government had "hijacked the democratic process". Yannis Stournaras, the technocratic finance minister, defended the adoption of emergency parliamentary procedures to push through measures on grounds that international creditors' deadlines for handing out €14.7bn of aid by March were fast approaching.	CONN	(M)	FT
14/01/2013	Monday	Risk-related currencies rose against the US dollar on Monday as foreign exchange markets started the week on a positive note, with the euro making further gains and the Japanese yen continuing to weaken. The single currency hit a fresh high for the year against the US currency, rising 0.2 per cent to touch \$1.3403, its strongest level since February, as optimism on the euro continued following the European Central Bank's decision last week not to cut interest rates.	ASTZ/P	(A,M)	FT
30/01/2013	Wednesday	The euro hit a 14-month high against the dollar, shrugging off a fall in Italian business confidence. There was also a contraction in Spanish economic growth and investors continued to rebalance towards the single currency. The euro rose 0.6 per cent against the US dollar to \$1.3579 after an economic sentiment indicator from the European Commission showed a better than expected rise in January. The single currency remained near that level after the Federal Reserve signalled no deviation from its highly	ETZ/P	(J,A)	FT
07/02/2013	Thursday	Mario Draghi, European Central Bank president, on Thursday verbally intervened in what some policy makers fear has the makings of a global currency war, sending the euro to its lowest level against the dollar in nearly two weeks. The recent strength of the euro has alarmed European businesses and politicians since a sustained rise could kill off early signs that the battered eurozone might return to growth this year as exports pick up. But with central banks around the world adopting ever looser monetary policies and in some cases, like Japan, bowing to overt political pressure to do so, concerns have grown of a series of competitive devaluations dubbed a currency war as nations try to ensure their exports remain competitively priced. After the ECB's monthly interest rate-setting governing council kept rates on hold at 0.75 per cent, Mr Draghi reiterated that the bank's mandate was to target inflation – or maintain price stability – and not the exchange rate. But he added: "We want to see if this appreciation is sustained and if it alters our assessment of price stability." He also issued a veiled rebuke to François Hollande, France's president, who this week called for a "managed exchange rate" – comments that had little effect on the euro. "President Hollande. Well, we should always remember that the ECB is independent," he said. "We heard all over the world now talking up, talking down currencies. The ultimate judgment of the effectiveness of this strategy is to see what markets make of these statements." The euro fell below \$1.34 against the dollar for the first time since January and suffered heavy losses against the UK pound and the Japanese yen.	ETZ/N	(A,H)	FT
20/02/2013	Wednesday	The US Federal Reserve is backing away from open-ended asset purchases as officials grow nervous about the dangers of a bigger balance sheet. According to the minutes of its January meeting released on Wednesday, "many" officials are concerned about the costs and risks of further asset purchases, as the Fed buys securities at a pace of \$85bn a month. The minutes suggest that QE3 – as the Fed's third round of quantitative easing is known – could end earlier than previously thought and is no longer a truly open-ended programme.	CONN	(A)	FT
20/02/2013	Wednesday	The dollar rallied after minutes from the Federal Reserve's latest meeting prompted investors to raise expectations that the central bank may wind down its bond-buying program sooner than expected. The Fed's statement showed that "a number of participants" in the January policy meeting discussed the possibility that the bank may need to taper its bond buying even before the job market improves. The U.S. central bank is currently buying \$85 billion a month in assets, pumping dollars into the economy to keep interest rates low and stimulate growth. Slowing	ATZ/N	(A)	WSJ

