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Does Mood Explain the Monday Effect?

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ABSTRACT

A number of studies have explored the sources of the Monday effect, according to which returns are on average negative on Mondays. We contribute to the literature by exploring whether a direct measure of mood explains the Monday effect. In line with psychological literature, a greater proportion of investors is more pessimistic in the early days of the week, and become more optimistic as the week progresses. We use novel daily mood data from Facebook across twenty international markets to explore the impact of mood on the Monday anomaly. We find that the Monday effect disappears after controlling for mood. In line with our hypothesis that mood drives the Monday effect, we find that the Monday effect is more prominent within small capitalisation indices and within collectivist and high uncertainty avoidance countries. Investors could consider mood levels to forecast Mondays with more (less) pronounced negative returns.

KEY WORDS: behavioural finance; Monday effect; Facebook mood index

JEL classification: G1, G34

INTRODUCTION

The Monday effect is one of the most widely published stock market anomalies, according to which Monday returns are negative or significantly lower than those of other days of the week, and Friday returns are the highest. French (1980) provided early evidence of such price pattern in the US market during the 1950s to 1970s. The Monday effect is also observed in international markets, as evidenced in Jaffe and Westerfield (1985), Condoyanni et al. (1987) and Tong (2000). These studies indicate that the Monday effect is an inherent phenomenon that is not confined to certain markets. A number of rational explanations have been put forth for the Monday effect; however, empirical results have been inconclusive. We contribute to the literature by exploring whether a direct measure of mood explains the Monday effect.

There are a number of studies from the psychology literature supporting the so-called 'blue Monday' hypothesis. Earlier studies observe that mood tends to be lowest on Monday and highest on Friday and during the weekend (Farber, 1953; Pecjak, 1970). Daily mood does not randomly vary but fluctuates in a seven-day cycle that peaks around or close to the weekend and falls sharply on Monday and Tuesday (Croft and Walker, 2001; Larsen and Kasimatis, 1990; Reis et al. 2000; Stone et al., 1985). Stone et al. (1985), McFarlane et al. (2006) and Stone et al. (2012) also observed that Monday's participants mood is not significantly different from that of Tuesday's. Daily mood fluctuation therefore seems to coincide with price fluctuations as reported in Monday returns.

Prior studies in finance have noted that mood may explain the Monday effect. For example, Rystrom and Benson (1989, pp.75) noted that "Monday is not similar with other days. For many people, it is the start of five long days of work after two days of leisure, and many people begin their work week with a certain amount of reluctance. Monday is often characterized as a "bad" day. Other days of the week do not have this reputation. By Friday, most people are looking forward to two leisure days with a positive attitude". However,

Rystrom and Benson (1989) did not empirically test the hypothesis. Gondhalekar and Mehdian (2003) is the only study that used data to explore a potential link between mood and the Monday effect. However, they only used indirect proxies of mood: discounts on closed-end funds, returns on small stocks, consumer confidence and consumer reluctance towards buying a house. They also only explored results within the US market, where the Monday effect has been weakly evident (e.g., Kamara, 1997). Regardless, Gondhalekar and Mehdian (2003) found that the Monday effect is more pronounced in periods of pessimism, signalling that an irrational explanation may drive the Monday effect.

We empirically explore a direct measure of mood and test whether mood explains the Monday effect. The lack of daily mood data may explain why little empirical investigation has been undertaken in the field. Conventional sentiment indices (e.g., the Baker and Wurgler index, the University of Michigan Consumer Sentiment Index and the Consumer Confidence Index) are normally available with a monthly frequency in the US market. We instead use daily mood data from Facebook that are available for twenty international markets. Recent studies by Siganos et al. (2013) and Karabulut (2013) have validated the Facebook index, showing that returns and mood are positively related, in line with other conventional sentiment indices. Our study is the first to use Facebook's data to focus on the Monday effect. The availability of international mood data from Facebook does not limit our research to developed markets (such as the US), where the Monday effect is weakly evident (e.g., Kamara, 1997). As preliminary analysis, Figure 1 shows returns per day of the week on days with the highest (Panel A) and lowest (Panel B) 10 percent mood. This is the first indication that mood and returns are positively related. Returns are significantly lower in days with poor mood, especially Mondays.

[Please insert Figure 1 here]

We use data from between September 2007 and March 2012 across twenty international markets and find that the Monday effect is present within our sample of

countries. We further find that mood is positively related with Monday returns. More importantly, after controlling for mood, we find that the Monday effect disappears. We further find that the Monday effect is stronger in small (rather than large) capitalisation firms, in line with the theory that small investors who are more influenced by mood tend to transact in small firms (De Long et al., 1990). We further explore a cultural impact on our results. In line with Schmeling (2009), we find that the Monday effect is more prominent within collectivist and high uncertainty avoidance countries, providing further evidence that psychological factors are behind the Monday effect. We finally explore the economical significance of the results from the standpoint of an investor. We show that mood levels can be used to determine whether the negative returns are more/less pronounced on Mondays. If investors can forecast mood levels, by taking a long position when mood is good and a short position when mood is bad, they can generate on average profit of 0.273%. We find that the Monday effect is more pronounced on days with pessimism within a market and less pronounced on counterpart Mondays with optimism.

We contribute to the literature as follows. This is the first study that uses a direct measure of mood to explain the Monday effect. We find that the Monday effect is present in international markets, but disappears after controlling for mood. Second, we show that the Monday effect is stronger within small capitalisation firms and within countries where participants are more prone to overreaction. These results offer further evidence that mood is behind the Monday price pattern. Third, this is the first paper that explores a social media factor to explore the Monday effect. Apart from a general link between sentiment/mood on returns, trading volume and volatility that has been previously reported (e.g., Joseph et al., 2011; Schmeling, 2007; Edmans et al., 2007), this study highlights the significance of mood in generating a price pattern in stock markets.

