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A Fresh Look at Seasonal Anomalies: An International Perspective

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Abstract

Under globalization and international market integration, exploring seasonality in global equity markets is imperative for portfolio managers and individual investors to timely reconstruct their portfolios and for firms to optimally schedule the issue of either new shares or IPOs. Prior research supports the presence of the January effect, particularly in the US stock market. However, in the context of international stock markets, the evidence is less compelling and often contradictory. This paper provides a fresh look at monthly seasonality in 34 international equity markets over the period from January 1988 to December 2010. Unlike prior findings, we do not find a significant January effect except perhaps for 3 markets. Instead, we find significantly larger and positive anomalies across the vast majority of these markets for December and April. The results further suggest the presence of significant negative anomalies for June, August, and September across most global markets in the sample.

Key words: international stock markets; market efficiency; seasonal anomaly; monthly effect
JEL classification: G14

1. Introduction

Seasonal anomalies in equity markets (whether daily, weekly, monthly, and even yearly) have attracted widespread attention among both practitioners and academics. The earliest research can be traced back to Tooke (1824) and Kemmerer (1911). Over the past hundred years, a large body of economics and finance literature well documents monthly seasonality of returns on various assets, such as stocks, debt securities, futures, foreign currencies, and commodities. More than 150

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journal articles, using a variety of data, methods, and time periods in different stock markets, support the existence of monthly anomalies.

Anomalous seasonality relates to the assumption that a certain pattern of stock markets, formed on the basis of past stock prices, can be used to predict future prices. If the anomalous pattern is fixed for a specific month, informed investors can utilize the pattern to earn a risk-free profit by trading these stocks. Therefore, the study of seasonality suggests that investors could employ the anomaly findings to predict the future behavior of prices (Fama, 1965). Thus, seasonal anomalies contradict the efficient market hypothesis, particularly in its weak-form sense.

Research on the US stock market suggests that stock returns in January are significantly greater than in other months of the year; this has been referred to as "the January effect" (Bonin and Moses, 1974; Ariel, 1987; Heston and Sadka, 2008; Bentzen, 2009; Dzhabarov and Ziemba, 2010). Except for some early studies which support the January effect in international markets (e.g., Officer, 1975; Brown et al., 1983; Gultekin and Gultekin, 1983), recent research like Yakob et al. (2005), Worthington (2010), and Liu and Li (2011) report mixed results for different markets.

Possible reasons explaining monthly seasonality include the tax-loss selling hypothesis and the gamesmanship hypothesis. Both hypotheses suggest that the average stock returns of small risky firms are higher in January. However, the gamesmanship hypothesis claims that institutional investors rebalance portfolio holdings in order to "window dress" or affect performance-based remuneration by the end of the year (Ritter and Chopra, 1989; Lakonishok et al., 1991; Ackert and Athanassakos, 2000). The gamesmanship hypothesis also suggests that the average returns of highly visible firms tend to be lower in January compared to other months of the year. Singal (2004) argues that small loser firms and large winner firms behave differently in December and January. In particular, higher returns in December for large winner firms support the December effect, while higher returns in January for small loser firms are consistent with the January effect.

Stock returns seasonality is an intriguing mystery in finance. And despite extensive research on international equity markets, the evidence remains mixed. The presence of return seasonality in global equity markets should interest a wide range of market participants, such as portfolio managers and individual investors, who will be informed of the timing of buying and selling stocks, and listed companies and private firms in need of capital would improve their timing for issuing new shares.

Several motivations underlie our paper. First, international equity markets have experienced dramatic changes, particularly in the aftermath of the Asian financial crisis of the 1990s and the more recent global financial crisis. These developments, together with the increased availability of communication technology, have undoubtedly heightened the significance and use of market information. Recent research suggests that these changes may have led to the possible disappearance of seasonal patterns in major stock markets (Doyle and Chen, 2009). Our paper examines this intriguing issue using recent international data.

Second, Bouman and Jacobsen (2002) report results supportive of the "sell in May and gone away" proposition, also known as "the Halloween effect." However, they confine their analysis to the statistical differences of stock returns between two periods: the May–October period (the Halloween season) and the November–April period. In particular, they overlook whether monthly stock returns differ within the Halloween and non-Halloween periods, an issue that we address in our paper.

Third, investigating monthly market anomalies is of considerable economic significance for firms. For example, it is critical for a new firm's IPOs to know in which month the firm can maximize its share value (optimal prices) beyond transaction costs. This market timing represents a central issue in corporate finance. Fund managers too cannot ignore seasonal anomalies in competitive markets. At the same level of transaction costs, portfolio rebalancing strategies require knowledge on selling (buying) in the best month and buying (selling) in the worst month. With a global market capitalization of more than $46 trillion as of January 2010 (World Federation of Exchanges, 2010), even a small variation in stock returns would bring huge gains or losses.

Finally, seasonal anomalies in equity markets may vary across countries owing to different financial structures and diverse stages of economic development. Our use in this paper of international equity index data for 34 countries across mature and emerging markets from January 1988 to December 2010 could reveal useful information on whether the presence of these anomalies is sensitive to such economic and financial details.

Contrary to most prior research, we do not find a significant January effect across the global equity markets, with the exception of only three markets (Denmark, Ireland, and Jordan). Indeed, we find stronger other-than-January month effects. The vast majority of global markets (21 out of 34) demonstrate significant December anomalies, particularly in the G7 and 14 other non-Asian mature markets. Furthermore, our results suggest that 4 of the G7 markets and 7 out the other 14 non-Asian mature markets also display robust April effects, while none of the Asian and emerging markets reveal any sign for the April anomaly. By contrast, September is the worst month for the G7 and for the non-Asian mature markets, in which the latter markets experience significantly negative returns. However, none of the Asian and emerging markets displays this September pattern, except for Indonesia. Finally, the month of August represents the worst month for all global markets in the sample as well as for the world MSCI index with various degrees of negative returns across the markets.

The rest of the paper is structured as follows. Section 2 briefly reviews the germane literature on monthly effects. Section 3 describes the data and summary statistics. Section 4 presents the empirical approach and results. Section 5 concludes.

2. Prior Research

Given the voluminous research on monthly seasonality in equity returns, below is a condensed review of only some of the well-known studies in this area.

Stock return seasonality has been debated in the literature for almost two centuries. Despite the use of alternative portfolio indexes, many studies on the US markets have long concluded that stock returns in January are significantly higher than in other months of the year. According to the tax-loss selling hypothesis, investors at year end tend to sell stocks at fallen prices to realize capital loss to offset capital gain, pushing returns higher on these stocks in January (Reinganum, 1983; Brauer and Chang, 1990; Bhabra et al., 1999; Poterba and Weisbenner, 2001). Some studies, like Roll (1983) and Schultz (1985), relate the January effect to firm size, arguing that small firms are the most likely candidates for tax-loss selling. Singal (2004) also examines the firm size issue and concludes that "the higher returns in December coupled with higher turnover in January for the large winner firms are consistent with the December effect. At the same time, the higher returns in January coupled with higher turnover in December for the small loser firms are consistent with the January effect" (p. 27). The large December returns for winner stocks are dubbed "the December" (or "Christmas") effect. Singal (2004) explains that rational investors sell winners in January rather than in December since doing so will deter tax payments by nearly one year and thus reduces selling pressures in December for winner stocks.

Aside from the US market, several studies examine monthly seasonality in other markets. These include Berges et al. (1984) for Canada; Jaffe and Westerfield (1985) for Japan, Pandey (2002) for Malaysia, Agrawal and Tandon (1994) for 18 countries, Yakob et al. (2005) for 10 Asia Pacific markets, and Liu and Li (2011) for Australia. As these countries employ different tax years from that of the US, the January effect reported in most of the countries fails to support the tax-loss selling hypothesis (e.g., Pandey, 2002; Worthington, 2010). Indeed, Pandey (2002) suggests that the average return in December is positive and the highest for the year.

The gamesmanship hypothesis purports that institutional investors rebalance portfolio holdings in order to "window dress" or affect performance-based remuneration by the end of the year (Ritter and Chopra, 1989; Ackert and Athanassakos, 2000). Although the gamesmanship hypothesis also suggests that the average stock returns of small risky firms are higher in January but, unlike the tax-loss selling hypothesis, it contends that the average returns of highly visible firms are lower in January relative to other months. Ritter (1988) and Ackert and Athanassakos (2000) argue that over the year, investors rebalance their portfolios at year end by discarding lesser-known and risky stocks and replacing them with well-known and less risky stocks.

3. Data

We investigate the monthly seasonal pattern of returns on 34 MSCI country indexes and the MSCI world index. Based on the categorization of the World Economic Outlook Database 2010 of the IMF, we divided the 34 countries into four groups. Group one is the G7 countries (Canada, France, Germany, Italy, Japan, UK, and USA), Group two is the A4 countries (Hong Kong, Korea, Singapore, and

Taiwan), Group three is the ODE14 (or 14 Other Developed Economies) countries (Australia, Austria, Belgium, Denmark, Finland, Greece, Ireland, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, and Switzerland), and Group four is the EDE9 (or 9 Emerging and Developing Economies) counties (Argentina, Chile, Indonesia, Jordan, Malaysia, Mexico, the Philippines, Thailand, and Turkey).

Our data are monthly closing prices of the MSCI indices from January 1988 to December 2010. The prices are adjusted by dividend distribution, new equity issuance, and share buyback. The data are sourced from DataStream.

