Do the US Macroeconomic News Announcements Explain Turn-of-the-Month and Intramonth Anomalies on European Stock Markets?

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Recent evidence from the US stock market suggests that the turn-of-the-month (hereafter TOM) and intramonth anomalies arise from the systematic monthly release of important US macroeconomic news that are clustered on the first half of the month. Based on the traditional studies on stock market integration and on the impact of US macroeconomic news announcements on European stock markets, we hypothesize that important US macroeconomic news releases are also behind the anomalies observed on European stock markets. Using data from the UK, German, and French stock markets, we first document the existence of significant TOM and intramonth effects. After controlling for the major US macroeconomics announcements these seeming anomalies disappear on European stock markets. Our results therefore show that the TOM and intramonth anomalies are driven by a common factor, namely, by the important US macroeconomic news announcements that are clustered at the beginning of the month.

INTRODUCTION

Turn-of-the-month (hereafter TOM) and related intramonth effects are so-called seasonal anomalies implying that stock returns are not evenly distributed over calendar time. Both anomalies are well documented and the existing literature suggests that these anomalies exist internationally (see e.g., Ariel, 1987; Lakonishok and Smidt, 1988; Cinar and Vu, 1991; Hensel et al., 1994; Martikainen et al., 1995; Gerlach, 2007; Nikkinen et al., 2007). In detail, the literature shows that returns are significantly positive at the TOM and positive (zero or even negative) in the first (second) half of the month (see e.g., Ariel, 1987; Lakonishok and Smidt, 1988; Odgen, 1990; Cadsby and Ratner, 1992). To illustrate the magnitude of the phenomenon, Pettengill and Jordan (1988) and Agrawal and Tandon (1994), for example, note that the

cumulative stock returns around turn-on-the-month [days -1 to +4] can make up as much as 55 % - 70 % of the total monthly return.

Despite the extensive research in the area, the causes for these particular anomalies have largely remained unanswered puzzles. One possible reason for the TOM effect has been proposed to be the clusterization of salary payments and other liabilities (see e.g., Pettengill and Jordan, 1988; Odgen, 1990; Booth et al., 2001). Alternatively, it may be the case that the assumption of random information arrival of the efficient market hypothesis (EMH) is unrealistic. Penman (1987) tackles this issue by investigating the effect of earnings announcement releases on the intramonth anomaly. While Penman (1987) suggests that the anomaly may arise from the clusterization of earnings releases, Peterson (1990) finds that the clusterization of earnings releases does not explain the phenomenon.

Recently, Gerlach (2007) and Nikkinen et al. (2007) investigated the role of US macroeconomic news releases in explaining these anomalies on the US stock market. Nikkinen et al. (2007) find that the TOM and intramonth anomalies on the US stock markets are explained by the major macroeconomic announcements occurring systematically at the beginning of the month and clustered, especially in the first half of the month. Similarly, Gerlach (2007) reports that six anomalies – the TOM, monthly, rainfall, temperature, holiday and lunar effects – found in the S&P 500 index returns can be explained by the macroeconomic news announcements. Consequently, taken together, these results provide fairly strong empirical evidence that the macroeconomic news announcements can explain the TOM and intramonth anomalies on the US stock markets.

In this paper, we examine whether the clustered information arrival, i.e. the clustered US macroeconomic news announcements, explains the TOM and intramonth anomalies on three major European stock markets. We hypothesize that because of integrated financial markets, the observed TOM and intramonth anomalies on European markets are also caused by important US macroeconomic news releases. The earlier literature on stock market integration (see e.g., Engsted and Tanggaard, 2004; Cumperayot et al., 2006; Gerlach et al., 2006) and the earlier literature on the impacts of US macroeconomic news announcements on European stock markets (see e.g., Nikkinen and Sahlström, 2004, Nikkinen et al., 2006) support this hypothesis development. For example, US macroeconomic news announcements have been found to have a greater effect on European stock markets than comparable domestic announcements.

