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On the impact of macroeconomic news surprises on Treasury-bond yields*

Imane El Ouadghiri† Valérie Mignon‡ Nicolas Boitout§

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Abstract

This paper investigates the impact of surprises associated with monthly macroeconomic news releases on Treasury-bond yields, by paying particular attention to the moment at which the information is published in the month. Implementing an event study on intraday data, we show that (i) the main bond market movers are based on economic activity and inflation indicators, (ii) long-maturity bonds are slightly more impacted by surprises than short-maturity ones, and (iii) the bond market is more sensitive to bad news than to good announcements. Finally, we evidence an empirical monotonic relationship between the surprises' impact and their corresponding news' publication date and/or their sign.

JEL Classification: G14, G12, E44, C22.
Keywords: bond market, event study, macroeconomic news.

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1 Introduction

A vast literature is devoted to the analysis of financial markets' responses to macroeconomic news announcements,[1] with pioneering studies[2] that have been implemented to investigate the efficient capital market hypothesis. Since the beginning of the 1980s, researches[3] have focused on whether the impact of macroeconomic news releases on financial assets is of the same nature and amplitude whatever the type of announcements, with the aim of identifying the economic indicators to which market participants are most sensitive. While the first studies (see, e.g. Schwert (1981)) were based, at the best, on daily data, the increasing availability of high-frequency series has lead to a renewed interest in the literature in assessing the reaction of return series to macroeconomic news few minutes or seconds after their publication.[4] Our paper falls into this strand of the event-study literature, considering the case of Treasury markets.

Basically, two kinds of information may affect asset prices. The first category is observed and interpreted homogeneously by all market participants, and is considered as "common knowledge news". The second category—"non-common knowledge news"—concerns information that is not observed by all market participants and gives way to different interpretations.[5] Being pre-scheduled with publication dates well known in advance by all market participants, expected macroeconomic news announcements can be considered as "common knowledge news". In this paper, we focus on such public news and aim at investigating the responses of Treasury-bond yields to those releases of scheduled macroeconomic announcements.

Information and economic statistics released by newspapers, news channels and international news agencies are generally published once per year, quarter, month or week. Organized according to a predetermined schedule known to all, these macroeconomic figures provide information about the current state of the economy and its future evolution through consensus forecasts published by professional forecasters. Public information concerns all economic fields, central banks policies, household sentiments, corporate profits, *etc.*, and the publication of these figures and associated forecasts plays a key role for financial analysts. Such information indeed constitutes a decision-making tool allowing them to take positions on the market. As shown by Andersen, Bollerslev, Diebold, and Vega (2002), Laakkonen (2007), Lee and Mykland (2008), and Lahaye, Laurent, and Neely (2011) among others, the arrival

[1] See, among others, Ederington and Lee (1993), Bollerslev, Cai, and Song (2000), Balduzzi, Elton, and Green (2001), Nikkinen and Sahlstrom (2001), Graham, Harvey, and Rajgopal (2005), Lobo, Darrat, and Ramchander (2006), Rigobon and Sack (2006), Lee and Mykland (2008), Birz and Lott Jr. (2011), Lahaye, Laurent, and Neely (2011), and Erdemlioglu, Laurent, and Neely (2012).

[2] See Ball and Brown (1968), Fama, Fisher, Jensen, and Roll (1969), Fama and Schwert (1977) and the literature surveys by Fama (1970) and Fama (1991).

[3] See e.g. Schwert (1981), Mitchell and Mulherin (1994) and the literature review by Fama (1991).

[4] See, e.g. Jain (1988), Becker, Finnerty, and Friedman (1995), Funke and Matsuda (2006), and Rigobon and Sack (2006).

[5] See Evans and Lyons (2002) and Evans and Lyons (2005) for more details.

of some of the most important expected macroeconomic news—such as the consumer price index, ISM (Institute of Supply Management) manufacturing index, consumer confidence index, retail sales, producer price index, non-farm payrolls and news related to the labor market to name a few—generate significant variations in asset returns and trading activities on financial markets, and often leads to large changes in market volatility, thereby causing discontinuities—commonly called "jumps" in the price process. These findings can be explained by the fact that traders change their positions in response to the arrival of new information on the market, such a flow of orders causing a sudden adjustment.

Agents do not automatically react to the value of macroeconomic figures itself, but more frequently to the distance that separates it from its forecast, i.e. to the surprise corresponding thus to the unanticipated component of news releases.[6] This characteristic explains why investors are willing to expend considerable resources in macroeconomic forecasting services in order to improve their decision-making process. As a consequence, a growing number of institutions conduct market participants' surveys and provide forecasts of upcoming macroeconomic news announcements. These institutions calculate the surprise component linked to the macroeconomic announcement, which is crucial in investigating the impact of such news on market returns and volatility (see Silvia and Iqbal (2012) among others). The choice of the forecasting institution is thus a key issue.

Specifically, there are currently five main forecast data providers, namely Bloomberg, Briefing.com, Dow Jones, International Money Market Services (MMS), and Reuters. MMS data have been used for a long time in several previous event studies. Considering various scheduled macroeconomic announcements provided by MMS, Ederington and Lee (1993) find that some of them affect the volatility of the three considered futures markets—Treasury bond, Eurodollar and Deutsche Mark—5 minutes after their announcement. Balduzzi, Elton, and Green (2001) investigate the effects of scheduled macroeconomic news also provided by MMS on bond prices, trading volume and bid-ask spreads, showing that 17 public news releases have a significant impact. Studying as well the influence of macroeconomic news announcements on interest rates using MMS consensus forecasts, Andersen, Bollerslev, Diebold, and Vega (2002) and Gürkaynak, Sack, and Swanson (2005) provide empirical evidence that long-term nominal forward rates are excessively sensitive to monetary policy shocks. Given that MMS ceased to provide its survey services in 2003 since its acquisition by Informa, recent studies essentially rely on data from Bloomberg, Dow Jones and Briefing.com. Dungey, McKenzie, and Smith (2007) use the Bloomberg survey to link the surprises to jumps and co-jumps in the U.S. term structure, and Jiang, Lo, and Verdelhan (2011) rely on both Bloomberg and Briefing.com forecasts to examine the importance of surprises versus market liquidity in explaining the jumps observed in the U.S. Treasury market. They find that jumps mainly

[6]See Ederington and Lee (1993), Balduzzi, Elton, and Green (2001), Andersen, Bollerslev, Diebold, and Vega (2007), Dungey, McKenzie, and Smith (2007) among others.

occur at the time when macroeconomic news are released, and that announcements preceding liquidity shocks—such as changes in the bid-ask spread and market depth—have significant predictive power for explaining those jumps. In all cases, the surprises are shown to have large and significant impact on financial asset prices.

