

CHAPTER 22

News Releases and Stock Market Volatility: Intraday Evidence from Borsa Istanbul

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22.1 INTRODUCTION

The effect of public information arrival on asset prices and volatility has been investigated extensively in the past using different markets, asset prices, and most importantly different proxies for information arrival. One line of research utilized macroeconomic announcements to investigate the effect of information arrival on asset returns and return volatility (e.g., [Ederington and Lee, 1993](#); [Andersen and Bollerslev, 1998](#); [Almeida et al., 1998](#); [Pearce and Roley, 1985](#); [Pearce and Solakoglu, 2007](#); [Kutan and Aksoy, 2004](#)). Another line of research focused on market information as a measure of news arrivals, such as trading volume, floor transactions, the number of price changes, and executed order imbalances, to investigate the same hypothesis ([Lamoureux and Lastrapes, 1990](#); [Andersen, 1996](#); [Bollerslev and Domowitz, 1993](#); [Locke and Sayers, 1993](#)). In the last line of research, new information arrival is measured by the frequency of public news that arrives to the market. These studies use either the number of news headlines obtained from newspapers ([Berry and Howe, 1994](#)) or those released by companies that provide data services, such as Dow Jones and Company or Reuters, to count the number of news items ([Kalev et al., 2004](#); [Mitchell and Mulherin, 1994](#); [Janssen, 2004](#); [Chang and Taylor, 2003](#); [Baklaci et al., 2011](#)).

This study follows the last line of research and utilizes the number of economic news headlines that arrives to the market to investigate the effect of news arrival on market return and return volatility. This study differs from earlier studies in three ways. First, we use intraday data, specifically 60-min returns, and focus on economic news only. Moreover, we separate news originating from the United States, Turkey, and a subsegment of

Europe that consists of the United Kingdom, France, Spain, Germany, and Italy (which we call Europe in this study)¹ and try to identify whether the source of the news is important for investors. Second, we analyze the effect of real economy news and inflation news on return and return volatility separately. In addition, since expected news should not have an impact on asset prices under the efficient market hypothesis, we count the number of unexpected surprises in the GDP and CPI news headlines and evaluate the effect of surprises on return and return volatility. Finally, we focus our analysis on the return and return volatility of two different stock market indices: BIST100 and Second National Market (SNM). In BIST100, there is a widespread existence of institutional investors, and hence we assume that these investors are more informed and have better access to both market- and firm-level information than those of the SNM. We also expect them to have better resources relative to the SNM investors to analyze information content. In the SNM index, the presence of institutional investors is much smaller relative to BIST100, and hence we assume investors are less informed. As a result, we aim to investigate whether this difference influences our results significantly.

Our findings show that the arrival of economic news causes return volatility to decline. However, there is no significant effect on index returns. We also find that return volatility reacts mostly to negative GDP and inflation surprises. Moreover, our results indicate that investors, whether well-informed or not, respond similarly to news arrival as documented by same-sign coefficients and by a comparable decline in volatility persistence.

The remainder of this study is organized as follows. In [Section II](#), we discuss data sources and present descriptive statistics. The model specification is also discussed in this section. Our findings and discussion are left for [Section III](#). The last section presents our main conclusions and suggestions for further research.

22.2 MODEL SPECIFICATION AND DATA

This study uses the hourly number of economic news headlines provided by *Foreks Data Terminal* to proxy the arrival of new information for the period between October 3, 2013 and March 31, 2014. News coverage is only included during weekdays and hence there is no data available for weekends.² To measure return volatility, we utilize two indexes—BIST100 and SNM index—of Borsa Istanbul (BIST). Hourly index data are obtained from *Matriks Data Terminal*. The BIST100 covers the largest 100 firms in Turkey, mostly with foreign portfolio investments that account for about 60% of traded shares, while the SNM covers small-to-medium-sized firms as well as those

¹ The share of Turkish exports to these countries within the 28 European Union countries is around 77% for 2013. Source: Turkish Government Ministry of Economy Web page (<http://www.economy.gov.tr>).