25/02/2013	Monday	the pace of those bond purchases, or ending the program altogether, might allow the dollar to rise. " The euro fell dramatically as concern about Italy's election stoked investor anxiety about a return of political risks in the euro zone. The single currency abruptly reversed gains notched in earlier trading after voter surveys in Italy pointed to a tight race. The euro had its biggest one-day decline against the yen since May 2010. Early exit polls in Italy indicated a center-left coalition led by Democratic Party leader Pier Luigi Bersani was on track to win a majority in Italy's lower house, but later polls indicated that former Prime Minister Silvio Berlusconi's center-right coalition might win in the upper house. That divide, if confirmed by the final vote tally, could put in doubt the country's ability to continue with key economic reforms, potentially pushing it toward a new election as early as this summer.	ATZ/N	(M)	WSJ
07/03/2013	Thursday	The euro rose more than 1 per cent against other major currencies after the European Central Bank kept interest rates on hold and said its monetary policy would remain "accommodative". The single currency hit its strongest level against the dollar in a week at \$1.3116 even as the ECB downgraded its growth forecasts for the year and said an interest-rate cut had been discussed, as expectations the central bank might cut rates Thursday were dashed.	ATZ/P	(A)	FT
18/03/2013	Monday	Cypriot authorities scrambled to renegotiate the terms of a €10bn bailout by moving to scrap its controversial levy on small account holders and instead seizing more from larger depositors and businesses. The islands' banks were ordered to stay closed for two more days to avoid a bank run, as the government delayed for the second day running a parliamentary vote on the deal struck with eurozone officials and the International Monetary Fund over the weekend.	CONN	(M)	FT
18/03/2013	Monday	The euro fell to its weakest level in three months against the US dollar as investors reacted to news that a proposed eurozone bailout of Cyprus would involve a tax on bank savers. The single currency dipped to \$1.2880 in Asian trading but later stabilized to trade above \$1.2950 as reports emerged that politicians in Cyprus were considering amending the deal to relieve the pressure on small depositors.	ASTZ/N	(M)	FT
19/03/2013	Tuesday	The euro dropped to a 16-week low against the dollar on Tuesday, weighed by uncertainty over the details of an international bailout for Cyprus. Cyprus's parliament on Tuesday rejected a proposal to tax the country's bank deposits, part of an international €10 billion (\$13 billion) rescue package for the island nation.	ATZ/N	(M)	WSJ
20/03/2013	Wednesday	The US Federal Reserve kept its foot on the monetary accelerator but made a slight change to its language on its third round of quantitative easing that puts greater weight on the costs and risks. Asset purchases under QE3 will continue at a pace of \$85bn a month and the US central bank expects to keep interest rates low until the unemployment rate falls below 6.5 per cent from the current 7.7 per cent, the Federal Open Market Committee said at the end of a two-day meeting in Washington.	ATZ/P	(A)	FT
25/03/2013	Monday	News that a bailout had finally been agreed in the early hours of Monday sparked an initial rise in European stock markets and peripheral government bonds. The reason was relief that Cyprus had avoided a full-scale bank collapse. But the relief proved short-lived. After early gains, the euro fell below \$1.29 against the dollar as traders digested the potential effects of capital controls and the risk of contagion across Europe's banking system. Fears that the Cyprus rescue, which includes a "haircut" for large depositors, would set a precedent for similar action in other troubled eurozone countries had been one of investors' main concerns. Little wonder, then, that markets retreated when Jeroen Dijsselbloem, head of the eurogroup of finance ministers, said the Cypriot rescue marked a watershed in how the region deals with failing banks. Investors are worried, too, that capital controls in Cyprus will taint the banking system in other struggling eurozone countries.	CONN	(M)	FT
25/03/2013	Monday	The euro lost earlier gains on Monday as investors digested the fallout from a last-minute bailout deal to save the banking sector in Cyprus late on Sunday night. The single currency when Jeroen Dijsselbloem, head of the eurogroup of finance ministers, said the Cypriot rescue marked a watershed in how the region deals with failing banks. The deal includes a tax on depositors, while controls are expected to be imposed to prevent capital flight when the	ASTZ/P	(M)	FT

