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The Day of the Week Effect: Unconditional and Conditional Market Risk Analysis

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ABSTRACT

The objective of our investigation is to test empirically the existence of the day of the week effect on the Canadian stock market between September 2009 and August 2019. Our findings show that the day of the week effect is present. The highest and lowest mean daily returns of the S&P/TSX Composite index are detected on Tuesday and Monday, respectively. Moreover, we try to give an explanation of the day of the week effect by referring to the world market risk. Using unconditional and conditional models, our results reveal that only the significant Monday effect is still present after accounting for world market risk. Then, we can deduce that the Monday effect in returns of the S&P/TSX Composite index is not explained by the risk-return relationship and that it is an anomaly of the Canadian stock market.

Keywords: Canadian Stock Market, Day of the Week Anomaly, Monday Effect, World Market Risk
JEL Classification: G14

1. INTRODUCTION

Seasonal anomalies (effects) in equity market returns have been of considerable interest to academics and practitioners for several years. They are defined as phenomena that allow investors to realize profits by trading at particular times. There are many types of the seasonal effects which are investigated in literature. We can cite, for example, the day of the week anomaly, the month of the year anomaly, the semi-month anomaly and the Ramadan anomaly. For academics, the study of seasonal anomalies in stock market returns may give important information about the level of market efficiency. Founded on the efficient market hypothesis (EMH), proposed by Fama in 1970, on an efficient market asset prices completely mirror all available news at any point in time. If this is the case, it is impossible to make predictions on the evolution of the price. For practitioners, the study of calendar anomalies in equity market returns is also useful. It can help the investors to construct a beneficial investment strategy by observing the best moment to purchase and to sell securities. For example, the day of the week anomaly provides a favorable circumstance for investors to purchase securities on the day with lower returns and to sell them on the day with larger returns.

To the best of our knowledge, there are many investigations exploring the day of the week anomaly in the Canadian stock market like Jaffe and Westerfield (1985), Kohers et al. (2004), Baker et al. (2008) or Zhang et al. (2017). The results of these studies are not similar. Jaffe and Westerfield (1985) and Zhang et al. (2017) find strong statistical evidence for the day of the week anomaly in the Canadian stock market. On the other hand, Kohers et al. (2004) and Baker et al. (2008) provide evidence of a weak day of the week effect in the Canadian stock market. Compared to these authors, our analysis gives another perspective by considering the impact of the global market risk on the daily evolution of the Canadian equity market return. In other words, in the current investigation we examine empirically the existence of the day of the week anomaly on the Canadian stock market between September 2009 and August 2019 employing both unconditional and conditional market risk analysis.

The rest of our article follows: Section 2 provides previous researches. Section 3 describes the data and section 4 methodology. Section 5 presents the findings and section 6 summarizes the conclusions.

2. LITERATURE REVIEW

The day of the week anomaly has examined in developed stock markets. Cross (1973) provides evidence of the day of the week anomaly in the American market between 1953 and 1970. He finds that the highest mean returns is detected on Fridays, while the lowest mean returns detected on Mondays. Cho et al. (2007) also find strong statistical evidence for the Monday effect in the US, Japan and UK stock markets. Zhang et al. (2017) investigate the day of the week anomaly in twelve developed markets. They provide evidence of the day of the week effect in all markets studied. However, in the UK market, Gregoriou et al. (2004) report that once transaction costs are taken into account the day of the week effect fades away between January 1986 and December 1997. Kohers et al. (2004) investigate the day of the week effect in eleven developed equity markets between January 1980 and June 2002. They provide evidence of the day of the week anomaly during the 1980's in the majority of markets studied. However, starting the 1990's the day of the week anomaly has disappeared. Baker et al. (2008) examine the existence of the day of the week anomaly on the return and the volatility of returns in the Canadian stock market between 1977 and 2002. They reveal that the day of the week effect both on the return and the volatility of returns is susceptible to the error distribution considered.

