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Revisiting the Day of the Week Anomaly in Financial Markets using Style Indices

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A great deal of research has been performed on the day of the week anomaly. However, extant literature in the area primarily assumes that investors are interested in investing in a composite market portfolio only and therefore, ignores the importance of style investing. This paper is the first of its kind as it explores the day of the week anomaly from an entirely different perspective. In this paper we have recognized the fact that individual and institutional investors may also actively engage in style investing. Therefore, instead of traditional benchmark indices, we have used daily return data on MSCI value and growth indices from 1997 to 2013 to determine the presence of a day of the week effect in 32 financial markets. Our findings suggest moderate to strong support for the existence of the day of the week effect in emerging markets; however, we do not find any evidence suggesting the presence of the anomaly in developed countries with the exception of Singapore, where a positive Wednesday effect exists. In emerging markets in which the anomaly exists, a positive Friday effect is the most frequent to occur. Our findings are supported by robustness checks utilizing each country's composite benchmark equity index and different sub-periods of time.

KEYWORDS *International Financial Markets, Calendar Anomalies, Day of the Week Anomaly, Style Investing, Market Efficiency*

JEL *G100, G110, G120, G140, G150*

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I. INTRODUCTION

Anomalies have been a topic of interest for finance researchers for almost four decades. These anomalies are the result of systematic return patterns found in various stock markets across the globe, which violate the assumptions of Efficient Market Hypothesis (EMH). They also challenge the traditional Capital Asset Pricing Model (CAPM) as actual returns do not match the expected returns proposed by the CAPM. In fact, if an anomaly is identified in stock returns, an investor can easily beat the market and earn abnormal profits without assuming much risk by simply adding stocks with systematic positive return patterns and/or shedding those with negative return patterns.

Based on their periodicity and characteristics, research has identified three basic types of anomalies, namely fundamental, technical and calendar anomalies (Latif *et al.* 2012). Practitioners may adopt investment strategies based on any of these anomalies or they may also adopt a blend of investment approaches using different anomalies to earn higher abnormal profits (Chan & Lakonishok 2004). Up until now, most of the research on anomalies within and outside the US has used data on benchmark equity indices like the S&P 500, NASDAQ, FTSE100, Nikkie225 etc. These studies assume that investors do not differentiate between individual stock types and only invest in composite indices. However, recognizing that most institutional and individual investors are involved in style investing (Barberis & Shleifer 2003), it is necessary to understand how anomalies affect the wealth of such investors. In addition, the absence of anomaly studies utilizing data on style indices results in an important gap in the literature. As a result, the purpose of this study is to fill this gap by using data on two particular style indices covering 32 financial markets across the globe.

Specifically, our study delves further into the calendar anomaly known as the "day of the week effect (DoWE)" using data on two style indices from emerging and developed markets, noting that in style investing, investors might invest in a particular class of asset or combination of two or more styles, like large-cap stocks, low-cap stock, value stocks, growth stocks pertaining to a particular sector etc. In our analysis, we used data from 1997 to 2013 on two investment styles, namely value and growth stocks formulated by Morgan Stanley Capital International under the umbrella of country specific value and growth indices.

This study is quite unique in the literature as it attempts to identify profit-making opportunities for investors by exploiting DoWE anomalies within value and/or growth stocks, particularly in emerging markets as we expect them to be less efficient compared to developed ones. It also extends the frontiers of research in the area of anomalies, as we have not been able to identify any study, which has used value or growth indices. As a result, the study provides a hitherto unexplored perspective regarding DoWE anomalies.

This paper is organized as follows: section II provides a brief literature review and develops the hypotheses, section III discusses the data and methodology, section IV covers the empirical results and section V concludes.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

In this paper, we explore whether the DoWE anomaly exists within value and growth stock indices of 19 emerging and 13 developed countries across the globe. Before developing the hypotheses, we provide a brief review on the DoWE anomaly. Then, we present our arguments to justify the usage of style indices to study the anomaly. Finally, we conclude this section with hypotheses development.

The DoWE suggests that mean returns of trading days within a week are not the same and therefore, there might be a pattern with which an investor can earn abnormal profits. Thus, it is a test of the weak form of market efficiency, which states that investors cannot beat the market based on information with respect to historical prices. Special cases of the DoWE are the weekend and reverse weekend effect (Nawaz & Mirza 2012).

Studying the S&P composite portfolio from 1953 through 1977, French (1980) found that while average returns on Monday were significantly negative, returns were significantly positive for the rest of the trading days of the week. This result confirmed the finding of Cross (1973), who identified the weekend effect for the first time, whereby Monday returns were significantly different from those of Friday. Lakonishok and Maberly (1990) provided additional evidence on the DoWE and asserted that the difference in trading patterns of individual and institutional participants partly explains the existence of the weekend effect. Using data from 1990 to 1994 of four indices, namely the Down Jones Industrial Index, CRSP value weighted index, S&P's 500 index and NYSE index, Brusa *et al.* (2000) found a traditional weekend effect for small firms and discovered a reverse weekend effect for large firms. In the reverse weekend effect, the mean return on Monday is positive and significantly higher than the average returns of the rest of the week's trading days.