This study extends the work of Gerlach (2007) and Nikkinen et al. (2007) by examining for the first time whether the clusterization of important US macroeconomic news announcements also causes the TOM and intramonth anomalies on the major European stock markets. Of the previous studies, Nikkinen et al. (2007) report that the TOM and intramonth anomalies on the US stock markets arise from the clusterization of important US macroeconomic news announcements. Similarly, Gerlach (2007) reports that the TOM anomaly present in the S&P 500 index returns from 1980-2003 are due to the US macroeconomic news announcements. Since the US macroeconomic news announcements have been found to affect stock prices internationally, these news announcements may also explain the TOM and intramonth effects outside the USA. Consequently, this study provides new insights on the issue of US macroeconomic news announcements as an explanation for these anomalies on European stock markets.

The results of our study show that there is significant turn-of-the-month effect on the DAX, FTSE-100 and CAC stock market, day 1 having the greatest positive return. Furthermore, we find that there exists an intramonth anomaly, as the returns are higher in the first half of the month or alternatively in the first third of the month. The empirical analysis provides a strong

support for the macroeconomic news announcement hypothesis, since once the impacts of important US macroeconomic news announcements have been taken into account the returns are no longer statistically different from zero at the TOM. Furthermore, returns are not statistically different from zero in the first half and in the first third of the month.

In our empirical analysis, we control for the fact that the realized return may be a combination of expected return and unexpected return due to unexpectedly low or high macroeconomic figures released. In addition, we address the possibility that the state of the economy may cause the impacts of macroeconomic news announcements on stock returns to vary over time. Extensive robustness checks confirm that the results are robust to autocorrelation, volatility clustering and other seasonal effects, such as day-of-the-week and turn-of-the-year effects. Overall, the findings of this study suggest that the effect of the systematic arrival of the important US macroeconomic news announcements is such that the apparent TOM and intramonth anomalies also arise on the European stock markets.

The remainder of the paper is organized as follows. The following section presents the hypothesis development, while the data is presented in Section 3. The methodology used in the study is described in Section 4. Empirical results are provided in Section 5 and the final section concludes and summarizes the findings of the study.

HYPOTHESIS DEVELOPMENT

The usual assumption in the finance literature is that information arrival is random and consequently risk is constant over time. Thus, expected and realized returns should be constant over time. However, several studies make the assumption of constant risk and return questionable (see e.g., Schwert, 1989). For example, macroeconomic news announcements have been found to cause the risk and return to be time-varying on the stock markets (Flannery and Protopapadakis, 2002; Patro et al., 2002; Nikkinen et al., 2006; Peng et al., 2007). Moreover, the studies show that some news announcements have a greater impact than others (e.g. Bollerslev et al., 2000).

On the US stock markets, Gerlach (2007) and Nikkinen et al. (2007) and hypothesize that the high returns observed at the beginning of the month are due to important US macroeconomic news releases. This macroeconomic news announcement hypothesis is solid for three main reasons. First, the release time of the scheduled macroeconomic news announcements is known in advance, thus they affect investors´ expected and realized risks and returns (see, e.g., Jones et al., 1998). Second, important macroeconomic news announcements are clustered on particular days of each month, especially in the first half of the month (see, e.g., Bollerslev et al., 2000; Graham et al., 2003). Third, trading activity is known to increase around these important announcements (e.g., Fleming and Remolona, 1999; Chordia et al., 2001; Nofsiner and Prucyk, 2003). Karpoff (1987) further shows that the increase in liquidity is positively associated with price changes and this relationship is mostly driven by information arrival. Therefore, the explanation of macroeconomic news announcements as a cause for these anomalies is consistent with the increased trading activity at the TOM (see Booth et al., 2001). The empirical results of Gerlach (2007) and Nikkinen et al. (2007) support the hypothesis constructed implying that the anomalies arise from the clusterization of the important US macroeconomic news announcements.

There are two main reasons why US macroeconomic news releases could also be a reason for the TOM and intramonth anomalies on the European stock markets. First, the empirical

evidence, such as that evinced by Nikkinen et al. (2006), shows that the European stock markets are affected by the US macroeconomic news releases. Moreover, Nikkinen and Sahlström (2004) report that the US macroeconomic news announcements have a greater effect on the stock market than corresponding domestic news releases on the European markets. Therefore, the results suggest that US macroeconomic news releases have a major effect on the pricing processes of the European stock markets. Second, studies on market integration show that European stock markets are highly integrated with the US stock markets. The studies document that realized returns and variances are highly correlated in these markets and, most importantly, they show that the US market seems to be the leading source of information (see e.g., Lin et al., 1994; Susmel and Engle, 1994; Bekaert and Harvey 1995; Booth et al., 1997). Based on these arguments, it is hypothesized that TOM and intramonth anomalies observed on European stock markets occur due to important US macroeconomic news releases.