The day of the week anomaly has been investigated not only in developed stock markets, but also in emerging and frontier markets. Basher and Sadorsky (2006) find that the day of the week anomalies detected on Philippines and Pakistan stocks markets persist even after adjusting for world market risk. Alagidede (2008) examines seven African stock markets over the 2001-2006 period and also finds strong statistical evidence for the day of the week effect in South Africa, Zimbabwe and Nigeria. He also reports that the day of the week anomaly do not fade away even after accounting for market risk. However, Brooks and Persand (2001) find that the day of the week effect, detected on Thailand and Malaysia stock markets over the 1989-1996 period, become less pronounced after taking into account the global market risk. Tilica and Oprea (2014) also find that the Friday effect, observed on the Romanian stock exchange from January 2005 to December 2011, is completely captured by the risk-return relationship. Al-Khazali et al. (2008) provide evidence of the day of the week anomaly in the Greek stock market between January 1985 and December 2004. They document that the mean stock returns are low on Tuesdays and high on Friday. Wang et al. (2013) examine the day of the week effect in the Shanghai and Shenzhen stock markets for the period January 2000 to December 2010. The findings show significantly higher mean returns on Monday and lower on Tuesday on both markets. Chaouachi and Ben Mrad Douagi (2014) report a Friday effect in the Tunisian stock market between January 1998 and December 2011. Rita et al. (2018) investigate the existence of the day of the week effect in the Indonesian stock market. They find evidence of the Monday effect. Gayaker et al. (2020) provide evidence of the day of the week anomaly in the Istanbul stock market between January 1990 and October 2017. They document that the mean stock returns are low on Mondays and high on Friday.

3. DATA

The data applied in our investigation consist of the daily closing prices of the S&P/TSX Composite index and the Dow Jones Global Total Stock Market (DWG) index from September 2009 to August 2019. The S&P/TSX Composite index is weighted by market capitalization and it includes stocks of the largest firms on the Toronto Stock Exchange. DWG index represents 77 countries and covers more than 12000 equity securities. It gives near-complete coverage of developed, emerging and frontier markets. The daily closing prices of the S&P/TSX Composite index and the DWG index were obtained respectively, from the www.investing.com and www.djindexs.com. S&P/TSX Composite index is applied to calculate the return of Canadian stock market and DWG index is used to compute the return of the world market portfolio. The daily returns for the S&P/TSX Composite index and the DWG index are computed as the difference in the natural log of the closing index values between day t and t-1.

Table 1 displays the summary statistics for daily returns of the S&P/TSX Composite index and the DWG index between September 2009 and August 2019. As shown in Table 1, both S&P/TSX Composite and the DWG indexes have negative skewness coefficient and exhibit excess kurtosis. Our findings indicate that return series for the S&P/TSX Composite index and the DWG index are skewed to the left and are leptokurtic. The Jarque-Bera statistics also reveal that return series for the S&P/TSX Composite index and the DWG index are non–normal at 1% level.

The Jarque Bera test measures the normality of the distribution of the series. If the Jarque Bera statistic is significant, the null hypothesis of normal distribution is rejected.

4. METHODOLOGY

To explore the day of the week effect in returns, we implement the regression of the returns on five daily dummy variables by applying the OLS technique.

$$R_t = \sum_{i=1}^{5} \alpha_{it} D_{it} + \varepsilon_t \tag{1}$$

Table 1: Summary statistics for daily returns of the S&P/TSX Composite index and the DWG index (%) September 2009 - August 2019

Description	S&P/TSX composite index	DWG index
Observation	2609	2609
Mean	0.0076	0.0119
Standard Deviation	1.1842	1.0909
Skewness	-0.6766	-0.5913
Kurtosis	13.4972	10.9724
Jarque-Bera	12177.72***	7061.39***

***Significant at 1% level

Where R_t is the index return on day t; D_{it} represent dummy variables such that D_{1t} takes the value one if day t is a Monday and zero otherwise and so forth; the parameters α_1 to α_5 indicate the average returns for Monday through Friday. ε_t is an error term.

The presence of statistically significant α_i coefficients would be indicative of day of the week effect and the market inefficiency. However, it is essential to mention that in model 1 we do not take into account the risk factors.