The remainder of the paper is structured as follows. The second section reviews relevant literature and develops hypotheses. The third section discusses the data and methodology used. The fourth section reports the empirical results and the final section concludes.

LITERATURE REVIEW

Prior studies have documented that average daily returns vary across various assets and markets (Copeland and Wang, 1994). In particular, Monday average returns are negative and significantly lower than those on other days of the week. The last trading days of the week, usually Friday, are associated with positive and significantly higher returns than other days of the week. This anomaly is termed the Monday, or the weekend, effect. French (1980) provided some early evidence of unexplained yet consistent negative Monday returns in the US S&P 500 index from 1953 to 1977, which he then used as a basis to question the extent of market efficiency. Beyond US data, the Monday effect is observed in international markets, such as in the UK, Japan, Australia and Canada (Jaffe and Westerfield, 1985), and in developing markets (Condoynanni et al., 1987). Chang et al. (1993) and Tong (2000) provided evidence in more diverse market settings, including less developed markets.

These studies attempt to explain the Monday effect, but results are inconclusive. The Monday effect has been attributed to measurement errors, such as where high returns on Fridays are subsequently reversed on Mondays (Board and Sutcliffe, 1988; Keim and Stambaugh, 1984); the gap between trading and settlement days (Gibbons and Hess, 1981); corporations' tendency to release news over the weekend (Damodaran, 1989); and individual investors' tendency to sell on Mondays, which leads to a fall in prices (Abraham and Ikenberry, 1994).

More recent studies have also found that the Monday effect is not as strong in recent data, and in many cases, especially within developed markets, the pattern has disappeared or even reversed. However, most of these studies observe that the Monday effect is persistent within smaller capitalisation indices. For instance, Kamara (1997) found that the Monday effect was present in both large and small stocks before the introduction of futures in the contract in the US stock market in 1982. After that period, however, Kamara (1997) found that the Monday effect disappeared within large capitalisation firms but persisted within counterpart small capitalisation firms. This finding is in line with Gibbons and Hess (1981) and Brusa et al. (2000).

Only a few studies have explored irrational explanations of the Monday effect. Rystrom and Benson (1989) and Jacobs and Levy (1988) suggested using emotion and mood, in particular the blue Monday hypothesis. They argued that the majority of investors feel more pessimistic on Monday than on other days of the week. Hence, they are less willing to buy or more willing to sell shares on Mondays compared to other days. The basic premise of this hypothesis asserts that investors are affected by systematic mood changes that cause negative pressures on Mondays and positive price pressures on Fridays. However, these studies only theoretically suggest the relation between mood and the Monday effect. To our knowledge, only Gondhalekar and Mehdian (2003) have empirically tested the relation between mood and the Monday effect. However, they used indirect proxies of mood: discounts on closed-end funds, returns on small stocks, consumer confidence and consumer reluctance to buy a house. Their study also focused on the US market, where the Monday effect has been weakly evident (Kamara, 1997). We contribute to the literature by using a direct proxy of mood based on Facebook's index, which is available for twenty international markets. Based on the discussion above, we develop the following hypothesis:

Hypothesis 1: Mood is positively related with Monday returns. After controlling for mood, Monday anomaly become insignificant.

A number of studies (e.g., De Long et al. 1990, Schmeling 2009) also report that sentiment is more strongly related with returns within small firms, which small investors tend to trade more heavily in. Small investors tend to trade within small capitalisation firms; this is the common proxy used in the literature. Schmeling (2009) also explored whether cultural variables have an impact at the level of mood within international markets. According to Chui et al. (2010), there is a higher likelihood of herding among investors within collectivist countries, and there is more evidence of overreaction among investors from high uncertainty avoidance countries. Our additional hypotheses are therefore as follows:

Hypothesis 2: The effect of mood on the Monday effect is stronger within small capitalisation firms.

Hypothesis 3: The effect of mood on the Monday effect is stronger within countries whose participants are more prone to overreact.

DATA AND METHODOLOGY

We obtain daily mood data from Facebook's Data Team across the following twenty markets¹: Argentina, Australia, Austria, Belgium, Canada, Chile, Colombia, Germany, India, Ireland, Italy, Mexico, the Netherlands, New Zealand, Singapore, South Africa, Spain, the United Kingdom, the United States and Venezuela. The coverage of the study is limited by Facebook's availability between September 2007 and March 2012. Mood data is compiled by Facebook's Data Team from status updates by millions of Facebook users.

¹ To our knowledge, Facebook's Data Team employs users' IP addresses to identify their country of origin.

The procedure to generate the mood index is explained in detail by Kramer (2010). In short, they determine a positive/negative percentage of the status updates based on the Text Analysis and Word Count programs. To identify ‘positive’ and ‘negative’ words, they follow the Linguistic Inquiry and Word Count dictionary. They undertake the following estimation to estimate mood:

$$GNH_{it} = \frac{x_{pt} - x_{pall}}{\sigma_{pall}} - \frac{x_{nt} - x_{nall}}{\sigma_{nall}} \quad (1)$$

where GNH_{it} is the mood of country i at day t , x_{pt} and x_{nt} show the average positive (p) and negative (n) words used respectively on day t for the country, and x_{pall} , x_{nall} , σ_{pall} and σ_{nall} are the average (x) positive and negative words used over the duration of the index and the standard deviation (σ) of those variables. Facebook’s Data Team excludes the highest and lowest ten percent of the days when estimating $x_{p,all}$, $x_{n,all}$, $\sigma_{p,all}$ and $\sigma_{n,all}$ to minimise the impact of extreme values on the estimation of daily mood levels. Due to such data elimination, the average mood is not equal to zero. In line with Siganos et al. (2013), we exclude mood data above the 99th percentile, as they are normally related with outlier messages such as “Happy New Year” or “Merry Christmas”.