25/03/2013	Monday	country's banks reopen on Tuesday. The euro fell more than 1 per cent to \$1.2829, wiping out all its earlier gains on initial optimism after the news the deal had been struck. The euro fell to a four-month low against the dollar on Monday on concerns that Cyprus's bailout deal may set a precedent for future euro-zone bank restructurings. Cyprus secured a €10 billion (\$13 billion) bailout from international creditors early Monday, avoiding an exit from the euro zone after a week of tense negotiations. The deal will downsize the island nation's largest banks and impose losses on deposits with more than €100,000, an unprecedented move that will hit senior bank bondholders, who had been previously protected throughout the euro-zone debt crisis. The euro initially rose after the deal was announced but weakened as the New York session started, accelerating losses after Eurogroup head Jeroen Dijsselbloem reportedly said Cyprus represents a template for resolving future euro-zone banking problems	ATZ/N	(M)	WSJ
04/04/2013	Thursday	The euro rose after Mario Draghi, president of the European Central Bank, said that the recent bailout of Cyprus was not a template for other countries in the eurozone and that the ECB was able to cope with serious crises in the single currency bloc. The euro initially fell to its lowest level in a week after Mr Draghi noted that weak economic activity in the eurozone had continued into the first part of the year and said the central bank would retain its accommodative monetary stance for "as long as needed". As expected, the ECB kept interest rates on hold at 0.75 per cent. But the euro later rose close to \$1.29 against the dollar after Mr Draghi sought to damp concerns that the bailout of Cyprus raised the spectre of a country leaving the euro, stating that those who speculated about a break-up of the eurozone vastly underestimated "the will of policy makers to hold it together. The euro rose 0.2 per cent against the dollar to \$1.2888.	ATZ/P	(A,M)	FT
09/04/2013	Tuesday	The US dollar was weaker across the board after traders interpreted comments from Ben Bernanke, chairman of the US Federal Reserve, in a speech on Monday night as a sign that the US was unlikely to end its programme of bond-buying to ease monetary policy any time soon.	ASTZ/P	(B)	FT
02/05/2013	Thursday	The euro fell for the first time in five days against the dollar after European Central Bank President Mario Draghi said policy makers may take the unprecedented step of charging banks to hold excess reserves. The single currency dropped against all except one of its 16 most-traded peers as the ECB cut its main refinancing rate and Draghi said policy makers had an open mind on a negative deposit rate.	ATZ/N	(A)	BLO
10/05/2013	Friday	The dollar soared against other major currencies, after Thursday's breach of ¥100 yen acted as a catalyst for a broad rally in the greenback. The greenback hit its strongest level since October 2008 against the yen, trading as high as ¥101.99 in New York trading. It also notched an eight-month high against the Swiss franc and a one-month high against the euro.	ETZ/N	(G)	WSJ
22/05/2013	Wednesday	The U.S. dollar rallied as Federal Reserve Chairman Ben Bernanke said the Fed could begin tapering its bond-buying program in the "next few meetings." That decision will depend on economic data, he said. The next Fed meeting is scheduled for June 18-19. The ICE dollar index, a gauge of the greenback's movement against six other major currencies, rose to 84.34 from 83.877 late Tuesday in North America. The dollar index had earlier fallen as low as 83.46, according to FactSet. The WSJ Dollar Index, an alternative measure of the currency's moves against a slightly wider basket, rose to 75.91 from 75.42 late Tuesday. Minutes from the April 30-May 1 meeting released Wednesday showed a "number" of officials were ready to taper purchases as soon as June, although no consensus was reached. While the Federal Open Market Committee minutes didn't get a lasting dollar reaction, they were significant because they mentioned June as a potential date for easing, said Colin Cieszynski, senior market analyst at CMC Markets.	ATZ/N	(B,C)	WSJ
06/06/2013	Thursday	A combative Mario Draghi, president of the European Central Bank, strongly defended one of his bank's most unorthodox and controversial moves of the eurozone crisis as "probably the most successful monetary policy measure undertaken in recent times". Speaking after the ECB kept its main refinancing rate on hold at 0.5 per cent and decided to keep any other non-standard measures "on the shelf", Mr Draghi said an absence of deflationary risks in	CONN	(A)	FT

		the eurozone and a stock market rally were the fruits of the bank's outright monetary transactions, or OMT scheme, announced last September.			