The market monthly return for month t is calculated as:

$$R_{i,t} = \log(P_{i,t} / P_{i,t-1}), \tag{1}$$

where $P_{i,t}$ is the price of market index i on the last day of month t and $P_{i,t-1}$ is the price of market index i on the last day of month $t-1$.

Table 1 presents summary statistics of the monthly returns. It reports the sample means, standard deviations, medians, minimums, maximums, skewness, kurtosis, Jacaque-Bera statistics, and the first-order autocorrelation coefficients. The mean monthly returns vary across countries, with the largest (4.52%) for Argentina and the lowest (–0.22%) for Japan. The returns and the risks (standard deviations) are highest for the EDE14 group compared to other groups. The Jarque-Bera statistics suggest non-normal return distributions except for Italy. Most of the returns are skewed to the left and exhibit excess kurtosis. The first-order autocorrelation coefficients are positive and differ across countries. In general, the G7 returns tend to be less serially correlated than the returns from other groups. The MSCI world index monthly return is 0.39%, is non-normal, and has a positive first-order autocorrelation coefficient.

4. Empirical Results

We first investigate whether the stock return on each month is significantly different from zero. The testing model is:

$$R_{i,t} = \sum_{j=1}^{12} \beta_{i,j} D_{j,t} + \varepsilon_{i,t}, \tag{2}$$

where $D_{j,t}$ is a dummy variable taking 1 for month j and 0 otherwise, $j = 1$ (January), 2 (February), …, 12 (December), $\beta_{i,j}$ is a regression coefficient to be estimated, and $\varepsilon_{i,t}$ is an error term. Due to the presence of large autocorrelation coefficients, the regressions use the Newey-West (1987) heteroskedasticity and autocorrelation consistent robust standard errors with 12 lags.

Table 2 displays the mean returns of the 34 stock indexes and the world index on each month and their associated standard errors. Also reported are the mean and median returns, the numbers of significant positive and negative stock returns in each month of the year.

Table 1. Summary Statistics

Country Code	Country	Mean (×100)	Std. Dev. (×100)	Median (×100)	Min (×100)	Max (×100)	Skewness	Kurtosis	Jarque-Bera	ρ(1)
G7 Markets										
CAN	Canada	0.57	4.48	1.05	–21.03	11.96	–0.97	3.05	150	0.13
FRA	France	0.55	5.65	1.18	–17.41	19.91	–0.39	0.57	11	0.05
GER	Germany	0.53	6.28	1.13	–28.67	17.96	–0.85	2.39	99	0.05
ITA	Italy	0.24	6.37	–0.14	–16.72	21.97	0.11	0.52	4#	0.01
JAP	Japan	–0.22	5.76	–0.09	–23.65	15.46	–0.45	1.41	32	0.10
UKM	UK	0.44	4.32	0.88	–13.98	13.44	–0.46	0.61	14	0.05
USA	USA	0.60	4.36	1.11	–18.93	10.57	–0.79	1.62	59	0.07
Asian Markets										
HKG	Hong Kong	0.73	7.59	0.85	–34.53	28.34	–0.31	2.39	70	0.10
KOR	Korea	0.64	9.03	0.23	–32.12	42.78	0.31	2.09	55	0.07
SIN	Singapore	0.48	6.71	0.98	–30.79	20.53	–0.71	2.98	125	0.09
TAI	Taiwan	0.42	10.15	0.40	–40.66	37.00	–0.09	1.78	37	0.11
Other Developed Markets										
AUS	Australia	0.48	4.07	1.13	–12.02	12.61	–0.43	0.18	9	0.04
AUT	Austria	0.37	7.21	1.08	–36.51	20.53	–1.09	4.46	283	0.23
BEL	Belgium	0.32	5.76	0.93	–35.27	22.82	–1.56	7.68	790	0.23
DEN	Denmark	0.90	5.48	1.45	–19.63	16.99	–0.56	1.05	27	0.06
FIN	Finland	0.62	9.27	0.46	–37.11	27.76	–0.30	1.48	29	0.21
GRE	Greece	0.55	9.80	0.58	–35.55	41.28	0.64	3.29	143	0.13
IRE	Ireland	0.01	6.50	0.78	–25.76	18.69	–0.76	1.53	54	0.20
NET	Netherlands	0.52	5.31	1.11	–20.39	13.11	–1.00	2.06	95	0.09
NZD	New Zealand	–0.06	5.55	0.09	–19.53	23.06	0.06	1.94	43	–0.10
NOR	Norway	0.66	6.98	1.63	–28.70	14.98	–1.06	2.42	119	0.14
POR	Portugal	0.13	6.05	0.20	–22.28	22.12	–0.13	1.62	31	0.14
SPA	Spain	0.52	6.29	1.08	–25.37	15.28	–0.66	1.52	47	0.09
SWE	Sweden	0.92	7.01	1.32	–24.50	29.72	–0.33	1.84	44	0.11
SWI	Switzerland	0.65	4.78	1.26	–20.12	13.00	–0.77	1.70	61	0.17
Emerging and Developing Markets										
ARG	Argentina	4.52	20.24	2.56	–52.04	132.28	2.84	14.79	2886	0.17
CHI	Chile	1.47	6.18	0.90	–32.93	19.49	–0.34	3.17	121	0.15
INO	Indonesia	1.38	11.52	1.51	–42.95	66.75	0.69	7.92	744	0.11
JOR	Jordan	0.37	5.49	0.04	–26.39	18.14	–0.42	3.11	119	0.20
MAL	Malaysia	0.62	7.72	1.00	–31.17	32.85	–0.13	2.89	97	0.10
MEX	Mexico	2.13	7.94	2.80	–29.15	28.01	–0.21	1.15	17	0.03
PHI	Philippines	0.72	8.34	1.16	–29.94	31.13	–0.10	1.35	21	0.13
THA	Thailand	0.51	10.58	1.19	–36.61	38.57	–0.22	2.06	51	0.02
TUR	Turkey	3.32	14.82	3.08	–47.37	58.99	0.39	1.47	32	0.05
World										
WRD	MSCI World	0.39	4.22	1.08	–17.98	9.55	–0.97	1.79	80	0.13

Notes: The country categorization is based on the 2010 World Economic Outlook Database. Jarque-Bera statistic for normality that is not significant at the 5% level is denoted with #. The samples are monthly from January 1988 to December 2010.

Table 2. Monthly Mean Returns

Country Code	January		February		March		April	
	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean
G7 Markets								
CAN	0.561	(0.857)	0.304	(0.986)	1.028	(0.820)	0.916	(0.729)
FRA	–0.327	(1.278)	1.351	(1.428)	1.543*	(0.935)	2.832**	(0.959)
GER	–0.167	(1.245)	0.922	(1.315)	0.730	(1.045)	2.210*	(1.239)
ITA	1.422	(1.338)	–0.186	(1.351)	0.844	(1.338)	3.110**	(1.277)
JAP	–0.339	(1.154)	–0.299	(0.904)	0.508	(1.336)	2.083**	(0.940)
UKM	–0.484	(1.123)	0.253	(0.777)	0.618	(0.680)	1.910**	(0.784)
USA	0.280	(0.898)	–0.485	(0.874)	1.034	(0.805)	1.813**	(0.772)
Asian Markets								
HKG	–0.487	(1.590)	2.271*	(1.312)	–0.450	(1.179)	1.826	(1.399)
KOR	3.737	(2.506)	–2.154*	(1.281)	0.970	(1.582)	1.966	(1.877)
SIN	–0.293	(1.512)	0.674	(1.106)	0.171	(1.160)	2.222*	(1.283)
TAI	2.985	(2.380)	3.726*	(2.177)	0.891	(1.145)	1.575	(2.026)
Other Developed Markets								
AUS	–0.143	(0.851)	–0.244	(0.734)	0.895	(0.840)	2.274**	(0.691)
AUT	1.110	(1.463)	2.737*	(1.534)	1.914	(1.223)	1.637	(1.108)
BEL	0.733	(1.358)	0.385	(1.452)	0.896	(0.793)	2.289**	(0.918)
DEN	2.792**	(1.182)	0.155	(1.013)	0.922	(1.083)	1.717	(1.171)
FIN	2.200	(1.860)	–0.465	(2.184)	1.860	(1.472)	3.135	(2.365)
GRE	2.602	(2.010)	1.528	(2.149)	0.716	(2.006)	4.234*	(2.381)
IRE	2.809**	(1.191)	0.116	(1.349)	1.705*	(0.954)	2.379**	(0.934)
NET	–0.167	(1.080)	0.660	(1.123)	1.511*	(0.865)	2.530**	(0.845)
NZD	0.677	(1.029)	–2.119*	(1.125)	0.181	(1.228)	2.711**	(0.726)
NOR	1.251	(1.628)	1.023	(1.183)	2.644**	(1.184)	2.772**	(1.133)
POR	2.065	(1.532)	1.131	(1.504)	0.758	(0.884)	–0.676	(0.862)
SPA	0.881	(1.376)	0.981	(1.201)	0.596	(1.006)	2.386**	(0.982)
SWE	2.407*	(1.355)	2.435*	(1.297)	0.373	(1.300)	2.517*	(1.299)
SWI	0.312	(0.993)	0.578	(1.088)	1.119	(0.823)	1.502**	(0.700)
Emerging and Developing Markets								
ARG	4.668	(4.084)	6.075	(6.386)	6.440**	(3.076)	5.755*	(3.046)
CHI	3.092**	(1.470)	2.905**	(1.368)	0.484	(1.144)	1.294	(1.140)
INO	3.527*	(1.873)	0.928	(1.202)	2.053	(1.734)	2.428	(2.074)
JOR	2.828**	(0.995)	–1.575*	(0.914)	–0.264	(0.826)	0.272	(1.314)
MAL	1.614	(1.305)	3.152**	(1.466)	–1.350	(1.194)	1.367	(2.097)
MEX	1.921	(1.711)	1.100	(2.049)	4.041**	(1.647)	1.557	(1.338)
PHI	2.749	(1.717)	0.224	(1.646)	–0.865	(0.980)	1.749	(1.849)
THA	4.257*	(2.520)	–0.417	(1.807)	–1.609	(1.627)	2.326	(1.846)
TUR	7.585**	(3.322)	2.367	(3.450)	–0.898	(2.484)	6.981**	(3.362)
World								
WRD	0.047	(0.860)	–0.132	(0.833)	0.763	(0.712)	1.966**	(0.681)