We download market performance data for the countries from Datastream. Empirical tests are undertaken using Datastream’s market indices (TOTMK). For robustness, we further estimate the relation between the Monday effect and mood on small (MSCI small) and large (MSCI large) indices, since small investors, who are more influenced by mood (e.g., DeLong et al., 1990), tend to invest in small capitalisation firms (e.g., Lemmon and Portniaguina, 2006). Logarithmic returns are estimated.

We explore whether mood explains the Monday effect by undertaking the following estimations:

$$R_{it} = \pm + b \text{Monday}_{it} + c \text{Mood}_{it} + d \text{Monday}_{it} * \text{Mood}_{it} + \text{Country Dummies} + u_{it} \quad (2)$$

$$R(\text{F-M})_{it} = \pm + b \text{Mood}(\text{F-M})_{it} + \text{Country Dummies} + u_{it} \quad (3)$$

R_{it} is the daily natural log returns of indices i for day t , while \pm is a constant variable that represents the average of non-Monday returns. Monday_{it} is a Monday dummy that takes the value of 1 if returns are observed on Monday, and 0 otherwise. Coefficients for Monday_{it} capture Monday's average return relative to other days' average returns. Mood_{it} is the mood proxy estimated by Facebook and $\text{Mood}_{it} * \text{Monday}_{it}$ is the interaction variable. F-M is the difference in returns/mood between Friday and Monday. Nineteen country dummies have been added to control for country variations. An insignificant coefficient on Monday_{it} and on the constant at Model 3 would indicate that the Monday effect disappears after adjusting for mood.

EMPIRICAL RESULTS

Does mood explain the Monday effect?

We first explore the univariate results for mood and returns. Results are shown for mood in Panel A of Table I and for returns in Panel B of Table I. In line with the 'blue Monday' hypothesis, we find that mood is on average less negative as time passes, in days, towards the end of the week, and becomes positive on Sunday. We also find the first evidence that the Monday effect is present in our sample. Average Monday returns are -0.092 percent; such performance is the lowest of all days of the week.

[Please insert Table I here]

We undertake regression analysis to explore whether mood explains the Monday effect. Table II shows the results. Column (1) supports the above result that the Monday effect is present in our sample. The coefficient for Monday_{it} is negative and significant at the

1 percent level, showing that Monday returns are significantly lower than returns on other days of the week. Interestingly, Column (2) shows that when incorporating the mood and the interaction between mood and Monday returns in the model, the coefficient of Monday_{it} becomes insignificant. This result indicates that mood explains the Monday effect. We find that both coefficients on mood and on the interaction variable are positive and statistically significant at the 1 percent level. Column (3) uses Model (3) to explore the robustness of the results when the difference between mood and returns between Friday and Monday is regressed. Results remain strong, further supporting the notion that mood is behind the Monday price pattern. When controlling for mood, the unexplained difference in returns between Friday and Monday is insignificant.

[Please insert Table II here]

Overall, the ‘blue Monday’ hypothesis is supported, showing that the Monday effect is driven by irrational/behavioural reasoning. Our results therefore support Hypothesis 1.

Robustness tests

We undertake a number of additional tests to explore the robustness of prior results. We first test whether the recent financial crisis drives our results. Garcia (2013) found that sentiment’s impact on returns is more pronounced during recessions. During a recession, fear and emotions have a more widespread impact across participants. We find that most countries’ market indices tend to reach their lowest point on 6th March, 2009. We therefore split the full period into during and after the financial crisis and re-estimate Models (2) and (3) for each sub-period.² Panel A of Table III shows the results. In line with Garcia (2013), we find that

² In the particular test, we examine results for Argentina and Mexico separately, since they have a significantly different cut-off point from that of the remaining countries. In unreported results, we find that results remain robust for both countries.

mood is positively related with Monday's returns especially during the recent financial crisis. More importantly, for the purpose of our study, the Monday effect disappears after adjusting for mood at both sub-periods.

[Please insert Table III here]

We further explore whether results are driven by particular weeks where mood is highly correlated across the countries in our sample. During weeks in which important global news is announced, mood is expected to be relatively highly correlated across countries. However, during weeks in which no significant news is available, the mood across countries is likely not to be correlated.

To test whether the relation between mood and Monday returns is affected by different levels of correlation in mood, we first estimate the weekly correlation of mood across the countries in our sample. Based on median values, we then split weeks into high and low correlation, and re-estimate Models (2) and (3) for each sub-sample separately. Panel B of Table III shows the results. We find that the results are to a large extent qualitatively similar for both sub-samples. We find that mood is significantly related with Monday returns in both sub-samples. Overall, these findings further support Hypothesis 1.

Results within small and large capitalisation indices

We further test whether prior results are driven by Datastream's estimation of market returns (TOTMK). We use MSCI index returns and re-explore prior relationships. Among others, De Long et al. (1990) and Schmeling (2009) have reported that sentiment is more strongly related with returns within small firms which tend to be more heavily traded in small investors. That may explain why studies (e.g., Kamara, 1997) find that the Monday effect is

more prominent within small capitalisation firms, since these are the firms in which small investors tend to transact.