Kiymaz and Berument (2003) studied the DoWE anomaly in relation to stock volatility and level of trading activity in the stock indices of Germany, Japan, Canada, UK and USA using data from 1988 until 2002. The null hypothesis of the same return on all trading days was rejected and the authors found the lowest returns for Japan on Tuesday, for Canada, USA and the UK on Wednesday and for Germany, on Friday. Thus, their study confirmed the existence of the DoWE anomaly in international markets. Likewise, in a recent study on ten East Asian financial markets, Chukwuogor-Ndu (2007) found evidence of the DoWE using data from 1998 to 2003. Lian and Chen (2004) also investigated stock return data from 1992 to 2002 on the stock markets of five ASEAN countries, namely Thailand, the Philippines, Indonesia, Singapore and Malaysia. They divided their data according to pre-Asian crisis, post-Asian crisis and during-Asian crisis periods. The authors found that the DoWE still existed in the pre and post-crisis periods, however only a Tuesday effect existed in Thailand and the Philippines during the financial crisis.

These findings on the existence of the DoWE anomaly and its special cases found in recent studies pose an important threat to EMH and create a puzzle for finance researchers, namely "how can a well-developed theoretical CAPM model be so inadequately defined when

it comes to empirical testing?" In response to this, we believe that style investing might have an impact on the existence of the DoWE, noting that all studies on anomalies to date have used composite equity indices of the subject countries, thereby ignoring the fact that many investors employ style investment strategies. Thus, in order to contribute to style investors' and academicians' understanding of the DoWE, we re-examine this anomaly using data from indices pertaining to a particular style of investing. Specifically, we use the indices of two major styles, the value style and growth style. In this context, value style investment refers to the investment in value stocks only, which are primarily categorized based on low price-to-earnings ratio or low price-to-book ratio, while growth style investment means investing in growth stocks, which represent stocks with high price-to-earnings or high price-to-book ratios. Investors might also invest in both styles at the same time to diversify their risks given that asset prices within the two styles may not be highly correlated with one another (Barberis & Shleifer 2003). Against that backdrop and given that existing research has confirmed the existence of the DoWE anomaly in different markets across the globe using composite indexes containing both growth and value stocks, we would expect to uncover the same anomaly within the disaggregated value and growth indices. As such, we make the following hypotheses:

H1 (a): DoWE persists in growth indices of different countries across the globe
H1 (b): DoWE persists in value indices of different countries across the globe

Moreover, as emerging countries' stock markets, hereafter emerging markets, are relatively new, we expect them to be less efficient than the ones in developed countries, hereafter developed markets. Therefore, we also hypothesize the following:

H2: DoWE is more prominent in emerging markets than developed markets

III. DATA AND METHODOLOGY

Many academicians believe that in the area of anomalies, researchers' natural predilection is to find systematic return patterns in order to make their paper interesting for publication. As a result, they cite data snooping as the reason behind the researching of the existence of such anomalies (Schwert 2003). In addition, because most of the anomalies either disappeared or diminished after their documentation in the finance literature (Latif *et al.* 2012), there is doubt as to whether there was ever an anomaly in the first place, or alternatively, belief that the anomaly has been exhaustively exploited. Consequently, critics have blamed data selection bias and underlying models for the generation of such anomalies.

To obviate this criticism, we use all available data on MCSI growth and value indices for emerging and developed markets beginning in 1997, when MCSI began generating such data, and extending until 2013. In addition, we analyze the value and growth indices for all32 countries for which we have complete data, comprising 19 emerging and 13 developed countries

(the complete list of emerging and developed countries used is mentioned in the Appendix A). Furthermore, we test the robustness of our initial results using the traditional benchmark equity index of each respective country. With the exception of benchmark indices of developed countries, all the data on value, growth and composite indices are taken from Bloomberg. Composite indices of developed countries are taken from DataStream database. Along with the complete list of countries, abbreviations of composite indices of respective countries are also mentioned in the Appendix A.

We use the benchmark regression equation estimated by French (1980), to test our hypotheses. This regression equation is given as follow:

$$R_{it} = \alpha + \beta_1 d_{1t} + \beta_2 d_{2t} + \beta_3 d_{3t} + \beta_4 d_{4t} + \varepsilon_{it} \qquad (1)$$

Where:

$R_{it} = Return\ on\ the\ value\ Index\ or\ growth\ index\ of\ country\ 'i'$
$d_{1t} = Dummy\ variable\ equals\ to\ '1' if\ return\ is\ observed\ on\ Tuesday$
$d_{2t} = Dummy\ variable\ equals\ to\ '1' if\ return\ is\ observed\ on\ Wednesday$
$d_{3t} = Dummy\ variable\ equals\ to\ '1' if\ return\ is\ observed\ on\ Thursday$
$d_{4t} = Dummy\ variable\ equals\ to\ '1' if\ return\ is\ observed\ on\ Friday$
$\varepsilon_{it} = Serially\ independent\ random\ variable\ whose\ expected\ value\ is\ zero$

In equation (1), the coefficient α represents the mean return on Monday and coefficients $\beta_1, \beta_2, \beta_3\ and\ \beta_4$ represent the difference between the expected returns on Tuesday, Wednesday, Thursday and Friday, respectively, with the expected return on Monday. The null hypothesis that the alpha and all beta coefficients are not significantly different from zero, meaning that the same level of return should be observed on each trading DoWE as suggested by EMH.