More generally, the properties of forecasting surveys and comparisons between agencies' forecasts have been the subject of some investigations in the literature. Pearce and Roley (1985) examine the accuracy of MMS forecasts and put forward a significant bias in industrial production expectations. Balduzzi, Elton, and Green (2001) find little evidence that MMS forecasts are biased predictors of the considered announcements, and no evidence of expectation revisions during the time interval between the survey release and the news publication. Some studies seeking to compare the quality of forecasting surveys highlight the superiority of Bloomberg over other agencies. Considering a sample of 51 announcements, Noel (2000) shows that MMS forecasts are more volatile than Bloomberg's ones. Examining the U.S. equity futures markets' reaction to announcement surprises provided by both Bloomberg and Briefing.com, Chen, Jiang, and Wang (2013) also find that Bloomberg forecasts are overall more accurate and display smaller prediction errors than Briefing.com.[7] In line with these findings, we focus in this paper on the impact of macroeconomic reports extracted from the Bloomberg terminal.

Based on these data, our paper aims at investigating the impact of surprises associated with monthly macroeconomic news releases on Treasury-bond returns, by paying particular attention to the moment at which the information is published in the month. While various factors may be at play in explaining the impact of news releases on returns, such as the type of news and the economic context that prevails at the time of publication, the publication date itself may indeed be of crucial importance, possibly influencing the other news and leading to mimetic phenomena. One may thus expect that the earlier the news is published during the month, the more important will be its impact. We investigate this hypothesis in the present study. Our analysis complements the existing studies in several ways. First, we focus on the Treasury-bond market and retain two maturities—namely 2-year and 10-year—allowing us to compare the news' impact at different horizons, and to test the hypothesis that long-term bonds are more volatile than short-term bonds. Second, instead of focusing on one specific country, we consider a sample of five countries by investigating the effect of macroeconomic news announced in the United States, the United Kingdom, China, Germany and Japan on bond yields of the three former economies. The choice of those three countries can be justified by the fact that (i) U.S. and U.K. forecasting institutions are usually seen as robust and enough "mature" to attract the interest of global markets, and (ii) the increasing role played by China, whose trade balance figures have become a key indicator of world economic

[7] Especially for important news, such as those related to consumer price index, durable goods orders, GDP, personal spending and retail sales.

health. Third, to avoid masking intraday effects when dealing with daily data, we use intraday data—the frequency being 15 minutes for U.S. data, and 5 minutes for U.K. and China. We also consider a longer and more recent period compared to the existing event studies, starting in January 2007 and ending in March 2013, thus including major topical events such as the world financial crisis as well as the European debt crisis. Fourth, from a methodological viewpoint and to our best knowledge, our contribution is the first to establish a link between the strength of the impact of macroeconomic news and the corresponding publication date in the month and/or the sign of the associated surprises.

Our main findings can be summarized as follows. The time at which the news is published in the month strongly matters. Specifically, information released in mid-month generates very few surprises contrary to the news published at the beginning or the end of the month. Regarding the type of announcements, the main market movers are based on economic activity and inflation related indicators. Our event study also evidences that (i) not only U.S. surprises have a significant impact on bond yields, but also German and Japanese news, (ii) bad news have a greater effect than good announcements, as expected, and (iii) long-maturity bonds are slightly more sensitive than short-maturity ones to the arrival of new information, in accordance with the liquidity preference theory.[8]

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 presents some preliminary results regarding the forecasting surveys' accuracy, and the importance of the news' publication date. Section 4 is devoted to the event study, and Section 5 concludes the paper.

2 Data description

Macroeconomic news and bond price data are respectively extracted from Bloomberg and Reuters terminals.

2.1 Macroeconomic news announcements

According to Fleming and Remolona (1999), Balduzzi, Elton, and Green (2001), Andersen, Bollerslev, Diebold, and Vega (2002) and Andersen, Bollerslev, Diebold, and Vega (2007), bond yields respond significantly to announcements about employment, inflation, output, housing, consumer (CPI) and producer (PPI) price indexes. Chen, Jiang, and Wang (2013) also evidence that markets strongly react to inflation news (CPI and PPI announcements) and negative shocks in housing prices, personal spending, and retail sales. Dungey, McKenzie, and Smith (2007) retain CPI, PPI, retail sales, housing starts, GDP, durable goods and

[8]See also Dungey, McKenzie, and Smith (2007) who show that U.S. Treasuries tend to co-jump across maturities, with more unique jumps at both ends of the term curve, providing some support for both liquidity and preferred habitat hypotheses.

non-farm payrolls as the most important news items for bond markets. These macroeconomic figures that are considered as key factors are known in the event-study literature as "market mover indicators" and naturally include activity, employment and inflation indicators. Other variables can also be retained, depending on data availability. Following the afore mentioned previous studies, as well as Lahaye, Laurent, and Neely (2011), Jiang, Lo, and Verdelhan (2011) and Erdemlioglu, Laurent, and Neely (2012), we consider a wide set of news items including the subsequent monthly announcements' categories for our five considered countries: activity indicators (industrial production, durable goods orders, factory orders, ISM manufacturing index...), consumption and employment indicators (consumer confidence index, consumer credit index, retail sales, new home sales, non-farm payrolls, unemployment rate...), inflation indicators (consumer price index, producer price index...) and foreign trade indicators (trade balance). These announcements are based on a total of 17 items for the U.S. market, 8 for the U.K., 4 for China, 10 for Germany, and 9 for Japan (see Tables 7 to 11 in Appendix).

Tables 7 to 11 in Appendix display an overview of the considered announcements released on the Bloomberg terminal during the January 2007 to March 2013 period, together with their main characteristics. U.S. macroeconomic figures are almost always released at expected times, mainly around 13:30 and 15:30 GMT (8:30 and 10:30 EST). More specifically, among the 17 regularly scheduled news releases, 10 are published at 13:30 GMT (08:30 EST), covering all inflation and employment indicators, trade balance, personal spending and durable goods orders. Five of the announcements are published at 15:00 GMT (10:00 EST), including new home sales, consumer confidence index, ISM manufacturing index, Philadelphia FED and factory orders; the remaining two announcements—industrial production and consumer credit—being published at 14:15 GMT (09:15 EST) and 20:00 GMT (15:00 EST) respectively. Most U.K. figures are released at 09:30 GMT (4:30 EST), except GfK's consumer confidence index. German figures are published around 07:00 GMT (2:00 EST) and 11:00 GMT (6:00 EST), Japanese ones around 23:30 GMT (18:30 EST) and 00:50 GMT (19:50 EST), and Chinese ones mostly around 01:30 and 10:30 GMT (20:30 and 05:30 EST).

Regarding the definition of the surprises, we follow the previous literature by standardizing the surprise of each news announcement (see Balduzzi, Elton, and Green (2001) among others). Let S_{it} be the forecast error related to news announcement i at time t, we have:

$$S_{it} = \frac{A_{it} - F_{it}}{\hat{\sigma}_i} \tag{1}$$

where A_{it} is the released value for announcement i at time t, F_{it} the median of the Bloomberg forecast survey,[9] and $\hat{\sigma}_i$ the standard deviation of the difference $A_{it} - F_{it}$. S_{it} is thus a measure

[9] Also called "consensus" data, i.e. the median of individual forecasts of the announcement i made each month by professional forecasters working mostly in banks, brokerages or forecast agencies.

of the unexpected component of the released information, i.e. the surprise.