Table 2. (Cont'd)

Country Code	May		June		July		August		September	
	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean
G7 Markets										
CAN	2.020**	(0.753)	–0.280	(0.837)	0.899	(0.749)	–0.728	(1.121)	–1.497	(1.022)
FRA	0.232	(0.787)	–0.906	(1.086)	0.456	(1.135)	–1.115	(1.156)	–2.001	(1.569)
GER	0.025	(0.849)	0.508	(0.964)	1.076	(1.362)	–1.997	(1.367)	–3.409*	(1.882)
ITA	–1.266	(0.939)	–1.177	(1.133)	0.498	(1.289)	–1.151	(1.235)	–2.432	(1.521)
JAP	–0.285	(1.028)	–0.675	(1.108)	–0.002	(1.047)	–1.603	(1.334)	–1.963	(1.421)
UKM	–0.016	(0.795)	–1.278*	(0.726)	1.155	(0.911)	0.178	(0.849)	–1.222	(1.278)
USA	1.350*	(0.742)	–0.518	(0.776)	0.891	(0.861)	–1.045	(0.985)	–0.258	(1.109)
Asian Markets										
HKG	0.514	(1.789)	–1.121	(1.319)	2.539**	(1.138)	–1.932	(1.316)	0.434	(1.881)
KOR	–0.543	(1.679)	–0.952	(1.624)	1.791	(1.847)	–0.995	(1.191)	–0.826	(1.797)
SIN	–0.134	(1.606)	0.356	(1.296)	1.552*	(0.856)	–2.949**	(1.376)	–1.416	(1.640)
TAI	–0.865	(1.681)	–1.050	(2.057)	–0.457	(1.947)	–2.184	(2.329)	–2.751	(2.296)
Other Developed Markets										
AUS	0.223	(0.761)	0.237	(0.699)	1.121	(0.833)	0.161	(0.851)	–0.455	(0.937)
AUT	0.067	(1.187)	–0.242	(1.101)	0.369	(1.301)	–0.695	(1.726)	–3.425*	(2.052)
BEL	–0.457	(0.632)	–0.487	(1.252)	0.526	(0.982)	–0.523	(1.041)	–2.045	(1.685)
DEN	2.405**	(0.942)	0.627	(1.008)	1.661*	(0.926)	–0.774	(1.359)	–1.865	(1.403)
FIN	–0.824	(1.185)	–1.976	(1.732)	0.311	(1.610)	–2.082	(2.098)	–1.606	(1.914)
GRE	–0.415	(1.855)	–1.755	(2.258)	3.291**	(1.473)	–0.358	(1.631)	–0.684	(2.760)
IRE	–1.146	(1.336)	–1.712	(1.189)	–0.981	(1.455)	–1.035	(1.531)	–3.159**	(1.574)
NET	0.345	(0.701)	–0.164	(1.040)	0.971	(1.309)	–0.965	(1.135)	–2.449	(1.555)
NZD	–0.883	(1.192)	–0.654	(1.116)	2.632**	(0.679)	–0.758	(1.607)	–2.303**	(1.059)
NOR	0.776	(1.133)	–0.844	(1.235)	1.488	(1.173)	–1.658	(1.630)	–3.015*	(1.792)
POR	–0.496	(1.117)	–1.764	(1.101)	0.096	(0.891)	–0.106	(1.406)	–1.302	(1.779)
SPA	0.950	(0.911)	–0.834	(1.284)	0.040	(1.249)	–1.041	(1.451)	–2.075	(1.612)
SWE	1.482	(1.071)	–0.184	(1.205)	1.666	(1.112)	–1.849	(1.205)	–3.378*	(1.947)
SWI	1.238	(0.881)	0.484	(1.043)	0.775	(1.035)	–1.144	(1.292)	–1.675	(1.215)
Emerging and Developing Markets										
ARG	7.300	(5.897)	7.020	(5.949)	1.332	(2.885)	4.407	(4.029)	6.008	(3.745)
CHI	1.468	(1.041)	2.662**	(1.320)	1.836**	(0.739)	–0.995	(1.728)	0.498	(1.167)
INO	3.207	(1.993)	1.186	(1.334)	0.703	(1.516)	–1.575	(4.214)	–3.252	(2.754)
JOR	1.097	(1.226)	0.046	(1.255)	–0.322	(0.703)	–1.241	(0.926)	0.448	(0.850)
MAL	0.250	(1.323)	–0.519	(1.245)	1.010	(1.155)	–3.604*	(2.052)	–0.953	(1.738)
MEX	4.049**	(1.878)	0.354	(1.587)	1.746	(1.484)	0.296	(1.792)	0.774	(1.594)
PHI	2.445	(1.518)	–0.221	(1.548)	1.292	(1.704)	–3.611*	(2.066)	0.684	(1.824)
THA	–0.500	(2.326)	0.614	(1.772)	–0.170	(2.121)	–1.480	(2.503)	–0.908	(2.610)
TUR	–2.201	(2.030)	3.931	(2.583)	3.314	(2.076)	–1.291	(2.977)	4.539	(3.478)
World										
WRD	0.649	(0.704)	–0.815	(0.774)	0.772	(0.833)	–1.125	(0.987)	–1.171	(1.152)

Table 2. (Cont'd)

Country Code	October		November		December		Joint-Test	
	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	Mean Return	Standard Error of Mean	F-stats	p-value
G7 Markets								
CAN	0.635	(1.238)	0.782	(0.891)	2.250**	(0.579)	1.28	(0.23)
FRA	1.258	(1.273)	0.854	(0.901)	2.419**	(0.874)	1.55	(0.11)
GER	1.711	(1.392)	1.739*	(0.999)	3.047**	(1.108)	1.93**	(0.04)
ITA	–0.181	(1.619)	0.367	(1.237)	3.018**	(1.050)	1.67*	(0.08)
JAP	–1.221	(1.386)	–0.413	(1.307)	1.602*	(0.921)	0.97	(0.47)
UKM	0.853	(0.962)	0.896	(0.706)	2.433**	(0.583)	1.60	(0.10)
USA	0.844	(1.085)	1.388	(0.949)	1.902**	(0.688)	1.18	(0.30)
Asian Markets								
HKG	1.698	(2.510)	1.036	(1.181)	2.388*	(1.220)	0.87	(0.57)
KOR	–0.119	(2.545)	2.953*	(1.726)	1.868	(1.796)	0.94	(0.50)
SIN	0.385	(1.898)	1.601	(1.111)	3.533**	(1.051)	1.48	(0.14)
TAI	–1.785	(2.144)	1.922	(1.590)	3.039	(2.429)	1.11	(0.35)
Other Developed Markets								
AUS	–0.077	(1.065)	–0.484	(0.893)	2.212**	(0.616)	1.29	(0.23)
AUT	–1.524	(2.010)	–0.946	(1.095)	3.419**	(1.028)	1.68*	(0.08)
BEL	–0.078	(1.711)	–0.015	(0.969)	2.634**	(0.589)	1.11	(0.35)
DEN	0.613	(1.185)	0.217	(0.844)	2.367**	(0.940)	1.48	(0.14)
FIN	3.874*	(2.274)	2.667*	(1.565)	0.348	(2.022)	1.17	(0.31)
GRE	–2.717	(2.029)	–1.558	(1.703)	1.669*	(1.004)	1.12	(0.34)
IRE	–0.149	(1.300)	–0.993	(1.400)	2.332*	(1.214)	2.02**	(0.03)
NET	0.435	(1.215)	0.808	(0.835)	2.724**	(0.852)	1.69*	(0.07)
NZD	–0.014	(1.272)	–0.163	(1.118)	–0.074	(0.801)	1.84**	(0.05)
NOR	–0.264	(1.869)	0.159	(1.383)	3.565**	(1.014)	1.78*	(0.06)
POR	0.359	(1.446)	0.284	(0.987)	1.195	(0.761)	0.74	(0.70)
SPA	1.572	(1.589)	1.335	(1.498)	1.494	(0.950)	0.95	(0.49)
SWE	0.916	(1.609)	2.805	(1.889)	1.908	(1.233)	1.76*	(0.06)
SWI	1.480*	(0.885)	1.319*	(0.692)	1.830**	(0.809)	1.16	(0.32)
Emerging and Developing Markets								
ARG	–3.298	(2.886)	–1.295	(1.711)	9.842**	(3.590)	0.80	(0.64)
CHI	1.109	(1.146)	1.111	(1.391)	2.234*	(1.275)	0.82	(0.62)
INO	–1.473	(2.078)	1.737	(2.470)	7.126**	(2.919)	1.30	(0.22)
JOR	0.130	(1.334)	0.959	(1.657)	2.051**	(0.963)	1.20	(0.29)
MAL	1.988	(1.674)	0.303	(1.503)	4.237**	(1.361)	1.76*	(0.06)
MEX	2.166	(1.872)	3.751**	(1.264)	3.794**	(1.043)	0.75	(0.69)
PHI	0.427	(2.189)	0.601	(1.278)	3.217*	(1.723)	1.12	(0.34)
THA	–0.515	(2.956)	0.297	(1.540)	4.256**	(1.907)	0.84	(0.60)
TUR	4.018*	(2.404)	2.412	(3.749)	9.041**	(3.298)	1.33	(0.21)
World								
WRD	0.772	(1.071)	0.867	(0.865)	2.074**	(0.576)	1.51	(0.13)

Notes: See notes to Table 1. Mean returns and their associated standard errors are expressed in percentages. Mean returns which are statistically different from zero at the 5% and 10% levels are denoted with ** and *, respectively.