As proposed by French (1980), returns are calculated with the following formula:

$$R_{it} = \ln[(P_{it} + D_{it}) / P_{i(t-1)}] = E(R_{it}) + \varepsilon_{it} \qquad (2)$$

Where:

$P_{it} = Price\ of\ the\ value\ or\ growth\ index\ of\ country\ 'i' at\ time\ 't'$
$P_{i(t-1)} = Price\ of\ the\ value\ or\ growth\ index\ of\ country\ 'i' at\ time\ 't-1'$
$D_{it} = Dividends\ on\ stocks\ in\ value\ or\ growth\ index\ of\ country\ 'i'$

However, in accordance with extant studies on the DoWE anomaly, we ignore the dividends in calculating the returns on the value and stock indices.

IV. EMPIRICAL RESULTS

We run regression equation (1) on the value and growth index data of 19 emerging and 13 developed markets. The results emerging markets suggest strong support for the first two hypotheses, H1 (a) and H1 (b). However, the results from the indices of developed markets refute the presence of the DoWE anomaly. Thus, we obtain mixed support for the first set of hypotheses while obtaining strong support for the second hypothesis, namely that the DoWE anomaly is more prominent in emerging markets. In fact, we generally do not find a DoWE anomaly, in either index in developed markets. Tables 1 through 4 present the results for the value and growth indices of emerging and developed markets. Please note that the returns in table 1 are expressed in percentage terms.

The results from table 1 suggest that the DoWE exists in 14 value indices out of the 19 emerging markets. We do not observe any DoWE in China, Czech Rep, Korea, Russia and South Africa. As alpha (α) and the beta coefficients of these countries are not statistically significant. We find the presence of the DoWE anomaly in every trading day for Chile, Indonesia and Israel, as mean returns for each weekday –Tuesday through Thursday- are significantly different from the mean returns on Monday (α). In the case of Chile, Indonesia and Thailand we observe the traditional Monday effect, as mean returns on Monday are significantly negative and mean returns on Friday are significantly positive. We also observe the reverse Monday effect in India and Israel. An interesting finding is that the Friday effect is the most prominent in emerging markets, as we find that 11 out of the 19 markets exhibit it. Out of these 11 Friday effects, nine are positive and only two are negative. Thus, in nine countries mean returns on Friday are positive and statistically different from mean returns on Monday. The Tuesday effect is less frequent than the other effects in the value indices of emerging market since only five emerging markets exhibit this effect. Overall, the analysis of the value indices for emerging market strongly supports H1 (a).

The results of our model on emerging markets' growth equity indices are given in table 2. We find relatively less support for the presence of the DoWE anomaly as only eight markets out of 19 suggest the existence of such effect. These eight countries are Chile, Colombia, Hungary, Malaysia, South Africa, Taiwan, Thailand and Turkey. Note, the growth indices of these countries exhibit the same pattern as their value indices for seven out of the eight countries, since South Africa did not have a DoWE anomaly in its value index. While we do not observe a reverse Monday effect in any market, there is a Monday effect in the growth indices of Chile, Taiwan and Thailand. Interestingly, as with the value indices of these markets, the growth indices analysis suggests that the Friday effect is most frequent, being present in six out of eight countries. The two exceptions are Hungary and South Africa, where the DoWE anomaly is found to be most prevalent on Monday and Thursday for Hungary and Monday for South Africa. As with the value indices, the Tuesday effect is least prominent and in fact, non-existent in all 19 markets.