Table IV shows the results within small (Panel A) and large (Panel B) capitalisation indices. In line with the developed hypothesis that mood drives the Monday effect, we find that the Monday effect is more prominent within small (rather than large) indices. Column (1) indicates that the coefficient on Mondays is -0.106 (significant at the 1 percent level) and -0.0654 (significant at the 10 percent level) for small and large MSCI indices, respectively. When we control for mood, Monday's coefficient reduces significantly for both small and large indices. Monday's coefficient becomes insignificant for large, but significant at the 10 percent level for small, indices. The coefficients for both mood and the interaction variable between mood and Monday remain positive and significant at the 1 percent level. Column (3), which uses Model (3) to explore the robustness of the results, also shows that the unexplained difference in returns between Friday and Monday is insignificant after controlling for mood.

[Please insert Table IV here]

Overall, we provide further support for our results above regarding the significance of mood to Monday's price pattern. In line with Hypothesis 2, we find that the Monday effect is stronger within small capitalisation firms.

The impact of culture

The above analysis used all twenty countries in the sample to explore the impact of mood on the Monday effect. We further generate sub-groups of countries to explore whether culture has an impact on the relation between mood and returns. In particular, we use the country's individualism level and the uncertainty avoidance index as constructed by Hofstede (2001).

In line with Schmeling (2009), mood is expected to be stronger within collectivist and within high uncertainty avoidance countries. According to Chui et al. (2010), there is a higher proportion of herding among investors within collectivist countries, and there is more evidence of overreaction among investors in high uncertainty avoidance countries.

We manually collect culture variables for each country from Hofstede's website.³ Based on the countries' cultural level, we then split them into two equal-sized sub-groups and re-estimate prior regressions for each group separately. Table V shows the results when Datastream's (TOTMK) indices are employed to capture market performance. In line with Schmeling (2009), we find that the Monday effect is more prominent within collectivist and high uncertainty avoidance countries. For example, the coefficient on Monday is -0.111 and -0.064 for low and high individualism countries, respectively. More importantly, the mood and the interaction variables between mood and Monday returns are always significantly positive within all sub-groups. Apart from high uncertainty avoidance countries, the Monday effect disappears after controlling for mood.

[Please insert Table V here]

Overall, we provide further support for our results regarding the effect of mood on the Monday effect. In line with Hypothesis 3, we find that the strength of the relation between mood and the Monday effect is related to cultural factors; the Monday effect is more prominent within collectivist and high uncertainty countries. After controlling for mood, the Monday effect tends to weaken significantly across all country sub-groups.

³ <http://geert-hofstede.com/national-culture.html> (last accessed December 2013).

Economical significance

We further explore the economical significance of prior results from the standpoint of an investor. Mood is strongly related with Monday returns, and in this section, we explore whether an investor could consider mood, making the Monday effect stronger. We first explore conventional strategies developed in the literature to explore the robustness of returns within our sample. We estimate Monday returns and Monday returns conditional to prior week's market performance. Jaffe et al. (1989) and Mehdian and Perry (2001) reported that when prior week's market performance is poor, Monday returns are more pronounced. Panel A of Table VI shows daily returns for above strategies. The naïve Monday strategy generates returns equal to -0.092 per cent for the full sample. We further confirm results of prior studies (e.g., Jaffe et al., 1989), showing that when the prior week's returns are on average negative, negative Monday returns are more pronounced (-0.008 vs. -0.121, for the full sample).

[Please insert Table VI here]

We generate additional strategies on the Monday effect focusing on the significance of mood levels. Based on Monday's mood, we split weeks into positive and negative days and estimate returns for both portfolios.⁴ Panel B of Table VI shows the results. We find that mood has a significant impact on returns. When mood is positive, Monday returns are positive, at 0.129 percent. In contrast, when mood is negative, Monday returns are significantly negative, at -0.1444 percent. The difference in returns between Mondays with positive and negative mood is therefore 0.273 percent, which is statistically significant at the 1 percent level. The impact of mood on Monday returns tends also to be stronger than the counterpart impact of prior week's market performance on returns. The positive minus negative arbitrage portfolio is for example 0.114 for the conventional strategy and

⁴ In unreported results, we find that the profitability of strategies based on top/bottom decile and quintile portfolios is relatively similar to that shown for positive and negative mood.

significantly higher at 0.273 for the mood/Monday developed strategy (full sample). We estimate daily returns for the full sample as well as for alternative portfolios based on size indices and cultural variables. We find similar return patterns across alternative size and cultural portfolios, indicating the robustness of the profitability of the developed strategy.

Overall, we highlight the significance of mood on Monday returns from the standpoint of an investor. We show that a strategy that short sells the market on Mondays when pessimism prevails and buys the market on Mondays with prevailing optimism, generates significant profitability.

CONCLUSION

A number of studies have investigated rational explanations for the Monday effect; however, they have not reached a consensus. We focus on a behavioural explanation for the Monday effect, according to which the ‘blue Monday’ hypothesis drives the results. There is plenty of evidence in the psychology literature (e.g., Farber, 1953) that supports the developed hypothesis, according to which investors are more pessimistic early in the week. To our knowledge, this is the first study that uses a direct mood index to empirically test the relation between mood and the Monday effect.