06/06/2013	Thursday	The dollar suffered a sharp fall on Thursday as concerns over how much longer the Federal Reserve would keep pumping liquidity through the global financial system led investors to sell off the US currency. The move followed a euro rally after the European Central Bank kept interest rates on hold at its monthly meeting and raised its forecasts for growth in the eurozone next year despite scaling back its expectations for 2013. This spurred further dollar selling in the world's largest financial market as the currency breached technical support levels. The dollar index fell nearly 2 per cent while the US currency dipped 3 per cent against Japan's yen to move below Y96.	ATZ/P	(A,C)	FT
09/06/2013	Sunday	One of the bitterest fights in monetary policy lands in court this week as Germany's highest legal authority hears evidence over whether the European Central Bank's pledge to save the euro last year undermined the constitution.	ASTZ/N	(M)	FT
19/06/2013	Wednesday	Ben Bernanke, Federal Reserve chairman, offered the firmest timeline yet for tapering US central bank asset purchases, saying that the central bank's \$85bn monthly programme could be slowed this year and end altogether around the middle of next year. In a statement following the latest meeting of the Federal Open Market Committee, Mr Bernanke said it would be "appropriate to moderate the monthly pace of purchases later this year," assuming the Fed's expectations for an improved economic outlook held true. He added that there would be "measured steps through the first half of next year" to slow asset purchases, which would end "around midyear". Mr Bernanke also said the bond buying could end once the unemployment rate fell below 7 per cent. It was 7.6 per cent in May.	CONN	(A,B)	FT
19/06/2013	Wednesday	The dollar surged after Federal Reserve Chairman Ben Bernanke took a more optimistic view of the economy and outlined a potential timeline for ending the central bank's bond buying. In a statement accompanying the central bank's monthly monetary policy meeting, Federal Reserve officials upgraded its assessment of the economic recovery, saying unemployment may fall to 6.5% by the end of 2014.	ATZ/N	(A,B)	WSJ
20/06/2013	Thursday	The International Monetary Fund is preparing to suspend aid payments to Greece by the end of next month unless eurozone leaders plug a €3bn-€4bn shortfall that has opened up in Greece's €172bn rescue programme, according to officials involved in management of the bailout. The gap emerged after eurozone central banks refused to roll over Greek bonds they hold, and comes amid signs that even the scaled-back privatisation plan Athens agreed to last year is falling behind schedule. Officials involved in the Greek talks emphasised that, unlike previous slippages in the bailout, the fault did not lie with Athens but rather in other eurozone capitals.	ASTZ/N	(M)	FT
20/06/2013	Thursday	The dollar surged against counterparts worldwide ranging from Australia's currency to Turkey's lira as the Federal Reserve's signal it is getting closer to reducing monetary stimulus pushed volatility to the highest in a year and spurred losses in carry trades. The U.S. currency strengthened versus all of its 16-most-traded peers and Deutsche Bank AG's G10 FX Carry Basket index fell to the lowest level since October as Fed Chairman Ben S. Bernanke yesterday outlined the case for reduced monetary stimulus this year if the U.S. economy keeps improving.	ETZ/N	(A,B)	BLO
21/06/2013	Friday	The Greek government of Antonis Samaras saw its parliamentary majority shrink to a handful of votes on Friday after a junior coalition partner quit over the closure of the state broadcaster, imperilling his ability to continue with tough bailout reforms. Although Mr Samaras may be able to count on a handful of independent members of parliament for support, the departure of the Democratic Left party left Mr Samaras' New Democracy and centre-left Pasok with a mere three seat majority.	ATZ/N	(M)	FT
24/06/2013	Monday	The dollar continued its march forward in the wake of the Federal Reserve's plans to tighten monetary easing with the US currency hitting its strongest level in more than two weeks. The dollar index, which weighs the US currency against a basket of counterparts, gained 0.4 per cent to trade above 82.50, its strongest level since the start of the month. Higher-yielding developed market currencies made heavier losses against the dollar.	ASTZ/N	(G)	FT

26/06/2013	Wednesday	The euro dipped below \$1.30 against the dollar for the first time in more than three weeks after Mario Draghi, European Central Bank president, said that the eurozone central bank would retain its accommodative stance for the foreseeable future. The euro fell 0.7 per cent to \$1.2985 as investors contrasted the ECB's dovish message with that of the Federal Reserve, which plans to tighten monetary policy later this year if the US economy improves.	ETZ/N	(A)	FT