2.2 Bond price data

Turning to bond price data, two maturities are considered, namely 2 and 10 years. Table 1 summarizes descriptive statistics regarding bond price returns series for China, U.K., and the U.S. For China and U.K., we use a long span of high frequency data for all T-Bonds for which more than 6 years of data are available, and set the data frequency to 5 minutes. The time period spans from January 1, 2007 to March 15, 2013, corresponding to 2148 trading days. The daily time interval covers the 24 hours, each day consisting of 288 intraday 5-minutes intervals, giving us a total of about 632,000 observations. For the U.S., we consider a 15-minutes frequency to avoid microstructure noise issues.[10] The U.S. sample covers the period from January 1, 2007 to July 11, 2011, which corresponds to 1611 trading days.[11] Each day consists in 96 intraday 15-minutes intervals, amounting to a total of about 154,656 observations.

Table 1: Summary statistics on bond price returns series

	China	U.K.		U.S.	
	CN2Y	**UK2Y**	**UK10Y**	**US2Y**	**US10Y**
Number of observations	632136	632735	632370	158262	158236
Frequency (minutes)	5	5	5	15	15
Mean	0.000451	1.66E-07	7.13E-06	-0.000411	1.07E-06
Std. Dev.	0.033872	0.000161	0.004213	0.020274	0.001370
Max	4.528806	0.063810	2.005850	0.008119	0.295221
Min	-0.818949	-0.014658	-0.729650	-1.000000	-0.227379
Skewness	23.88745	124.7908	207.8209	-49.27977	33.66598
Kurtosis	1229.371	44582.52	94590.31	2429.643	18911.82

CN: China, UK: United Kingdom, US: United States.

2Y denotes the two-year maturity, 10Y the ten-year maturity.

As shown in Table 1, average intradaily returns are globally close to zero, as expected. They are notably negative for the U.S., which may be explained by the major recent events that have strongly affected the world, and especially the U.S., such as the global financial crisis, but also by the downward trend in U.S. nominal interest rates since the mid-1980s. Finally, as it is frequently the case with financial data, bond price returns are skewed and display high kurtosis values, which means that the empirical returns distribution is more peaked and has fatter tails than the normal density.

[10] See Lee and Mykland (2008) for more details.

[11] The period is shorter than for China and U.K., due to a limited access to high frequency data for the U.S.

3 Data preliminary analysis

We first examine whether consensus forecasts of monthly news announcements from Bloomberg surveys have a tendency to be systematically biased. Then, we study the relationship between macroeconomic news' forecast errors and their corresponding publication dates.

3.1 The consensus "dilemma"

The dilemma lies in the fact that if consensus data represent the mean (or median) market sentiment, the smoothing process induced by the averaging (or median) operation may generate biased forecasts. However, as stressed above, it is not the published value in itself that is important, but its distance from the expected value. Hence, the reaction of market participants to macroeconomic figures should not be apprehended in absolute but rather in relative terms.

Given that prediction quality is obviously related to the number of forecasters included in the panel of experts, we assess the accuracy of Bloomberg consensus forecasts by considering the number of forecasters who participate to the survey. For important news announcements, such as those related to industrial production, retail sales and consumer price index, the number of professional forecasters submitting their forecasts to Bloomberg prior to a variable release announcement can reach up to 80 (source: Bloomberg). However, the number of forecasters varies depending on the type of macroeconomic news announcements, and also from month to month. To assess if there are enough panelists so that we can estimate the mean or median surveys with sufficient accuracy, we construct a test allowing us to estimate the significance of the distance between the mean of the responses from forecasters and the mean of the market, the latter being given by the actual realization of the macroeconomic news release. The underlying idea of our test is based on the definition of consensus forecasts as the median of individual forecasts made by the experts. Specifically, if the panel comprises a sufficient number of experts, the median of individual forecasts tends to its asymptotic value and, in turn, constitutes a good proxy for the consensus. If this is not the case, the corresponding value has to be eliminated from the considered series. Assuming that mean and median are approximately the same because of the symmetry of the distribution, the distance is thus defined as:

$$dist = \hat{\mu}_F - \hat{\mu}_A \tag{2}$$

where $\hat{\mu}_F$ is the mean of forecasters' responses, and $\hat{\mu}_A$ denotes the mean of the market. To estimate the standard deviation of the mean of forecasters' responses, we consider the usual formula:

$$sdev(\hat{\mu}_F) = \frac{\hat{\sigma}_F}{\sqrt{N}} \tag{3}$$

where N is the number of forecasters from which we compute the mean, and $\hat{\sigma}_F$ is the empirical standard deviation of the forecasters' responses. Therefore, we build a t-test that divides the distance between the mean of surveys and the mean of the market by the standard deviation of the mean of forecasters' responses:

$$T_{dist} = \frac{dist}{sdev(\hat{\mu}_F)} = \frac{\hat{\mu}_F - \hat{\mu}_A}{\hat{\sigma}_F} \times \sqrt{N} \tag{4}$$

T_{dist} is distributed as a Student with $(T - K)$ degrees of freedom, T being the number of observations included in the calculation of the distance and K the number of estimated variables. Applying this test on our data has allowed us to clean our database by eliminating all values that were non-significant at the usual 95% confidence level. Finally, note that we have checked that all our considered series—macroeconomic figures announced, consensus forecasts, and bond price returns— are stationary.[12]

3.2 Relationship between the publication date and surprise's nature

The amount of macroeconomic news published every month is constantly growing, whose importance differs according to the considered market. This importance may also be different, depending on the time at which the news is published in the month. One key issue is thus to identify the given moment at which macroeconomic news starts to be considered by investors as a market mover indicator.

It seems reasonable to think that all markets tend to react immediately when a typical figure is of primary importance for market participants. An emblematic example is U.S. non-farm payrolls, available each first Friday of the month at 13:30 GMT. It is the subject of intense scrutiny by market participants, and therefore market post-releases reactions are immediate. While this is a very typical case, we can however expect that the date at which the news is published in the month (beginning, end, mid) matters regarding the surprises size, and, in turn, the market impact. For a given type of news, if the first information published is associated with the strongest market reaction, one may expect a "rush" to publication. In the recent period, private institutions publishing macroeconomic news rushed to release their figures quite early during the month. An example is provided by the Markit PMI, which is published the first day of each month and generates a very strong market reaction.