Brooks and Persand (2001), Basher and Sadorsky (2006) and Tilica and Oprea (2014) argue that on specific days of the week, the world market risk is significantly higher or lower than the average and this could be the explanation for the day of the week effect. Following the methodology employed by these authors, we introduce the world market risk as follows:

$$R_t = \sum_{i=1}^{5} \alpha_{it} D_{it} + \beta RWM_t + \varepsilon_t \tag{2}$$

Where the terminology of model 2 is identical to model 1; the parameter represents the sensitivity of return for the S&P/TSX Composite index to a variation in the world market return and RWM_t indicates the world market portfolio return. It is applied as a proxy for global market risk. The presence of insignificant α_i coefficients indicates that the seasonality is completely attributed to the risk-return relationship. However, if the parameters α_i are statistically significant, we can argue that the day of the week effect in returns may be explained by other risk factors. It is important to mention that in model 2 the world market risk do not vary across the days of the week.

In model 3, we let the world market risk to vary across the days by multiplying world market risk by dummy variables. Model 3 is written as follows:

$$R_t = \sum_{i=1}^{5} \alpha_{it} D_{it} + \sum_{i=1}^{5} \beta_i \left[D_{it} RWM_t \right] + \varepsilon_t \tag{3}$$

Where the terminology of model 3 is identical to model 2 and β_i represent the mean sensitivity parameters for each day of the week.

Models 1, 2 and 3 are unconditional models. These models suppose the existence of a symmetric relationship between stock market returns and world mark risk. An alternative approach is to employ a conditional model to examining for day of the week anomalies. This model supposes that market risk can have an asymmetric impact on stock returns. Model 4 is a conditional model relating stock market returns to world market risk.

$$R_t = \sum_{i=1}^{5} \alpha_{it} D_{it} + \beta_u D_{ut} RWM_t + \beta_d D_{dt} RWM_t + \varepsilon_t \tag{4}$$

Where D_{ut} (D_{dt}) is a dummy variable takes the value one if RWM_t are positive (negative) and zero otherwise.

In model 5, we let the conditional risk to vary across the days by multiplying the conditional market risk ([$D_{ut}RWM_t$] or [$D_{dt}RWM_t$]) by dummy variables (D_{it}). Model 5 is written as follows:

$$R_t = \sum_{i=1}^{5} \alpha_{it} D_{it} + \sum_{i=1}^{5} \beta_{iu} D_{it} \left[D_{ut} RWM_t \right] + \sum_{i=1}^{5} \beta_{id} D_{it} \left[D_{dt} RWM_t \right] + \varepsilon_t \tag{5}$$

5. FINDINGS

Estimation results for model 1 are reported in Table 2. The coefficients for all dummy variables are statistically significant. The presence of statistically significant α_i coefficients indicates the existence of day of the week effects. Table 2 also reveals that the lowest mean returns are detected on Monday. However the highest mean returns are observed on Tuesday. Our results indicate at a first sight, the presence of arbitrage opportunities, since market participants may construct beneficial investment strategies. For example, market participants could purchase stocks on Monday and sell them on Tuesday in order to take benefit of this anomaly. Our findings are in line with Jaffe and Westerfield (1985), Athanassakos and Robinson (1994), Baker et al. (2008) and Zhang et al. (2017). These authors find strong statistical evidence for the Monday anomaly in the Canadian stock market.

Model 2 shows that the coefficients for all dummy variables, except Monday are statistically insignificant. Then, the significant day of the week effects, except Monday effect, detected in Table 2 disappear after adjusting for world market risk (Table 3). From Table 3 we can also say that only the Monday effect is not explained by the risk-return relationship. It is important to mention that in model 2, the world market risk do not vary across the days of the week. Moreover, the market coefficient (β) in model 2 is significantly positive and less than unity, implying that the Canadian market is less risky than the world stock market.