In particular, we employ Facebook’s daily mood index across twenty international markets to test the developed hypotheses. We empirically support that mood drives the Monday effect. After adjusting for mood, the Monday effect tends to disappear. We further show that the Monday effect is stronger within small capitalisation firms and within collectivist and low uncertainty avoidance countries, giving further evidence that mood is behind the Monday effect. Small capitalisation firms are mostly traded in by small investors who are influenced most by mood (e.g., De Long et al., 1990). Also, participants within

collectivist and low uncertainty avoidance countries are more prone to overreaction (e.g., Chu et al., 2010).

We further explore how investors could take advantage of the findings of the study. We find that Monday returns are significantly lower when where there is pessimism among participants in a country, and significantly higher returns are experienced on Mondays with prevailing optimism. The strategy could therefore be to short sell the market on Mondays with prevailing pessimism and to buy the market on Mondays with prevailing optimism. Overall, we support behavioural reasoning to understand the Monday price pattern. Future research may explore the impact of mood to understand other daily stock price patterns, such as that around merger announcements.

REFERENCES

- Abraham, A., Ikenberry, D. L. 1994. The individual investor and weekend effect. *Journal of Financial and Quantitative Analysis* **29**: 263-277.
- Board, J., Sutcliffe, C. M. 1988. The weekend effect in UK stock market returns. *Journal of Business Finance & Accounting* **15**: 199-213.
- Brusa, J., Liu, P., Schulman, C. 2000. The weekend effect, 'reverse' weekend effect, and firm size. *Journal of Business Finance & Accounting*, **27**: 555-574.
- Chang, E. C., Pinegar, J. M., Ravichandran, R. 1993. International evidence on the robustness of the day-of-the-week effect. *Journal of Financial and Quantitative Analysis* **28**: 497-513.
- Chui, A. C., Titman, S., Wei, K. J. 2010. Individualism and momentum around the world. *Journal of Finance* **65**: 361-392.
- Condoyanni, L., O'Hanlon, J., Ward, C. W. R. 1987. Day of the week effects on stock returns: International evidence. *Journal of Business Finance and Accounting* **14**: 159-174.
- Copeland, L., Wang, P. 1994. Estimating daily seasonality in foreign exchange rate changes. *Journal of Forecasting* **13**: 519-528.
- Croft, G. P., Walker, A. E. 2001. Are the Monday blues ail in the mind? The role of expectancy in the subjective experience of Mood. *Journal of Applied Social Psychology* **31**: 1133-1145.
- Damodaran, A. 1989. The weekend effect in information releases: A study of earnings and dividend announcements. *Review of Financial Studies* **2**: 607-623.
- De Long, B., Shleifer, A., Summers, L., Waldmann, R., 1990. Noise trader risk in financial markets. *Journal of Political Economy* **98**: 703-738.
- Edmans, A., Garcia, D., Norli, O., 2007. Sport sentiment and stock returns. *Journal of Finance* **4**: 1967-1998.

- Farber, M. L. 1953. Time-perspective and feeling-tone: A study in the perception of the days. *Journal of Psychology* **35**: 253-257.
- French, K. R. 1980. Stock returns and the weekend effect. *Journal of Financial Economics* **8**: 55-69.
- Garcia, D. 2013. Sentiment during recessions. *Journal of Finance* **68**:1267-1300.
- Gibbons, M. R., Hess, P. 1981. Days of the week effects and asset returns. *Journal of Business* **54**: 579-596.
- Gondhalekar, V., Mehdian, S. 2003. The Blue-Monday Hypothesis: Evidence Based on Nasdaq Stocks, 1971-2000. *Quarterly Journal of Business and Economics* **42**: 73-89.
- Hofstede, G. H. 2001. *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*: Sage.
- Jacobs, B. I., Levy, K. N. 1988. Calendar anomalies: abnormal returns at calendar turning points. *Financial Analysts Journal* 28-39.
- Jaffe, J., Westerfield, R. 1985. The weekend effect in common stock returns: The international evidence. *Journal of Finance* **40**: 433-454.
- Jaffe, J., Westerfield, R., Ma, C., 1989. A twist on the Monday effect in stock prices: Evidence from the US and foreign stock markets. *Journal of Banking and Finance* **13**: 641-650.
- Joseph, K., Wintoki, M., Zhang, Z., 2011. Forecasting abnormal stock returns and trading volume using investor sentiment: Evidence from online search. *International Journal of Forecasting* **27**: 1116-1127.
- Kamara, A. 1997. New evidence on the Monday seasonal in stock returns. *Journal of Business* **70**: 63-84.

- Karabulut, Y. 2013. *Can Facebook predict stock market activity?* Working paper.
- Keim, D. B., Stambaugh, R. F. 1984. A further investigation of the weekend effect in stock returns. *Journal of Finance* **39**: 819-835.
- Kramer, A. D. 2010. *An unobtrusive behavioral model of gross national happiness*. Paper presented at the Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.
- Lakonishok, J., Smidt, S. 1988. Are seasonal anomalies real? A ninety year perspective. *Review of Financial Studies* **1**: 403-425.
- Larsen, R. J., Kasimatis, M. 1990. Individual differences in entrainment of mood to the weekly calendar. *Journal of Personality and Social Psychology* **58**: 164.
- Lemmon, M., Portniaguina, E. 2006. Consumer confidence and asset prices: Some empirical evidence. *Review of Financial Studies* **19**: 1499-1529.
- Mehdian, S., Perry, M.J. 2001. The reversal of the Monday effect: New evidence from US equity markets. *Journal of Business Finance and Accounting* **28**:1043-1065.
- McFarlane, J., Martin, C. L., Williams, T. M. 2006. Mood fluctuations. *Psychology of Women Quarterly* **12**: 201-223.
- Pecjak, V. 1970. Verbal synesthesiae of colors, emotions, and days of the week. *Journal of Verbal Learning and Verbal Behavior* **9**: 623-626.
- Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., Ryan, R. M. 2000. Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin* **26**: 419-435.
- Rystrom, D. S., Benson, E. D. 1989. Investor psychology and the day-of-the-week effect. *Financial Analysts Journal* 75-78.