DATA

Stock Market Data

Data on the European main stock markets, i.e. Germany, France and the UK, are used. The DAX-30, CAC-40 and FTSE-100 indices are selected as proxies for the general market indices. The sample period is 1998-2006. Daily index returns are defined as the natural logarithm of the ratio of the consecutive daily closing values. The descriptive statistics and the correlations between the indices are reported in Table 1.

TABLE 1
DESCRIPTIVE STATISTICS OF THE RETURNS

Panel A:	DAX	CAC	FTSE
Mean	0.000	0.000	0.000
Median	0.001	0.001	0.000
Maximum	0.076	0.070	0.059
Minimum	-0.064	-0.060	-0.056
Std. dev.	0.016	0.014	0.012
Skewness	-0.063	-0.031	-0.132
Kurtosis	5.224	5.358	5.403
Panel B: Correlations			
DAX	1.000		
CAC	0.832	1.000	
FTSE	0.743	0.821	1.000

US Macroeconomic News Data

The sample of scheduled macroeconomic news announcements investigated is largely based on the Bureau of Labor Statistics (BLS) classifications of major economic indicators. In addition, the importance of the selected news announcements has been shown in several earlier studies (see e.g., Bollerslev et al., 2000; Graham et al., 2003). Thus, the announcements are selected because of their anticipated effect on the stock market. Both the timing and content of the announcements are considered in the empirical analyses. Following, for example, Ederington and Lee (1996), Heuson and Su (2001) and Nikkinen et al., (2007), the dates for the release of macroeconomic news are used as information events. Moreover, the market expectations of the

announcements taken from the surveys by Bloomberg are applied to measure the surprise component of the news announcements. The surprise components of the macroeconomic announcements are computed by subtracting the market expectation from the actual announcement.

All the releases are made in the morning when the US stock market is not open, except the reports on Industrial Production and manufacturing and non-manufacturing of Institute for Supply Management (ISM), which are released respectively at 9.15 a.m. and 10:00 a.m. Eastern Time.[1] However, the European stock markets are open at these release times. Moreover, there are several hours of trading time left on the European markets after the release times, suggesting that the effect of these news releases is well incorporated into the closing prices of European stocks.

The average dates of the announcements, the issuing authorities of the information releases, and the number of announcements contained in the sample are presented in Table 2. Certain announcements are made consistently on a given day each month, which can be seen in the statistics. For example, the Employment Report is released on the first Friday of the month and the Manufacturing ISM and non-manufacturing ISM reports respectively on the first and third trading days of the month.

TABLE 2
RELEASE TIME OF THE MACROECONOMIC NEWS ANNOUNCEMENTS

Report m:	Symbol	Issued	# of releases	Release date[a]
1. Institute for Supply Management[b]: Manufacturing	ISM	Monthly	108	1.0
2. Institute for Supply Management[b]: Nonmanufacturing	ISMS	Monthly	108	3.0
3. Employment	EMP	Monthly	108	4.0
4. Retail Sales	RS	Monthly	108	9.3
5. Producer Price Index	PPI	Monthly	108	9.9
6. Industrial Production	IP	Monthly	108	11.2
7. Consumer Price Index	CPI	Monthly	108	11.8
8. Consumer Confidence	CONSCON	Monthly	108	18.8
9. Gross Domestic Product	GDP	Quarterly[c]	108	19.4
10. Employment Cost Index	EMPCOST	Quarterly	35	19.7

NOTES:
a) Average release day of the month as measured by trading days.
b) Previously these reports were entitled National Association of Purchasing Management reports.
c) Revised monthly.