In model 3, we let the world stock market risk to vary across the days. We also find that the significant Monday effect found in model 1 remains after adjusting for world market risk. Then, we can also say that the Monday effect is not explained by the risk-return relationship. Further, model 3 reveals that the lowest mean interaction between the Canadian market and the world market are detected on Friday (0.77), followed by Monday (0.78). However, the highest mean interaction are observed on Thursday (0.85), followed by Wednesday (0.84).

Models 4 and 5 are conditional models. These models suppose the existence of an asymmetric relationship between stock market returns and world market risk. The results from estimating model 4 show that the coefficients (β_u and β_d) are not statistically significant. Then, the Monday effect seen in Tables 2-4 is still present.

In model 5, we let the conditional risk to vary across the day. The estimation results from this model indicate that the coefficients (β_{iu} and β_{id}) are statistically significant at 1 % level. Also, we note that the Monday effect detected in Table 6 remains.

6. CONCLUSIONS

The study of day of the week anomaly in equity market returns interests academics and practitioners. For academics, the

Table 2: Estimation results for model 1

Day	Mean	T-stat.
Monday	−0.1392***	−2.69
Tuesday	0.2133***	2.91
Wednesday	0.1732**	2.36
Thursday	0.1612**	2.20
Friday	0.1864**	2.54

***Significant at 1% level. **Significant at 5% level

Table 3: Estimation results for model 2

	Mean	T-stat.
Monday	−0.1446***	−2.98
Tuesday	−0.0304	−0.62
Wednesday	−0.0553	−1.14
Thursday	−0.0488	−1.01
Friday	0.0537	1.56
RWM	0.8127***	57.78

***Significant at 1% level

Table 4: Estimation results for model 3

	Mean	T-stat.
Monday	−0.1458***	−3.00
Tuesday	−0.0298	−0.61
Wednesday	−0.0564	−1.16
Thursday	−0.0494	−1.01
Friday	0.0534	1.55
Monday RWM	0.7870***	29.08
Tuesday RWM	0.8073***	26.13
Wednesday RWM	0.8450***	25.85
Thursday RWM	0.8573***	26.42
Friday RWM	0.7705***	21.23

***Significant at 1% level

Table 5: Estimation results for model 4

	Mean	T-stat.
Monday	−0.1639**	−2.34
Tuesday	0.0477	0.68
Wednesday	−0.0176	−0.25
Thursday	−0.0161	−0.23
Friday	−0.0054	−0.06
RWM down	−0.0202	−0.59
RWM up	0.1286	1.01

**Significant at 5% level

Table 6: Estimation results for model 5

	Mean	T-stat.
Monday	−0.1159**	−2.32
Tuesday	−0.0248	−0.49
Wednesday	−0.0361	−0.72
Thursday	−0.0493	−0.98
Friday	0.0365	1.03
Monday down	−0.4129***	−10.29
Tuesday down	−0.3929***	−10.07
Wednesday down	−0.5397***	−11.77
Thursday down	−0.4247***	-8.39
Friday down	−0.2920***	−9.75
Monday up	0.9805***	7.55
Tuesday up	1.4852***	10.29
Wednesday up	0.9025***	7.52
Thursday up	1.2399***	10.91
Friday up	0.8696***	8.50

***Significant at 1% level. ** Significant at 5% level

analysis of this anomaly gives insights about the level of market efficiency. Practitioners utilize it to build their investment strategy. In this article, we investigate the day of the week effect in daily returns of S&P/TSX Composite index in the Canadian stock market between September 2009 and August 2019. Our findings reveal the existence of the day of the week effect. The highest and lowest mean returns are detected on Tuesday and Monday, respectively. Our findings are in line with Jaffe and Westerfield (1985), Athanassakos and Robinson (1994), Baker et al. (2008) and Zhang et al. (2017) in the Canadian stock market.

Further, we try to explain the day of the week effect by referring to the world market risk. Using unconditional and conditional models, our results show that only the significant Monday effect remains after adjusting for world market risk. For this reason, the major conclusion of this article is that the Monday effect in daily returns of the S&P/TSX Composite index is not caused by the world market risk. An important extension of this paper would be to test empirically the day of the week effect in various stock markets in order to make a comparison between them about their reaction to the world market risk.

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