- Schmeling, M. 2007. Institutional and individual sentiment: Smart money and noise trader risk? *International Journal of Forecasting* **23**: 127-145.
- Schmeling, M. 2009. Investor sentiment and stock returns: some international evidence. *Journal of Empirical Finance* **16**: 394-408.
- Siganos, A., Vagenas-Nanos, E., Verwijmeren, P. 2013. Facebook's daily sentiment and international stock markets. Working Paper.
- Stone, A. A., Hedges, S. M., Neale, J. M., Satin, M. S. 1985. Prospective and cross-sectional mood reports offer no evidence of a "blue Monday" phenomenon. *Journal of Personality and Social Psychology* **49**: 129.
- Stone, A. A. 1987. Event content in a daily survey is differentially associated with concurrent mood. *Journal of Personality and Social Psychology* **52**: 56.
- Stone, A. A., Schneider, S., Harter, J. K. 2012. Day-of-week mood patterns in the United States: On the existence of 'Blue Monday', 'Thank God it's Friday' and weekend effects. *Journal of Positive Psychology* **7**: 306-314.
- Tong, W. 2000. International evidence on weekend anomalies. *Journal of Financial Research* **23**: 495-522.

Table I. Descriptive statistics

	Mean	Std. Dev	Max	Min
Panel A: Mood				
Monday	-0.012	0.023	0.143	-0.106
Tuesday	-0.016	0.024	0.141	-0.108
Wednesday	-0.015	0.024	0.146	-0.113
Thursday	-0.013	0.024	0.145	-0.183
Friday	-0.009	0.025	0.146	-0.161
Saturday	-0.003	0.025	0.145	-0.132
Sunday	0.000	0.028	0.144	-0.131
Panel B: Returns				
Monday	-0.092	1.782	15.078	-13.676
Tuesday	0.035	1.458	16.046	-7.396
Wednesday	0.039	1.461	8.286	-9.377
Thursday	-0.052	1.456	7.745	-9.199
Friday	-0.028	1.394	9.352	-12.745

This table reports aggregated mood/returns for all twenty countries according to the day of the week (Panel A/Panel B). We use Facebook status updates to proxy mood across twenty international markets. Returns are logarithmic and Datastream's indices are used to capture market performance (TOTMK). The sample period is between September 2009 and March 2012.

Table II. Regression analysis

	(1)	(2)	(3)
Monday _{it}	-0.091*** (0.000)	-0.040 (0.174)	
Mood _{it}		2.523*** (0.000)	
Mood _{it} *Monday _{it}		4.295*** (0.000)	
Mood(F-M) _{it}			2.248 (0.267)
_cons	0.062 (0.173)	0.090** (0.049)	-0.026 (0.870)
N	21,902	21,902	4,113
F statistic	1.400	3.825	0.876

This table explores whether the Monday effect is present in our sample (Column 1) and whether mood explains Monday returns (Columns 2 and 3). We estimate the following key OLS regressions: $R_{it} = \pm + b \text{Monday}_{it} + c \text{Mood}_{it} + d \text{Monday}_{it} * \text{Mood}_{it} + \text{Country Dummies} + u_{it}$ and $R(F-M)_{it} = \pm + b \text{Mood}(F-M)_{it} + \text{Country Dummies} + u_{it}$, where R_{it} is the daily natural log returns of indices i for day t , while \pm is a constant variable that represents the average of non-Monday returns. Monday_{it} is a Monday dummy that takes the value of 1 if returns are observed on a Monday, and 0 otherwise. Mood_{it} is the mood proxy estimated by Facebook and $\text{Mood}_{it} * \text{Monday}_{it}$ is the interaction variable. F-M is the difference in returns/mood between Friday and Monday. Nineteen country dummies have been added to control for country variations. Datastream's indices are used to capture market performance (TOTMK). P-values are shown in parentheses. ** and *** indicate significance at the 5 and 1 percent levels, respectively.

Table III. Robustness tests

Panel A: Results during and after the recent financial crisis				
	During	During	After	After
Monday _{it}	-0.0844 (0.320)		-0.0169 (0.646)	
Mood _{it}	2.424* (0.075)		1.108 (0.224)	
Mood _{it} *Monday _{it}	4.462* (0.056)		2.529 (0.153)	
Mood (F-M)		7.437 (0.219)		-2.660 (0.371)
_cons	-0.137 (0.213)	-0.139 (0.732)	0.054 (0.302)	-0.031 (0.857)
N	5382	1012	10227	1873
F statistic	1.308	0.731	0.623	0.413
Panel B: Results for high and low correlated weeks				
	Above median	Above median	Below median	Below median
Monday _{it}	-0.0135 (0.758)		-0.0432 (0.318)	
Mood _{it}	3.827*** (0.000)		1.965** (0.023)	
Mood _{it} *Monday _{it}	3.625** (0.024)		5.215*** (0.003)	
Mood (F-M)		1.568 (0.619)		6.291** (0.025)
_cons	0.096 (0.208)	0.140 (0.604)	0.0446 (0.480)	0.530*** (0.004)
N	10285	1898	10558	2025
F statistic	2.651	0.552	2.082	0.926

