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The Week-End Effect in Common Stock Returns: The International Evidence

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ABSTRACT

This paper examines the daily stock market returns for four foreign countries. We find a so-called "week-end effect" in each country. In addition, the lowest mean returns for the Japanese and Australian stock markets occur on Tuesday.

The remainder of the paper answers four questions. Are seasonal patterns in foreign stock markets independent of those previously reported in the U.S.? Do Japan and Australia exhibit a seasonal one day out of phase due to different time zones? Do settlement procedures across countries bias week-end effects? Does the seasonal pattern in foreign exchange offset the week-end effect in stocks for Americans investing overseas?

SOME OF THE MOST ANOMALOUS empirical findings in finance are associated with the sample distributions of daily common stock returns. Cross [1], French [2], Gibbons and Hess [3], and Keim and Stambaugh [4] have documented that the average return on Friday is abnormally high, and the average return on Monday is abnormally low. To our knowledge, this so-called "day-of-the-week effect" or "week-end effect" has yet to be explained.

Because this anomaly has been reported primarily for U.S. stock returns, it is appropriate to investigate whether similar results occur for other countries. Positive findings would strongly support the proposition that the weekly seasonal effect is a general, world-wide phenomenon rather than the result of a special type of institutional arrangement in the U.S.

To shed more light on this proposition, our paper examines stock market returns in the U.K., Japan, Canada, and Australia. Since we find a week-end effect in each country, we can examine a set of interesting questions. For example, are these seasonals independent of the previously reported seasonal in the U.S.? Due to different time zones, do Far Eastern countries exhibit a seasonal one day out of phase? Do different settlement procedures across countries influence week-end effects? Does the seasonal in foreign exchange fluctuations (see McFarland, Pettit, and Sung [7] and Levi [6]) offset the week-end effect in stock market returns for Americans investing overseas?

The paper is structured as follows. Separate results for each country are presented in Section I. Relationships between countries are considered in Section II. We treat settlement costs and misquotes in Section III. Foreign exchange

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fluctuations and foreign stock market returns are integrated in Section IV. We present concluding remarks in the final section.

I. The International Week-End Effect

We compiled a daily record of returns for stock market indexes of Japan, Canada, Australia, the U.K., and the U.S. These countries account for approximately 87% of the world's market value of exchange-listed securities.[1] The specific foreign indexes and time periods are: Japan—the Nikkei Dow from January 5, 1970 to April 30, 1983; Canada—the Toronto Stock Exchange Index from January 2, 1976 to November 30, 1983; Australia—the Statex Actuaries Index from March 1, 1973 to November 30, 1982; and U.K.—the Financial Times Ordinary Share Index from January 2, 1950 to November 30, 1983.[2] In order to facilitate comparisons with previous research on U.S. capital markets, we have also included the Standard and Poor's 500 Composite Stock Price Index (S&P) from July 2, 1962 to December 30, 1983. During our entire sample period, stock markets of the U.S., Canada, Australia, and the U.K. were open from Monday through Friday. The Tokyo Stock Exchange traded on Saturday as well. For each day, we compute a return as the percentage change in the value of the index from the previous day (using closing prices).

Table I displays sample values of average returns, standard deviation, kurtosis, and skewness by day of the week for each index. Consistent with previous research on the U.S. stock markets, we find a negative average Monday return and high average Friday and Saturday returns for each index. This so-called week-end effect is significant. A difference of the means statistical test is performed by comparing Monday's average return with the average of the remaining days for each stock index. This test is also repeated for the last trading

[1] *Capital Market Perspectives* compiled the following information concerning the aggregate market value of all the listed common stocks in various countries at the end of 1982:

	Market Value	Rank
U.S.	1308.2 (55.6%)	1
Japan	410.2 (17.4%)	2
U.K.	181.6 (7.7%)	3
Canada	105.0 (4.5%)	4
Australia	41.4 (1.8%)	6
Total	2046.4 (87.0%)	
"World"	2351.7 (100.0%)	

Source: *Capital Market Perspectives.*

[2] The Nikkei Dow is a price-weighted index of 225 securities; the Toronto Stock Exchange Index is a value-weighted index of 300 securities; the Statex Actuaries Index is an unweighted index of the 50 largest securities on the Australian Stock Exchanges in terms of market size and volume; the Financial Times Ordinary Index is a geometrically weighted index of 30 securities on the London Stock Exchange.