² The analysis uses 961 observations.

Table 22.1 Descriptive statistics

| | Mean | Standard deviation | Minimum | Maximum | Skewness | Kurtosis |
|-------------------------------------|-------|--------------------|---------|---------|----------|----------|
| <i>Total economic news</i> | 10.08 | 9.31 | 0.00 | 52.00 | 1.29 | 4.56 |
| <i>US economic news</i> | 1.90 | 4.94 | 0.00 | 36.00 | 3.49 | 16.73 |
| <i>US news on real economy</i> | 0.55 | 1.70 | 0.00 | 15.00 | 4.13 | 23.25 |
| <i>US news on inflation</i> | 0.10 | 0.70 | 0.00 | 12.00 | 9.18 | 112.82 |
| <i>Europe economic news</i> | 1.63 | 3.34 | 0.00 | 25.00 | 2.75 | 11.96 |
| <i>Europe news on real economy</i> | 0.63 | 1.60 | 0.00 | 10.00 | 3.02 | 12.41 |
| <i>Europe news on inflation</i> | 0.41 | 1.68 | 0.00 | 16.00 | 6.16 | 49.27 |
| <i>Turkish economic news</i> | 1.99 | 4.81 | 0.00 | 33.00 | 2.88 | 11.71 |
| <i>Turkish news on real economy</i> | 0.23 | 1.09 | 0.00 | 14.00 | 6.68 | 58.20 |
| <i>Turkish news on inflation</i> | 0.21 | 1.06 | 0.00 | 10.00 | 6.17 | 46.48 |

In the table, the number of economic news headlines is provided. Europe news includes news on a sample of European countries. These countries are: UK, France, Germany, Spain, and Italy.

delisted from the National Index.³ Hence, while BIST100 includes large institutional holdings of securities, the SNM index is mostly for local investors, and by including these two indexes we want to identify differences in how the news arrival are evaluated by these two distinct investor groups.⁴ A recent study by Solakoglu and Demir (2014) provides sample evidence that shows the existence of sentimental herding for SNM investors and not for better-informed investors of BIST100.

Table 22.1 reports descriptive statistics on news arrivals. On average, 10 news headlines arrive to the market per hour, with a maximum of 52 news headlines per hour. The average number of daily news arrivals, not reported, is 80 during our sample, with a minimum of 29 and a maximum of 157. For both Europe and the USA, more news on output arrives to the market than inflation. For Turkish news, there does not seem to be a significant difference between news on inflation and news on output. In addition,

³ For details on these two indexes, see <http://www.borsaistanbul.com>.

⁴ For example, in 2012, the average holding period was 316 days for foreign investors and only 37 days for local investors, showing the differences in investment strategies (Bourse Trend Report, January 2013, <http://www.tuyid.org/tr/>).

the highest number of hourly news arrivals seems to be on Thursdays, with an average of 13.3 news headlines per hour for our sample period. The least number of news arrives on Tuesdays, with an average of 7.7 news items per hour. Although not presented in the table, the average daily return for SNM appears to be higher than for BIST100. However, the range is also much larger for SNM. In addition, the SNM index returns are more leptokurtic than for BIST100 index returns, indicating that it is more likely to observe extreme ups and downs in the market, thus pointing out that the SNM is riskier with higher return on the average than is the BIST100.

Following earlier studies, we utilize the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) models introduced by Engle (1982) and Bollerslev (1986) to test the effect of new information arrival on return and return volatility. Through the use of the GARCH model, we also expect volatility persistence to decline. That is, we will be able to observe whether some of the volatility clustering observed in the conditional volatility is due to new information. The model we estimate is provided below.

$$\begin{aligned}
 R_{i,t} &= \mu + \phi_1 D_1 + \phi_2 D_2 + \phi_3 D_3 + \phi_4 D_4 + \phi_5 Open + \sum \lambda_j N_{jt} \\
 &+ \varepsilon_t, \text{ where } \varepsilon_t \sim N(0, \sigma_t^2) \\
 \sigma_t^2 &= \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \sum \lambda_j N_{jt}
 \end{aligned} \tag{22.1}$$