Table 1: Regression results for value indices of emerging countries

Variables / Countries	α	β1	β2	β3	β4	Obs	F-stat
Argentina	-0.128 (-1.428)	0.192 (1.517)	0.223* (1.760)	0.134 (1.062)	0.284** (2.242)	3,236	1.446
Chile	-0.121*** (-3.340)	0.113** (2.203)	0.188*** (3.665)	0.176*** (3.424)	0.264*** (5.140)	4,433	7.388
China	0.021 (0.300)	-0.057 (-0.582)	0.000 (0.005)	-0.051 (-0.515)	0.098 (0.992)	4,434	0.793
Colombia	0.038 (0.705)	-0.026 (-0.337)	0.077 (0.995)	-0.003 (-0.037)	0.169** (2.192)	4,433	2.165
Czech Rep	-0.025 (-0.469)	0.064 (0.845)	0.104 (1.376)	0.030 (0.402)	0.019 (0.257)	4,433	0.588
Hungary	0.139** (2.025)	-0.141 (-1.460)	-0.134 (-1.380)	-0.198** (-2.048)	-0.056 (-0.578)	4,433	1.294
India	0.155*** (2.738)	-0.132* (-1.649)	-0.072 (-0.894)	-0.193** (-2.417)	-0.190** (-2.377)	4,434	2.122
Indonesia	-0.280*** (-3.869)	0.402*** (3.927)	0.391*** (3.819)	0.362*** (3.539)	0.407*** (3.980)	4,327	5.884
Israel	0.149*** (3.650)	-0.148** (-2.563)	-0.177*** (-3.068)	-0.181*** (-3.130)	-0.166*** (-2.870)	4,433	3.481
Korea	0.014 (0.217)	-0.003 (-0.032)	0.063 (0.674)	0.027 (0.289)	0.022 (0.239)	4,434	0.161
Malaysia	-0.079 (-1.500)	0.084 (1.130)	0.141* (1.897)	0.107 (1.441)	0.184** (2.470)	4,327	1.713
Mexico	-0.004 (-0.071)	0.053 (0.769)	0.125* (1.799)	0.066 (0.949)	0.019 (0.278)	4,433	0.962
Peru	-0.093 (-1.526)	0.137 (1.586)	0.156* (1.805)	0.107 (1.243)	0.208** (2.412)	4,433	1.604
Poland	0.132** (2.328)	-0.163** (-2.029)	-0.188** (-2.343)	-0.155* (-1.928)	-0.050 (-0.619)	4,433	2.067
Russia	0.085 (0.844)	-0.126 (-0.884)	-0.152 (-1.071)	-0.062 (-0.434)	0.101 (0.710)	4,433	1.028
South Africa	0.051 (1.123)	0.003 (0.052)	-0.038 (-0.579)	0.038 (0.583)	-0.061 (-0.949)	4,433	0.709
Taiwan	-0.064 (-1.265)	-0.025 (-0.350)	0.143** (1.996)	0.063 (0.876)	0.136* (1.888)	4,434	2.275
Thailand	-0.168** (-2.371)	0.143 (1.423)	0.267*** (2.659)	0.133 (1.327)	0.381*** (3.794)	4,327	4.156
Turkey	-0.114 (-1.275)	0.139 (1.098)	0.185 (1.463)	0.360*** (2.849)	0.395*** (3.126)	4,433	3.330

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Overall, the results from the analysis of growth style indices of emerging markets moderately supports hypothesis H1 (b). Interestingly, the results from both style indices seem to co-move with one another as in all six countries in which the Friday effect is positive for growth indices, it is also positive for value indices. Also, recall that we found similar results for value

indices of emerging markets where nine out of eleven Friday effects were positive. In short, we have found that the Friday effect with positive returns holds in both the value and growth style indices of six countries, namely Chile, Colombia, Malaysia, Taiwan, Thailand and Turkey. As a result, viewed in totality, we find moderate to strong support for our hypotheses H1 (a) and H1 (b).

Table 2: Regression results for growth indices of emerging countries

Variables Countries	α	β1	β2	β3	β4	Obs	F-stat
Argentina	-0.119 (-1.130)	0.16 -1.073	0.167 -1.123	0.064 -0.43	0.283 -1.902	3,236	1.058
Chile	-0.097* (-2.414)	0.106 -1.862	0.157** -2.762	0.124* -2.181	0.207*** -3.631	4,433	3.627
China	0.022 -0.295	-0.158 (-1.509)	-0.069 (-0.657)	-0.108 (-0.443)	0.03 -0.285	4,434	0.953
Colombia	-0.039 (-0.812)	-0.027 (-0.404)	0.127 -1.888	0.086 -1.284	0.195** -2.907	4,433	3.692
Czech Rep	0.077 -1.308	-0.071 (-0.847)	-0.118 (-1.419)	0.005 -0.066	-0.102 (-1.221)	4,433	0.943
Hungary	0.149* -2.063	-0.12 (-1.175)	-0.152 (-1.483)	-0.222* (-2.174)	-0.127 (-1.239)	4,433	1.235
India	0.05 -0.84	0.007 -0.08	0.099 -1.171	-0.024 (-0.290)	-0.091 (-1.083)	4,434	1.315
Indonesia	-0.021 (-0.266)	-0.017 (-0.149)	0.048 -0.436	0.05 -0.447	0.191 -1.715	4,327	1.077
Israel	0.104 -1.686	-0.138 (-1.585)	-0.107 (-1.226)	-0.107 (-1.028)	-0.085 (-0.979)	4,433	0.694
Korea	-0.042 (-0.546)	0.09 -0.837	0.179 -1.655	0.068 -0.63	0.027 -0.25	4,434	0.812
Malaysia	-0.094 (-1.863)	0.092 -1.286	0.124 -1.746	0.086 -1.212	0.154* -2.16	4,327	1.317
Mexico	-0.004 (-0.077)	0.085 -1.078	0.119 -1.511	0.064 -0.817	0.042 -0.529	4,433	0.648
Peru	-0.029 (-0.398)	0.082 -0.792	0.062 -0.596	0.047 -0.457	0.16 -1.548	4,433	0.642
Poland	-0.007 (-0.105)	0.038 -0.42	-0.04 (-0.434)	-0.001 (-0.011)	0.021 -0.232	4,433	0.205
Russia	0.079 -0.769	-0.092 (-0.628)	-0.19 (-1.303)	-0.106 (-0.724)	0.124 -0.851	4,433	1.345
South Africa	0.104* -2.182	-0.075 (-1.117)	-0.087 (-1.290)	-0.072 (-1.076)	-0.102 (-1.523)	4,433	0.689
Taiwan	-0.129* (-2.151)	0.124 -1.453	0.220** -2.588	0.11 -1.288	0.185* -2.18	4,434	1.972
Thailand	-0.170* (-2.437)	0.094 -0.949	0.237* -2.4	0.197* -1.993	0.370*** -3.748	4,327	4.076
Turkey	-0.169 (-1.933)	0.212 -1.715	0.231 -1.866	0.410*** -3.31	0.402** -3.246	4,433	3.682