04/07/2013	Thursday	The European Central Bank and the Bank of England both took the unorthodox step of offering explicit guidance on low future interest rates on Thursday, in what amounted to a transatlantic rejoinder to hints of tightening by the US Federal Reserve. Dropping a longstanding policy of never "pre-committing" to future interest rate decisions, Mario Draghi, ECB president, ruled out any rate increase for an extended period, reflecting nervousness about the economic outlook for the bloc .In London, Mark Carney, the Bank of England's new governor, introduced a similar element of "forward guidance" into a statement on the economy by saying the market's recent expectations of rate rises in 2015 "were unwarranted".	CONN	(A)	FT
04/07/2013	Thursday	The euro hit its weakest level since May after the European Central Bank said it expected interest rates to remain at or below their current levels for an extended period of time. The single currency fell nearly 1 per cent to dip below \$1.29 after Mario Draghi, ECB president, said the restrained outlook for inflation, weakness in the eurozone economy and subdued monetary dynamics had led the central bank to inject a downward bias to interest rates. Mr Draghi said the decision to give forward guidance on interest rates, which was taken unanimously by the ECB governing council, was "a very significant step forward" for the central bank.	ATZ/N	(A)	FT
09/07/2013	Tuesday	The euro slid to a three-month low against the dollar after an official at the European Central Bank signalled it may remain accommodative for more than a year, further diverging from policy in the U.S. Europe's shared currency slid versus most major peers after Reuters reported ECB Executive-Board Member Joerg Asmussen said the bank's forward guidance, which is that interest rates will stay low for an extended period, goes beyond 12 months.	ATZ/N	(B)	BLO
10/07/2013	Wednesday	The dollar fell against the yen and euro after minutes from the Federal Reserve's June meeting failed to clarify when the central bank would end its bond purchases. The minutes showed Fed officials divided about the timing of a reduction in bond-buying, with half of Fed officials believing the central bank should end the stimulus program by the end of this year. Other Fed officials said the labour market hasn't improved enough to begin tapering so soon. That disappointed traders hoping for a clearer timetable, and sent the dollar lower against its rivals.	ATZ/P ASTZ/P (T+1)	(A)	WSJ
05/09/2013	Thursday	Mario Draghi, European Central Bank president, expressed extreme caution about the eurozone's nascent economic recovery as the bank's governing council kept rates on hold on Thursday and reiterated its pledge that it would not tighten for an extended period. Although he stressed that the bank was "particularly attentive" to money market conditions, where expectations of future overnight interest rates have edged upwards as excess liquidity in the banking system falls, Mr Draghi if anything stepped back from previous suggestions that the ECB would take action under certain predictable circumstances. "I am very, very cautious about the recovery, I can't share the enthusiasm," he said at a monthly press conference. "These shoots are still very, very green."The eurozone exited an 18-month recession in the second quarter when it grew 0.3 per cent. But in spite of the improvement, the euro area remains weighed down by record joblessness and output is well below the level at which it entered the crisis. The ECB chief said there had been a discussion about cutting interest rates at the governing council meeting, with some among the 17 national central bank governors and six ECB executive board members suggesting the fragility of the recovery merited discussing a cut and others arguing that the improvement itself meant no cut should be debated.	CONN	(A)	FT
05/09/2013	Thursday	The euro fell after European Central Bank President Mario Draghi reiterated that interest rates would remain "at present or lower levels for an extended period of time" and revealed there had been a discussion on the possibility of further rate cuts.	ATZ/N	(A)	FT

16/09/2013	Monday	The dollar fell to a one-month low as the exit of former Treasury Secretary Lawrence Summers from the race to lead the Federal Reserve damped bets for an early end to expansionary monetary policy. The U.S. currency weakened as Summers's decision fuelled speculation the Fed will be more cautious to remove monetary stimulus, which tends to weaken a nation's foreign exchange.	ASTZ/P	(E)	BLO
18/09/2013	Wednesday	The US Federal Reserve sprung a surprise on markets by keeping its asset purchases steady at \$85bn a month as it cut growth forecasts for 2013. Despite expectations that the Fed would start to taper its third round of quantitative easing, the rate-setting Federal Open Market Committee said it would "await more evidence that progress will be sustained before adjusting the pace of its purchases".	ATZ/P	(A,I)	FT