In this equation, $R_{i,t}$ is the hourly index return, calculated as the log difference. The mean equation includes day-of-the-week effect as represented by day dummies D_1 to D_4 , with Friday being the base, as well as a dummy, $Open$, that represents the opening hour for BIST. In both the mean and the conditional variance equation, N_{jt} denotes measures of new information arrivals at time t for measure j , and λ_j denotes the associated coefficients. If the new information arrival is important, we expect λ_j to be statistically significant for the j th news measure. Moreover, with the new information arrival, we expect a decline in volatility persistence, as defined by the sum of coefficient estimates, α_1 and β .

22.3 RESULTS AND DISCUSSION

We reported the estimation results for Eqn (22.1) in Table 22.2 for both BIST100 and SNM returns. Base model reports the estimation results when no news arrival measure is used. When the news arrival is measured by the total number of economic news, our findings indicate that return volatility declines for BIST100 and not for SNM index. In addition, there seems to be no impact on returns itself. The last columns present results when the news is segmented based on country of origin. For both index returns, the number of economic news arriving from the US, Europe, and Turkey causes return volatility to decline. Although this result seems puzzling as one expects return volatility to increase due to news arrival, it is not unique to our study. For example, Kutan and Aksoy

Table 22.2 New information arrival and return volatility

| | BIST100 | | | SNM | | |
|--------------------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
| | Base model | Model 1 | Model 2 | Base model | Model 1 | Model 2 |
| Return equation | | | | | | |
| <i>Total economic news</i> | – | 0.000004 | – | – | –0.000009 | – |
| | | (0.000015) | | | (0.000013) | |
| <i>US economic news</i> | – | – | 0.000031 | – | – | 0.000064** |
| | | | (0.000042) | | | (2.008843) |
| <i>Europe economic news</i> | – | – | 0.000102 | – | – | 0.000127 |
| | | | (0.000092) | | | (1.655401) |
| <i>Turkey economic news</i> | – | – | 0.000003 | – | – | 0.000005 |
| | | | (0.000059) | | | (0.112800) |
| Conditional Variance equation | | | | | | |
| <i>g</i> | 0.000002*** (0.000000) | 0.000011*** (0.000001) | 0.000026*** (0.000004) | 0.000001*** (0.000000) | 0.000003*** (0.000000) | 0.000023*** (0.000003) |
| <i>d₁</i> | 0.026173*** (0.004823) | 0.059396*** (0.012601) | 0.149867*** (0.049291) | 0.090068*** (0.007881) | 0.112992 (0.011541) | 0.149952*** (0.030456) |
| <i>d₂</i> | 0.954729*** (0.007605) | 0.753705*** (0.024490) | 0.599660*** (0.081638) | 0.897270*** (0.008125) | 0.843588 (0.015449) | 0.599626*** (0.066174) |
| <i>Opening hour</i> | –0.000013*** (0.000003) | 0.000000 (0.000000) | –0.000017*** (0.000006) | –0.000002 (0.000002) | –0.000002 (0.000002) | –0.000013*** (0.000005) |
| <i>Total economic news</i> | – | –0.000004*** (0.000003) | – | – | 0.000000 (0.000000) | – |
| <i>US economic news</i> | – | – | –0.000001*** (0.000000) | – | – | –0.000001*** (0.000000) |
| <i>Europe economic news</i> | – | – | –0.000002*** (0.000000) | – | – | –0.000002*** (0.000000) |
| <i>Turkey economic news</i> | – | – | –0.000001*** (0.000000) | – | – | –0.000001*** (0.000000) |
| <i>Function value</i> | 3666.58 | 3678.44 | 3612.35 | 3868.56 | 3875.84 | 3725.24 |
| <i>AIC</i> | –7.59 | –7.61 | –7.47 | –8.01 | –8.02 | –7.70 |

***, **, * denotes statistical significance at 1%, 5%, and 10%, respectively. Standard errors are provided in parentheses. For brevity, we did not provide coefficient of the constant and day-of-the-week dummies in the return equation. Opening hour corresponds to first hour where the trading starts to represent the effect of accumulated news on return and return volatility. Function value is the log likelihood value, and AIC denotes Akaike Information Criteria. BIST, Borsa Istanbul; SNM, Second National Market.