METHODOLOGY

We begin our analysis by investigating whether stock market returns exhibit any turn-of-the-month effect. For that purpose we follow Nikkinen et al. (2007) and Szakmary and Kiefer (2004) and estimate a regression model that controls for autocorrelation, volatility clustering and other

[1] Institute for Supply Management reports (ISM) were previously entitled National Association of Purchasing Management reports (NAPM).

calendar effects.[2] Similar controls are used in all our regressions. Thus, the following regression model is estimated for each market:

$$r_t = \sum_{i=-9}^{9} \alpha_i D_{i,t} + \alpha_0 ROM_t + \varepsilon_t \,, \qquad (1)$$

where r_t is the stock market return at time t, i refers to days (-9.-8, …, +8, +9), $D_{i,t}$ stands for the dummy variable having a value of 1 on day i, otherwise zero, ROM_t is a dummy variable that takes a value of 1 on rest-of-the-month days (i.e., other than -9,-8,…,+8,+9), otherwise zero.

To investigate the existence of the intramonth effect the month is split into two equal halves based on the approach of Ariel (1987). Moreover, we re-run the regression by splitting the month into three parts to investigate the intramonth effect in more detail. For each market these regression models are as follows:

$$r_t = \alpha_1 FH_t + \alpha_2 SH_t + \varepsilon_t \qquad (2)$$

$$r_t = \alpha_1 FT_t + \alpha_2 ST_t + \alpha_2 LT_t + \varepsilon_t \,, \qquad (3)$$

where FH_t (first half of the month) takes a value of 1 if day t constitutes a trading day -1 through +8 relative to the turn-of-the-month and otherwise 0, and SH_t (second half of the month) equals 1 if day t falls on the range trading day -10 through -2 relative to the turn-of-the-month.[3] Furthermore, FT_t (first third of the month) equals 1 if day t falls on the range trading day -1 through 6 relative to the turn-of-the-month. Using similar logic, ST_t (second third of the month) captures the effect between days 7 to 13 and LT_t (last third of the month) between days 14 to 20. The other variables are as previously defined.

To investigate whether the US macroeconomic news affect stock returns on European markets and are consequently possible causes for the TOM and intramonth effects, the following regression model is estimated separately for each market[4]:

$$r_t = c + \sum_{m=1}^{10} \alpha_m MACROS_{m,t} + \sum_{m=1}^{10} \alpha_m MACROD_{m,t} + \varepsilon_t \qquad (4)$$

where c is the intercept term, *MACROS* represents the surprise component of a macroeconomic news announcement (m=CCS, CPIS, …, RETAILS) defined as the actual value minus expected value, *MACROD* is a dummy variable that takes the value of 1 when macronews (m=CCD, CPID, …, RETAILD) is announced, otherwise zero. In this model, the return on a trading day therefore consists of a common expected part (intercept), expected part due to a particular

[2] The results indicated that there was no autocorrelation in the return series. Furthermore, the regression results were not sensitive to the turn-of-the-year and day-of-the-week effects.

[3] Following the earlier literature on the intramonth anomaly (e.g., Ariel, 1987; Gerlach, 2007; and Nikkinen et al., 2007) the first periods of the month (FH and FH) start at day -1. The results are not sensitive to whether the starting day of the window is -1 or 1.

[4] As a robustness check, we also analyzed, as suggested by McQueen and Roley (1993) and Adams et al. (2004), the impact of the surprises on returns in different states of the economy. According to these robustness regressions, only the employment and ISM reports show some asymmetric effects. We also examine the effects of these findings on our primary analysis and found the macroeconomic news announcements as explanations for these anomalies are not sensitive to the controlling for the different states of the economy.

macroeconomic news announcement release ($MACROD_{m,t}$), unexpected part due to surprise in a particular macroeconomic variable ($MACROS_{m,t}$) and unexpected part due to other information releases on day *t (the error term).*

To investigate whether the US macroeconomic news is the reason for the TOM and intramonth effects on European markets, we investigate the residuals ($resid_t$) estimated from Model (4). These residuals can be considered as the portion of stock returns that are orthogonal to risk premiums related to the macroeconomic news announcements, i.e. the effect of US macroeconomic news has been whipped out from the return series. Thus, if the US macroeconomic news releases are the reason for the effects, then the effects should not be observed in the residuals estimated from Model (4). To investigate these issues, the following regression models are estimated for each market:

$$resid_t = \sum_{i=-9}^{9} \alpha_i D_{i,t} + \alpha_0 ROM_t + \varepsilon_t \quad (5)$$

$$resid_t = \alpha_1 FH_t + \alpha_2 SH_t + \varepsilon_t \quad (6)$$

$$resid_t = \alpha_1 FT_t + \alpha_2 ST_t + \alpha_2 LT_t + \varepsilon_t, \quad (7)$$

where $resid_t$ refers to residuals saved from Model (4) and the other variables are as previously defined. If US macroeconomic news announcements explain the effects on European markets, then the coefficients for the dummy variables should not differ from zero.