t-statistics in parentheses
*** p<0.001, ** p<0.01, * p<0.05

To test the robustness of our results from emerging markets, we run the regression model using each market's respective benchmark equity index. The results of the analysis are given in

table 3. We do not run our analysis on the composite index of Colombia, as we are not able to match the data of the dates available to us with its style indices. Abbreviations of these benchmark equity indices, as listed on Bloomberg, are given in the Appendix A. Our results resemble more closely those of the value indices, as we are able to observe a DoWE anomaly in 14 of the 18 countries, with the exceptions being –the Czech Republic, India, Korea and Poland. Furthermore, the results of our robustness test suggest that the Friday effect persists in Argentina, Chile, Indonesia, Malaysia, Peru, Taiwan, Thailand and Turkey- and that in all eight of these markets, mean returns on that day are positive.

Table 3: Regression results for benchmark indices of emerging countries

Variables Countries	α	β1	β2	β3	β4	Obs	F-stat
Argentina	-0.066 (-0.848)	0.101 -0.942	0.164 -1.531	0.096 -0.888	0.212** -1.964	4,185	1.102
Chile	-0.114*** (-2.919)	0.117** -2.138	0.179*** -3.282	0.164*** -2.991	0.270*** -4.917	4,237	6.464
China	0.071 -1.235	-0.12 (-1.484)	0.056 -0.696	-0.195** (-2.399)	0.008 -0.097	4,103	3.294
Czech Rep	0.007 -0.149	-0.003 (-0.047)	0.031 -0.454	0.04 -0.59	-0.035 (-0.519)	4,433	0.39
Hungary	0.160** -2.506	-0.159* (-1.786)	-0.155* (-1.748)	-0.217** (-2.445)	-0.092 (-1.026)	4,243	1.722
India	0.083 -1.477	-0.04 (-0.500)	0.032 -0.397	-0.083 (-1.036)	-0.103 (-1.291)	4,233	0.971
Indonesia	-0.142** (-2.404)	0.186** -2.233	0.242*** -2.918	0.213** -2.545	0.299*** -3.547	4,145	3.64
Israel	0.109*** -3.447	-0.087 (-1.573)	-0.142** (-2.564)	-0.117** (-2.127)	N/A N/A	4,168	2.871
Korea	-0.021 (-0.336)	0.036 -0.401	0.103 -1.151	0.063 -0.706	0.039 -0.438	4,295	0.358
Malaysia	-0.099** (-1.991)	0.104 -1.493	0.157** -2.266	0.097 -1.391	0.180*** -2.598	4,188	2.012
Mexico	-0.015 (-0.278)	0.088 -1.199	0.149** -2.028	0.064 -0.863	0.065 -0.882	4,276	1.063
Peru	-0.019 (-0.384)	0.011 -0.165	0.059 -0.844	0.071 -1.011	0.238*** -3.401	4,242	3.72
Poland	0.072 -1.373	-0.073 (-0.982)	-0.102 (-1.376)	-0.066 (-0.887)	0.032 -0.431	4,228	1.118
Russia	0.197* -1.926	-0.193 (-1.355)	-0.290** (-2.038)	-0.116 (-0.816)	-0.041 (-0.283)	4,029	1.363
South Africa	0.102** -2.055	-0.065 (-0.942)	-0.065 (-0.940)	-0.031 (-0.450)	-0.112 (-1.600)	4,247	0.723
Taiwan	-0.073 (-1.513)	0.017 -0.237	0.172** -2.451	0.066 -0.935	0.147** -2.086	4,320	2.323
Thailand	-0.234*** (-3.912)	0.190** -2.276	0.329*** -3.96	0.228*** -2.742	0.468*** -5.617	4,162	8.671
Turkey	-0.114 (-1.273)	0.125 -0.988	0.171 -1.359	0.368*** -2.92	0.398*** -3.149	4,244	3.551

t-statistics in parentheses
*** p<0.001, ** p<0.01, * p<0.05

While we do not find any reverse Monday effect in the results, we observe a Monday effect in Indonesia, Malaysia, Taiwan, Thailand and Turkey. We also observe the DoWE anomaly for every trading day of the week in Chile and Indonesia. This result is similar to what we found in value indices of these countries. Also, in all three indices of emerging markets the most prominent effect is the Friday one while the least prominent is Tuesday.