Table 2 clearly shows that December and April are the two months with the highest average returns. In both months, 32 out of 34 indexes have positive returns,[1] and the majority of these positive returns are statistically significant. The world index (WDR) also shows substantial positive returns for these two months. Furthermore, while the April and December returns are comparable across most markets in the sample (G7, A4, and ODE14), the December returns appear much higher than the April returns for the EDE9 group. In fact, all the emerging and developing markets in the EDE9 group possess significantly positive returns in December, but most of them do not display significantly positive returns in April. In addition to December and April, January provides the third highest returns where 26 out of 34 indexes show positive returns, but only 8 of them proved statistically significant. August and September are the two months with the lowest returns as 30 indexes give negative returns in August returns and 27 indexes with negative returns in September. The same holds true for the WDR index which also delivers the lowest returns for August and September.

Table 2 also reports test results on whether the returns in each of 12 months are jointly equal (*F*-statistics with 11 degree of freedom). The testing hypothesis is:

$$H_0 : D_1 = D_2 = D_3 = \ldots = D_{12}. \tag{3}$$

The results suggest that 8 out of 34 markets reject the null of equal monthly returns.

In the second stage of our analysis, we examine if the return on any given month is statistically different from the average return on the 11 remaining months of the year. The testing model is:

$$R_{i,t} = \alpha_{i,j} + \beta_{i,j} D_{j,t} + \varepsilon_{i,t}, \tag{4}$$

where $\alpha_{i,j}$ is an average stock return in the months other than month j. $\beta_{i,j}$ measures the difference in return on month j of stock i from its average returns on all other months. We report the results in Table 3.

Results in Table 3 generally confirm those conclusions we deduced earlier from Table 2. Across the vast majority of the markets in the sample (32 of the 34 indexes), the average stock return in December is 1.340 percentage points higher than the average in other months where two thirds of these higher returns are also statistically significant. The biggest percentage gains for December occur in the EDE9 group (e.g., Indonesia, 6.266; Turkey, 6.245; Argentina, 5.805). Like December, the month of April also yields 1.213 percentage points higher than the monthly average for the rest of the year in most markets (21 in 34 indexes) with many of these excess monthly returns achieving statistical significance.

Although several markets show higher returns for January compared to the monthly average from the rest of the year, almost all of the January excess returns fail to carry statistical weight.[2] In addition, the world index for January also displays a lower monthly return relative to the average monthly return from the rest of the year. The results further suggest that the three months of June, August, and September represent the worst months of the year. In each of these three months, 30

of 34 indexes have lower returns compared with the average monthly return from the rest of the year, and the same bleak return outcomes hold for these three months in terms of the WRD index.

Table 3. Testing Mean Differences

Country Code	Jan-Non Jan		Feb-Non Feb		Mar-Non Mar		Apr-Non Apr	
	Mean Difference	Standard Error	Mean Difference	Standard Error	Mean Difference	Mean Difference	Mean Difference	Standard Error
G7 Markets								
CAN	–0.014	(0.910)	–0.295	(0.981)	0.495	(0.863)	0.373	(0.854)
FRA	–0.956	(1.257)	0.874	(1.423)	1.083	(1.043)	2.489**	(1.184)
GER	–0.764	(1.253)	0.424	(1.320)	0.215	(1.142)	1.830	(1.469)
ITA	1.291	(1.255)	–0.464	(1.411)	0.660	(1.395)	3.132**	(1.507)
JAP	–0.133	(1.065)	–0.089	(0.955)	0.791	(1.262)	2.509**	(1.163)
UKM	–1.009	(1.104)	–0.206	(0.780)	0.193	(0.734)	1.602*	(0.940)
USA	–0.349	(0.864)	–1.184	(0.806)	0.473	(0.924)	1.324	(0.880)
Asian Markets								
HKG	–1.324	(1.602)	1.685	(1.512)	–1.283	(1.199)	1.199	(1.469)
KOR	3.377	(2.834)	–3.049**	(1.465)	0.359	(1.620)	1.446	(1.904)
SIN	–0.838	(1.538)	0.217	(1.373)	–0.332	(1.161)	1.906	(1.221)
TAI	2.797	(2.657)	3.606	(2.331)	0.514	(1.315)	1.260	(1.866)
Other Developed Markets								
AUS	–0.676	(0.856)	–0.786	(0.742)	0.456	(0.882)	1.961**	(0.809)
AUT	0.809	(1.363)	2.584	(1.628)	1.686	(1.360)	1.384	(1.497)
BEL	0.449	(1.273)	0.070	(1.425)	0.627	(0.975)	2.146*	(1.197)
DEN	2.060*	(1.228)	–0.816	(1.093)	0.021	(1.096)	0.888	(1.300)
FIN	1.724	(1.681)	–1.183	(2.072)	1.353	(1.533)	2.744	(2.551)
GRE	2.243	(1.937)	1.072	(2.183)	0.186	(2.148)	4.024*	(2.334)
IRE	3.050**	(1.135)	0.111	(1.296)	1.845*	(1.115)	2.580**	(1.243)
NET	–0.749	(1.020)	0.152	(1.088)	1.081	(0.949)	2.192**	(1.050)
NZD	0.808	(1.070)	–2.242*	(1.204)	0.267	(1.353)	3.027**	(0.831)
NOR	0.647	(1.587)	0.398	(1.309)	2.166	(1.364)	2.306	(1.417)
POR	2.112	(1.473)	1.093	(1.501)	0.686	(0.966)	–0.877	(1.018)
SPA	0.389	(1.333)	0.499	(1.237)	0.079	(1.040)	2.032*	(1.139)
SWE	1.617	(1.350)	1.647	(1.244)	–0.602	(1.330)	1.737	(1.481)
SWI	–0.371	(0.911)	–0.080	(1.085)	0.510	(0.837)	0.928	(0.880)
Emerging and Developing Markets								
ARG	0.160	(5.441)	1.695	(5.746)	2.093	(2.790)	1.346	(2.361)
CHI	1.764	(1.380)	1.560	(1.348)	–1.081	(1.334)	–0.198	(1.300)
INO	2.339	(2.193)	–0.496	(1.454)	0.731	(1.888)	1.140	(2.044)
JOR	2.683**	(0.852)	–2.121**	(1.010)	–0.690	(0.862)	–0.106	(1.374)
MAL	1.079	(1.423)	2.757	(1.916)	–2.154*	(1.261)	0.810	(1.960)
MEX	–0.227	(1.740)	–1.123	(2.063)	2.086	(1.808)	–0.624	(1.388)
PHI	2.209	(1.906)	–0.546	(1.800)	–1.734	(1.144)	1.118	(1.650)
THA	4.085	(2.952)	–1.014	(1.935)	–2.315	(1.744)	1.978	(1.826)
TUR	4.657	(3.451)	–1.035	(3.515)	–4.598*	(2.666)	3.998	(3.694)
World								
WRD	–0.373	(0.801)	–0.568	(0.802)	0.408	(0.757)	1.720**	(0.828)

Table 3. (Cont'd)