RESULTS

The results of investigating whether the European stock markets exhibit the TOM effect are reported in Table 3, i.e. the figures in Table 3 are the estimation results of regression Model (1). The results suggest that the TOM effect is present on all the markets investigated. Specifically, the first day has significantly positive returns on the German, the French and the UK markets. These findings are consistent with earlier findings (see e.g., Lakonishok and Smidt, 1988) that the TOM effect persists for a couple of days surrounding the turn of the month. In addition to these significant days, there are other positive and significant days on each market.

To investigate the existence of the intramonth effect Equation (2) and Equation (3) are estimated. These results are presented in Table 4. The results suggest that there is a significant intramonth effect on all the markets as the first part of the month has significantly positive coefficients. The anomaly is especially strong when the month is split into three parts, i.e. Equation (3). The results are consistent with earlier studies, such as those by Ariel (1987), Lakonishok and Smidt (1988), Gerlach (2007) and Nikkinen et al. (2007) showing significantly positive returns during the fist half of the month and insignificant returns in the second half of the month.

TABLE 3
EXISTENCE OF THE TOM EFFECT

The following regression analysis is applied for each market:

$$r_t = \sum_{i=-9}^{9} \alpha_i D_{i,t} + \alpha_0 ROM_t + \varepsilon_t$$

where r_t is the stock index return at time t, i refers to days (-9.-8, …, +8, +9), $D_{i,t}$ stands for the dummy variable taking the value of 1 on day i, otherwise zero, ROM_t is a dummy variable that takes the value 1 on rest-of-the-month days, otherwise zero. The regressions are corrected for heteroscedasticity with GARCH terms. Estimates that are significant at 5 % (10 %) level are in bold face (italics).

	DAX		CAC		FTSE	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
-9	*0.0018*	0.063	0.0013	0.162	0.0011	0.122
-8	-0.0006	0.586	-0.0008	0.440	-0.0011	0.163
-7	-0.0011	0.312	-0.0012	0.221	*-0.0014*	0.076
-6	0.0010	0.354	0.0011	0.324	0.0007	0.417
-5	-0.0001	0.888	0.0007	0.457	0.0003	0.709
-4	0.0006	0.578	0.0008	0.439	-0.0008	0.302
-3	*0.0022*	0.071	**0.0027**	0.014	**0.0015**	0.037
-2	0.0007	0.516	0.0009	0.298	0.0008	0.317
-1	0.0009	0.473	0.0012	0.213	*-0.0015*	0.039
1	**0.0055**	0.000	**0.0056**	0.000	**0.0053**	0.000
2	0.0014	0.212	0.0002	0.837	*0.0018*	0.027
3	0.0001	0.896	0.0003	0.779	0.0006	0.346
4	0.0009	0.379	0.0004	0.687	0.0000	0.971
5	*0.0021*	0.060	0.0008	0.439	**0.0017**	0.026
6	-0.0013	0.308	-0.0016	0.210	-0.0013	0.118
7	-0.0003	0.790	0.0001	0.955	0.0002	0.793
8	-0.0008	0.434	-0.0013	0.197	**-0.0017**	0.042
9	**0.0021**	0.048	**0.0021**	0.028	*0.0011*	0.073
ROM	-0.0001	0.936	0.0000	0.989	-0.0001	0.821
C	0.0000	0.001	0.0000	0.003	0.0000	0.007
ARCH(1)	0.0851	0.000	0.0771	0.000	0.0996	0.000
GARCH(1)	0.9092	0.000	0.9177	0.000	0.8963	0.000

