The Turn-of-the-Month Effect in the World's Stock Markets, January 1988 - January 1990

1. Introduction

Numerous researchers have discovered systematic seasonalities in stock market returns. These effects have been related to the day-of-the-week, holiday, turn-of-the-year and turn-of-the-month (TOM), among others. For instance, the extensive day-of-the week literature indicates significantly negative returns on Mondays or in the first half of the week.[1] Moreover, strong gains have occurred on pre-holiday trading days and negative returns on the post-holiday trading days. January returns have been higher than in other months especially for small capitalized stocks. Many of these seasonalities have been observed to be global. ZIEMBA (1994) reviews world wide security market regularities.

This paper focuses on the turn-of-the-month effect. ARIEL (1987) reported that the returns of U.S. stocks were larger in the turn-of-the-month than in the rest-of-the-month for the period of 1963-1981. The turn-of-the-month was defined as a period from the last trading day of the previous month (-1) and the first four trading days of the new month (+1 to +4). His results have been supported by e.g., KEIM/SMIRLOCK (1987), LINN/LOCKWOOD (1988), LAKONISHOK/SMIDT (1988), CINAR/VU (1991), and HENSEL/SICK/ZIEMBA (1993a, 1993b). Similar patterns seem to appear both in the U.S. stock and stock index futures markets (which seem to partially anticipate the effects). The turn-of-

the-month effect has also been documented in Japanese stock markets by ZIEMBA (1991) for the period 1949-1988. However, his results indicated that the Japanese turn-of-the-month effect was on days from -5 to 2 because of differing cash flows. The TOM effect was also observable in the Japanese stock index futures markets as well, and partially anticipated the cash effect (see ZIEMBA (1989)). BARONE (1990) also documents a turn-of-the-month effect in Italy that is in the second half-of-the-month because of Italy's special settlement procedures. Recently, ZIEMBA (1994) confirmed the existence of a significant turn-of-the-month effect in the U.K. cash and futures markets. Moreover, CADSBY/RATNER (1991) report the turn-of-the-month effect to be significant in Canada, Australia, Germany and Switzerland.

There are various alternative explanations for the TOM regularity. The U.S. economy has substantial payments to private investors of salaries and debt interest on the -1 day of the month (see OGDEN (1990)). For instance, most of the corporate and municipal debt is payable on the first or last days of the month. Also bad news such as that relating to earnings announcements is delayed and announced late in the month, while good news is released promptly at the beginning of the month (PENMAN (1987)). HENSEL/SICK/ZIEMBA (1993a) offer a more detailed discussion on the underlying reasons for this regularity. This paper provides new evidence on the TOM effect in the world's stock markets.

The analysis of this regularity has been limited to the major financial markets of the world. In this paper, the behavior of stock returns at the TOM is investigated in 24 countries and 12 different regions of the world. The global investigation of the TOM regularity is interesting because the major explanations offered for this regularity are based on institutional factors which may differ between countries. Thus, there may well be significant differences across countries. Moreover, the use of new data and new markets reduces the potential data snooping bias related to these type of studies (see e.g. LO/MAC KINLAY (1990)). The global results are also interesting in the context of recent deregulation and integration of the world's financial markets. The loosening capital controls and faster information processing of world-wide news have made international portfolio management increasingly important for investors. The results also offer new insights in the context of the behavior of small markets.[2] A drawback of our study is that particular countries may have turn-of-the-month effects but at different times such as those discussed above in Japan and Italy. A complete study will analyze the common and different aspects of this seasonal anomaly in various world wide markets.

This paper is organized as follows. The next section describes the data used in the study. The third section offers the empirical results. Section four concludes.

2. The Data

The data used in this study consists of daily closing stock prices of the Financial Times-Actuaries World Indices (see GOLDMAN SACHS (1988)). The indices are calculated separately for 24 countries in local currencies, U.S. dollars and U.K. pound sterling. These indices provide as full a coverage as possible; usually at least 70% of the aggregate market value of all domestic exchange-listed companies' shares of stock. Regarding the coverage of each market by number of quoted companies, the aim has been for at least 10% of the available

universe with up to 30 per cent being the preferred coverage. Markets, companies and securities are only included where the direct holding of capital by foreign nationals is permissible. Firms with an aggregate market value of less than $100 million are mainly excluded (at the end of 1985, the start date). The FT-indices are also calculated for different regions. The regional indices are measured in a form that reflects weighted local currency returns. In the world index, the Japanese and U.S. markets have the largest weights, followed by Great Britain.

All indices are value-weighted and adjusted for all capital changes, including new issues and dividends. The data covers the period January 6th, 1988 to January 31st, 1990. Thus, we use solely the post-crash period of 1987. This is because it has been shown that the behavior of stock markets has significantly changed after the crash, and that the co-movements between national markets are considerably stronger than before (see e.g., HAMAO/MA-SULIS/NG (1991), and MALLIARIS/URRUTIA (1992)). The returns are measured as first differences of logarithmic price indices. Assuming continuous compounding, these are good approximations for returns. All returns are measured in local currencies and multiplied by 100.

3. Empirical Results

Figure 1 shows the average return pattern by trading day for the Financial Times-Actuaries World Index. As expected, the largest returns are observable on day -1, i.e. the last day of the trading month (compare e.g. ZIEMBA (1991), pp. 143-144, for Japanese results). Also other days around the TOM have positive returns. This supports the assumption of the existence of the TOM regularity in the world's stock markets. The weight of U.S. markets is considerable in the World Index. Thus, it is possible that the above result is mainly due to the U.S. TOM effect, rather than due to a global phenomenon. To investigate this further, the analysis was replicated for 35 other indices. Some of those results are displayed in Figures 2-4.