This table explores the robustness of the results shown in Table II during and after the financial crisis (Panel A) and within high and low correlated mood weeks (Panel B). We use 6th March 2009 to split the period into during and after the financial crisis, and re-estimate regressions for each sub-period. The full sample period is between September 2007 and March 2012. We further explore whether results are driven by particular weeks where mood is highly or less correlated across the countries in our sample. We first estimate the correlation of mood across the countries in our sample and then, based on median values, we split weeks into high and low correlated, and re-estimate regressions for each sub-sample. In particular, we estimate the following OLS regressions: $R_{it} = \pm + b \text{Monday}_{it} + c \text{Mood}_{it} + d \text{Monday}_{it} * \text{Mood}_{it} + \text{Country Dummies} + u_{it}$ and $R(\text{F-M})_{it} = \pm + b \text{Mood}(\text{F-M})_{it} + \text{Country Dummies} + u_{it}$, where R_{it} is the daily natural log returns of indices i for day t , while \pm is a constant variable that represents the average of non-Monday returns. Monday_{it} is a Monday dummy that takes the value of 1 if returns are observed on a Monday, and 0 otherwise. Mood_{it} is the mood proxy estimated by Facebook and $\text{Mood}_{it} * \text{Monday}_{it}$ is the interaction variable. F-M is the difference in returns/mood between Friday and Monday. Nineteen country dummies have been added to control for country variations. Datastream's indices are used to capture market performance (TOTMK). P-values are shown in parentheses. *, ** and *** indicate significance at the 10, 5 and 1 percent levels, respectively.

Table IV. Results for small and large indices

	(1)	(2)	(3)
Panel A: MSCI small indices			
Monday _{it}	-0.106*** (0.000)	-0.0590* (0.050)	
Mood _{it}		3.591*** (0.000)	
Mood _{it} *Monday _{it}		4.463*** (0.000)	
Mood(F-M) _{it}			1.821 (0.317)
_cons	-0.186* (0.064)	-0.171* (0.088)	0.309 (0.328)
N	20,352	20,352	3,984
F statistic	1.362	5.236	0.664
Panel B: MSCI large indices			
Monday _{it}	-0.065* (0.068)	-0.002 (0.956)	
Mood _{it}		2.608*** (0.001)	
Mood _{it} *Monday _{it}		5.028*** (0.001)	
Mood(F-M)			3.398 (0.259)
_cons	-0.009 (0.879)	0.028 (0.659)	0.183 (0.411)
N	19,570	19,570	3,593
F statistic	0.708	2.255	0.69

This table explores the Monday effect and the significance of mood to explain Monday returns. Results are estimated within MSCI small (Panel A) and large (Panel B) capitalisation indices. We estimate the following key OLS regressions: $R_{it} = \pm + b \text{Monday}_{it} + c \text{Mood}_{it} + d \text{Monday}_{it} * \text{Mood}_{it} + \text{Country Dummies} + u_{it}$ and $R(F-M)_{it} = \pm + b \text{Mood}(F-M)_{it} + \text{Country Dummies} + u_{it}$, where R_{it} is the daily natural log returns of indices i for day t , while \pm is a constant variable that represents the average of non-Monday returns. Monday_{it} is a Monday dummy that takes the value of 1 if returns are observed on a Monday, and 0 otherwise. Mood_{it} is the mood proxy estimated by Facebook and $\text{Mood}_{it} * \text{Monday}_{it}$ is the interaction variable. F-M is the difference in returns/mood between Friday and Monday. Nineteen country dummies have been added to control for country variations. P-values are shown in parentheses. * and *** indicate significance at the 10 and 1 percent levels, respectively.

Table V. The impact of culture

	High individualism	High individualism	Low individualism	Low individualism	High uncertainty avoidance	High uncertainty avoidance	Low uncertainty avoidance	Low uncertainty avoidance
Monday _{it}	-0.064* (0.077)	-0.021 (0.600)	-0.111*** (0.002)	-0.063 (0.122)	-0.099*** (0.005)	-0.067* (0.073)	-0.077** (0.030)	-0.015 (0.720)
Mood _{it}		1.746** (0.043)		2.654*** (0.000)		1.673** (0.020)		2.914*** (0.000)
Mood _{it} *Monday _{it}		5.418*** (0.003)		3.304** (0.015)		3.719** (0.015)		4.749*** (0.002)
_cons	-0.031 (0.516)	-0.015 (0.760)	0.035 (0.447)	0.070 (0.137)	0.033 (0.460)	0.059 (0.192)	-0.028 (0.564)	-0.005 (0.916)
N	11,176	11,176	11,160	11,160	10,192	10,192	12,144	12,144
F statistic	0.575	2.276	2.216	4.625	2.168	3.600	0.808	3.443