Country Code	May-Non May		June-Non June		Jul-Non Jul		Aug-Non Aug	
	Mean Difference	Standard Error	Mean Difference	Standard Error	Mean Difference	Standard Error	Mean Difference	Standard Error
G7 Markets								
CAN	1.578*	(0.936)	–0.932	(0.819)	0.354	(0.720)	–1.420	(1.207)
FRA	–0.346	(0.852)	–1.588*	(0.892)	–0.102	(1.148)	–1.816	(1.279)
GER	–0.554	(0.946)	–0.027	(0.788)	0.592	(1.291)	–2.759*	(1.480)
ITA	–1.642	(1.090)	–1.545	(0.993)	0.283	(1.248)	–1.517	(1.352)
JAP	–0.074	(1.325)	–0.500	(1.074)	0.235	(1.020)	–1.512	(1.361)
UKM	–0.499	(0.885)	–1.876**	(0.683)	0.779	(0.850)	–0.288	(0.966)
USA	0.819	(0.846)	–1.219*	(0.695)	0.318	(0.858)	–1.794	(1.159)
Asian Markets								
HKG	–0.232	(1.891)	–2.016	(1.334)	1.978	(1.282)	–2.900**	(1.320)
KOR	–1.292	(1.855)	–1.738	(1.639)	1.254	(1.858)	–1.785	(1.344)
SIN	–0.665	(1.690)	–0.130	(1.261)	1.175	(0.900)	–3.736**	(1.456)
TAI	–1.402	(1.577)	–1.604	(1.878)	–0.958	(1.953)	–2.841	(2.184)
Other Developed Markets								
AUS	–0.277	(0.874)	–0.261	(0.660)	0.703	(0.844)	–0.344	(0.952)
AUT	–0.328	(1.428)	–0.666	(0.984)	0.000	(1.224)	–1.160	(1.728)
BEL	–0.849	(0.707)	–0.882	(1.004)	0.223	(0.887)	–0.922	(1.314)
DEN	1.639	(1.132)	–0.301	(0.856)	0.827	(0.871)	–1.829	(1.428)
FIN	–1.575	(1.384)	–2.833*	(1.499)	–0.337	(1.608)	–2.948	(2.328)
GRE	–1.049	(1.835)	–2.511	(2.104)	2.994*	(1.601)	–0.986	(1.808)
IRE	–1.265	(1.420)	–1.882**	(0.907)	–1.086	(1.227)	–1.144	(1.721)
NET	–0.191	(0.811)	–0.746	(0.846)	0.493	(1.212)	–1.620	(1.349)
NZD	–0.893	(1.339)	–0.644	(1.066)	2.941**	(0.826)	–0.757	(1.656)
NOR	0.128	(1.405)	–1.638	(1.078)	0.906	(1.123)	–2.526	(1.633)
POR	–0.681	(1.105)	–2.064**	(0.928)	–0.036	(0.838)	–0.256	(1.446)
SPA	0.465	(0.967)	–1.481	(1.122)	–0.528	(1.357)	–1.707	(1.595)
SWE	0.608	(1.216)	–1.210	(1.050)	0.808	(1.040)	–3.026**	(1.261)
SWI	0.640	(1.029)	–0.183	(0.888)	0.135	(1.021)	–1.958	(1.437)
Emerging and Developing Markets								
ARG	3.031	(4.888)	2.726	(4.929)	–3.479	(3.224)	–0.124	(3.413)
CHI	–0.007	(1.143)	1.296	(1.285)	0.394	(0.790)	–2.694	(1.702)
INO	1.990	(2.095)	–0.215	(1.589)	–0.742	(1.589)	–3.227	(4.136)
JOR	0.794	(1.382)	–0.353	(1.169)	–0.754	(0.719)	–1.756*	(0.992)
MAL	–0.408	(1.343)	–1.248	(1.132)	0.421	(1.196)	–4.613**	(2.029)
MEX	2.095	(1.810)	–1.937	(1.648)	–0.418	(1.416)	–2.000	(1.863)
PHI	1.877	(1.535)	–1.031	(1.590)	0.619	(1.679)	–4.729**	(2.142)
THA	–1.105	(2.258)	0.110	(1.621)	–0.745	(2.348)	–2.174	(2.531)
TUR	–6.019**	(1.876)	0.670	(2.378)	–0.003	(2.644)	–5.026*	(3.004)
World								
WRD	0.283	(0.863)	–1.313**	(0.660)	0.418	(0.806)	–1.652	(1.112)

Table 3. (Cont'd)

Country Code	Sep-Non Sep		Oct-Non Oct		Nov-Non Nov		Dec-Non Dec	
	Mean Difference	Mean Difference	Standard Error	Standard Error	Mean Difference	Standard Error	Mean Difference	Standard Error
G7 Markets								
CAN	–2.259**	(0.918)	0.066	(1.223)	0.227	(0.897)	1.828**	(0.542)
FRA	–2.782*	(1.449)	0.773	(1.433)	0.332	(0.895)	2.040**	(0.799)
GER	–4.300**	(1.740)	1.286	(1.598)	1.316	(1.022)	2.742**	(1.072)
ITA	–2.913**	(1.434)	–0.458	(1.767)	0.139	(1.267)	3.032**	(0.981)
JAP	–1.904	(1.349)	–1.095	(1.437)	–0.213	(1.352)	1.984**	(0.919)
UKM	–1.814	(1.204)	0.449	(1.082)	0.496	(0.772)	2.172**	(0.607)
USA	–0.935	(0.998)	0.267	(1.074)	0.860	(0.934)	1.421*	(0.735)
Asian Markets								
HKG	–0.319	(1.901)	1.060	(2.454)	0.338	(1.335)	1.813	(1.381)
KOR	–1.601	(1.955)	–0.829	(2.491)	2.521	(1.621)	1.338	(1.618)
SIN	–2.063	(1.614)	–0.098	(1.863)	1.229	(1.208)	3.336**	(1.094)
TAI	–3.460	(2.202)	–2.406	(2.536)	1.638	(1.745)	2.857	(2.696)
Other Developed Markets								
AUS	–1.017	(0.883)	–0.604	(1.092)	–1.048	(0.932)	1.894**	(0.610)
AUT	–4.138**	(1.851)	–2.065	(1.984)	–1.434	(1.059)	3.328**	(0.977)
BEL	–2.582*	(1.466)	–0.435	(1.659)	–0.367	(0.885)	2.523**	(0.669)
DEN	–3.020**	(1.179)	–0.317	(1.207)	–0.749	(0.816)	1.598*	(0.833)
FIN	–2.429	(1.752)	3.549	(2.430)	2.233	(1.546)	–0.297	(1.972)
GRE	–1.342	(2.646)	–3.560	(2.246)	–2.296	(1.783)	1.225	(1.084)
IRE	–3.461**	(1.338)	–0.178	(1.366)	–1.098	(1.277)	2.529**	(1.097)
NET	–3.239**	(1.398)	–0.092	(1.347)	0.314	(0.893)	2.404**	(0.779)
NZD	–2.443**	(1.055)	0.054	(1.235)	–0.108	(1.210)	–0.011	(0.799)
NOR	–4.007**	(1.624)	–1.006	(1.914)	–0.545	(1.319)	3.171**	(0.998)
POR	–1.560	(1.735)	0.252	(1.604)	0.169	(1.028)	1.163	(0.756)
SPA	–2.835*	(1.578)	1.144	(1.760)	0.885	(1.527)	1.059	(0.902)
SWE	–4.694**	(1.830)	–0.010	(1.699)	2.051	(1.996)	1.073	(1.197)
SWI	–2.538**	(1.108)	0.904	(0.989)	0.728	(0.724)	1.286*	(0.715)
Emerging and Developing Markets								
ARG	1.622	(2.707)	–8.530**	(3.866)	–6.345**	(3.176)	5.805*	(3.437)
CHI	–1.066	(1.143)	–0.399	(1.279)	–0.396	(1.392)	0.829	(1.158)
INO	–5.056*	(2.849)	–3.115	(2.094)	0.387	(2.589)	6.266**	(2.854)
JOR	0.086	(0.697)	–0.261	(1.228)	0.644	(1.467)	1.834	(1.132)
MAL	–1.721	(1.898)	1.488	(1.547)	–0.351	(1.433)	3.941**	(1.472)
MEX	–1.478	(1.743)	0.041	(1.942)	1.770	(1.335)	1.816	(1.236)
PHI	–0.043	(1.876)	–0.325	(2.110)	–0.134	(1.455)	2.719	(1.793)
THA	–1.549	(2.814)	–1.121	(2.879)	–0.235	(1.604)	4.084**	(1.951)
TUR	1.333	(3.074)	0.765	(2.635)	–0.987	(4.005)	6.245*	(3.266)
World								
WRD	–1.702	(1.039)	0.418	(1.104)	0.522	(0.858)	1.838**	(0.589)

Notes: See notes to Tables 1 and 2.

In sum, seasonality in international stock returns appears robust and most pronounced for December and April with significantly higher returns than other months. The results further suggest that June, August, and September are likely the worst three months of the year across international stock markets with significantly lower returns.

Note that our evidence for significantly higher returns in December and April in most global markets cannot be explained by the tax-induced selling behavior of individual investors, as many countries have different financial calendar years. However, other explanations appear promising. For example, the strong positive December effect is sometimes dubbed "the Santa Claus rally" by practitioners, as December often yields the highest monthly return in the US market. Russolillo (2010) reports that, over the previous 65 years, the S&P's 500 stock index has risen 1.7% on average in December, compared with 0.7% for other months. This December rally is sometimes seen resulting from people buying stocks in anticipation of the rise in stock prices during the following January, while others relate the December phenomenon to the Christmas shopping mood extending to the stock market (Investopedia, 2011). In addition, our findings of significant December and April returns could also be linked to "the Halloween effect" discussed by Bouman and Jacobsen (2002), where stock returns tend to be significantly lower during the May–October period compared to the November–April period. The best two months, December and April, are both in the "high return" November–April preiod, while the three months of June, August, and September we find to give the worst monthly returns of the year across international stock markets are all in the "low return" May–October period.

Finally, we subject our empirical results to three rounds of sensitivity tests. First, to what extent are our results robust to using an alternative analytical model? To shed some light on this important issue, we follow Sun and Tong (2010) and use a GARCH (1, 1) model to examine seasonal anomalies. The testing model is as follows:

$$\begin{aligned} R_{i,t} &= \alpha_{i,0} + \alpha_{i,1} R_{i,t-1} + \alpha_{i,2} D_{j,t} + \varepsilon_{i,t}, \ \varepsilon_{i,t} \sim N(0, h_{i,t}) \\ h_{i,t} &= \beta_{i,0} + \beta_{i,1} h_{i,t-1} + \beta_{i,2} \varepsilon_{i,t-1}^2. \end{aligned} \tag{5}$$

The results in Table 4 are generally consistent with our findings reported in Table 3. That is, December remains the best month in terms of stock returns, followed by April and January; while August and September are the worst. Also, like Table 3, the majority of markets (29 out of 34) in Table 4 display positive returns for April but only 3 of them prove significant. An alternative specification of the GARCH model produced similar results. These alternative results are available from the authors upon request.

