MACROECONOMIC INDICATORS FORECASTS ACCURACY AND REACTION OF INVESTORS ON THE WSE

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Abstract: Every day analysts and news agencies publish forecasts of important macroeconomic indicators. When the announced value of an indicator differs from its forecast, investors must revise their strategies. The strength of investors' reaction depend on the difference between expectations and the true value of the indicator. In this paper we analyze the reaction of investors on the WSE to U.S. macroeconomic news announcements. We compare the strength of the reaction when forecasts are based on information from different financial services.

Keywords: macroeconomic news announcements, WSE, event study

INTRODUCTION

It is well known that publications of various macroeconomic data impact stock markets. In particular, data describing the U.S. economy imply strong reaction of investors all around the world. It is clearly visible in the case of European stock markets, because U.S. macroeconomic news is released during trading hours of stock markets in Europe. The impact of U.S. data is even stronger than impact of news from European economies. It is because news from European economies is mainly released before opening of stock markets or after their closure. This fact is confirmed by Nikkinen and Sahlström [Nikkinen and Sahlström 2004] who study the impact of monthly announcements of CPI, PPI and Unemployment Rate on German and Finnish stock markets on the basis of data from January 1996 to December 1999. They show that the strongest reaction

of both markets is implied by announcements about unemployment and PPI in U.S. Moreover, both markets react only on announcements of U.S. data and they are unaffected by domestic news.

These results are extended by Nikkinen et al. [Nikkinen et al. 2006] who analyze reaction of developed and emerging markets in various parts of the world. They show that announcements of some U.S. macroeconomic indicators significantly impact developed European markets, while emerging markets in Central and Eastern Europe (including Poland) remain unaffected. On the other hand, [Cakan et al. 2015] show the strong impact of U.S. news on volatility on emerging markets (including Poland, Russia and Turkey). The effect of U.S. macroeconomic data announcements solely on the Warsaw Stock Exchange is examined by Gurgul et al. [Gurgul et al. 2012]. They show that CPI and Industrial Production announcements significantly impacts daily returns of WIG20, but there is no significant reaction to announcements about unemployment.

The above papers are based on daily data, however, U.S. macroeconomic news announcements mostly impact intraday returns. It is clearly showed by Harju and Hussain [Harju and Hussain 2011] who examine intraday pattern in volatility and returns of CAC40, DAX30, FTSE100 and SMI. They find that U.S. macroeconomic news announcements induce an immediate and significant reaction of European developed markets. Significant changes in returns are observed in the first five minutes after news announcements. The strongest impact is implied by Unemployment Rate and Durable Goods Orders announcements.

Quite different results concerning European emerging economies are provided by Hanousek et al. [Hanousek et al. 2009] who study reaction of stock markets in the Czech Republic, Hungary and Poland. They show that the strongest reaction of 5-minute returns is observed on the stock market in Prague, while the Warsaw Stock Exchange seems to be unaffected by U.S. macroeconomic news.

Quite different conclusions follow from study of Gurgul et al. [Gurgul et al. 2013]. On the basis of intraday data, they show very strong and immediate reaction of WIG20 to unexpected news from the U.S. economy. Significant changes in the main index of WSE are observed in the first five minutes after announcements about industrial production, durable goods orders, retail sales and nonfarm payrolls. The later implies the strongest reaction. These results are strengthened by Gurgul and Wójtowicz [Gurgul and Wójtowicz 2014] who prove that indices of WSE react significantly to U.S. macroeconomic data even in the first minute after news announcements. Once again, the strongest reaction is implied by Nonfarm Payrolls.

This is in line with results of Suliga and Wójtowicz [Suliga and Wójtowicz 2013] who study reaction of WIG20 to announcements of different indices included in the Employment Report describing the U.S. labor market. The strongest reaction is connected with announced values of Nonfarm Payrolls. It is even much more important to investors than Unemployment Rate. The importance of Nonfarm Payrolls is also underlined by Andersen et al. [Andersen et al. 2007].

In the above papers there are similar definitions of good and bad news. Usually, news is good when an announced value of a macroeconomic indicator is greater than its forecast. News is bad when the value of the indicator is less than expected[2]. However, when the difference between real and expected value of the indicator is small, investors may treat information as in line with expectations. Hence, results of an analysis of the impact of macroeconomic news announcements may depend on definition of good and bad news. In similar way, the choice of a source of macroeconomic forecasts may impacts results of such analysis.