(2004a, b) also find a decline in return volatility using data from BIST. Moreover, for both bearish and bullish periods, Baklaci et al. (2011) show that news arrival causes return volatility to decline for several firms. If the arrival of news causes information asymmetry to decline, then it is plausible also to observe return volatility to decline (Diamond and Verrechia, 1991). In other words, investors/traders are clearer about the market, and hence their confusions or questions are removed as the news (positive or negative) arrives. As a result, return volatility declines as they are in line with one another following market fundamentals.

The information content of news that arrives to the market will be different if the news is on output or on inflation. Therefore, in Table 22.3, we provide estimation results when the news headlines are separated by whether the news is on the real economy or on inflation. As before, we do not find any significant relationship between return and news arrival. However, for the BIST100 index, regardless of the type of news, return volatility and news arrival are negatively related. For the SNM index, our results indicate that US and Europe news on output causes a decline in return volatility. However, neither inflation news nor news on the Turkish economy with respect to output or inflation has a significant influence on return volatility. Given that investors in the firms listed under the SNM index are mostly local investors with much lower average holding periods, this finding does not seem to be a surprise. Perhaps the SNM investors, being frequent sellers and buyers, are buying the past winners and selling the past losers with no particular attention to news arrivals.

If the markets are efficient, anticipated news should provide no new information to investors/traders, while unanticipated news contains new information that changes investment/trading behavior. In other words, news headlines that indicate an expected output growth can have a different interpretation than a headline announcing a surprise output growth. Moreover, news arrival that indicates a surprise output growth or a surprise rise in price levels can have a different impact on return volatility than a surprise decline in output growth or a surprise decline in price level.

Therefore, for CPI and GDP news, we identify surprises by comparing actual and expected announcements provided by *Foreks Data Terminal*. We also distinguish surprise news as either a positive surprise or a negative surprise. Although we define positive surprises when the actual value is greater than the expected value, we do not intend to associate positive surprises with good news or bad news all the time. As discussed in Pearce and Solakoglu (2007) and Birz and Lott (2011), the same news headlines can send different signals when the economy is in a recession as opposed to overheating. For instance, news on surprise output growth can be interpreted as bad news in an overheating economy, while the same news can be interpreted as good news when the economy is in recession. Given that our sample period does not correspond to a crisis period, we believe that both surprise growth in output and surprise decline in inflation represent signals of good news for the Turkish economy.

Table 22.3 Type of information and return volatility

| | BIST100 | | SNM | |
|--------------------------------------|----------------------------|----------------------------|----------------------------|-------------------------|
| | X = Real | X = Inflation | X = Real | X = Inflation |
| Return equation | | | | |
| <i>US news on X economy</i> | 0.000062 (0.606543) | -0.000119 (0.000439) | 0.000209** (0.000086) | -0.000037 (0.000350) |
| <i>Europe news on X economy</i> | 0.000060 (0.193720) | 0.000073 (0.000057) | -0.000077 (0.000111) | 0.000015 (0.000178) |
| <i>Turkey news on X economy</i> | -0.000073 (-0.212380) | -0.000139 (0.000146) | 0.000098 (0.000184) | 0.000002 (0.000227) |
| Conditional variance equation | | | | |
| <i>g</i> | 0.000028*** (0.000008) | 0.000026*** (0.000005) | 0.000011*** (0.000001) | 0.000025 (0.000006) |
| <i>d₁</i> | 0.149605** (0.066503) | 0.149162** (0.058623) | 0.150534*** (0.023091) | 0.149760 (0.042670) |
| <i>d₂</i> | 0.598895*** (0.126722) | 0.597579*** (0.094998) | 0.595804*** (0.048324) | 0.597969 (0.099808) |
| <i>Opening hour</i> | -0.000016 (0.000009) | -0.000024*** (0.000009) | -0.000005 (0.000004) | -0.000021 (0.000009) |
| <i>US news on X economy</i> | -0.000003*** (0.000001) | -0.000002** (0.000001) | -0.000001*** (0.000000) | -0.000002 (0.000001) |
| <i>Europe news on X economy</i> | -0.000003* (0.000002) | -0.000003*** (0.000001) | -0.000002*** (0.000000) | -0.000003 (0.000000) |
| <i>Turkey news on X economy</i> | -0.000003*** (0.000001) | -0.000004*** (0.000001) | -0.000001 (0.000001) | -0.000003 (0.000001) |
| <i>Function value</i> | 3549.81 | 3560.89 | 3795.16 | 3638.39 |
| <i>AIC</i> | -7.34 | -7.36 | -7.85 | -7.52 |