A second inquiry examines whether the December effect is primarily driven by Christmas shopping. We divide December into weeks and report results in Table 5. The weekly results indicate that the December effect derives primarily from the last two weeks of the month compared to the first two weeks.

Table 4. Testing Monthly Effects Using GARCH (1, 1) Model

Country Code	Jan		Feb		Mar		Apr	
	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error
G7 Markets								
CAN	–0.172	(0.873)	0.348	(0.871)	–0.507	(0.899)	–0.339	(0.885)
FRA	0.004	(1.119)	1.206	(1.150)	1.097	(1.090)	1.676	(1.169)
GER	–0.113	(1.244)	1.373	(1.182)	–0.654	(1.272)	1.114	(1.215)
ITA	0.953	(1.218)	–0.489	(1.277)	0.240	(1.178)	2.415*	(1.272)
JAP	–0.925	(1.184)	0.270	(1.171)	1.179	(1.105)	1.919	(1.193)
UKM	–0.816	(0.807)	–0.169	(0.790)	–0.281	(0.846)	1.255	(0.827)
USA	0.169	(0.735)	–0.636	(0.807)	–0.760	(0.754)	0.324	(0.743)
Asian Markets								
HKG	0.423	(1.438)	1.087	(1.441)	–1.811	(1.474)	0.517	(1.509)
KOR	0.382	(1.897)	–2.762	(1.878)	0.894	(1.752)	0.586	(1.732)
SIN	0.091	(1.161)	0.096	(1.295)	–0.848	(1.164)	0.735	(1.228)
TAI	1.904	(1.870)	4.395**	(1.752)	–0.590	(2.123)	0.822	(1.743)
Other Developed Markets								
AUS	–0.493	(0.901)	–0.488	(0.862)	0.285	(0.858)	1.659**	(0.824)
AUT	1.023	(1.297)	1.486	(1.351)	0.578	(1.202)	0.337	(1.313)
BEL	0.604	(0.988)	0.550	(0.995)	–0.053	(1.109)	1.254	(0.998)
DEN	1.754	(1.121)	–0.522	(1.154)	–0.440	(1.108)	0.488	(1.148)
FIN	2.743	(1.701)	–0.640	(1.576)	1.710	(1.567)	0.836	(1.542)
GRE	3.002*	(1.747)	1.540	(1.666)	–1.678	(1.792)	1.558	(1.786)
IRE	1.822	(1.204)	–0.438	(1.204)	0.532	(1.214)	1.238	(1.235)
NET	–0.389	(0.994)	0.683	(0.977)	0.784	(0.994)	1.450	(1.016)
NZD	0.508	(1.124)	–2.302**	(1.062)	–0.280	(1.175)	2.804**	(1.157)
NOR	–0.015	(1.490)	0.271	(1.471)	2.001	(1.499)	1.632	(1.485)
POR	1.494	(1.115)	0.694	(1.167)	0.546	(1.196)	–0.628	(1.117)
SPA	0.046	(1.220)	0.346	(1.260)	–0.574	(1.258)	1.697	(1.261)
SWE	1.098	(1.354)	1.029	(1.333)	0.383	(1.269)	0.747	(1.346)
SWI	–0.600	(0.913)	–0.119	(0.958)	0.118	(0.924)	1.157	(0.947)
Emerging and Developing Markets								
ARG	3.944*	(2.223)	–2.171	(2.351)	–1.923	(2.182)	–1.490	(2.087)
CHI	1.167	(1.231)	0.541	(1.216)	–1.702	(1.276)	1.104	(1.279)
INO	1.239	(2.070)	–0.720	(2.112)	–0.049	(2.154)	2.274	(2.194)
JOR	2.317**	(1.122)	–2.594**	(1.118)	–1.367	(1.128)	–0.569	(1.063)
MAL	1.482	(1.205)	0.943	(1.272)	–1.039	(1.123)	1.243	(1.142)
MEX	–0.589	(1.632)	–1.248	(1.681)	2.451	(1.615)	–1.447	(1.680)
PHI	2.179	(1.841)	–1.933	(1.796)	–1.524	(1.800)	1.855	(1.682)
THA	1.760	(1.847)	1.145	(1.793)	–3.013	(1.889)	1.981	(1.875)
TUR	3.548	(2.871)	–3.298	(2.658)	–3.735	(2.830)	2.586	(2.815)
World								
WRD	–0.318	(0.864)	–0.477	(0.783)	–0.162	(0.761)	1.235	(0.774)

Table 4. (Cont'd)

Country Code	May		June		Jul		Aug	
	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error
G7 Markets								
CAN	1.263	(0.924)	–0.829	(0.907)	1.492**	(0.746)	–1.785**	(0.849)
FRA	–0.942	(1.107)	–1.342	(1.075)	–0.071	(1.124)	–1.595	(1.088)
GER	–1.351	(1.246)	–0.201	(1.321)	0.503	(1.204)	–2.571**	(1.163)
ITA	–2.439*	(1.325)	–0.476	(1.248)	0.236	(1.246)	–1.178	(1.284)
JAP	–1.308	(1.294)	0.287	(1.189)	–0.182	(1.283)	–1.417	(1.140)
UKM	–0.960	(0.795)	–1.151	(0.845)	0.946	(0.799)	–0.234	(0.827)
USA	0.682	(0.844)	–1.200*	(0.702)	0.288	(0.783)	–1.590*	(0.811)
Asian Markets								
HKG	–0.907	(1.414)	–1.496	(1.500)	1.959	(1.540)	–1.607	(1.407)
KOR	–1.178	(1.745)	–2.292	(1.774)	2.279	(1.712)	–0.993	(1.835)
SIN	–1.653	(1.174)	0.762	(1.183)	1.550	(1.323)	–2.813**	(1.238)
TAI	–1.149	(1.966)	–0.052	(1.941)	–1.207	(1.875)	–2.887	(1.952)
Other Developed Markets								
AUS	–1.014	(0.811)	0.113	(0.849)	0.191	(0.836)	–0.532	(0.846)
AUT	–2.148*	(1.282)	0.527	(1.225)	–0.221	(1.285)	–0.745	(1.256)
BEL	–1.113	(1.024)	–0.247	(0.907)	0.479	(1.000)	–1.898*	(0.999)
DEN	0.534	(1.172)	0.356	(1.130)	0.785	(1.137)	–1.720*	(1.015)
FIN	–0.183	(1.688)	–1.798	(1.694)	0.285	(1.875)	–1.622	(1.643)
GRE	–2.308	(1.673)	–1.899	(1.696)	1.994	(1.915)	–1.483	(1.718)
IRE	–1.100	(1.061)	–0.549	(1.187)	0.429	(1.138)	–0.543	(1.111)
NET	–1.052	(1.057)	–0.200	(0.978)	0.595	(0.976)	–2.126**	(0.951)
NZD	–0.504	(1.165)	–1.075	(1.111)	1.966	(1.268)	–0.076	(1.097)
NOR	–0.567	(1.475)	–0.960	(1.525)	1.543	(1.515)	–2.959**	(1.475)
POR	0.144	(0.979)	–1.204	(1.127)	–0.400	(1.039)	–0.263	(1.068)
SPA	0.683	(1.238)	–1.256	(1.215)	–0.773	(1.301)	–1.033	(1.248)
SWE	–0.669	(1.403)	–0.852	(1.300)	1.381	(1.393)	–3.040**	(1.233)
SWI	–0.006	(0.971)	–0.359	(0.943)	–0.293	(0.982)	–1.818*	(0.951)
Emerging and Developing Markets								
ARG	0.453	(2.228)	0.942	(2.361)	(2.227)	–0.873	(2.299)	3.435
CHI	0.682	(1.225)	2.071*	(1.206)	(1.332)	–2.353*	(1.277)	–1.143
INO	1.430	(1.784)	–0.856	(2.228)	(2.408)	–4.164**	(1.974)	–1.606
JOR	0.909	(1.042)	–1.368	(1.040)	(1.012)	–1.617	(1.081)	0.673
MAL	–2.315*	(1.213)	–0.025	(1.260)	(1.214)	–3.752**	(1.139)	–1.162
MEX	2.573	(1.662)	–2.128	(1.501)	(1.713)	–1.863	(1.627)	–1.641
PHI	1.900	(1.892)	–0.820	(1.814)	(1.844)	–4.938**	(1.812)	0.600
THA	0.207	(1.822)	0.633	(1.899)	(1.865)	–1.981	(1.896)	–1.002
TUR	–4.935*	(2.988)	0.182	(2.925)	(3.131)	–4.349	(2.938)	3.066
World								
WRD	–0.288	(0.777)	–1.304	(0.854)	(0.790)	–1.555**	(0.769)	–0.711

Table 4. (Cont'd)