02/10/2013	Wednesday	The euro jumped to an eight-month high against the dollar on Wednesday after the European Central Bank held out the possibility of more cheap loans for banks and Italy's Prime Minister Enrico Letta survived a confidence vote. Mario Draghi, ECB president, told reporters after the central bank's decision to leave interest rates unchanged that it remained ready to take more action if needed – leaving open the possibility of a third longer-term refinancing operation. Moreover, he voiced no concern about the level of the euro. The single currency rose as high as \$1.3606 during his press conference. "A lot of people expected Draghi to repeat what he did back in February when he expressed his concern at the level of the euro versus the dollar," said Kathleen Brooks at Forex.com.	ATZ/P	(A,M,H)	FT
15/10/2013	Tuesday	The dollar gained versus the euro for the first time in three days as the House and Senate worked on competing plans to end the two-week government shutdown and keep the U.S. from exhausting its ability to borrow money.	ETZ/N	(F)	BLO
17/10/2013	Thursday	The U.S. dollar sank, U.S. Treasury prices rallied and gold shot higher after lawmakers reached a last-minute deal to avoid a U.S. debt default, as investors anticipated that lingering uncertainty in Washington would push back the Federal Reserve's plans to wind down stimulus efforts. The 11th-hour deal struck late Wednesday in Congress will reopen the government, but investor relief turned to concern about the 16-day fight's toll on the world's largest economy. Many analysts have pushed back their expectations for a reduction in Fed bond buying—once viewed as certain to begin in September—until the first quarter of 2014. In addition, investors remain wary that U.S. lawmakers will go through a similar political standoff in early 2014, further muddying the growth outlook.	ETZ/P ATZ/P	(F)	WSJ
31/10/2013	Thursday	The euro fell sharply on Thursday after data showing eurozone inflation at its weakest in nearly 4 years prompted speculation that the European Central Bank could soon take action to avert the risk of Japan-style deflation. The euro has been one of the strongest major currencies this year, supported by a hefty current account surplus, a resumption of capital inflows to equity markets and a broader perception that its long-term survival is no longer in doubt. Moreover it has also regained a role as a haven currency as uncertainty over US monetary policy and aggressive monetary easing in Japan reduced the attractions of the dollar and yen.	ETZ/N ATZ/N	(J,G)	FT
01/11/2013	Friday	Investors' love affair with the euro has come to an abrupt end. The single currency traded at \$1.3488 early Friday in ATZ/N New York, down 2.5% from a nearly two-year high of \$1.3833 a week ago. Much of those losses have come since. Thursday, when the euro zone reported that inflation cooled to a four-year low in October, while joblessness climbed to a record high. Some now expect that anemic euro-zone inflation reading will spur the European Central Bank to cut rates at its meeting next week. Meanwhile, better-than-expected U.S. manufacturing data raise the odds of the Fed cutting its bond purchases in December.	ETZ/N	(J,G)	WSJ
07/11/2013	Thursday	The European Central Bank on Thursday responded to fears of deflation across the eurozone by unexpectedly cutting rates to a record low and insisting it had more weapons in its "artillery" to prevent price falls. Mario Draghi strengthened his reputation as a far bolder ECB head than his predecessor, presiding over a cut which left the central bank's benchmark main refinancing rate at 0.25 per cent and sent the euro tumbling against the dollar. A fall in inflation last month to less than half the ECB's target of just under 2 per cent has heightened concerns that disinflation, or even a period of Japan-style deflation, could add to the currency bloc's economic woes. Though most analysts thought the ECB would	ETZ/N ATZ/N	(I)	FT

wait until December to cut, Mr Draghi said there was now a possibility that the bloc could “experience a prolonged period of low inflation”. The euro initially recorded its sharpest fall in almost two years. While it later clawed back some of those losses, it remained down about 0.8 per cent by late afternoon in London, trading at \$1.34. Investors applauded the decision, sending European stocks up to five-year highs at one point and eurozone bond yields tumbling.

20/11/2013	Friday	The US Federal Reserve is considering cutting the interest it pays to banks on their reserves in a dramatic move to offset an eventual slowing of its \$85bn-a-month asset purchases. The central bank offered no new hints on when it could “taper”, reiterating that it was still expecting such a move “in coming months” but the discussion of alternatives at the rate-setting Federal Open Market Committee suggests it is keen to slow its buying.	CONN	(A,I)	FT
20/11/2013	Friday	The dollar rose against most major peers as Federal Reserve officials said they might reduce their \$85 billion in monthly bond purchases “in coming months” as the economy improves, minutes of their last meeting show. The euro dropped from a four-year high versus the yen as the European Central Bank is considering a negative deposit rate if more economic stimulus is needed, according to two people with knowledge of the debate.	ATZ/N	(A,I)	BLO