Figure 1: Average daily returns at the TOM for the World Index
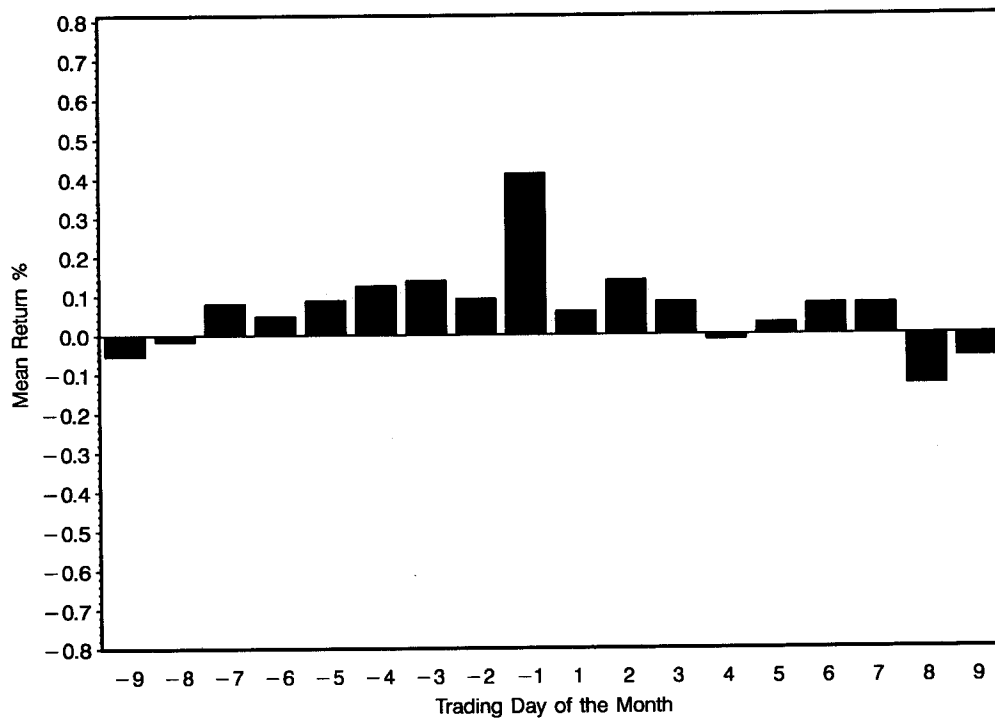
Period: January 1988 - January 1990.

Figure 2: Average daily returns at the TOM for the USA
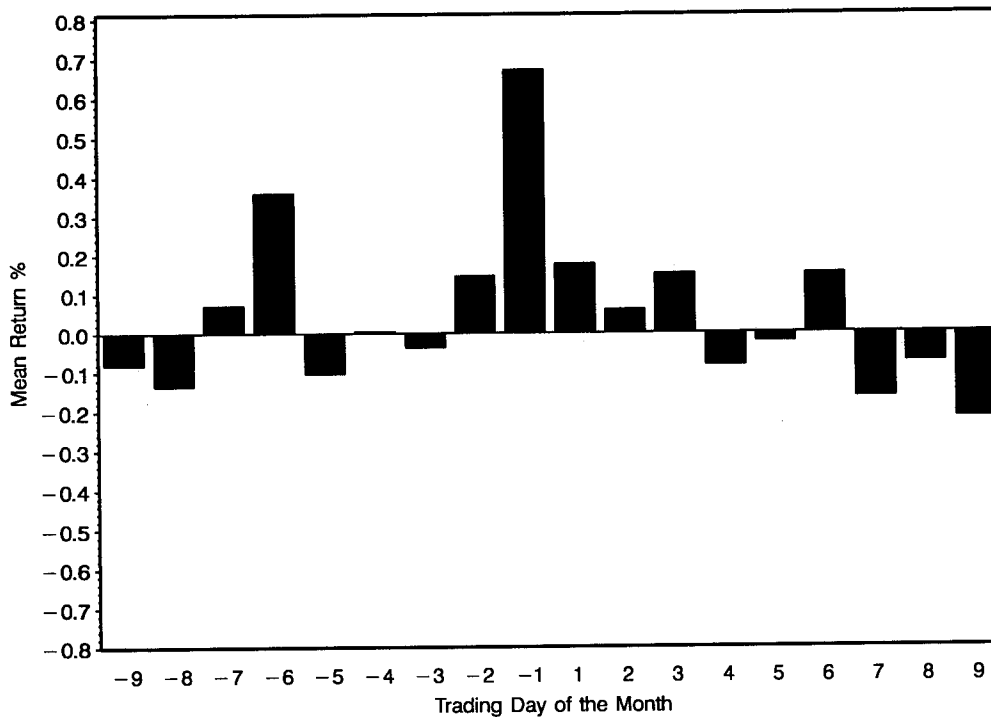
Period: January 1988 - January 1990.

Figure 3: Average daily returns at the TOM for Europe

Period: January 1988 - January 1990.

Figure 4: Average daily returns at the TOM for Japan

Period: January 1988 - January 1990.