Our analysis on benchmark indices generally confirms the robustness of our results from the styles indices as we find moderate to strong support for the existence of the DoWE anomaly in emerging markets. Thus, H1 (a) and H1 (b) appear to be substantiated. In particular, all three country-specific emerging market indices strongly suggest the presence of a Friday effect, where mean returns on Friday are significantly positive in Chile, Malaysia, Taiwan, Thailand and Turkey. In addition, we observe a Monday effect in all three indices of Chile, Thailand and Turkey, where mean returns on Monday are significantly negative and the ones on Friday are positive and significantly different from the mean return on Monday.

After getting support for H1 (a) and H1 (b) in emerging markets, we conduct the same analysis on value and growth style indices for the markets of developed countries. The selection of developed markets is based on Fama and French (1998). Our results of the regression analysis on value indices of developed markets are given in table 4. A cursory glance at the table suggests that these results do not support H1 (a), as the DoWE is present only in Singapore, where we observe Wednesday and Friday effects with mean returns on these days being 0.155% and 0.134%, respectively, higher than means return on Monday. Apart from Singapore, there is no sign of a DoWE anomaly in the remaining 12 developed countries. The results of the analysis on growth style indices of developed markets also do not support H1 (b), indicating that the DoWE anomaly is present only in Hong Kong and, once again, Singapore. In the interest of brevity, we only present the results of these two countries in table 5 because results are not significant for the rest of the 11 developed markets. In Singapore, the Monday effect is observed along with the Wednesday effect, as mean returns on Monday are significantly negative while mean returns on Wednesday are significantly positive –(0.137% and 0.177%, respectively). The Friday effect is observed in Hong Kong where mean returns are significantly positive and 0.16% higher than mean returns on Monday.

Our results from developed market value and growth style indices are quite robust as we generate similar results using benchmark equity indices of these countries. Specifically, we again find the DoWE anomaly in Singapore only, where mean returns on Wednesday and Friday are positive. This result is presented in table 5 along with the results of growth indices of Hong Kong and Singapore.

Thus, apart from Singapore, our analysis on the data of three different indices of developed market totally rejects the presence of any DoWE anomaly. . In short, our analysis on style and benchmark indices of developed countries strongly rejects H1 (a) and H1 (b).

Therefore, we conclude that overall there is mixed support for H1 (a) and H1 (b), as the DoWE anomaly persists in emerging stock markets only.

Table 4: Regression results for value indices of developed countries

Variables Countries	α	β1	β2	β3	β4	Obs	F-stat
Australia	0.008 -0.208	0.027 -0.523	0.051 -0.983	0.011 -0.211	-0.022 (-0.416)	4434	0.559
Belgium	-0.057 (-1.077)	0.004 -0.05	0.076 -1.011	0.087 -1.158	0.103 -1.363	4433	0.828
France	-0.005 (-0.091)	0.037 -0.509	0.009 -0.125	0.04 -0.549	0.038 -0.527	4433	0.134
Germany	0.056 -1.019	-0.029 (-0.378)	-0.032 (-0.418)	-0.078 (-1.004)	-0.05 (-0.639)	4433	0.272
Hong Kong	0.027 -0.484	-0.117 (-1.491)	0.035 -0.441	-0.09 (-1.145)	0.053 -0.677	4434	1.862
Italy	-0.057 (-1.117)	0.108 -1.496	0.119 -1.645	0.044 -0.605	0.058 -0.807	4433	0.907
Japan	-0.037 (-0.789)	0.035 -0.531	0.067 -1.026	0.087 -1.325	0.007 -0.108	4434	0.657
Netherlands	0.02 -0.319	0.026 -0.293	-0.017 (-0.195)	-0.001 (-0.016)	-0.015 (-0.164)	4433	0.075
Singapore	-0.074 (-1.527)	0.097 -1.407	0.155** -2.254	0.101 -1.462	0.134* -1.95	4434	1.497
Sweden	0.058 -1.126	-0.041 (-0.565)	-0.008 (-0.108)	-0.062 (-0.856)	-0.018 (-0.250)	4433	0.247
Switzerland	-0.014 (-0.248)	0.011 -0.148	0.067 -0.866	0.025 -0.323	0.031 -0.398	4433	0.216
UK	0.029 -0.689	0.013 -0.225	-0.097 (-1.611)	-0.026 (-0.426)	0.009 -0.155	4433	1.151
USA	-0.002 (-0.052)	0.07 -1.12	0.002 -0.026	0.008 -0.131	0.015 -0.245	4387	0.439

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Moreover, since we find support for the DoWE anomaly in emerging markets and no support in developed markets, H2 is clearly substantiated. As reasons for the support of r H2, we cite that financial markets in developed countries function more efficiently (and hence are less

susceptible to anomalies like the day of the week effect) due to their maturity, liquidity , more developed regulation and the extensive level of research having been performed on them by academicians.