In this paper we analyze the impact of unexpected news implied by publication of the Employment Report by the U.S. Bureau of Labor Statistics on the Warsaw Stock Exchange. We study how investors reaction depends on the difference between announced values of Nonfarm Payrolls and their forecasts published by various news agencies and internet services. There are two main aims of this analysis. First, we examine how large should be the discrepancy between value of the announced indicator and its forecast to describe investors' reaction properly. The second aim, is the comparison of practical value of macroeconomic forecasts published on different websites. To do this we compare reaction of WIG20 returns to Nonfarm Payrolls announcements on the basis of forecasts provided by different financial services.

The structure of this paper is as follows. Next section describes the data under study. Empirical results are presented and discussed in the third section. Short summary concludes the paper.

DATA

The Employment Report published monthly by the U.S. Bureau of Labor Statistics describes the U.S. labor market in the month prior to release date. It is usually released on the first Friday of the month at 8:30 EST (Eastern Standard Time) i.e. at 14:30 CET (Central European Time)[3]. The Report is one of the most important publication containing macroeconomic data. Its importance comes from the fact that it is usually first official publication in the month that describes U.S. economy. Because it precedes other macroeconomic indicators announcements, values of these indicators can be partially forecasted on the basis of information contained in the Report.

The Employment Report contains four important indicators: Unemployment Rate, Average Hourly Earnings, Average Workweek and Nonfarm Payrolls (NFP). Previous studies [Suliga and Wójtowicz 2013] show that reaction of stock markets depends mostly on unexpected news contained in NPF. Hence, an analysis of the impact of NFP announcements gives the most visible results.

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[2] Opposite definitions of good and bad news are applied in the case of unemployment.

[3] Due to differences in introduction of the Daylight Saving Time in the U.S. and Europe some of the announcements (in November) are released at 13:30 CET.

In this paper we study the impact of NFP announcements on 1-minute log-returns of WIG20 on the basis of data from July 2008 to April 2015. In this period, there were 77 announcements of the Employment Report that took place during trading session on the Warsaw Stock Exchange.

In order to compare investors' reaction to NFP announcements when their expectations are based on different sources, we take into account macroeconomic forecasts published by several financial services. Forecasts come from the following websites:
- bloomberg.com,
- briefing.com,
- yahoo.com,
- deltastock.com,
- forexfactory.com,
- investing.com,
- wbponline.com,
- macronext.com.

It should be noted here that macroeconomic forecasts published by Bloomberg are provided by Econoday service. Forecast made by Briefing are published also by Yahoo! Finance whereas data provided by macroNEXT are published by several important Polish financial services, for example by biznes.pl or parkiet.com.

To investigate the impact of NFP announcements on intraday WIG20 returns we apply event study methodology. For each of the announcements we use 1-minute WIG20 returns from a window that starts 185 minutes before the announcement and ends 60 minutes after the announcement. These returns are divided into two groups: a pre-event window that contains first 180 returns and an event window that starts five minutes before the announcement and ends one hour after it. In the whole window we define abnormal returns (AR_t) as differences between observed returns and the average of returns from the pre-event window. The total effect of announced news is better described by cumulative abnormal returns (CAR_t) defined as a sum of abnormal returns from the announcement time to a given time t.

News about NFP has impact on WIG20 if mean of abnormal returns or cumulative abnormal returns are significantly different from zero after announcements. To test the significance of these means in the event window we apply the nonparametric generalized rank test of Kolari and Pynnönen [Kolari and Pynnönen 2011] with a correction for event-implied volatility[4]. This test does not need any assumption about the normality of abnormal returns and it has relatively high power.

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[4] See also Gurgul and Wójtowicz [2015] for detailed information about test procedure.

EMPIRICAL RESULTS

Different definition of good and bad news

In the first part of the empirical analysis we study how the impact of NFP announcements (measured by AR_t and CAR_t) depends on definition of good and bad news. The definition is based on consensus values published by Bloomberg a few days before each announcement.

In the literature, unexpected news is defined usually as the difference between announced value of an indicator and its expected value published few days before the announcement. Good news is when released value of NFP is greater than forecast while NFP smaller than expected is bad news. Good news is followed by positive returns, while bad news is followed by negative returns. However, when difference between forecast and announced value is small, the announcement may be ignored by investors irrespective of the sign of the difference. Determination of a suitable threshold that will separate important and unimportant news may be important to properly describe investors reaction to NFP announcements.

Values of NFP released in the period under study presented in Figure 1 range from -663 000 to 431 000 with median equal to 113 000. However, threshold value depends rather on forecasts' accuracy. Absolute values of differences between NFP values and Bloomberg forecasts in this period range from 0 to 233 000 with median 42 000.