Figure 1 provides a first insight by displaying the number of zero surprises (y-axis) together with the corresponding macroeconomic announcements' date (i.e. day in the month, x-axis). With the exception of China,[13] Figure 1 exhibits a similar pattern for the four other countries: news published at the beginning or the end of the month are associated with the highest number of non-zero surprises (i.e., expectations that differ from published values). In other

[12] Results of unit root tests are available upon request to the authors.

[13] China exhibits a different pattern because news are published mid-month.

words, the news published in mid-month generate very few surprises, making them more easily predictable. Turning to information type, CPI and unemployment related news are associated with the highest number of zero surprises.[14] Various possible explanations could be proposed regarding the importance of the publication date. The first one is the fact that psychological phenomena are more at play at the beginning or the end of the month, leading to more anticipation errors (i.e., surprises). Such psychological phenomena could take the form of mimetic and/or overreaction behaviors due to the quite important amount of information provided at the beginning or the end of the month. Similarly, the very few surprises associated with the news published in mid-month could be explained by the existence, at the beginning of the month, of specific information related to those mid-month scheduled news allowing for more accurate predictions. The second explanation could stem from the nature of the news published at the considered time. As previously mentioned, some of the news published at the beginning of the month constitute indicators to which market participants are highly sensitive and for which post-releases reactions are thus important. Finally, a more "practical" explanation could be that large traders, who have to report at the end of each month to their supervisor, somehow balance their portfolio at the end of month and have thus more liquidity to invest at the beginning of the following month. Let us now provide an in-depth analysis of these first results through the impact study.

4 Impact study

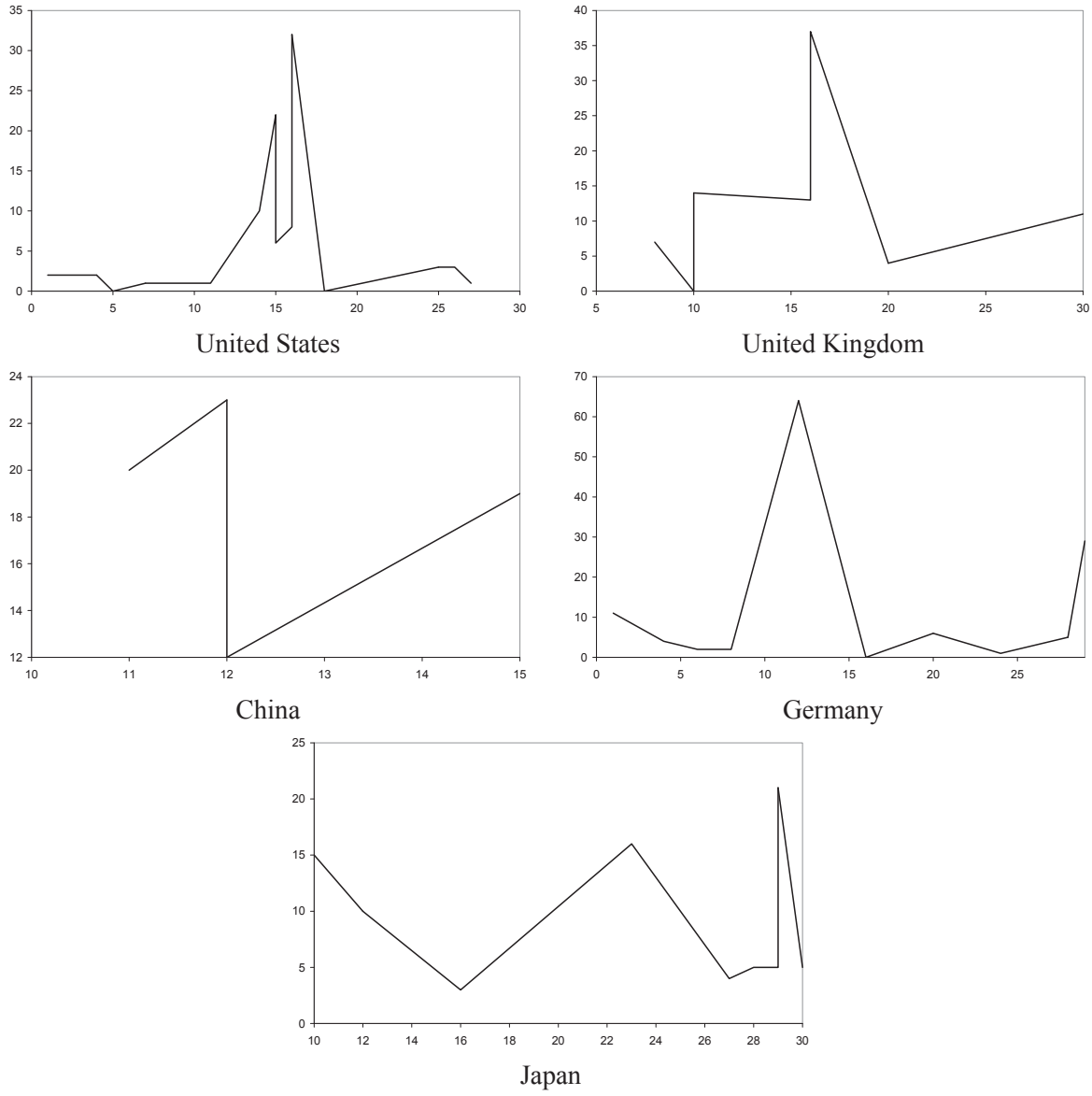
4.1 Impact of macroeconomic news on bond returns

To analyze the impact of macroeconomic news on bond returns, we estimate the intra-daily response of bond yields at two maturities (2 and 10 years) to economic news releases using the standard event-study methodology. More specifically, we regress bond price changes from 5 minutes before to 15 minutes after the announcement (from 15 minutes before to 15 minutes after release for the U.S.) on the standardized surprise component of the macroeconomic news releases. The choice of this window can be justified by the fact that price variations are extremely rapid on the Treasury-bond market, with most of the impact occurring in the first five minutes after the release (Balduzzi, Elton, and Green (2001)). To ensure that all relevant price changes are fully captured, we thus retain a 15-minutes post-release interval. For each announcement i and each considered country, we run an OLS regression of the form:

$$R_{it} = \beta_{0i} + \beta_{1i} S_{it} + \beta_{2i} A_{it} + \sum_{k=1}^{3} \alpha_{ki} R_{i,t-k} + e_{it} \tag{5}$$

with:

[14] All detailed results are available upon request to the authors.



Note: *x*-axis: macroeconomic announcements' date (day of the month), *y*-axis : number of zero surprises.