Table 5: Regression results for growth indices of Hong Kong and Singapore and for benchmark index of Singapore

Regression results for growth indices of Hong Kong and Singapore							
Variables Countries	**α**	**β1**	**β2**	**β3**	**β4**	**Obs**	**F-stat**
Hong Kong	-0.011 (-0.202)	-0.063 (-0.784)	0.090 (1.132)	-0.054 (-0.676)	0.160* (2.006)	4,434	2.907
Singapore	-0.137** (-2.795)	0.134 (1.939)	0.177* (2.560)	0.113 (1.629)	0.222** (3.208)	4,434	2.914
Regression results for benchmark index of Singapore							
VARIABLES Country	**α**	**β1**	**β2**	**β3**	**β4**	**Obs**	**F-stat**
Singapore	-0.086 (-1.758)	0.077 (1.118)	0.153* (2.219)	0.071 (1.033)	0.146* (2.126)	4,435	1.660

t-statistics in parentheses
*** p<0.001, ** p<0.01, * p<0.05

More evidence on the presence of DoWE anomaly

To gain deeper insight into the DoWE anomaly and further test our initial findings for robustness we conduct our regression analysis on temporal sub-samples of the data for all three indices in emerging and developed markets. We divide the data on all the indices into four temporal sub-samples, namely 1997 to 2000, 2001 to 2004, 2005 to 2008 and 2009 to 2013. We use letters of the alphabet to represent these sub-samples for presentation purposes, coding the periods from 1997 to 2013, 1997 to 2000, 2001 to 2004, 2005 to 2008 and 2009 to 2013 as the letters a, b, c, d and e, respectively.

The results for the overall data and data from sub-periods are summarized in table 6 through table 8. We only present the results where we observe the DoWE anomaly. A particular DoWE anomaly in a given country is more likely to exist when a larger number of letters (a, b, c, d and e) appear in the cell. . For example, table 6 suggests that the Friday effect is strongly observed in Chile as this effect is present in four time sub-samples, namely a(1997 to 2013), b (1997 to 2000), c (2001 to 2004) and e (2009 to 2013). The results of this in depth analysis of emerging markets in table 6 suggest strong support for H1 (a) and moderate support for H1 (b).Among all periods there is a higher frequency of DoWE in value indices than growth indices.

In line with our earlier analysis, the Friday effect is most prevalent and Tuesday effect is least frequent for both value and growth indices. Specifically, for value indices, the Friday effect is observed 30 times compared to 13 times for the Tuesday effect, while the comparable numbers for growth indices are 17 and 5, respectively.

Table 6: **Summary of results using value and growth equity indices of emerging markets for different periods**

	Value Index					Growth Index				
	Monday Effect	Tuesday Effect	Wednesday Effect	Thursday Effect	Friday Effect	Monday Effect	Tuesday Effect	Wednesday Effect	Thursday Effect	Friday Effect
Argentina			a		a					
Chile	a,b,c	a,c	a,b,c,d	a,c,d	a,b,c,e	a,c	c	a,c	a,c	a,b,c
China					b					
Colombia	c,d	c	c,d,e	d	a,d	d	b,e	d,e	b,d	a,c,d
Czech Rep										
Hungary	a,e		e	a,b	e	a	e		a,b	
India	a,b	a,b	b	a,b	a,b		c			b
Indonesia	a,b,c	a,b,c	a,c,e	a,b,c	a,b,c			b,c,e		c
Israel	a,b	a,b	a,b	a,b,e	a,b					
Korea	d		e	c	c,d					
Malaysia			a		a,c					a
Mexico			a,c	c				b		
Peru			a		a,b					
Poland	a,c,e	a,e	a,b	a,e						
Russia			c			c		c		
South Africa						a		c	b	
Taiwan			a,c,e		a	a,c		a,c		a
Thailand	a,b	c	a,c,e		a,b,c,d	a		a	a	a,b,c,d
Turkey	c			a,c	a,b,c	c			a,c	a,b,c

a	1997-2013
b	1997-2000
c	2001-2004
d	2005-2008
e	2009-2013

Table 7 summarizes results for developed countries. These results suggest that financial markets of developed countries are quite efficient as there are few instances of the occurrence of the DoWE throughout all five periods. Specifically, there are only 17 instances in which we observe the DoWE in value indices of developed countries compared to 113 such instances in the case of value indices of emerging countries. Moreover, the comparable numbers in the case of growth indices are21 and . 55, respectively. Interestingly, we see a relatively large number of letters (3 to be exact) with respect to the Wednesday effect in both indices for Singapore, clearly suggesting that the effect is observed in Singapore. However, apart from that country, we do not identify any cell in which we can find at least three letters. Hence, both H1 (a) and H1 (b) are strongly rejected in developed markets. In short, once again our analyses suggest that the DoWE anomaly persists in emerging countries only.