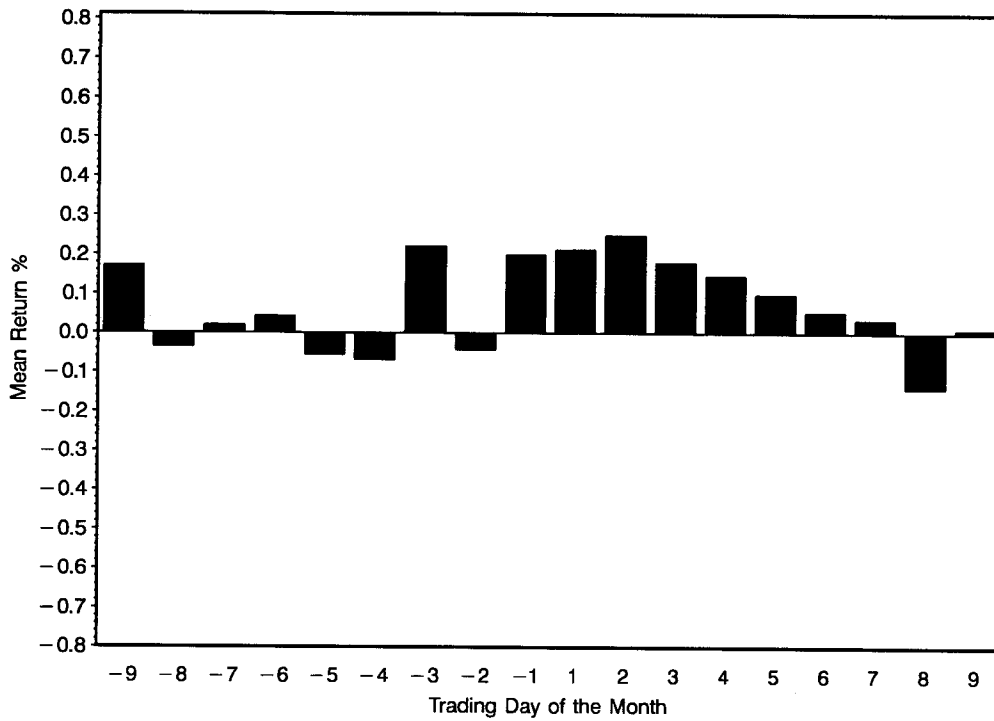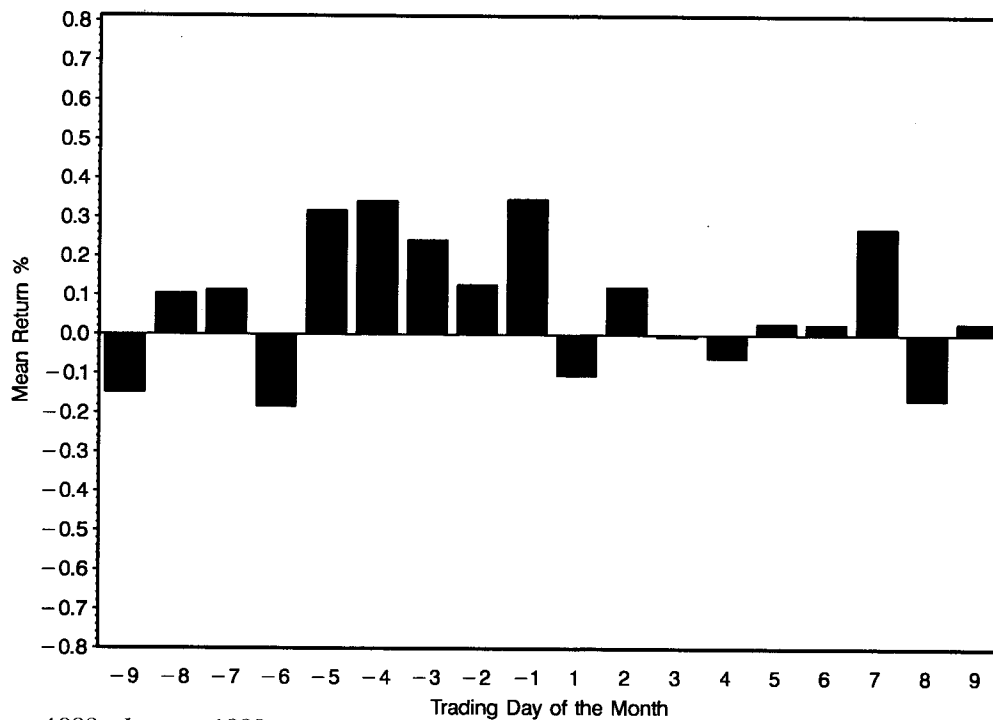Figure 2 illustrates the variation of stock returns by trading day in U.S. markets. As expected, the mean returns from -1 to 3 are all positive. The returns on -1 day are large. This supports the earlier findings by HENSEL/SICK/ZIEMBA (1993a) on the significance of this day in the U.S. markets. Figure 3 shows that there appears to be tendency towards the TOM effect in Europe as well. All returns between days -1 and 4 have positive means. The results in Figure 4 reveal that the TOM seems to be different in Japan. As suggested by ZIEMBA (1991), the TOM effect starts earlier in Japan [3] than in USA. This seems to be explained, for instance, by the fact that in Japan most salaries are paid prior to the end of the calendar month.[4]

Table 1 shows the average daily returns of 24 individual stock markets and 12 different regions for trading days from -9 to 9. The average return for the World Index on day -1 is 0.41%, while the average returns are below 0.15% on all other days. For the U.S. the average -1 day returns are very high, 0.67%. World wide returns with the USA excluded

had their highest return on the same day. This gives further support to the assumption that the TOM regularity is international rather than purely a U.S. phenomenon. Belgium, Italy [5], Japan, and The Netherlands had their highest return on the last trading day of the month. Only three markets had negative returns on day -1, namely New Zealand, Norway and South Africa. South Africa had consistently positive returns on days 1 to 5, Norway on days 1 to 4, and New Zealand on days 1 to 3. The TOM effect thus appeared later in these markets. The t-values for the null hypothesis that the returns do not differ from zero on different trading days of the month are in Table 2. For the World Index, the returns on days -1 and 2 are significantly different from zero at the 0.05 level, while on other days they do not differ from zero. For most regional indices (exceptions Scandinavia and Pacific Ex. Japan), the returns on -1 day are significantly positive. Regarding individual countries, a similar pattern applies most clearly in U.S. markets.

Table 1: Average daily percentage returns of various world wide stock markets and indices for trading days -9 to 9