Figure 1: Publication date vs. surprises

$$R_{it} = \begin{cases} (P_{15it} - P_{-15it})/P_{-15it} & \text{for the United States} \\ (P_{15it} - P_{-5it})/P_{-5it} & \text{for others} \end{cases}$$

and:

$$A_{it} = \begin{cases} S_{it} & \text{if} \quad S_{it} < 0 \\ 0 & \text{if} \quad S_{it} \geq 0 \end{cases}$$

where P_{15it} denotes the price 15 minutes after announcement i at time t,[15] P_{-5it} the price 5 minutes before the announcement i at time t, P_{-15it} the price 15 minutes before the announcement i at time t, and S_{it} the standardized surprise associated with announcement i at time t. A_{it} captures asymmetric effects by accounting for the sign of the surprise, β_{1i} measures the sensitivity of the bond price return to the announcement i and e_{it} is an i.i.d. error term. The number of lags k included in the regressions is selected using the Schwarz information criterion.

Estimation results are presented in Table 2 for U.K. and U.S., and in Table 3 for China. For each surprise associated to announcement i ($i = 1, ..., 48$ for the U.S. and U.K., and $i = 1, ..., 26$ for China), those tables report the estimated value of the slope coefficient (β_{1i}), the p-value corresponding to the asymmetry coefficient (β_{2i}), and the value of the R-squared (R^2). As shown, some U.S. news releases have a significant impact on bond yields, as expected, but this is also the case of some German and Japanese surprises, particularly regarding activity and manufacturing indicators. By contrast, Chinese news surprises have very little effect. Various explanations may be suggested regarding this result. First, it could potentially reflect a weak confidence in figures published by the Chinese public institutions. Second, since bond prices reflect, among others, expectations regarding monetary policy, our result may be due to the weak reaction of China's monetary policy to Chinese news. Third, it could stem from the absence of portfolio reallocation after the news releases.

Interestingly, our results evidence that long-term maturity bonds are only slightly more reactive to news surprises than low-maturity ones. Turning to asymmetry coefficients, in most cases only the negative surprises have an impact on the returns, consistent with the well-known result suggesting that bad news have a stronger effect than good announcements.

More in detail, some news surprises are significant for several bond yields, while others affect only one or two of them. The consumer price index is very present among the economic indicators significantly affecting bond returns, being the most widely followed monthly inflation indicator. The core CPI indicator (CPIC) is even more scrutinized by market participants due to its greater monthly stability. An increase in CPIC is associated with a decrease in bond returns, since declining interest rates (resulting from low inflation) tend to rise bond prices. The German business climate and PMI services indicators are also tracked by investors because they are early indicators of current economic conditions, the former representing busi-

[15] Computed as the mean between bid and ask prices.

ness expectations and the latter referring to the private sector economy. Japanese tertiary industry, machine orders and unemployment rate indicators are also in the list of significant surprises. They represent respectively a measure of domestic activity, a leading indicator of production and a way for investors to gauge the tightness degree on the job market. If wage inflation threatens, interest rates are expected to rise, leading to a fall in bond prices. U.S. consumer confidence index, new home sales and non-farm payrolls provide information respectively on (i) the direction of the economy, the more confident consumers are about the economy, the more they are likely to spend; (ii) the housing market trend and, in turn, economic momentum; and (iii) the current level of economic activity. An increase in non-farm payrolls translates into earnings that workers will spend on goods and services in the economy, leading to a decline in bond returns—rapid increases in employment causing fears of inflationary pressures suggesting a rise in interest rates.

Table 2: Estimation results: impact of surprises on bond yields, United Kingdom and United States