Table 7: Summary of results using value and growth equity indices of developed markets for different periods

	Monday Effect	Tuesday Effect	Wednesday Effect	Thursday Effect	Friday Effect	Monday Effect	Tuesday Effect	Wednesday Effect	Thursday Effect	Friday Effect
Australia						d	d	d	d	
Belgium						e				
France	b									
Germany	b			b						
Hong Kong										a,b
Italy	e		e							
Japan				c						
Netherlands	b			b		b			b	
Singapore		e	a,b,e		a	a,b		a,b,e		a,b
Sweden	b			b		b		b	b	
Switzerland	b			b					b	
UK						b			b	
USA										

a	1997-2013
b	1997-2000
c	2001-2004
d	2005-2008
e	2009-2013

We further test the robustness of our results for the subsamples by using data from composite indices of both emerging and developed countries. As can be seen in Table 8, we find that the DoWE anomaly only persists in emerging markets, clearly supporting H2, which states that .the DoWE is more prominent in emerging markets and less prominent in developed markets.

Table 8: Summary using benchmark equity indices of emerging & developed markets for different periods

	Emerging Market					Developed Market					
	Monday Effect	Tuesday Effect	Wednesday Effect	Thursday Effect	Friday Effect	Friday Effect	Thursday Effect	Wednesday Effect	Tuesday Effect	Monday Effect	
Argentina	d				a						Australia
Chile	a,b,c	a,b,c	a,b,c	a,c	a,b,c,e						Belgium
China	c,d	c,d		a,d,e							France
Colombia	c,d		d,e	d	c,d		b				Germany
Czech Rep		b									Hong Kong
Hungary	a,b,e	a,e	a	a,b,e	e						Italy
India	b			b	b		b				Japan
Indonesia	a,c	a,c,e	a,c,e	a,c	a,c,d,e		b			b	Netherlands
Israel	a,b		a,b	a,d	NA	a		a,e			Singapore
Korea		c	e				b			b	Sweden
Malaysia	a		a		a,d		b				Switzerland
Mexico		c	a,b								UK
Peru	b,c				a,b,c,e						USA
Poland											
Russia	a,c,e		a,c								
South Africa	a										
Taiwan			a,c,e		a,c						
Thailand	a,b,c,d	a,c	a,b,c,e	a	a,b,c,d						
Turkey	c			a,c	a,b,c						

a	1997-2013
b	1997-2000
c	2001-2004
d	2005-2008
e	2009-2013

V. CONCLUSION

We contribute to the extant literature on the day of the week (DoWE) anomaly by, first, updating the findings regarding emerging and developed countries while utilizing daily return data on value and growth indices for the first time. Second, we perform a broad country based analysis, which includes 32 financial markets, thus increasing the breadth and depth of sample sizes utilized to date. Third, we test the robustness of our results based on style indices by analyzing traditional composite equity indices in each respective country. Finally, we divide the data into sub-samples to further assess the temporal persistence of our headline findings. We analyze data from 1997 to 2013 on value and growth stock indices for a sample of 32 financial markets, comprised of 19 emerging markets and 13 developed ones. We find that the day of the week anomaly exists in many emerging markets but not in developed ones, (with the exception of Singapore where we observed a positive Wednesday effect). Specifically, in depth analysis suggests a strong presence in Chile, Indonesia, Israel, Taiwan, Hungry, Thailand and Turkey, while no anomaly was observed in Argentina, the Czech Republic, Korea and South Africa. For the remaining eight emerging markets, we observe mixed results wherein their respective value and/or growth index suggests the presence of an anomaly but the traditional composite index does not, or vice versa. Where the anomaly exists, we observe that a positive Friday effect is most prevalent while a Tuesday effect is least frequent.

As a limitation to our study, we cite the usage of Morgan Stanley Capital International's (MSCI) style indices and their attendant methodology for constructing the indices, rather than constructing style portfolios based on our own criteria. Nonetheless, we note that the advantage of using MSCI style indices is that it made it possible for us to perform a more broad based country analysis than had ever been performed before.

Regarding future research, our study provides opportunities in the area of calendar and fundamental anomalies, since it raises questions concerning the characteristics and idiosyncrasies of stock markets with respect to the DoWE anomaly. As such, we believe that it would be pertinent to analyze each market in which the anomaly was identified in depth in order to identify the underlying factors driving the anomaly. Also, as this study used readily available value and growth indices, it might be interesting for researchers to re-examine and check the robustness of our results using their own constructed value and growth portfolios, to the extent feasible.

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APPENDIX A

Emerging Countries		**Developed Countries**	
Countries	**Bloomberg mnemonics for countries' benchmark index**	**Countries**	**DataStream mnemonics for countries' benchmark index**
Argentina	MERVAL	Australia	ASX300I
Chile	IPSA	Belgium	BGBEL20
China	SHASHR	France	FRCAC40
Colombia	IGBC	Germany	DAXINDX
Czech Rep	HNWD	Hong Kong	HNGKNGI
Hungary	BUX	Italy	WIITALL
India	SENSEX	Japan	JAPDOWA
Indonesia	JCI	Netherlands	AMSTEOE
Israel	TA-100	Singapore	SNGPORI
Korea	KOSPI	Sweden	SWEDOMX
Malaysia	FBMKLCI	Switzerland	SWISSMI
Mexico	MEXBOL	UK	FTSE100
Peru	IGBUL	USA	SPX
Poland	WIG		
Russia	INDEXCF		
South Africa	TOP40		
Taiwan	TWSE		
Thailand	SET		
Turkey	XU100		