	-9	-8	-7	-6	-5	-4	-3	-2	-1	+1	+2	+3	+4	+5	+6	+7	+8	+9
Australia	0.29	0.19	0.14	0.03	-0.04	-0.18	0.04	-0.06	0.21	0.01	0.11	0.25	-0.05	-0.04	-0.01	0.16	-0.28	0.00
Austria	0.00	-0.01	0.05	0.29	0.19	0.02	0.15	0.19	0.18	0.43	0.53	0.31	0.10	0.01	0.34	0.35	0.29	0.19
Belgium	-0.04	0.12	-0.08	-0.01	0.07	-0.03	-0.12	-0.07	0.30	0.08	0.21	0.32	0.30	0.11	0.02	0.11	0.11	-0.13
Canada	0.07	-0.11	-0.05	0.06	-0.11	0.02	0.04	0.07	0.33	0.11	0.10	-0.00	0.09	0.09	0.02	-0.11	-0.10	-0.12
Denmark	0.17	0.15	0.15	0.40	0.12	-0.08	0.12	0.24	0.21	0.13	0.33	0.29	0.32	0.03	0.02	0.23	0.04	0.01
Finland	0.15	0.13	0.06	-0.12	-0.09	-0.00	-0.09	0.12	0.23	0.00	0.14	-0.14	0.21	0.37	-0.02	-0.05	0.04	0.12
France	0.22	0.06	0.24	0.58	0.17	-0.14	0.17	-0.06	0.26	0.26	0.44	0.29	0.04	0.14	0.13	0.14	-0.18	0.01
Germany	0.13	0.06	0.01	0.05	0.06	-0.16	0.26	-0.01	0.11	0.59	0.51	0.19	0.28	0.19	0.19	-0.04	-0.16	0.03
Hong Kong	-0.35	-0.56	0.14	0.03	-0.06	-0.37	0.16	-0.03	0.32	-0.04	0.39	-0.49	0.22	0.40	0.24	0.69	0.09	-0.06
Ireland	0.41	0.04	0.10	0.01	0.31	-0.09	0.12	0.19	0.05	-0.12	0.18	0.11	0.26	0.04	0.22	0.09	-0.21	0.02
Italy	-0.04	-0.08	-0.07	-0.04	-0.14	-0.01	-0.12	-0.04	0.32	0.14	-0.03	-0.17	0.01	-0.03	-0.18	0.18	0.03	0.04
Japan	-0.15	0.10	0.11	-0.18	0.32	0.34	0.24	0.13	0.35	-0.10	0.12	-0.01	-0.06	0.03	0.03	0.27	-0.17	0.03
Malaysia	-0.16	0.20	0.22	0.16	0.16	-0.03	-0.04	0.19	0.15	0.09	0.17	0.22	0.08	0.04	0.40	0.39	0.15	0.12
Mexico	0.71	0.58	-0.08	0.45	0.50	-0.15	0.15	0.02	0.01	0.37	-0.15	0.09	0.43	0.49	0.52	0.03	0.07	-0.38
Netherlands	0.26	0.00	-0.08	-0.08	0.02	-0.08	0.18	-0.06	0.22	0.17	0.17	0.22	0.19	0.18	0.16	0.06	-0.35	-0.14
New Zealand	0.02	-0.13	-0.11	0.18	-0.24	-0.71	0.27	0.08	-0.11	0.06	0.35	0.42	-0.08	-0.23	0.13	0.34	-0.07	-0.33
Norway	0.48	0.43	-0.00	0.08	-0.01	-0.18	0.14	-0.09	-0.00	0.34	0.48	0.18	0.22	-0.03	-0.19	0.46	-0.11	-0.20
Singapore	-0.16	-0.11	0.14	-0.13	0.03	-0.13	0.01	0.27	0.11	0.05	0.17	0.28	0.16	0.06	0.10	0.51	0.21	0.08
South Africa	0.14	-0.09	0.26	0.25	0.19	-0.16	0.16	0.03	-0.06	0.28	0.33	0.52	0.67	0.53	-0.03	0.12	-0.25	-0.26
Spain	-0.15	-0.05	-0.05	-0.07	0.16	-0.03	0.04	-0.14	0.24	0.26	0.15	-0.03	0.04	0.16	0.02	0.11	0.03	-0.10
Sweden	-0.20	0.17	-0.03	0.24	0.24	-0.05	0.27	0.21	0.19	0.12	0.24	0.37	0.46	0.04	0.27	0.19	0.18	0.00
Switzerland	-0.21	0.01	0.12	0.01	-0.04	-0.24	0.13	0.13	0.10	0.25	0.40	0.38	0.22	0.15	-0.04	0.20	-0.34	0.20
UK	0.29	-0.13	0.00	-0.05	-0.20	-0.01	0.34	-0.09	0.21	0.12	0.15	0.20	0.12	0.07	0.01	-0.05	-0.15	0.06
USA	-0.08	-0.14	0.07	0.36	-0.10	0.00	-0.04	0.15	0.67	0.18	0.06	0.15	-0.08	-0.02	0.15	-0.17	-0.07	-0.22
Europe	0.17	-0.04	0.02	0.04	-0.05	-0.07	0.22	-0.04	0.20	0.21	0.25	0.18	0.15	0.10	0.05	0.03	-0.14	0.01
Scandinavia	-0.09	0.19	-0.15	0.16	0.29	-0.04	0.32	0.12	0.08	0.38	0.38	0.37	0.31	-0.48	0.36	0.19	0.19	0.13
Pacific Basin	-0.14	0.09	0.12	-0.17	0.30	0.31	0.23	0.12	0.34	-0.10	0.13	-0.00	-0.05	0.03	0.03	0.28	-0.16	0.03
Euro-Pacific	-0.04	0.05	0.08	-0.11	0.19	0.19	0.23	0.07	0.30	-0.06	0.23	0.06	0.01	0.06	0.04	0.20	-0.16	0.02
North America	-0.07	-0.13	0.06	0.34	-0.07	-0.03	-0.03	0.14	0.65	0.17	0.06	0.14	-0.07	-0.02	0.14	-0.16	-0.08	-0.21
Europe Ex. UK	0.08	0.03	0.03	0.13	0.07	-0.11	0.13	-0.02	0.21	0.30	0.32	0.18	0.17	0.13	0.08	0.09	-0.13	-0.04
Pac. Ex. Jap.	0.03	-0.09	0.13	0.03	-0.07	-0.26	0.09	-0.02	0.21	0.00	0.21	0.04	0.05	0.09	0.09	0.36	-0.11	-0.02
World Ex. US	-0.04	0.04	0.08	-0.10	0.18	0.18	0.22	0.07	0.29	0.01	0.17	0.06	0.02	0.06	0.04	0.19	-0.15	0.02
World Ex. UK	-0.09	-0.00	0.09	0.06	0.12	0.14	0.12	0.11	0.44	0.05	0.14	0.07	-0.03	0.03	0.08	0.09	-0.13	-0.07
World Ex. SAf.	-0.05	-0.02	0.08	0.05	0.09	0.13	0.14	0.09	0.42	0.06	0.14	0.08	-0.02	0.03	0.08	0.08	-0.13	-0.06
World Ex. Jap.	0.02	-0.09	0.06	0.22	-0.08	-0.03	0.07	0.07	0.46	0.18	0.14	0.15	0.02	0.04	0.11	-0.07	-0.10	-0.12
The World Ind.	-0.05	-0.02	0.08	0.05	0.09	0.13	0.14	0.09	0.41	0.06	0.14	0.08	-0.01	0.03	0.08	0.08	-0.13	-0.06

Period: January 1988 - January 1990.