News\Bonds	**UK2Y**			**UK10Y**			**US2Y**			**US10Y**		
	β_{1i}	β_{2i} (p-value)	R^2	β_{1i}	β_{2i} (p-value)	R^2	β_{1i}	β_{2i} (p-value)	R^2	β_{1i}	β_{2i} (p-value)	R^2
CNCPI	0.00108	0.10	0.03	-0.0003	0.95	0.91	-0.00192	0.02**	-0.04	-0.0022	0.13	0.01
CNIP	-0.00037	0.27	-0.03	-0.0029	0.49	0.67	-0.00048	0.96	0.10	-0.0020	0.76	0.02
CNM2	0.00002	0.23	-0.02	-0.0011	1.00	0.25	-0.00026	0.13	0.38	0.0022	0.06*	0.01
CNPPI	-0.00041	0.31	-0.04	-0.009*	0.05*	0.16	0.00212	0.16	0.21	0.0044	0.36	0.13
DEBC	0.00000	0.38	0.01	0.0003*	0.16	0.97	-0.00003	0.08*	0.11	0.0000	0***	0.25
DECPI	0.00000	0.82	0.15	-0.0002**	0.03**	-0.01	-0.00001**	1.00	0.01	0.0000	0***	0.02
DEIP	-0.00008	0.09*	0.09	0.0005	0.09*	0.89	0.00000	0.12	0.16	0.0000	0.21	0.05
DEFO	-0.0001*	0.12	0.00	0.0001	0.42	-0.01	-0.0001***	0***	0.15	-0.0002***	0.17	0.09
DEPMIMF	0.00000	0.23	0.35	0.0003	0.04**	0.92	0.00004	0.47	0.12	-0.0001	0.31	0.02
DEPMISV	-0.000005**	0.01**	0.04	0.0007	0.62	0.05	-0.00012	0.33	0.01	-0.0001	0.93	0.05
DEPPI	0.00000	0.68	-0.01	-0.0007	0.32	-0.03	-0.00002	0.62	0.25	-0.0001	0.54	-0.02
DERS	0.00000	0.11	-0.04	-0.0002	0.43	0.11	0.00006	0.52	0.36	0.0004	0.13	0.04
DEUP	0.00000	0.87	0.23	-0.0004	0.16	0.96	-0.00009	0.17	-0.04	0.0000	0.98	0.02
DEZEW	0.00000	0.85	-0.03	0.0000	0.19	0.83	-0.00007*	0.54	0.22	-0.0003	0.80	0.02
JPCPI	0.00000	0.87	0.15	0.0000	0.26	0.13	-0.00001	0.02**	0.10	-0.0001	0.1*	0.07
JPDCGP	-0.00001	0.13	0.15	0.0000	0.39	0.15	-0.00002	0.69	-0.05	-0.0002	0.88	-0.05
JPHSPD	0.00003	0.48	0.41	0.0000	0.37	0.11	-0.00005	0.55	-0.03	-0.0001	0.32	0.06
JPIP	-0.0001**	0.02**	0.45	0.0000	0.78	0.10	-0.00031	0.24	-0.05	-0.0001	0.18	-0.05
JPMO	0.00003	0.52	0.10	0.0000	0.09*	0.69	-0.00003*	0.22	-0.03	0.0001	0.98	-0.05
JPRT	0.00001	0.99	0.62	0.0000	0.27	0.51	-0.00009	0.40	-0.03	0.0000	0.88	-0.06
JPTB	-0.00005	0.76	-0.01	0.0000	0.22	0.21	0.00010	0.49	0.02	0.0001***	0.06*	-0.02
JPTI	-0.00004**	0.02**	0.46	0.0000	0.56	0.03	0.00003**	0.64	0.09	0.0001	0.76	0.02
JPUP	0.00003	0.08*	0.47	0.0000	0.86	0.12	-0.00002	0.92	-0.04	-0.0002	0.02**	-0.04
UKCCF	-0.00003	0.45	0.01	0.0000	0.33	1.00	0.00000	0.59	-0.05	-0.00001**	0***	-0.07
UKCPI	0.00000	0.01**	-0.03	-0.0003**	0.02**	0.31	0.00001	0.85	0.05	0.0001*	0***	-0.01
UKCPIC	0.00000	0.47	-0.04	-0.0003**	0.04**	0.26	-0.00006*	0.15	0.07	0.0001	0.61	-0.05
UKIP	0.00000	0.97	-0.04	-0.0002	0.34	0.05	0.00003	0.34	0.00	0.0002	0.16	0.01
UKPPI	0.00000	0.27	0.00	0.0003	0.43	0.96	-0.00001	0.20	0.09	0.0000	0.14	0.17
UKRSLA	0.00001	0.11	0.27	0.0004**	0.55	0.87	0.00000	0.35	0.24	-0.0006***	0***	0.28
UKTB	-0.000005***	0***	0.26	0.0000	0.43	0.96	0.00002	0.68	0.26	0.0002	0.26	-0.03
UKUP	0.00000	0.29	0.56	-0.0001	0.72	0.54	-0.00004	0.90	0.18	0.0002	0.50	0.06
USCCD	0.00005	0.29	0.23	0.0000	0.25	0.02	-0.00002	0.88	-0.04	0.0002	0.18	0.14
USCCF	-0.00003	0.61	-0.02	-0.0012	0.38	-0.03	-0.0001**	0.79	0.08	-0.0007*	0.25	0.07
USCPI	0.00007	0.16	0.01	-0.0003*	0.87	0.74	-0.0001**	0.01**	0.33	-0.0005*	0.04**	-0.01
USCPIC	-0.0001*	0.50	0.05	-0.0002	0.59	0.74	-0.0001**	0.48	0.33	-0.001***	0.04**	0.22
USDGO	0.00009	0.19	0.14	0.0003	0.61	0.90	-0.00005	0.20	0.15	0.0002	0.25	-0.02
USFO	0.00010	0.04**	0.01	0.0001	0.48	0.09	0.00002	0.88	0.16	0.0002	0.76	-0.05
USIP	-0.00002	0.49	-0.03	-0.0002	0.30	0.96	-0.00005	0.40	0.17	-0.0002	0.79	-0.01
USISM	-0.00002	0.26	0.09	-0.0001	0.62	-0.02	-0.00012	0.32	0.28	-0.0008	0.75	0.27
USNFP	0.00009	0.30	0.35	-0.0006	0.45	0.90	-0.0005**	0.51	0.15	-0.0012	0.86	0.24
USNHS	0.00003	0.86	-0.03	-0.0001*	0.09*	0.76	-0.0001*	0.98	0.22	-0.0003	0.63	0.05
USPCE	0.00002	0.41	0.32	-0.0002	0.18	0.67	0.00006	0.42	-0.04	0.0003	0.08*	0.00
USPHIL	0.00008	0.17	0.02	0.0001	0.42	-0.03	-0.00009	0.80	0.20	-0.0009**	0.34	0.11
USPPI	0.00001	0.71	0.04	0.0000	0.19	0.96	-0.00002	0.70	0.07	-0.0001	0.35	0.06
USPPIC	-0.00005	0.79	0.07	0.0000	0.47	0.96	0.00004	0.41	0.05	-0.0001	0.65	-0.04
USRSLA	0.00000	0.84	0.26	-0.0010	0.49	-0.03	0.00001	0.22	0.08	0.0001	0.13	0.14
USTB	0.00005	0.03**	0.25	0.0001	0.95	0.96	0.00000	0.84	0.09	0.0001	0.59	-0.03
USUP	-0.00005	0.14	0.34	-0.0007*	0.33	0.91	0.00013	0.68	-0.01	0.0003	0.86	0.09

* (resp. **, ***): significance at the 10% (resp. 5%, 1%) statistical level.

4.2 Relationship between macroeconomic surprises' impact and their publication date

To complement our preliminary analysis and the above event study, we now statistically seek for a potential monotonic relationship between the surprises' impact strength on bond returns and their corresponding publication date and/or their sign (number of negative, positive or zero surprises). Among the various measures that can apprehend such a relationship, the Kendall rank correlation coefficient—commonly referred to Kendall τ statistic—seems particularly appealing.[16]

We consider the Kendall τ_b statistic, which is a non-parametric measure of association between two sets of ordinal variables, say x and y, when "tied" rankings are permitted. Its values vary from -1 for perfectly negative association to 1 for perfectly positive association, with $\tau_b = 0$ corresponding to the absence of association. The calculation of τ_b is based on comparisons of pairs of joint rankings (x_i, y_i) and (x_j, y_j), $i, j = 1, ..., N$, N being the number of items. More specifically, we have:

$$x_{i,j} = \begin{cases} +1 & \text{if} \quad x_i < x_j \\ 0 & \text{if} \quad x_i = x_j \\ -1 & \text{if} \quad x_i > x_j \end{cases} \qquad y_{i,j} = \begin{cases} +1 & \text{if} \quad y_i < y_j \\ 0 & \text{if} \quad y_i = y_j \\ -1 & \text{if} \quad y_i > y_j \end{cases}$$

for $i, j = 1, 2, ..., N$
and:

$$\tau_b = \frac{\sum_{i,j} x_{i,j} y_{i,j}}{\sum_{i,j} x_{i,j}^2 \sum_{i,j} y_{i,j}^2} \tag{6}$$

We then have the following properties:

- (i) if $x_i < x_j$ and $y_i < y_j$, or $x_i > x_j$ and $y_i > y_j$, pairs are called concordant,
- (ii) if $x_i < x_j$ and $y_i > y_j$, or $x_i > x_j$ and $y_i < y_j$, pairs are called discordant.

Based on our previous results, we aim at establishing a link, a correspondence relationship between the coefficients' (β_{1i}) t-statistics obtained in the impact study—representing the strength of the impact of each surprise on bond yields—and corresponding news release dates and / or surprises' sign.[17] The null hypothesis is that the pairs (t-statistic, publication date)—or (t-statistic, number of zero surprises), (t-statistic, number of positive surprises) or (t-statistic, number of negative surprises)—are independent.

[16] According to Laurencelle (2009), it has indeed two advantages over the other tests (such as Spearman, Pearson, Gamma-based tests...): it transcends the metric of measured variables and removes the need for a parametric model, making it a truly non-parametric index, suitable for categorical ordinal variables (see also Agresti (1976) and Khamis (2008)).

[17] Descriptive statistics for the data used in our analysis are reported in Tables 12 to 16 in Appendix.