Country Code	Sep		Oct		Nov		Dec	
	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error
G7 Markets								
CAN	–2.044**	(0.870)	0.689	(0.889)	0.204	(0.852)	1.944**	(0.904)
FRA	–1.941*	(1.088)	–0.092	(1.129)	–0.058	(1.080)	2.636**	(1.119)
GER	–2.298*	(1.201)	0.455	(1.241)	0.774	(1.198)	3.217**	(1.325)
ITA	–1.827	(1.267)	–0.558	(1.199)	0.335	(1.220)	2.967**	(1.184)
JAP	–0.572	(1.142)	–1.681	(1.268)	0.183	(1.147)	2.068*	(1.189)
UKM	–0.996	(0.807)	–0.008	(0.823)	0.515	(0.800)	2.235**	(0.816)
USA	–0.173	(0.787)	0.444	(0.865)	0.899	(0.717)	1.574*	(0.853)
Asian Markets								
HKG	–0.479	(1.515)	0.544	(1.380)	1.282	(1.510)	1.018	(1.568)
KOR	1.744	(1.614)	–1.546	(1.742)	2.255	(1.805)	0.914	(1.732)
SIN	–0.945	(1.150)	–0.515	(1.160)	0.709	(1.206)	3.340**	(1.188)
TAI	–2.334	(1.765)	–3.549*	(1.812)	0.030	(1.981)	4.368**	(1.683)
Other Developed Markets								
AUS	–0.953	(0.816)	–0.269	(0.859)	–0.443	(0.908)	1.960**	(0.829)
AUT	–3.128**	(1.356)	–0.795	(1.237)	–0.037	(1.227)	3.542**	(1.356)
BEL	–0.842	(1.021)	0.091	(1.070)	–0.642	(0.984)	2.021**	(1.004)
DEN	–2.201*	(1.124)	–0.271	(1.124)	–0.416	(1.139)	2.022*	(1.160)
FIN	–2.659	(1.634)	1.436	(1.704)	0.458	(1.789)	–0.617	(1.755)
GRE	–1.129	(1.618)	–1.149	(1.705)	–0.259	(1.836)	2.423	(1.972)
IRE	–2.134**	(1.069)	–0.889	(1.247)	–0.677	(1.199)	2.545**	(1.229)
NET	–2.207**	(0.985)	–0.183	(1.054)	0.376	(1.003)	2.517**	(1.026)
NZD	–1.757	(1.111)	0.658	(1.095)	–0.056	(1.065)	0.083	(1.131)
NOR	–3.297**	(1.578)	–0.735	(1.539)	0.129	(1.490)	3.147**	(1.479)
POR	–0.116	(1.096)	–0.733	(1.205)	0.042	(1.213)	0.922	(1.293)
SPA	–1.493	(1.326)	0.793	(1.202)	0.518	(1.194)	1.066	(1.331)
SWE	–1.210	(1.201)	–1.011	(1.286)	1.140	(1.240)	1.170	(1.388)
SWI	–1.258	(0.911)	1.105	(0.966)	0.436	(0.976)	1.843*	(0.959)
Emerging and Developing Markets								
ARG	3.435	(2.259)	–3.349	(2.326)	0.147	(2.554)	5.712**	(2.352)
CHI	–1.143	(1.236)	–0.547	(1.240)	–0.768	(1.237)	1.013	(1.245)
INO	–1.606	(2.276)	–3.985*	(2.278)	0.064	(2.400)	6.188**	(2.014)
JOR	0.673	(1.073)	0.115	(0.987)	0.843	(1.012)	2.264**	(1.084)
MAL	–1.162	(1.231)	0.883	(1.160)	0.156	(1.179)	1.729	(1.198)
MEX	–1.641	(1.690)	0.279	(1.614)	1.561	(1.656)	1.904	(1.590)
PHI	0.600	(1.819)	–1.144	(1.812)	–0.294	(1.862)	2.629	(1.924)
THA	–1.002	(1.878)	–1.597	(1.777)	–1.064	(1.933)	3.911**	(1.774)
TUR	3.066	(2.794)	0.299	(3.022)	–1.709	(2.832)	6.277**	(2.824)
World								
WRD	–0.711	(0.805)	0.507	(0.852)	0.481	(0.776)	2.012**	(0.830)

Notes: See also notes to Tables 1 and 2. For brevity, only coefficients ($\alpha_{i,2}$) and standard errors of month dummy ($D_{j,t}$) are reported.

Table 5. Testing Weekly Effects in December Months Using GARCH (1, 1) Model

Country Code	Week 1		Week 2		Week 3		Week 4		Weeks 1&2		Weeks 3&4	
	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error
G7 Markets												
CAN	0.697*	(0.404)	–0.633	(0.433)	0.841**	(0.403)	0.777*	(0.415)	0.044	(0.288)	0.822**	(0.301)
FRA	0.979*	(0.561)	–0.584	(0.578)	0.982*	(0.545)	0.714	(0.575)	0.228	(0.382)	0.850**	(0.383)
GER	1.332**	(0.518)	–0.715	(0.543)	1.182**	(0.512)	0.390	(0.571)	0.386	(0.378)	0.825**	(0.378)
ITA	0.748	(0.588)	0.270	(0.619)	0.915	(0.590)	0.649	(0.648)	0.547	(0.429)	0.801*	(0.432)
JAP	0.788	(0.586)	–0.008	(0.570)	–0.284	(0.535)	1.264**	(0.580)	0.423	(0.408)	0.442	(0.393)
UKM	0.415	(0.453)	–0.376	(0.495)	1.199**	(0.426)	0.668	(0.444)	0.030	(0.310)	0.928**	(0.304)
USA	0.528	(0.416)	–0.198	(0.399)	0.627	(0.409)	0.112	(0.451)	0.167	(0.293)	0.398	(0.311)
Asian Markets												
HKG	0.611	(0.628)	–0.576	(0.583)	0.183	(0.636)	0.346	(0.642)	0.021	(0.433)	0.269	(0.455)
KOR	0.667	(0.846)	0.628	(0.794)	–0.962	(0.860)	0.022	(0.852)	0.640	(0.547)	–0.481	(0.576)
SIN	0.560	(0.510)	0.408	(0.506)	0.416	(0.512)	1.396**	(0.538)	0.523	(0.379)	0.885**	(0.363)
TAI	2.390**	(0.722)	–0.462	(0.739)	–0.219	(0.771)	1.743**	(0.809)	0.985*	(0.509)	0.794	(0.537)
Other Developed Markets												
AUS	0.332	(0.435)	–0.085	(0.422)	0.768*	(0.412)	1.039**	(0.425)	0.128	(0.314)	0.898**	(0.289)
AUT	1.958**	(0.500)	–0.603	(0.519)	0.479	(0.510)	0.560	(0.537)	0.797**	(0.371)	0.528	(0.382)
BEL	1.265**	(0.410)	–0.434	(0.440)	0.784*	(0.449)	0.445	(0.472)	0.429	(0.338)	0.641*	(0.336)
DEN	0.849*	(0.454)	–0.508	(0.554)	0.437	(0.505)	0.884*	(0.505)	0.199	(0.339)	0.663*	(0.398)
FIN	1.417*	(0.769)	–2.894**	(0.783)	0.869	(0.753)	0.287	(0.921)	–0.700	(0.609)	0.586	(0.595)
GRE	1.781**	(0.829)	–0.099	(0.777)	–0.577	(0.755)	1.013	(0.822)	0.878	(0.546)	0.178	(0.572)
IRE	1.156**	(0.577)	0.256	(0.593)	0.032	(0.594)	0.768	(0.692)	0.769*	(0.420)	0.365	(0.411)
NET	0.677	(0.426)	–0.098	(0.426)	1.074**	(0.370)	0.495	(0.451)	0.291	(0.302)	0.806**	(0.319)
NZD	–1.049**	(0.511)	–0.202	(0.488)	0.807*	(0.429)	1.147**	(0.438)	–0.636*	(0.368)	0.974**	(0.324)
NOR	0.437	(0.641)	0.404	(0.631)	0.737	(0.602)	1.321*	(0.686)	0.420	(0.456)	1.000**	(0.444)
POR	0.527	(0.431)	–0.209	(0.418)	–0.056	(0.436)	0.766	(0.587)	0.182	(0.320)	0.224	(0.381)
SPA	0.747	(0.527)	–0.420	(0.568)	0.642	(0.486)	–0.009	(0.575)	0.180	(0.382)	0.356	(0.385)
SWE	1.397**	(0.616)	–1.027*	(0.597)	0.359	(0.601)	0.582	(0.683)	0.189	(0.433)	0.465	(0.447)
SWI	0.738	(0.471)	–0.476	(0.467)	0.813*	(0.455)	0.603	(0.453)	0.133	(0.327)	0.717**	(0.313)
Emerging and Developing Markets												
ARG	1.584	(0.987)	–0.532	(0.972)	2.527**	(1.092)	–0.561	(0.970)	0.368	(0.733)	1.054	(0.772)
CHI	–0.061	(0.613)	0.388	(0.504)	0.532	(0.617)	–0.105	(0.516)	0.193	(0.407)	0.235	(0.439)
INO	–1.593**	(0.662)	0.681	(0.808)	0.852	(0.937)	1.549*	(0.941)	–0.731	(0.634)	1.230*	(0.717)
JOR	0.967**	(0.469)	0.550	(0.431)	–0.314	(0.480)	1.113**	(0.463)	0.784**	(0.322)	0.461	(0.329)
MAL	–0.093	(0.526)	0.195	(0.495)	0.053	(0.509)	0.837	(0.515)	0.048	(0.355)	0.459	(0.373)
MEX	1.027	(0.754)	–1.224	(0.747)	0.867	(0.756)	0.562	(0.794)	–0.108	(0.546)	0.734	(0.559)
PHI	0.642	(0.786)	–1.460*	(0.771)	1.346*	(0.738)	1.521**	(0.767)	–0.471	(0.597)	1.469**	(0.555)
THA	1.473*	(0.870)	0.123	(0.858)	–1.025	(0.808)	2.190**	(0.902)	0.793	(0.754)	0.525	(0.607)
TUR	3.171**	(1.198)	–1.171	(1.275)	0.599	(1.049)	0.287	(1.248)	1.050	(0.766)	0.458	(0.828)
World												
WRD	0.646	(0.805)	–1.517*	(0.819)	–0.717	(0.772)	0.455	(0.806)	0.487	(0.760)	2.033**	(0.824)

Notes: See also notes to Tables 1 and 2. For brevity, only coefficients ($\alpha_{i,1}$) and standard errors of month dummy ($D_{DECw,t}$) are reported. The four weeks are defined as days 1–7, 8–15, 16–23, and 24–31.