Table 2: T-values for the hypothesis H_0: $R = 0$ for Table 1

	-9	-8	-7	-6	-5	-4	-3	-2	-1	+1	+2	+3	+4	+5	+6	+7	+8	+9
Australia	1.50	1.04	0.85	0.24	-0.18	-0.83	0.20	-0.41	1.28	0.07	0.51	1.71	-0.32	-0.28	-0.06	0.81	-1.97	0.03
Austria	0.00	-0.11	0.31	1.48	1.49	0.09	0.93	0.76	1.15	1.41	1.78	2.15*	0.42	0.04	2.04	2.26*	1.70	0.76
Belgium	-0.21	1.28	-0.67	-0.06	0.86	-0.18	-1.83	-0.56	1.07	0.81	1.86	2.63*	2.20*	0.74	0.10	1.00	1.06	-0.90
Canada	0.96	-0.74	-0.49	0.46	-1.41	0.18	0.45	1.05	3.43*	1.22	1.06	-0.04	0.78	0.59	0.13	-0.96	-0.73	-1.28
Denmark	1.46	1.04	1.29	1.05	1.36	-0.51	1.18	1.24	1.06	1.14	1.89	2.07*	2.58*	0.27	0.15	1.37	0.23	0.12
Finland	1.05	0.71	0.33	-0.87	-0.83	-0.02	-0.39	0.80	1.41	0.00	1.20	-0.69	1.40	2.25*	-0.15	-0.29	0.23	0.84
France	1.21	0.28	1.57	3.79*	0.77	-0.71	1.22	-0.33	1.43	1.89	2.89*	1.86	0.27	0.98	0.85	0.70	-1.08	0.04
Germany	0.59	0.36	0.04	0.29	0.31	-0.81	1.21	-0.07	0.90	3.02*	2.33*	1.06	2.02	1.11	0.96	-0.23	-0.81	0.13
Hong Kong	-1.44	-1.16	0.35	0.14	-0.13	-2.29*	0.80	-0.15	1.48	-0.21	1.99	-0.44	0.81	1.75	0.92	3.01*	0.25	-0.29
Ireland	2.16*	0.20	0.67	0.04	1.42	-0.62	0.72	0.81	0.36	-0.51	0.83	0.60	2.15*	0.20	0.76	0.64	-1.51	0.18
Italy	0.17	-0.38	-0.45	-0.27	-0.72	-0.06	-0.68	-0.32	2.29*	0.78	-0.14	-0.93	0.06	-0.20	-1.04	1.16	0.35	0.23
Japan	-1.10	0.74	0.99	-1.56	1.67	1.99	1.50	0.93	3.07*	-0.68	1.19	-0.05	-0.51	0.30	0.18	2.56*	-1.18	0.21
Malaysia	-0.80	1.02	1.39	0.78	0.90	-0.17	-0.26	1.24	1.15	0.57	0.94	0.99	0.39	0.18	1.42	2.17*	0.78	0.78
Mexico	2.19*	1.49	-0.20	0.93	1.07	-0.59	0.59	0.06	0.03	0.83	-0.38	0.18	1.70	1.77	1.71	0.07	0.19	-1.26
Netherlands	1.44	0.03	-0.58	-0.52	0.11	-0.48	1.12	-0.34	1.45	0.81	1.12	1.45	1.39	1.27	0.68	0.41	-2.38*	-0.68
New Zealand	0.10	-0.62	-0.54	0.72	-1.02	-2.24*	1.10	0.38	-0.64	0.33	1.30	1.34	-0.31	-1.29	0.53	1.40	-0.36	-2.20*
Norway	1.69	1.75	-0.02	0.28	-0.07	-0.83	0.59	-0.33	-0.01	1.40	2.10*	1.19	1.09	-0.17	-0.65	1.91	-0.29	-0.90
Singapore	-0.90	-0.68	0.81	-0.73	0.17	-0.63	0.08	1.60	0.76	0.27	0.76	1.17	0.93	0.41	0.32	2.84*	0.73	0.58
South Africa	0.58	-0.44	0.90	1.14	0.97	-0.68	0.67	0.15	-0.24	1.43	1.69	2.09*	3.78*	1.70	-0.12	0.64	-1.20	-1.20
Spain	-1.87	-0.53	-0.47	-0.60	1.74	-0.27	0.59	-1.46	1.89	1.80	1.12	-0.22	0.32	1.41	0.11	1.10	0.28	-0.75
Sweden	-1.15	0.93	-0.16	1.48	1.11	-0.29	1.72	1.40	1.22	0.50	1.57	2.59*	2.46*	0.27	1.36	1.49	0.89	0.00
Switzerland	-0.71	0.04	1.03	0.04	-0.18	-0.99	0.68	0.74	0.84	1.54	2.20*	2.70*	1.31	1.05	-0.16	1.42	-2.27*	-1.28
UK	2.07*	-0.82	0.01	-0.28	-1.44	-0.04	2.22*	-0.48	1.37	0.75	1.17	1.66	0.79	0.50	0.07	-0.33	-1.05	0.40
USA	-0.50	-0.67	0.55	1.88	-0.64	0.04	-0.23	0.93	3.62*	1.26	0.42	1.11	-0.50	-0.07	1.02	-1.60	-0.40	-1.46
Europe	1.47	-0.32	0.23	0.34	-0.43	-0.54	2.09*	-0.33	2.08*	1.77	2.64*	2.41*	1.64	1.12	0.38	0.31	-1.21	0.07
Scandinavia	-0.56	0.90	-1.11	0.48	1.79	-0.26	2.55*	0.47	0.65	0.95	2.68*	2.19*	2.09*	-1.02	2.39*	1.43	1.75	0.99
Pacific Basin	-1.07	0.69	1.06	-1.52	1.65	1.87	1.49	0.90	3.10*	-0.66	1.32	-0.03	-0.46	0.34	0.21	2.67*	-1.22	0.20
Euro-Pacific	-0.56	0.47	0.98	-1.01	1.44	1.49	1.82	0.64	3.33*	-0.45	2.30*	0.67	0.11	0.69	0.30	2.18*	-1.35	0.22
North America	-0.46	-0.67	0.51	1.84	-0.45	-0.20	-0.20	0.94	3.66*	1.27	0.45	0.97	-0.46	-0.05	1.01	-1.59	-0.42	-1.46
Europe Ex. UK	0.63	0.24	0.35	1.11	0.49	-0.74	1.17	-0.14	2.39*	2.58*	3.02*	2.16*	2.02	1.41	0.53	0.86	-1.11	-0.28
Pac. Ex. Jap.	0.21	-0.46	0.73	0.30	-0.32	-1.53	0.61	-0.13	1.56	0.01	1.25	0.13	0.33	0.72	0.50	2.18*	-0.61	-0.16
World Ex.US	-0.35	0.43	0.98	-0.95	1.40	1.48	1.84	0.65	3.37*	0.06	2.30*	0.72	0.21	0.76	0.30	2.14*	-1.35	0.16
World Ex.UK	-0.93	-0.03	1.12	0.52	0.89	1.34	1.22	1.06	3.93*	0.47	2.23*	0.84	-0.26	0.19	0.89	1.32	-1.03	-0.75
World Ex. SAf.	-0.57	-0.14	1.03	0.41	0.71	1.26	1.43	0.90	3.91*	0.51	2.11*	0.97	-0.19	0.21	0.82	1.05	-1.07	-0.62
World Ex. Jap.	0.19	-0.64	0.63	1.54	-0.67	-0.33	0.60	0.61	3.51*	1.55	1.42	1.48	0.18	0.19	1.09	-0.79	-0.73	-1.13
The World Ind.	-0.57	-0.15	1.06	0.42	0.72	1.25	1.44	0.89	3.89*	0.53	2.14*	1.00	-0.14	0.23	0.83	1.07	-1.08	-0.64