***, **, * denotes statistical significance at 1%, 5%, and 10%, respectively. Standard errors are provided in parentheses. For brevity, we did not provide coefficient of the constant and day-of-the-week dummies in the return equation. Opening hour corresponds to first hour where the trading starts to represent the effect of accumulated news on return and return volatility. Function value is the log likelihood value, and AIC denotes Akaike Information Criteria. BIST, Borsa Istanbul; SNM, Second National Maret.

Table 22.4 provides estimation results for GDP and CPI surprises. Consistent with our earlier results, we do not observe a significant association between surprise news and returns in general. However, we provide some evidence that negative surprises, whether it is related to output or inflation, lead to a decline in return volatility. On

Table 22.4 PI and GDP surprises and return volatility
BIST100

| <i>A: Return equation</i> | BIST100 | | | | SNM | | | |
|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 1 | Model 2 | Model 3 | Model 4 |
| <i>Surprise CPI announcements</i> | -0.000649 (0.001146) | - | - | - | 0.000069 (0.000810) | - | - | - |
| <i>Positive CPI surprises</i> | - | -0.001530 (0.002898) | - | - | - | 0.000223 (0.001378) | - | - |
| <i>Negative CPI surprises</i> | - | -0.000406 (0.002516) | - | - | - | 0.000874** (0.000387) | - | - |
| <i>Surprise GDP announcements</i> | - | - | 0.002180* (0.001273) | - | - | - | 0.002551 (0.001626) | - |
| <i>Positive GDP surprises</i> | - | - | - | -0.000266 (0.002174) | - | - | - | 0.001521 (0.002175) |
| <i>Negative GDP surprises</i> | - | - | - | 0.000399 (0.007507) | - | - | - | 0.001745 (0.002408) |
| B: Conditional variance equation | | | | | | | | |
| g | 0.000002*** (0.000000) | 0.000024*** (0.000001) | 0.000023*** (0.000002) | 0.000026*** (0.000009) | 0.000001*** (0.000000) | 0.000001*** (0.000000) | 0.000014*** (0.000002) | 0.000023*** (0.000005) |
| d_1 | 0.026269*** (0.005211) | 0.143223*** (0.045575) | 0.140714*** (0.042958) | 0.145278** (0.068690) | 0.093729*** (0.008774) | 0.085933*** (0.009644) | 0.159740*** (0.026459) | 0.148508*** (0.037781) |
| d_2 | 0.955229*** (0.008373) | 0.583938*** (0.023855) | 0.584064*** (0.008469) | 0.588012*** (0.156037) | 0.893191*** (0.009175) | 0.891845*** (0.010133) | 0.563065*** (0.055657) | 0.587324*** (0.087025) |