Figure 1. Nonfarm Payrolls changes (in thousands) in the period July 2008 - April 2015
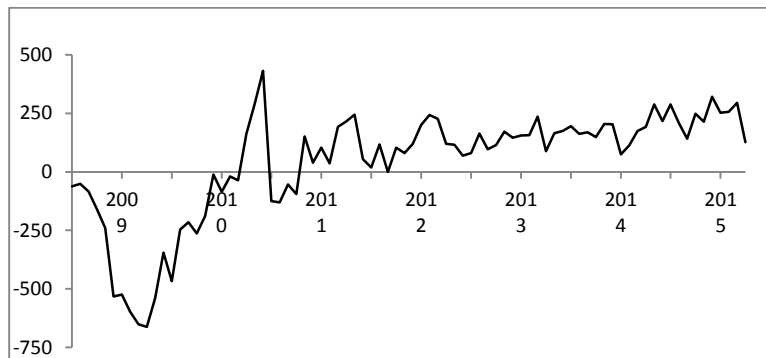
Source: Author's computation

Taking it into account we consider six threshold values, namely (in thousands): 0, 10, 20, ..., 50 and we define good news when the difference between announced NFP and Bloomberg consensus is greater than the given threshold. Bad news is defined analogously, when the difference is smaller than "-threshold". For different values of threshold we report in Table 1 averages of abnormal returns in first minute after news announcements together with the number of announcements

in each cluster. Panel A contains results for "good news" clusters, while Panel B contains results for "bad news" clusters. Kolari-Pynnönen tests confirm that all computed means are significant at least at the 1% level. It means that regardless of the definition of good and bad news, reaction of WIG20 is significant in the first minute after news announcements. However, the strength of the reaction depends on this definition. The strongest reaction to good news is observed for threshold 40K, while the strongest reaction to bad news is observed for threshold 30K. To determine whether means of abnormal returns immediately after news announcements depend on assumed threshold we apply bootstrap methods to test the significance of differences between means of abnormal returns reported in Table 1. Means of abnormal returns after good news do not differ significantly. On the other hand, after bad news only significant difference is between mean for thresholds 0 and 30K (approximate p-value is 0.026). It follows that in the case of good news, the choice of threshold and definition of good news has no visible impact on WIG20. However, the choice is important for the definition bad news. Taking into account only announcements that are smaller than forecast more than 30K significantly improves mean of abnormal returns.

Table 1. Averages of abnormal returns in first minute after NFP announcements when good and bad news are defined for different values of threshold

|	Threshold					
	0	10K	20K	30K	40K	50K
Panel A: good news						
AR_1 (in %)	0.268	0.299	0.292	0.296	0.299	0.268
number of events	42	38	28	23	22	21
Panel B: bad news						
AR_1 (in %)	−0.262	−0.302	−0.323	−0.398	−0.370	−0.381
number of events	33	29	27	22	18	16

Source: Author's computation

Publication of the Employment Report impacts WIG20 not only in first minutes after announcements. Kolari-Pynnönen tests confirm significance of cumulative abnormal returns in almost the whole event window[5]. Thus, it is justified to examine also differences between cumulative abnormal returns computed for different values of threshold. Figure 2 presents averages of CAR_ts in the first hour after good (left panel) and bad (right panel) news announcements. Differences between means of CAR_ts after good news do not differ significantly for any time t in the event window. On the other hand, means of cumulative abnormal returns

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[5] For example, when threshold is equal to 0 CAR_ts are significant at the 5% level in the whole event window after bad news and up to 56 minutes after good news announcements.

computed for threshold 0 and 30K are significantly different up to eight minutes after bad news announcements. The other means can be seen as equal.

Figure 2. Averages of cumulative abnormal returns (CAR_ts) in first 60 minutes after NFP announcements computed for different values of threshold after good (left panel) and bad (right) panel news announcements
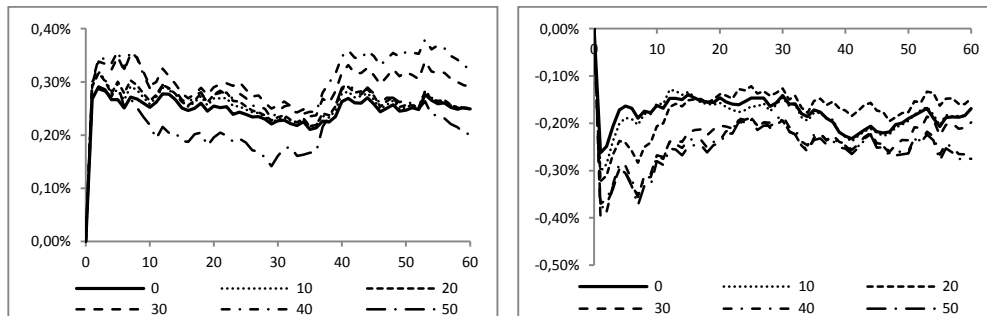
Source: Author's computation