Tables 4, 5 and 6 report the results of the Kendall-based test.[18] The results are quite different for U.K. and U.S. 2-year bonds. Indeed, as shown in Table 4, the Kendall τ_b is significant at the 10% level for the pair (t-statistic, negative surprises), meaning that there is a concordance between t-statistics' order and the number of negative surprises. For the U.S. (Table 5), the significance of the Kendall τ_b statistic is obtained for the pairs (t-statistic, positive surprises). Consequently, macroeconomic news generating the largest number of negative surprises (i.e., a frequent overestimation of economic figures, causing forecast errors that are mostly negative) in U.K. and the largest number of positive surprises in U.S. are those that have the strongest impact on U.K. and U.S. bond returns, respectively. Turning now to long-term maturity bonds, Table 6 evidences that there is a concordance between t-statistics' order and publication dates: macroeconomic news published at the beginning or the end of the month are those that exert the strongest impact on bond returns.

On the whole, our findings evidence that the null hypothesis of mutual independence between the size of the impact on the one hand, and the ranking of news' publication by date or surprises' sign on the other hand, is rejected for 3 out of our 5 considered instruments. This supports our previous findings that investors tend to privilege news that are associated with both the largest number of non-zero surprises and publication dates planned at the beginning or the end of the month, rather than announcements with less surprises and planned mid-month.

5 Conclusion

The aim of this paper is to investigate the impact of surprises associated with monthly macroeconomic news releases on Treasury-bond yields, by paying particular attention to the moment at which the information is published in the month. Relying on intraday data, our event study globally shows that not only U.S. surprises have a significant effect on bond yields, but also German and Japanese ones. More in detail, we find that (i) the main market movers are based on economic activity and inflation indicators, (ii) long-term maturity bonds are slightly more impacted by surprises than short-maturity ones, and (iii) the bond market is more sensitive to bad news than to good announcements. Finally, we evidence an empirical monotonic relationship between the surprises' impact and their corresponding news' publication date and/or their sign. We find that the sign of the surprise matters in case of short-maturity bonds, while the publication date plays a key role for long-maturity bonds—the strongest impact being observed for news published at the beginning or the end of the month. The macroeconomic news that are characterized by such features are mainly activity indicators, explaining their "market mover" key role.

[18] Only significant results are reported (the Kendall τ_b statistic is not significant for the 10-year maturity U.K. bond, nor for China).

Table 3: Estimation results: impact of surprises on bond yields, China

CN2Y			
News	β_{1i}	β_{2i} (p-value)	R^2
CNIP	-0.003	0.28	-0.04
CNM2	-0.867	0.36	0.06
DEBC	-0.004	0.76	-0.04
DECPI	-0.018	0.17	0.07
DEIP	0.000	0.66	0.10
DEFO	0.000	0.32	0.00
DEPMIMF	0.000	0.17	-0.02
DEPMISV	-0.0004*	0.10	0.11
DEPPI	0.005*	0.21	0.15
DERS	-0.021	0.29	0.20
DEUP	-0.017	0.85	0.67
DEZEW	0.000	0.38	-0.02
UKCCF	0.000	0.47	-0.03
UKCPI	0.000	0.43	-0.04
UKCPIC	0.000	0.98	-0.04
UKIP	-0.0001*	0.09*	0.08
UKPPI	-0.0002**	0.10	0.49
UKRSLA	0.000	0.35	-0.03
UKTB	0.000	0.50	-0.03
UKUP	0.000	0.27	0.02
USCCF	-0.005	0.63	-0.03
USCPI	-0.025	0.34	0.01
USCPIC	0.002	0.30	-0.02
USDGO	0.001	0.53	1.00
USFO	-0.001*	0***	0.14
USIP	-0.001	0.53	0.72
USISM	0.000	0.33	0.25
USNFP	0.000	0.08*	0.35
USNHS	0.028	0.12	0.23
USPCE	0.034	0.25	0.48
USPHIL	-0.019	0.91	0.00
USPPI	0.0001*	0.56	0.12
USPPIC	0.000	0.28	-0.03
USRSLA	0.007	0.65	-0.04
USTB	0.002	0.38	-0.02
USUP	0.000	0.77	0.24
* (resp. **, ***): significance at the 10% (resp. 5%, 1%) statistical level.			

Table 4: United Kingdom, 2-year bonds - Kendall τ_b

	Date	**Zero Surp**	**NonZero Surp**	**Neg Surp**	**Pos Surp**
Kendall τ_b	0.0581	0.1245	-0.0856	-0.1677	0.1019
Kendall score	64	138	-95	-186	113
SE of score	112.080	112.276	112.290	112.285	112.284
Prob $>\|z\|$	0.5741	0.2224	0.4025	**0.0994 ***	0.3185

* (resp. **, ***): significance at the 10% (resp. 5%, 1%) statistical level.
SE of score is corrected for ties.

Table 5: United States, 2-year bonds - Kendall τ_b

	Date	**Zero Surp**	**NonZero Surp**	**Neg Surp**	**Pos Surp**
Kendall τ_b	-0.0727	-0.1100	0.0802	-0.0541	0.2479
Kendall score	-80	-122	89	-60	275
SE of score	112.080	112.276	112.290	112.285	112.284
Prob $>\|z\|$	0.4809	0.2812	0.4332	0.5993	**0.0147 ****

* (resp. **, ***): significance at the 10% (resp. 5%, 1%) statistical level.
SE of score is corrected for ties.

Table 6: United States, 10-year bonds - Kendall τ_b

	Date	**Zero Surp**	**NonZero Surp**	**Neg Surp**	**Pos Surp**
Kendall τ_b	-0.1827	0.1074	-0.0920	-0.1561	0.0920
Kendall score	-201	119	-102	-173	102
SE of score	112.076	112.272	112.285	112.281	112.280
Prob $>\|z\|$	**0.0743***	0.2933	0.3684	0.1256	0.3684

* (resp. **, ***): significance at the 10% (resp. 5%, 1%) statistical level.
SE of score is corrected for ties.

Appendix

Table 7: United States (U.S.) - Macroeconomic news announcements description

Type of announcement	Variable name	Release time	Reporting convention	Source
Activity Indicators				
Philadelphia Federal Index	PHIL	15:00	Value	Philadelphia FDR
Industrial Production	IP	14:15	Rate / %	Federal Reserve
Durable Goods Orders	DGO	13:30	Rate / % Change	U.S. Census Bureau
Factory Orders	FO	15:00	Rate / % Change	U.S. Census Bureau
ISM Manufacturing	ISM	15:00	Value / S.A.	ISM
Consumption and Employment Indicators				
Consumer Confidence	CCF	15:00	Rate / S.A./ 1985=100	Conference Board
Consumer Credit	CCD	20:00	Value / Billions	Federal Reserve
Retail Sales less auto	RSLA	13:30	Rate / % Change	U.S. Census Bureau
Change in Non-farm Payrolls	NFP	13:30	Value / Thousands	BLS
Personal Spending	PCE	13:30	Rate / % Change	BEA
Unemployment rates Total in Labor Force SA	UP	13:30	Rate / %	BLS
New Home Sales	NHS	15:00	Volume / Thousands	U.S. Census Bureau
Inflation Indicators				
Producer Price Index	PPI	13:30	Rate / % Change	BLS
Consumer Price Index	CPI	13:30	Rate / % Change	BLS
PPI Ex Food and Energy	PPIC	13:30	Rate / % Change	BLS
CPI Ex Food and Energy	CPIC	13:30	Rate / % Change	BLS
Foreign Trade Indicators				
Trade Balance	TB	13:30	Value / Billions	U.S. Census Bureau

All announcements are monthly. BLS: Bureau of Labor Statistics; ISM: Institute for Supply Management; BEA: Bureau of Economic Analysis.