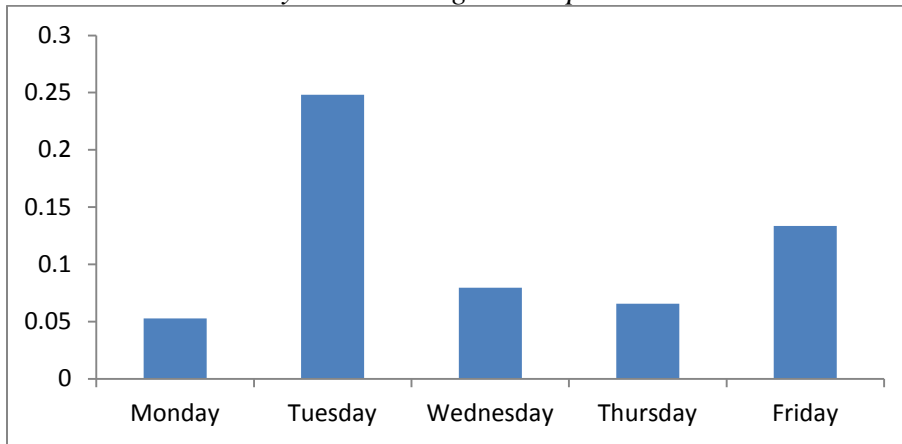
This table explores the impact of culture on the results. We use the individualism level and the uncertainty avoidance index as constructed by Hofstede (2001). We manually collect culture variables for each country from Hofstede's website. We first split countries into two equal-sized sub-groups based on their cultural value and then re-estimate the following regression for each group separately: $R_{it} = \pm + b \text{Monday}_{it} + c \text{Mood}_{it} + d \text{Monday}_{it} * \text{Mood}_{it} + \text{Country Dummies} + u_{it}$, where R_{it} is the daily natural log returns of indices i for day t , while \pm is a constant variable that represents the average of non-Monday returns. Monday_{it} is a Monday dummy that takes the value of 1 if returns are observed on a Monday, and 0 otherwise. Mood_{it} is the mood proxy estimated by Facebook and $\text{Monday}_{it} * \text{Mood}_{it}$ is the interaction variable. Nineteen country dummies have been added to control for country variations. Datastream's indices are used to capture market performance (TOTMK). P-values are shown in parentheses. *, ** and *** indicate significance at the 10, 5 and 1 percent levels, respectively.

Table VI. Daily returns (%)

	Full sample	MSCI indices		Individualism		Uncertainty avoidance	
		Large	Small	High	Low	High	Low
Panel A: Conventional strategies							
Monday returns	-0.092*** (0.000)	-0.0844** (0.022)	-0.119*** (0.000)	-0.084** (0.031)	-0.101*** (0.008)	-0.092** (0.016)	-0.093** (0.016)
Monday returns conditional to:							
Positive prior week average returns	-0.008** (0.032)	-0.017*** (0.005)	0.006** (0.011)	-0.115** (0.010)	-0.019 (0.667)	-0.052 (0.213)	-0.079* (0.090)
Negative prior week average returns	-0.121*** (0.008)	-0.011 (0.852)	-0.311*** (0.000)	-0.051 (0.443)	-0.194*** (0.003)	-0.139** (0.039)	-0.107* (0.090)
Positive - Negative	0.114** (0.014)	-0.006 (0.926)	0.317*** (0.000)	-0.641 (0.419)	0.175** (0.024)	0.087 (0.271)	0.028 (0.714)
Panel B: Mood strategy							
Positive mood	0.129* (0.074)	0.158** (0.021)	0.140** (0.02)	0.108 (0.147)	0.151** (0.014)	0.085 (0.150)	0.184** (0.021)
Negative Mood	-0.144*** (0.000)	-0.137*** (0.001)	-0.176*** (0.000)	-0.129*** (0.004)	-0.159*** (0.000)	-0.145*** (0.002)	-0.143*** (0.000)
Positive - Negative	0.273*** (0.000)	0.296*** (0.000)	0.316*** (0.000)	0.237*** (0.001)	0.311*** (0.000)	0.231*** (0.002)	0.327*** (0.000)

This table explores the economical significance of the relation between mood and Monday returns. Panel A explores the profitability of conventional strategies previously developed in the literature. We first explore Monday returns and then Monday returns in relation to the previous week's positive/negative average market performance. Panel B explores Monday returns when Monday's mood is positive and negative separately. We collect individualism level and the uncertainty avoidance index from Hofstede's website. Apart from MSCI large and small indices, Datastream's indices are used to capture market performance (TOTMK). P-values are shown in parentheses. *, ** and *** indicate significance at the 10, 5 and 1 percent levels, respectively.

A. Returns on days with the highest 10 percent mood



B. Returns on days with the lowest 10 percent mood

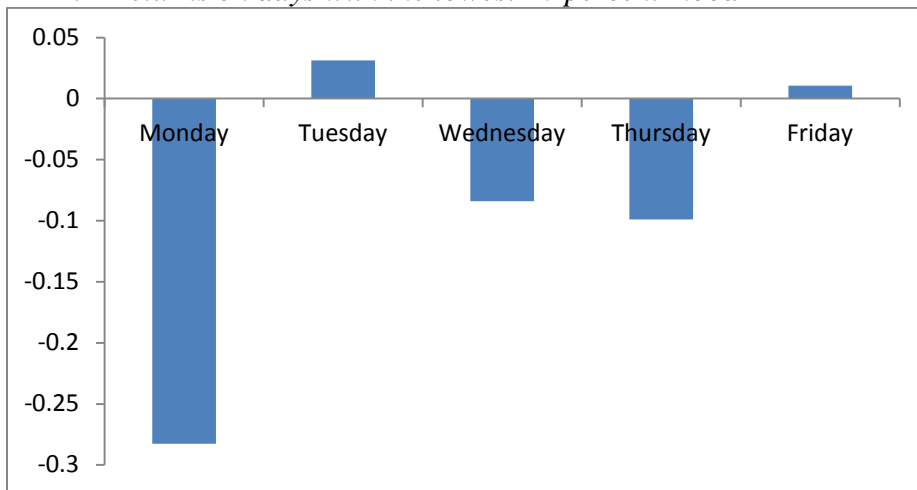


Figure 1. Extreme mood levels and corresponding market performance