* significant at 0.5 level.
Period: January 1988 - January 1990.

Table 3: T-values for the hypothesis H_0: $R = \overline{R}$ for Table 1

	-9	-8	-7	-6	-5	-4	-3	-2	-1	+1	+2	+3	+4	+5	+6	+7	+8	+9
Australia	1.21	0.74	0.50	-0.21	-0.46	-1.09	-0.07	-0.76	0.93	-0.21	0.25	1.32	-0.69	-0.63	-0.36	0.53	-2.36*	-0.28
Austria	-1.08	-1.87	-0.71	0.65	0.23	-0.86	-0.11	0.12	0.12	0.88	1.23	1.03	-0.27	-0.44	1.08	1.21	0.75	0.11
Belgium	-0.62	0.50	-1.25	-0.51	0.03	-0.70	-2.88*	-1.13	0.81	0.04	1.21	2.02	1.67	0.25	-0.25	0.35	0.34	-1.39
Canada	0.70	-0.87	-0.69	0.30	-1.66	-0.02	0.23	0.76	3.22*	1.00	0.85	-0.22	0.60	0.46	-0.02	-1.14	-0.88	-1.50
Denmark	0.15	0.02	-0.02	0.65	-0.37	-1.50	-0.36	0.46	0.30	-0.14	1.02	0.99	1.37	-0.97	-0.91	0.46	-0.68	-1.08
Finland	0.67	0.41	0.04	-1.27	-1.35	-0.40	-0.62	0.43	1.09	-0.29	0.74	-0.95	1.05	1.92	-0.59	-0.63	-0.11	0.45
France	0.61	-0.23	0.87	3.08*	0.29	-1.26	0.43	-0.94	0.83	1.11	2.18*	1.15	-0.41	0.21	0.16	0.14	-1.73	-0.41
Germany	0.12	-0.32	-0.68	-0.29	-0.24	-1.36	0.71	-0.63	0.01	2.48*	1.84	0.47	1.26	0.49	0.43	-0.85	-1.35	-0.39
Hong Kong	-1.58	-1.24	0.26	-0.04	-0.21	-2.50*	0.63	-0.30	1.32	-0.41	1.81	-0.47	0.68	1.60	0.79	2.86*	0.16	-0.47
Ireland	1.57	-0.43	-0.08	-0.44	0.90	-1.42	0.02	0.33	-0.50	-1.01	0.31	-0.04	1.23	-0.43	0.37	-0.16	-2.30*	-0.65
Italy	-0.40	-0.66	-0.79	-0.64	-1.03	-0.37	-1.01	-0.79	1.88	0.47	-0.41	-1.25	-0.28	-0.53	-1.37	0.79	-0.31	-0.11
Japan	-0.65	0.23	0.36	-2.18*	1.29	1.57	1.05	0.40	2.43*	-1.15	0.48	-0.72	-1.14	-0.45	-0.30	1.87	-1.70	-0.31
Malaysia	-1.49	0.32	0.54	0.10	0.13	-0.89	-1.09	0.36	0.13	-0.33	0.18	0.38	-0.32	-0.48	0.93	1.40	0.06	-0.08
Mexico	1.37	0.80	-0.84	0.38	0.51	-1.61	-0.43	-0.92	-0.53	0.24	-1.07	-0.34	0.66	0.82	0.84	-0.49	-0.50	-2.14*
Netherlands	1.08	-0.44	-1.03	-0.94	-0.21	-0.84	0.73	-0.70	1.04	0.50	0.70	1.04	0.93	0.82	0.41	-0.00	-2.81*	-0.99
New Zealand	0.11	-0.61	-0.53	0.73	-1.00	-2.23*	1.12	0.39	-0.62	0.35	1.31	1.35	-0.30	-1.27	0.54	1.42	-0.34	-2.18*
Norway	1.22	1.20	-0.60	-0.19	-0.70	-1.45	0.03	-0.85	-0.52	0.85	1.51	0.28	0.43	-0.90	-1.12	1.36	-0.65	-1.50
Singapore	-1.39	-1.24	0.30	-1.23	-0.37	-1.07	-0.43	1.07	0.15	-0.21	0.35	0.80	0.41	-0.16	0.05	2.34*	0.42	-0.07
South Africa	0.15	-0.97	0.53	0.64	0.41	-1.14	0.21	-0.41	-0.65	0.88	1.14	1.65	3.18*	1.35	-0.60	0.08	-1.71	-1.69
Spain	-2.16*	-0.78	-0.71	-0.80	1.47	-0.49	0.24	-1.71	1.69	1.63	0.94	-0.40	0.14	1.20	-0.04	0.85	0.07	-0.94
Sweden	-1.91	0.18	-0.86	0.67	0.49	-1.06	0.89	0.53	0.38	-0.04	0.71	1.66	1.76	-0.60	0.69	0.46	0.25	-0.81
Switzerland	-0.86	-0.17	0.63	-0.22	-0.41	-1.18	0.44	0.49	0.46	1.27	1.95	2.38*	1.05	0.74	-0.32	1.11	-2.56*	-1.57
UK	1.72	-1.11	-0.43	-0.55	-1.78	-0.33	1.90	-0.74	1.05	0.45	0.81	1.26	0.46	0.17	-0.18	-0.63	-1.39	0.08
USA	-0.78	-0.88	0.22	1.66	-0.91	-0.30	-0.49	0.65	3.39*	0.95	0.11	0.72	-0.77	-0.22	0.73	-2.02	-0.64	-1.75
Europe	0.89	-0.92	-0.55	-0.19	-0.96	-1.08	1.45	-0.87	1.38	1.21	1.93	1.51	0.89	0.36	-0.10	-0.31	-1.80	-0.48
Scandinavia	-1.28	0.35	-1.94	0.13	1.07	-0.95	1.62	0.00	-0.32	0.66	1.86	1.51	1.32	-1.26	1.64	0.58	0.68	0.12
Pacific Basin	-1.62	0.16	0.41	-2.16*	1.25	1.44	1.03	0.36	2.45*	-1.14	0.59	-0.69	-1.11	-0.40	-0.26	1.98	-1.75	-0.33
Euro-Pacific	-1.01	-0.19	0.17	-1.68	0.90	0.94	1.26	0.01	2.54*	-0.97	1.59	-0.16	-0.64	-0.17	-0.23	1.42	-1.95	-0.45
North America	-0.74	-0.89	0.18	1.61	-0.72	-0.52	-0.46	0.66	3.42*	0.96	0.15	0.69	-0.73	-0.20	0.71	-2.00	-0.66	-1.75
Europe Ex. UK	-0.05	-0.48	-0.55	0.38	-0.14	-1.32	0.40	-0.84	1.43	1.86	2.23*	1.13	1.03	0.50	0.00	0.08	-1.84	-0.91
Pac. Ex. Jap.	-0.10	-0.72	0.46	-0.17	-0.53	-1.82	0.29	-0.49	1.19	-0.31	0.95	-0.01	0.00	0.34	0.23	1.89	-0.88	-0.50
World Ex. US	-0.99	-0.24	0.16	-1.64	0.86	0.92	1.27	0.01	2.57*	-0.50	1.35	-0.13	-0.55	-0.09	-0.24	1.37	-1.96	-0.53
World Ex. UK	-1.59	-0.60	0.34	-0.03	0.42	0.75	0.59	0.46	3.37*	-0.08	1.22	0.13	-0.91	-0.27	0.23	0.42	-1.55	-1.42
World Ex. SAf.	-1.21	-0.71	0.26	-0.12	0.23	0.67	0.80	0.32	3.34*	-0.02	1.18	0.26	-0.83	-0.26	0.19	0.23	-1.58	-1.28
World Ex. Jap.	-0.29	-1.00	0.05	1.17	-1.13	-0.84	0.13	0.15	3.11*	1.10	0.90	0.98	-0.30	-0.09	0.57	-1.42	-1.11	-1.60
The World Ind.	-1.22	-0.71	0.27	-0.11	0.23	0.65	0.82	0.30	3.32*	-0.01	1.21	0.28	-0.79	-0.24	0.19	0.24	-1.60	-1.30