| | | | | | | | | |
|---------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|----------------------------|----------------------------|----------------------------|
| <i>Opening hour</i> | -0.000012*** (0.000003) | -0.000032*** (0.000006) | -0.000028*** (0.000007) | -0.000028*** (0.000009) | -0.000001 (0.000002) | -0.000001 (0.000002) | -0.000019*** (0.000002) | -0.000026*** (0.000005) |
| <i>Surprise CPI announcements</i> | 0.000003** (0.000002) | - | - | - | -0.000001 (0.000001) | - | - | - |
| <i>Positive CPI surprises</i> | - | -0.000013 (0.000016) | - | - | - | 0.000004 (0.000002) | - | - |
| <i>Negative CPI surprises</i> | - | -0.000035*** (0.000003) | - | - | - | -0.000004*** (0.000001) | - | - |
| <i>Surprise GDP announcements</i> | - | - | -0.000027*** (0.000010) | - | - | - | 0.000000 (0.000009) | - |
| <i>Positive GDP surprises</i> | - | - | - | -0.000036 (0.000025) | - | - | - | -0.000014 (0.000014) |
| <i>Negative GDP surprises</i> | - | - | - | -0.000034*** (0.000008) | - | - | - | -0.000031*** (0.000005) |
| <i>Function value</i> | 3667.84 | 3579.13 | 3573.78 | 3552.64 | 3868.79 | 3871.65 | 3735.26 | 3648.28 |
| <i>AIC</i> | -7.59 | -7.40 | -7.40 | -7.35 | -8.01 | -8.01 | -7.73 | -7.55 |

***' **' * denotes statistical significance at 1%, 5% and 10%, respectively. Standard errors are provided in parentheses. For brevity, we did not provide coefficient of the constant and day-of-the-week dummies in the return equation. Opening hour corresponds to first hour where the trading starts to represent the effect of accumulated news on return and return volatility. Function value is the log likelihood value, and AIC denotes Akaike Information Criteria. BIST, Borsa Istanbul; SNM, Second National Maret.

the other hand, positive surprises have no significant effect on return volatility. We can link this interesting finding with the herding intentions of investors/traders. It is possible that investors/traders observe lower than expected output growth as a signal for market stress (bad news) and hence decide to act together, which leads to a decline in return volatility (see, for example, [Hwang and Salmon, 2004](#); [Christie and Huang, 1995](#); [Chang et al., 2000](#)).

The mixture of distribution hypothesis states that if news arrival is important for return volatility, the inclusion of news arrival into the conditional volatility equation should cause a decline in volatility persistence. With the inclusion of economic news headline counts, volatility persistence drops about 17% for the BIST100 index and only about 3% for the SNM index. However, when news is separated by country of origin, for both indices, we observe a decline of about 24% in volatility persistence. In addition, the decline in persistence is over 30% when the news arrival is measured by the news on output or inflation separately, or by the positive and negative surprises. As a result, even though investor characteristics are different for both indices, the reaction of investors/traders to news arrival appears to be similar.

22.3 CONCLUSION

In this study, we try to understand the role of news arrival on return and return volatility for two types of investors, informed versus not-informed, using hourly data for the Turkish stock market. News arrival is measured by the number of economic headlines received from the US, a sample of European countries and Turkey. News is classified based on the country of origin and type of news headlines. Moreover, for GDP and inflation news, we identify positive and negative surprises for the countries we considered during our sample period.

Our results are surprising in two fronts. One is the lack of significant response of returns to news arrival. The second one is the significant decline in return volatility due to news arrival. We believe that news arrival leads information asymmetry to decline among investors which, in turn leads to a decline in return volatility ([Diamond and Verrechia, 1991](#)). Given that return volatility declines significantly only under negative GDP and inflation surprises, we can also reference herding behavior as a possible explanation for the decreased return volatility. In addition, our findings imply that the information asymmetry is lower and hence investors/traders are clearer about the market when news arrival is about negative surprises on GDP and inflation. Although we consider two types of investors, our results do not provide strong evidence that indicate the differences in the usage of information arrivals between the two groups. Overall, both groups seem to be affected similarly, both for the effect of news arrival on return and return volatility and decline in volatility persistence.

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