TABLE 4
EXISTENCE OF THE INTRAMONTH EFFECT

The following regression analysis is applied for each market:

$$r_t = \alpha_1 FH_t + \alpha_2 SH_t + \varepsilon_t$$

$$r_t = \alpha_1 FT_t + \alpha_2 ST_t + \alpha_3 LT_t + \varepsilon_t$$

where r_t is the stock index return at time t, FH_t (first half of the month) takes on the value of 1 if day t constitutes trading day -1 through +8 relative to the turn-of-the-month and otherwise 0, and SH_t (second half of the month) equals 1 if day t falls into the range trading day -10 through -2 relative to the turn-of-the-month. FT_t (first third of the month) takes on the value of 1 if day t constitutes trading day -1 through +6 relative to the turn-of-the-month and otherwise 0, and ST_t (second third of the month) equals 1 if day t falls into the range trading day 7 through 13 relative to the turn-of-the-month, while LT_t (last third of the month) equals 1 if day t falls into the range trading day 14 through 20 relative to the turn-of-the-month. The regressions are corrected for heteroscedasticity with GARCH terms. Estimates that are significant at the 5 % (10 %) level are in bold face (italics).

	DAX		CAC		FTSE	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
FH	**0.0010**	0.010	*0.0006*	0.064	**0.0006**	0.014
SH	0.0004	0.307	0.0005	0.169	0.0001	0.591
C	0.0000	0.001	0.0000	0.003	0.0000	0.003
ARCH(1)	0.0883	0.000	0.0775	0.000	0.0922	0.000
GARCH(1)	0.9050	0.000	0.9166	0.000	0.9021	0.000
FT	**0.0014**	0.001	**0.0010**	0.010	**0.0010**	0.000
ST	0.0004	0.368	0.0004	0.349	0.0000	0.964
LT	0.0004	0.384	0.0006	0.167	0.0000	0.934
C	0.0000	0.001	0.0000	0.002	0.0000	0.005
ARCH(1)	0.0875	0.000	0.0776	0.000	0.0935	0.000
GARCH(1)	0.9058	0.000	0.9161	0.000	0.9007	0.000

Table 5 provides the estimation results of Equation (4) investigating the effect of the US macroeconomic news on the European stock markets. The results show that the announcements for ISM and the Employment reports have a positive and significant impact on the stock returns on all the markets investigated. Moreover, the surprise component of the Employment report is statistically significant and positive, indicating that higher (lower) than expected employment figures cause returns to be positive (negative) on the German and French stock markets. Furthermore, at the 10% level of significance the surprise component of ISMS is positive, indicating that a higher than expected figure for ISMS causes stock returns to be positive (negative) on the German and the UK markets. The surprise component of the EMPCOST has a negative and significant impact on returns in German and in France implying that lower (higher) than expected employment costs causes stock returns to be positive (negative). These results suggest that US macroeconomic news announcements are possible causes of the TOM and intramonth effects since, the Employment, the ISM manufacturing and nonmanufacturing reports especially are released at the beginning of each month, which can be verified from Table 2.

To investigate whether the US macroeconomic news releases explain the European TOM effect, the residuals from Model (4) are regressed with the day of the month dummies, i.e. Equation (5) is estimated. The results reported in Table 6 show that after the effect of US macroeconomic news announcement has been controlled for, the TOM effect disappears from the European stock markets at the 5% level of significance. These results support the hypothesis that the US macroeconomic news announcements are the reason for the TOM effect on the European markets.

TABLE 5
IMPACT OF MACROECNOMIC NEWS ANNOUNCEMENTS ON STOCK RETURNS

The analysis is based on the following regression analysis for each market:

$$r_t = c + \sum_{m=1}^{10} \alpha_m MACROS_{m,t} + \sum_{m=1}^{10} \alpha_m MACROD_{m,t} + \varepsilon_t$$

where r_t is the stock index return at time *t*, *MACROS* is the surprise component of a macroeconomic news announcement (m=CCS, CPIS, …, RETAILS), *MACROD* is a dummy variable that takes the value of 1 when macronews (*m*=CCD, CPID, …, RETAILD) is announced, otherwise zero. The regression is corrected for heteroscedasticity with GARCH terms. Estimates that are significant at the 5 % (10 %) level are in bold face (italics). For the definition of macroeconomic news announcements, see Table 2.