* significant at 0.5 level.
Period: January 1988 - January 1990.

Table 3 provides the t-values for testing the null hypothesis that the average returns by trading day of the month do not differ from the average returns across all trading days. The results indicate that there is significant variation in returns by trading day of the month. For most regional indices, including, for instance, the World Index, Pacific Basin and North America the returns on the last trading day of the month are significantly higher than on other days.

Table 4 provides statistical tests for the TOM phenomenon. Average daily returns are computed for four periods, i.e. the turn-of-the-month (trading days from -1 to 4), the first-half-of-the-month (from -1 to 9), the rest-of-the-month (from 10 to -2), and the whole period. The average values of these returns appear in the first four columns of the table. They indicate consistently positive returns for all markets and periods. Mexico, Austria, and Denmark had the highest average returns during the period.

The remaining columns of Table 4 show the t-statistics for the null hypotheses that the average returns by periods do not differ from zero or the average returns through the research period. The tests of the latter hypothesis indicate that from the 36 indices, the TOM effect between trading days -1 and 4 was statistically significant in 12 cases at the 0.05

Table 4: Average daily percentage returns and t-values during the different periods of month for various world wide stock markets and indices

	Average daily returns				t-values for $H_0: R = 0$				t-values for $H_0: R = \bar{R}$			
	-1 to +4	-1 to +9	+10 to -2	All days	-1 to +4	-1 to +9	+10 to -2	All days	-1 to +4	-1 to +9	+10 to -2	All days
Australia	0.105	0.035	0.074	0.056	1.349	0.625	1.197	1.332	0.632	-0.387	0.296	-0.000
Austria	0.306	0.271	0.068	0.161	2.925*	3.730*	1.228	3.592*	1.382	1.505	-1.698	-0.000
Belgium	0.240	0.140	0.014	0.072	3.295*	2.854*	0.363	2.326*	2.300*	1.379	-1.476	0.000
Canada	0.126	0.041	0.003	0.020	2.747*	1.091	0.081	0.814	2.308*	0.548	-0.525	0.000
Denmark	0.256	0.160	0.142	0.150	3.770*	3.401*	2.575*	4.089*	1.553	0.205	-0.150	-0.000
Finland	0.091	0.091	0.022	0.054	1.223	1.828	0.429	1.512	0.503	0.752	-0.640	0.000
France	0.257	0.151	0.073	0.109	3.635*	2.770*	1.290	2.757*	2.093*	0.767	-0.632	-0.000
Germany	0.333	0.186	0.038	0.106	4.276*	3.202*	0.478	2.112*	2.915*	1.374	-0.868	-0.000
Hong Kong	0.083	0.179	-0.090	0.035	0.352	1.368	-1.003	0.446	0.206	1.105	-1.389	0.000
Ireland	0.097	0.064	0.154	0.112	1.226	1.118	2.183*	2.431*	-0.195	-0.844	0.588	0.000
Italy	0.057	0.032	0.079	0.057	0.724	0.607	1.281	1.394	0.002	-0.484	0.353	-0.000
Japan	0.062	0.050	0.092	0.073	1.131	1.256	2.154*	2.468*	-0.198	-0.567	0.454	0.000
Malaysia	0.141	0.180	0.100	0.137	1.786	2.974*	1.401	2.886*	0.057	0.716	-0.523	-0.000
Mexico	0.070	0.192	0.329	0.266	0.370	1.578	2.834*	3.164*	-1.043	-0.607	0.546	-0.000
Netherlands	0.195	0.087	0.043	0.063	2.745*	1.602	0.775	1.622	1.854	0.433	-0.362	-0.000
New Zealand	0.123	0.045	-0.044	-0.003	1.115	0.619	-0.541	-0.058	1.144	1.663	-0.502	0.000
Norway	0.241	0.113	0.154	0.135	2.456*	1.434	1.818	2.317*	1.084	-0.282	0.225	-0.000
Singapore	0.154	0.174	0.017	0.090	1.788	2.602*	0.253	1.865	0.747	1.262	-1.061	-0.000
South Africa	0.348	0.183	0.044	0.108	3.497*	2.482*	0.566	2.007*	2.413*	1.016	-0.830	0.000
Spain	0.133	0.088	-0.030	0.024	2.221*	2.146*	-0.746	0.828	1.819	1.557	-1.335	0.000
Sweden	0.280	0.208	0.068	0.133	3.461*	3.732*	1.154	3.236*	1.819	1.349	-1.089	0.000
Switzerland	0.268	0.109	-0.010	0.045	3.873*	2.002*	-0.150	0.992	3.228*	1.180	-0.794	-0.000
UK	0.160	0.074	0.026	0.048	2.536*	1.544	0.563	1.442	1.774	0.535	-0.469	0.000
USA	0.197	0.064	0.026	0.043	2.689*	1.135	0.466	1.101	2.096*	0.367	-0.324	-0.000
Europe	0.198	0.103	0.036	0.067	4.663*	3.044*	0.894	2.497*	3.077*	1.062	-0.761	-0.000
Scandinavia	0.301	0.190	0.050	0.115	3.254*	2.616*	0.661	2.177*	2.008*	1.027	-0.853	-0.000
Pacific Basin	0.065	0.053	0.087	0.071	1.221	1.361	0.975	1.388	-0.125	-0.485	0.179	-0.000
Euro-Pacific	0.107	0.069	0.071	0.070	2.319*	2.086*	2.021*	2.887*	0.801	-0.020	0.017	0.000
North America	0.193	0.063	0.024	0.042	2.721*	1.149	0.454	1.100	2.128*	0.380	-0.334	-0.000
Europe Ex. UK	0.234	0.130	0.045	0.084	5.514*	3.669*	0.952	2.788*	3.533*	1.294	-0.836	-0.000
Pac. Ex. Jap.	0.103	0.093	0.011	0.049	1.121	1.598	0.189	1.192	0.587	0.760	-0.661	0.000
World Ex. US	0.110	0.070	0.068	0.069	2.624*	2.213*	2.025*	2.967*	0.975	0.023	-0.018	-0.000