Finally, we also examine whether the strong December effect we report in this paper is robust in the face of major economic and financial events. To investigate the possibility of structural instability in our results, we split the sample period using three alternative dates. The first key event we examine is the recent and continuing global financial crisis of 2008 which has undoubtedly influenced stock markets worldwide. Therefore, we delete the post-crisis years from the sample (having too few observations) and confine our estimations to the pre-crisis period. Second, some recent studies (e.g., Darrat et al., 2012) suggest that the terrorist attack of September 11, 2001, significantly impacted equity markets. Thus, we conduct another round of estimations on the pre- and post-attack sub-periods. Third, following Farley et al. (1975) and Beck (1983), we also divide our sample at the midpoint to maximize the empirical power of the sensitivity check. We report all sub-sample results in Table 6. It is encouraging and reassuring that the results from all sub-samples using the above three splitting dates are generally consistent with our finding of a robust and positive December effect. This is further evidence for the robustness of the December effect as it proves insensitive to structural shifts in the data.

At least two lines of future research present themselves. An examination of seasonal anomalies across different industries seems fruitful. Another issue relates to using a longer sample, dating back to the 1960s, to investigate whether the December effect has emerged only after research in the 1980s and 1990s established the presence of a strong January effect.

Table 6. Sub-Sample Results

Country Code	**Excluding GFC**		**Pre-9/11**		**Post-9/11**		**Mid-Point Break**			
	1988:1-2006:12		1988:1-2001:8		2002:1-2012:12		1988:1-1999:12		2000:1-2010:12	
	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error
G7 Markets										
CAN	1.917**	(0.968)	2.069*	(1.156)	1.561	(1.338)	2.212*	(1.287)	1.594	(1.259)
FRA	1.998*	(1.157)	1.871	(1.548)	3.551**	(1.000)	1.731	(1.622)	3.705**	(1.108)
GER	2.946**	(1.258)	3.637**	(0.023)	4.934**	(1.882)	4.623**	(0.016)	3.589*	(2.176)
ITA	2.645**	(1.238)	3.571*	(1.941)	3.302**	(1.179)	3.779**	(0.015)	2.613**	(1.298)
JAP	1.482	(1.249)	0.849	(1.718)	3.653**	(1.608)	0.887	(1.768)	2.989**	(1.476)
UKM	1.898**	(0.895)	2.039*	(1.210)	2.806**	(0.976)	1.830	(1.165)	2.828**	(0.977)
USA	1.498*	(0.829)	1.731	(1.082)	1.412	(1.118)	1.729	(1.093)	1.389	(1.251)
Asian Markets										
HKG	1.064	(1.681)	2.283	(2.389)	–0.409	(2.012)	0.929	(2.309)	0.912	(1.893)
KOR	–0.080	(2.105)	0.499	(2.608)	0.926	(2.444)	0.237	(2.688)	1.985	(2.366)
SIN	3.527**	(1.222)	4.740**	(1.654)	1.854	(1.480)	4.735**	(1.542)	2.282	(1.502)
TAI	4.062**	(1.890)	3.313	(2.671)	3.586*	(2.031)	3.327	(2.820)	3.977*	(2.069)

Table 6. (Cont'd)

Country Code	**Excluding GFC**		**Pre-9/11**		**Post-9/11**		**Mid-Point Break**			
	1988:1-2006:12		1988:1-2001:8		2002:1-2012:12		1988:1-1999:12		2000:1-2010:12	
	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error	Coef	Standard Error
Other Developed Markets										
AUS	1.919**	(0.861)	2.600**	(0.011)	2.094**	(1.027)	2.327**	(1.080)	1.632*	(0.964)
AUT	3.124**	(1.419)	3.080*	(1.753)	4.406**	(1.942)	3.006	(1.943)	3.971**	(1.821)
BEL	2.034*	(1.105)	2.268*	(1.306)	3.245**	(1.436)	1.256**	(0.137)	3.642**	(1.361)
DEN	1.860	(1.188)	2.129	(1.547)	2.813*	(1.687)	2.460	(1.657)	2.181	(1.708)
FIN	–1.647	(1.951)	–1.878	(2.435)	0.475	(2.707)	–1.898	(2.555)	1.550	(2.433)
GRE	2.685	(2.116)	3.326	(2.770)	2.276	(2.902)	2.643	(2.764)	2.346	(2.647)
IRE	2.151*	(1.219)	1.759	(1.587)	4.368**	(1.746)	1.698	(1.642)	3.845**	(1.711)
NET	1.640*	(0.976)	1.631	(1.133)	4.304**	(1.600)	2.252*	(1.204)	3.546**	(1.592)
NZD	–0.207	(1.243)	–1.259	(1.670)	1.831	(1.344)	–0.741	(1.808)	1.078	(1.317)
NOR	2.487*	(1.510)	3.222*	(1.850)	2.881	(2.727)	3.565*	(2.050)	2.558	(2.271)
POR	0.078	(1.528)	0.343	(2.158)	2.235	(1.800)	–0.527	(2.203)	2.068	(1.648)
SPA	0.815	(1.340)	0.450	(1.768)	2.311	(1.810)	0.166	(1.832)	2.107	(1.821)
SWE	0.673	(1.461)	0.192	(1.837)	2.291	(1.846)	–0.161	(1.954)	2.000	(1.992)
SWI	1.897*	(1.068)	2.338*	(1.410)	1.889	(1.149)	2.435**	(1.185)	1.931*	(1.138)
Emerging and Developing Markets										
ARG	7.340**	(2.617)	6.402*	(3.413)	–1.130**	(0.015)	5.981*	(3.395)	5.615**	(2.775)
CHI	1.034	(1.363)	1.916	(1.916)	–0.088**	(0.002)	2.076	(2.156)	–0.338	(1.410)
INO	6.911**	(2.370)	8.458**	(3.141)	4.434	(3.439)	9.734**	(3.367)	3.472	(2.964)
JOR	2.461**	(1.216)	3.578**	(1.139)	–0.626	(2.332)	4.183**	(1.209)	–1.162	(1.835)
MAL	1.927	(1.353)	3.184	(1.992)	–0.171	(1.374)	3.639*	(2.037)	0.408	(1.582)
MEX	1.477	(1.942)	1.448	(2.271)	0.935	(1.756)	1.184	(2.485)	1.611	(1.734)
PHI	2.850	(1.910)	2.433**	(0.468)	1.053	(3.172)	0.192*	(0.107)	3.209	(2.212)
THA	4.256**	(1.898)	4.393	(2.933)	4.766*	(2.563)	4.876*	(2.838)	4.425**	(2.155)
TUR	6.650**	(3.277)	8.566*	(4.378)	5.754*	(3.271)	7.994*	(4.442)	6.106*	(3.176)
World										
WRD	1.831**	(0.869)	1.979*	(1.130)	2.467**	(1.048)	1.926*	(1.155)	2.462**	(1.065)

Notes: See also notes to Table 4. For brevity, only coefficients ($\alpha_{i,2}$) and standard errors of month dummy ($D_{j,t}$) are reported.

5. Concluding Remarks

Seasonal anomalies in equity markets have attracted widespread attention in academic and public circles. Prior research supports the presence of monthly seasonality, particularly for January in the US stock market. However, in the context of international stock markets, the evidence is less compelling and often contradictory. The presence of monthly seasonality has profound implications for international portfolio managers, individual investors, listed companies, and private firms, especially in view of globalization and international market integration.

This paper provides a fresh look at monthly seasonality in 34 international equity markets over the period from January 1988 to December 2010. Unlike prior research, we do not find significant January effects in international equity markets, except perhaps for 3 markets. Instead, we find significantly larger positive anomalies across most international markets for December and April. The results further support significant negative anomalies for the three months of June, August, and September compared to other months of the year in almost all global markets in the sample. The persistence of these seasonal patterns over time and across different markets may suggest market inefficiency as they open the possibility of formulating profitable trading rules based on these seasonal patterns. In addition, based on the results from the GARCH (1, 1) model, our evidence for a strong December effect is consistent with many studies, including Ritter and Chopra (1989), Ackert and Athanassakos (2000), "the Halloween effect" of Bouman and Jacobsen (2002), and Singal (2004).

Our results bear some practical implications. We find evidence for positive anomalies for both December and April, while September in particular displays negative anomaly in the majority of the markets. If true, then an optimal trade rule for rational investors and fund managers may be to sell stocks in December and April but buy stocks in September to maximize trading gains. Moreover, the gamesmanship hypothesis of Ackert and Athanasskos (2000) suggests that institutional investors rebalance their portfolio holdings in order to "window dress" or influence performance-based remuneration by the end of year. Our findings further suggest that the collective behavior of investors may contribute to triggering the December anomaly.

Notes

1. The only two exceptions with negative (but insignificant) average returns are New Zealand in December and Portugal in April.
2. As results in Tables 2 and 3 indicate, the January returns in the US market (whether positive or negative) are statistically insignificant across most markets. This rejection of the January effect in the US market is contrary to most prior research. However, as Singal (2004) and Sun and Tong (2010) argue, the January effect is primarily driven by small- rather than large-cap firms. Recent research also suggests that the January effect mainly exists in equal-weighted, not value-weighted,

indexes. Since the US index we use in this paper is value-weighted, it should not be surprising that our results reject the January effect in the US market.

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