Different source of information

In the second part of the empirical analysis we study differences in WIG20 abnormal returns when good and bad news are defined on the basis of NFP forecasts provided by different financial services mentioned in the previous section. As before, we first consider the case when threshold is equal to 0 i.e. news is good if announced value of NFP is simply greater than its forecast. Table 2 presents averages of abnormal returns in the first minute after the announcements[6]. As previously, all means of abnormal returns are significant at least at 1% level. When good news is announced three differences are significant: Bloomberg-Briefing, Bloomberg-macroNEXT and WBP Online-Briefing. After bad news announcements only information from Bloomberg and macroNEXT leads to significantly different means of abnormal returns[7]. The other means of abnormal returns do not differ significantly.

As a comparison, Table 3 presents averages of AR_1s for threshold equal to 30K. As above, Kolari-Pynnönen tests indicate that all the means are significantly different from zero. When good news is announced mean based on Bloomberg forecasts does not differ significantly from the other means. The only significant differences are between results based on Briefing and Yahoo! or between Briefing and WBP Online. On the other hand, after bad news mean abnormal returns

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[6] Information from three services (DeltaStock, Forex Factory and Investing) give the same "good news" and "bad news" clusters. Hence, we present their averages in one column.

[7] It should be noted here that in the bootstrap procedure not only difference between means is important, but also number of events in clusters and number of common events play important role.

implied by macroNEXT forecasts differ significantly from means based on information from Bloomberg and Forex Factory.

Table 2. Averages of abnormal returns in first minute after NFP announcements when good and bad news are defined on the basis of forecasts provided by different financial services

	Financial service					
	Bloomberg	Briefing.com	Yahoo!	DeltaStock Forex Factory Investing	WBP Online	makroNEXT
Panel A: good news						
AR_1	0.268	0.172	0.245	0.226	0.250	0.224
number of events	33	37	35	35	36	35
Panel B: bad news						
AR_1	−0.244	−0.206	−0.249	−0.233	−0.265	−0.231
number of events	44	40	42	42	41	42

Source: Author's computation

Table 3. Averages of abnormal returns in first minute after NFP announcements when good and bad news are defined for threshold 30K on the basis of forecasts provided by different financial services

	Financial service							
	Bloomberg	Briefing.com	Yahoo!	DeltaStock	Forex Factory	Investing	WBP Online	makroNEXT
Panel A: good news								
AR_1 (in %)	0.296	0.178	0.307	0.284	0.266	0.266	0.312	0.266
number of events	22	23	23	22	21	21	23	21
Panel B: bad news								
AR_1 (in %)	−0.398	−0.343	−0.390	−0.360	−0.397	−0.353	−0.390	−0.352
number of events	23	26	25	25	24	25	25	24

Source: Author's computation

When we compare total impact of unexpected news based on information provided by the financial services under study, two main conclusions arise. First, for threshold 0 the differences between means of CAR_ts after bad news are almost indistinguishable with the only exception CAR_ts implied by forecasts from

Briefing. Means based on Briefing forecasts diverge from the other means towards zero. Similar pattern is observed after bad news announcements.

When we consider threshold equal to 30, means based of Briefing forecasts are significantly different after good news. Bad news are followed by almost identical means irrespective on the source of information.

CONCLUSIONS

In this paper we study how results of the analysis of stock market reaction to U.S. macroeconomic news announcements depend on definition of good and bad news. We also study the robustness of such analysis to the choice of a source of macroeconomic forecasts. The empirical analysis in the paper is performed on example of Nonfarm Payrolls announcements between July 2008 and April 2015. On the basis of 1-minute log-returns of WIG20 we show that reaction of investors on WSE is significant in first minutes after news announcements irrespective of the definition of good and bad news. However, the strength of the reaction depends on what we define as unimportant news. The best results are obtained when threshold is between first quartile and the median of absolute values of differences between announced and forecasted values of a macroeconomic indicator. In general, the conclusion about the significance of reaction to news announcements also do not depend on source of forecasts. However, application of data from some financial services can lead to significantly different means of cumulative abnormal results.

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