World Ex. UK	0.136	0.068	0.057	0.062	3.046*	2.080*	1.806	2.733*	1.656	0.177	-0.156	0.000
World Ex. SAf.	0.136	0.067	0.054	0.060	3.112*	2.098*	1.756	2.709*	1.735	0.216	-0.192	-0.000
World Ex. Jap.	0.192	0.080	0.028	0.052	3.733*	2.056*	0.747	1.921	2.717*	0.717	-0.634	-0.000
The World Ind.	0.138	0.068	0.054	0.061	3.164*	2.132*	1.761	2.735*	1.770	0.232	-0.206	0.000

* significant at 0.5 level.
Period: January 1988 - January 1990.

level. Regarding regional indices, the TOM effect was significant in Europe, Scandinavia, North America, Europe Ex. U.K and World Ex. Japan. Thus, the World Index does not reflect any positive TOM in this case. This is apparently due to the fact that the TOM regularity was observed to occur earlier in Japan than in other countries. When Japan is excluded from the World Index, the TOM regularity is significant. The first-half-of-the-month was always statistically insignificant.

Regarding individual countries, significant TOM returns are observed in Belgium, Canada, France, Germany, South Africa, Switzerland and U.S.A., when the hypothesis that the returns do not differ from the average returns across all trading days is tested. There are alternative explanations why the TOM is not statistically significant in other countries. One reason may be that for some markets the FT-indices are rather thin and do not cover the market behavior of these countries well enough.

4. Conclusions and Further Research

This paper provides new evidence on the turn-of-the-month effect in the world's stock markets. In earlier research, the analysis of this regularity has been limited to the major financial markets of the world. We investigate the phenomenon in 24 individual countries and 12 different regions of the world. This global investigation is interesting because the major explanations offered for this regularity are based on institutional factors. Moreover, the use of new data sets reduces the potential data snooping bias related to these type of studies. The turn-of-the-month effect was found for several countries, as well as for most regions of the world. The effect was strongest in the U.S. markets. Regarding individual days, the returns of -1 day were higher than the returns of other TOM days.

Due to the short estimation period used, the results of this paper should be replicated with a much larger data set. This data would also enable investigation of the association between the TOM regularity and other seasonalities, such as the January effect, in

various countries as well as differing institutional and investor practices and constraints. In addition, it would be interesting to study the relationship between firm size, share price and the TOM regularity in different countries. Finally, the lead-lag relationships between markets with respect to the TOM effect might offer an interesting avenue for further research.

Footnotes

[1] In most markets, the Monday effect is observable. In some smaller markets, however, the Tuesday effect seems to be dominant (see MARTIKAINEN/PUTTONEN (1993) for a review). The day-of-the-week effect is sensitive to the research period used and possibly has been absent in U.S. markets in the late 1980's and early 1990's.

[2] THEOBALD/PRICE (1984) discuss the problems of seasonality estimation in thin markets.

[3] In 1990-1992 there was no turn-of-the-month effect in Japan (see ZIEMBA (1994)). The reason for this may be that with an extreme declining market individual investors were not interested in stock market investment at the times they had cash flows.

[4] For instance, most salaries are paid on days 20 to 25 of the month with the 25th being especially popular. ZIEMBA/SCHWARTZ (1992) discuss numerous other reasons as well. The include that there is portfolio window dressing on day -1, there is buying on day -3 because of the investment strategies of security firms, and large brokerage firms have a sales push that lasts 7 to 10 days starting around day -5.

[5] Table 1's results are also consistent with BARONE's (1990) 1975-1989 Italian data set. The -1 day has high mean return; but the TOM effect occurs in the second half of the month because that is how the settlement procedures in Italy define it. Their month essentially begins on the 15th and ends on the 14th with all orders up to the 15th settled on the -1 day. Hence there tends to be buying immediately after the 15th and selling immediately after the -1 day.

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