	DAX		CAC		FTSE	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
CCS	0.0005	0.104	0.0004	0.172	0.0003	0.226
CCD	-0.0012	0.353	-0.0007	0.540	-0.0011	0.159
CPIS	-0.7610	0.235	**-1.4626**	0.032	-0.4093	0.441
CPID	0.0011	0.280	0.0004	0.713	0.0003	0.734
EMPS	*0.0000*	0.055	**0.0000**	0.013	0.0000	0.146
EMPD	**0.0036**	0.001	**0.0025**	0.020	**0.0028**	0.003
EMPCOSTS	*-1.5277*	0.056	**-1.6641**	0.019	0.2880	0.648
EMPCOSTD	-0.0016	0.360	-0.0009	0.558	0.0008	0.553
GDPS	0.1050	0.794	0.2438	0.412	0.3284	0.272
GDPD	0.0013	0.297	*0.0019*	0.061	0.0007	0.425
IPS	0.2458	0.503	-0.1125	0.747	-0.2295	0.423
IPD	*-0.0019*	0.051	-0.0014	0.184	*-0.0013*	0.083
ISMS	0.0008	0.215	0.0005	0.293	0.0003	0.418
ISMD	**0.0046**	0.000	**0.0052**	0.000	**0.0050**	0.000
ISMSS	*0.0007*	0.070	0.0005	0.120	*0.0004*	0.092
ISMSD	-0.0008	0.510	-0.0003	0.773	-0.0001	0.912
PPIS	-0.0123	0.963	-0.0329	0.891	-0.1398	0.471
PPID	0.0001	0.949	-0.0001	0.949	-0.0009	0.301
RETAILS	-0.0037	0.913	-0.0049	0.794	-0.0019	0.884
RETAILD	0.0017	0.182	0.0014	0.224	*0.0014*	0.078
C	0.0003	0.357	0.0002	0.393	0.0000	0.961
C	0.0000	0.001	0.0000	0.003	0.0000	0.007
ARCH(1)	0.0878	0.000	0.0830	0.000	0.0983	0.000
GARCH(1)	0.9062	0.000	0.9107	0.000	0.8968	0.000

TABLE 6
IMPACT OF MACROECONOMIC NEWS ANNOUNCEMENTS ON THE TOM EFFECT

The regression formula takes the following form for each market:

$$resid_t = \sum_{i=-9}^{9} \alpha_i D_{i,t} + \alpha_0 ROM_t + \varepsilon_t$$

where $resid_t$ is the residual from Model 4, which can be considered as the portion of stock index returns, that are orthogonal to risk premiums related to the macroeconomic news announcements, *i* refers to days (-9.-8, …, +8, +9), $D_{i,t}$ stands for the dummy variable taking the value of 1 on day *i*, otherwise zero, ROM_t is a dummy variable that takes the value 1 on rest-of-the-month days, otherwise zero. The regressions are corrected for heteroscedasticity with GARCH terms. Estimates that are significant at the 5 % (10 %) level are in bold face (italics).

	DAX		CAC		FTSE	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
-9	0.0015	0.140	0.0010	0.247	0.0012	0.102
-8	-0.0009	0.387	-0.0010	0.299	-0.0011	0.178
-7	-0.0015	0.169	-0.0016	0.101	*-0.0014*	0.067
-6	0.0007	0.551	0.0009	0.463	0.0007	0.429
-5	-0.0004	0.693	0.0004	0.624	0.0004	0.626
-4	0.0004	0.706	0.0005	0.622	-0.0006	0.405
-3	0.0019	0.121	*0.0023*	0.059	*0.0016*	0.058

-2	0.0000	0.982	0.0000	0.978	0.0005	0.548
-1	0.0006	0.592	0.0005	0.604	*-0.0015*	0.061
1	0.0001	0.948	0.0000	0.975	0.0001	0.927
2	0.0006	0.591	-0.0004	0.683	*0.0015*	0.074
3	0.0001	0.900	0.0002	0.875	0.0003	0.718
4	0.0002	0.860	0.0001	0.938	-0.0005	0.582
5	0.0005	0.636	-0.0002	0.812	0.0007	0.357
6	-0.0019	0.129	-0.0020	0.110	*-0.0015*	0.072
7	-0.0007	0.562	-0.0001	0.905	0.0003	0.715
8	-0.0013	0.210	-0.0017	0.101	**-0.0017**	0.040
9	0.0006	0.534	0.0009	0.329	0.0004	0.533
ROM	-0.0002	0.730	-0.0002	0.791	0.0002	0.723
C	0.0000	0.002	0.0000	0.004	0.0000	0.008
ARCH(1)	0.0845	0.000	0.0779	0.000	0.1026	0.000
GARCH(1)	0.9099	0.000	0.9166	0.000	0.8929	0.000