Table 8: United Kingdom (U.K.) - Macroeconomic news announcements description

Type of announcement	Variable name	Release time	Reporting convention	Source
Activity Indicators				
Industrial Production	IP	09:30	Rate / % Change	ONS
Consumption and Employment Indicators				
GfK Consumer Confidence Survey	CCF	00:01	Value /	GfK NOP
Retail Sales Less Auto	RSLA	09:30	Rate / % Change	ONS
ILO Unemployment Rates	UP	09:30	Rate / % RATIO	ONS
Inflation Indicators				
Producer Price Index	CPI	09:30	Rate / % Change	ONS
Consumer Price Index	PPI	09:30	Rate / % Change	ONS
CPI Ex Food and Energy	CPIC	09:30	Rate / % Change	ONS
Foreign Trade Indicators				
Visible Trade Balance	TB	09:30	Value / Millions	ONS
All announcements are monthly. ONS: Office for National Statistics.				

Table 9: China (CN) - Macroeconomic news announcements description

Type of announcements	Variable name	Release time	Reporting convention	Source
Activity Indicators				
Industrial Production	IP	03:00 - 06:30	Rate / % Change	NBSC
Inflation Indicators				
Consumer Price Index	CPI	2:30 - 04:00	Rate / % Change	NBSC
Producer Price Index	PPI	02:00 - 04:00	Rate / % Change	NBSC
Monetary Policy Indicators				
Money Supply 2	M2	08:00 - 10:00	Rate / % Change	POC
All announcements are monthly. POC: People's Bank of China; NBSC : National Bureau of Statistics of China.				

Table 10: Germany (DE) - Macroeconomic news announcements description

Type of announcement	Variable name	Release time	Reporting convention	Source
Activity Indicators				
IFO Business Climate	BC	09:00	Value	IFO Institut
Factory Orders	FO	11:00	Rate / % Change	GFSO
Industrial Production	IP	11:00	Rate / % Change	DB
PMI Services	PMISV	08:55	Rate / % Change	MARKIT
PMI Manufacturing	PMIMF	08:55	Rate / % Change	MARKIT
Zew Surveys	ZEW	10:00	value	ZEW CEER
Consumption and Employment Indicators				
Unemployment rate	UP	08:55	Rate / %	FEA
Retail Sales	RS	07:00	Rate / % Change	GFSO
Inflation Indicators				
Producer Price Index	PPI	07:00	Rate / % Change	GFSO
Consumer Price Index	CPI	07:00	Rate / % Change	GFSO

All announcements are monthly. GSFO: German Federal Statistical Office; DB: Deutsche Bundesbank; CEER: Centre for European Economic Research; FEA: Federal Unemployment Agency.

Table 11: Japan (JP) - Macroeconomic news announcements description

Type of announcement	Variable name	Release time	Reporting convention	Source
Activity Indicators				
Industrial Production	IP	23:50 / 00:50	Rate / % Change	MET&IJ
Tertiary Industry	TI	23:50 / 00:50	Rate / % Change	MET&IJ
Machine Orders	MO	23:50 / 00:50	Rate / % Change	ESRIJ
Consumption and Employment Indicators				
Jobless Rate	UP	23:30 / 00:30	Rate / % Change	MFJ
Household Spending	HSPD	23:30 / 00:30	Rate / % Change	MIAC
Retail Trade	RT	23:50 / 00:50	Rate / % Change	MET&IJ
Inflation Indicators				
Consumer Price Index	CPI	23:30 / 00:30	Index Point	BoJ
Domestic Corporate Goods Price	DCGP	23:50 / 00:50	Rate / % Change	MIAC
Foreign Trade Indicators				
Trade Balance	TB	23:50 / 00:50	Value / Billions JPY	MIAC

All announcements are monthly. MET&IJ: Ministry of Economy Trade & Industry Japan; ESRIJ: Economic and Social Research Institute Japan; MFJ: Ministry of Finance Japan; MIAC: Ministry of Internal Affairs and Communications; BoJ: Bank of Japan.

Table 12: Panel U.S. - Descriptive statistics on macroeconomic surprises

News	CCD	CCF	CPI	CPIC	DGO	FO	IP	ISM	NFP	NHS	PCE	PHIL	PPI	PPIC	RSLA	TB	UP
Release Date	7	27	16	16	26	4	16	1	5	25	28	18	15	15	14	11	5
Negative Surp	29	40	26	24	39	35	33	29	42	43	29	42	33	23	32	35	32
Positive Sup	46	35	26	20	34	39	34	45	34	30	28	34	37	31	34	40	24
Zero Surp	1	1	24	32	3	2	8	2	0	3	19	0	6	22	10	1	20

Table 13: Panel U.K. - Descriptive statistics on macroeconomic surprises

News	CCF	CPIC	CPIC	IP	PPI	RSLA	TB	UP
Release Date	30	16	16	8	10	20	10	16
Negative Surp	35	26	19	43	24	32	48	22
Positive Sup	30	37	37	26	38	40	28	17
Zero Surp	11	13	20	7	14	4	0	37

Table 14: Panel China - Descriptive statistics on macroeconomic surprises

News	PPI	CPI	M2	IP
Release Date	11	12	12	15
Negative Surp	31	24	31	30
Positive Sup	25	29	33	27
Zero Surp	20	23	12	19

Table 15: Panel Germany - Descriptive statistics on macroeconomic surprises

News	PMIMF	PMISV	FO	IP	CPI	ZEW	PPI	BC	RS	UP
Release Date	1	4	6	8	12	16	20	24	28	29
Negative Surp	27	37	41	42	1	38	35	31	50	31
Positive Sup	38	35	33	32	11	38	35	44	21	16
Zero Surp	11	4	2	2	64	0	6	1	5	29

Table 16: Panel Japan - Descriptive statistics on macroeconomic surprises

News	MO	DCGP	TI	TB	CPI	RT	HSPD	UP	IP
Release Date	10	12	16	23	27	28	29	29	30
Negative Surp	39	25	36	38	36	28	38	32	42
Positive Sup	33	36	30	35	24	44	33	23	29
Zero Surp	15	10	3	16	4	5	5	21	5

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