The effect of US macroeconomic news on the European intramonth effect is investigated by estimating Model (6) and Model (7). The results are reported in Table 7. The results show that once the effect of US macroeconomic news has been taken into account the intramonth effect disappears in both models. In general, the results imply that US macroeconomic news causes the TOM and intramonth effects on the European stock markets, since the higher beginning of the month stock returns can be explained by the release of US macroeconomic news. This is consistent with the findings of Gerlach (2007) and Nikkinen et al. (2007) that US macroeconomic news announcements explain the US TOM and intramonth effects.

CONCLUSIONS

The study investigates the turn-of-the-month and intramonth effects on three major European stock markets. The earlier literature reports that on the world´s largest stock markets, namely the US stock markets, the anomalies arise due to the systematic release of important macroeconomic news announcements on specific days on each month (Gerlach, 2007; and Nikkinen et al., 2007). Based on the traditional studies on stock market integration and on the impact of US macroeconomic news announcements on European stock markets, it is hypothesized that the anomalies on European markets are also caused by important US macroeconomic news releases.

The results of the study are the following. First, it is found that TOM and intramonth anomalies exist on the major European stock markets. In particular, the returns in the first days of the month and in the first half of the month are statistically significant and positive. Second, the results of the study support the hypothesis developed. It is found that once the impact of important US macroeconomic news announcements has been taken into account, returns are not statistically significant at the TOM or in the first half of the month. The findings therefore indicate that the anomalies are driven by a common factor, namely by the important US macroeconomic news announcements that are clustered at the beginning of the month.

TABLE 7
IMPACT OF MACROECONOMIC NEWS ANNOUNCEMENTS ON THE INTRAMONTH EFFECT

The regression formulae take the following forms for each market:

$$resid_t = \alpha_1 FH_t + \alpha_2 SH_t + \varepsilon_t$$

$$resid_t = \alpha_1 FT_t + \alpha_2 ST_t + \alpha_3 LT_t + \varepsilon_t$$

where $resid_t$ is the residual from Model 4, which can be considered as the portion of stock index returns that are orthogonal to risk premiums related to the macroeconomic news announcements, FH_t (first half of the month) takes on the value of 1 if day *t* constitutes trading day -1 through +8 relative to the turn-of-the-month and otherwise 0, and SH_t (second half of the month) equals 1 if day *t* falls into the range trading day -10 through -2 relative to the turn-of-the-month. FT_t (first third of the month) takes on the value of 1 if day *t* constitutes trading day -1 through +6 relative to the turn-of-the-month and otherwise 0, and ST_t (second third of the month) equals 1 if day *t* falls into the range trading day 7 through 13 relative to the turn-of-the-month, while LT_t (last third of the month) equals 1 if day *t* falls into the range trading day 14 through 20 relative to the turn-of-the-month. The regressions are corrected for heteroscedasticity with GARCH terms. Estimates that are significant at the 5 % (10 %) level are in bold face (italics).

	DAX		CAC		FTSE	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
FH	-0.0002	0.652	-0.0004	0.246	-0.0003	0.309
SH	0.0000	0.908	0.0001	0.721	0.0002	0.510
C	0.0000	0.001	0.0000	0.002	0.0000	0.005
ARCH(1)	0.0876	0.000	0.0795	0.000	0.0984	0.000
GARCH(1)	0.9064	0.000	0.9147	0.000	0.8965	0.000
FT	0.0000	0.931	-0.0003	0.496	-0.0001	0.643
ST	-0.0001	0.840	0.0000	0.971	0.0000	0.939
LT	0.0000	0.926	0.0002	0.683	0.0000	0.940
C	0.0000	0.001	0.0000	0.002	0.0000	0.006
ARCH(1)	0.0876	0.000	0.0798	0.000	0.0985	0.000
GARCH(1)	0.9064	0.000	0.9145	0.000	0.8966	0.000

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