Table I

Average Percent Returns on Country Common Stock Indexes by Day of Week[a]

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	All Days
United States							
SP500 (1962–1983)							
Mean	−0.126	0.017	0.107	0.028	0.082		0.023
Standard Deviation	0.892	0.797	0.827	0.733	0.718		0.794
Kurtosis[b]	2.468	2.931	3.438	1.92	2.39		2.882
Skewness[c]	−0.164	0.411	0.546	0.432	0.247		0.22
Observations	1044	1098	1087	1083	1077		5393
Japan							
Nikkei Dow (1970–1983)							
Mean	−0.020	−0.090	0.150	0.026	0.063	0.115	0.038
Standard Deviation	0.876	0.788	0.815	0.875	0.788	0.668	0.817
Kurtosis	14.311	7.758	6.383	20.478	6.321	22.352	12.63
Skewness	−1.918	0.497	−0.660	−1.613	.069	−1.883	−0.953
Observations	623	638	631	640	631	501	3694
Canada							
Toronto (1976–1983)							
Mean	−0.139	0.022	0.115	0.106	0.139		0.052
Standard Deviation	0.840	0.824	0.787	0.856	0.761		0.820
Kurtosis	3.464	3.693	1.353	6.776	8.269		4.616
Skewness	−0.838	−0.008	−0.020	−0.940	−0.052		−0.417
Observations	372	409	411	408	396		1995
United Kingdom							
LSE (1950–1983)							
Mean	−0.142	0.087	0.079	0.046	0.060		0.028
Standard Deviation	1.126	1.110	1.049	1.059	1.022		1.076
Kurtosis	4.309	5.131	3.212	5.836	11.109		5.720
Skewness	−0.072	0.531	−0.068	0.204	0.747		0.246
Observations	1628	1742	1751	1750	1713		8593
Australia							
1973–1983							
Mean	−0.052	−0.133	0.037	0.166	0.130		0.032
Standard Deviation	1.185	1.031	1.046	0.942	0.918		1.031
Kurtosis	14.155	7.018	9.851	1.680	4.884		8.785
Skewness	0.759	0.792	1.101	−0.10	−0.444		0.488
Observations	513	571	579	575	562		2804

[a] Returns are computed as $r_t = (v_t/v_{t-1} - 1) \cdot 100$, where v_t is the value of the country index at the end of day t.

[b,c] The moment estimators of kurtosis and skewness are reported. Kurtosis is $\hat{\mu}^4/(\hat{\sigma}^2)^2$ and skewness is $\hat{\sigma}^3$; where $\hat{\sigma}$ is the standard deviation estimator, and $\hat{\mu}$ is the mean estimator.

day of the week, i.e., Saturday for Japan and Friday for all other countries. The t-statistics are presented in Table II. As can be readily seen, the results indicate statistical significance at reasonable levels of confidence in every case. It is also interesting that Friday's mean return is lower than Saturday's mean return for the Japanese index. This result is consistent with that of Keim and Stambaugh, who find that Friday's return for the S&P Index is lower in weeks with Saturday trading.

Following French, Gibbons and Hess, and Keim and Stambaugh, we construct a test for differences in mean return across the days of the week by computing the following regression for each country index:

$$r_t = \alpha_1 d_{1t} + \alpha_2 d_{2t} + \cdots + \alpha_6 d_{6t} + u_t \qquad t = 1, \cdots, T \tag{1}$$

where $d_{1t} = 1$ if day t is a Monday, and $d_{1t} = 0$ otherwise; $d_{2t} = 1$ if t is a Tuesday, etc. We test the hypothesis that $\alpha_1 = \alpha_2 = \cdots = \alpha_6$ for Japan's stock index and the hypothesis that $\alpha_1 = \alpha_2 = \cdots = \alpha_5$ for the U.S., Canada, Australia, and the U.K. An F-statistic is computed for each regression and reported in Table III. Equality is rejected in every case at the 1% significance level.

In one respect, the data are different from previous studies of daily seasonals. The lowest mean returns for both the Japanese and Australian indices occur on Tuesday. As can be seen from Table II, the average Tuesday return for both these countries is significantly different from the overall average return on the other days of the week. This phenomenon is puzzling since it was not found in past studies on the U.S., and we do not observe it for either Canada or the U.K.

Tokyo, Japan is 14 hours ahead of New York, and Sydney, Australia is 15 hours ahead. Conversely, London is only 5 hours ahead of New York and Canada is 1 hour behind. Trading on the New York Stock Exchange is never concurrent with trading on the stock markets in either Japan or Australia. The negative average Tuesday daily return in the Japanese and Australian stock markets could reflect the time zone differences between these markets and the one in New York, a possibility we examine in the next section.

Table II

t-Test Statistic for the Average Returns on Monday, Tuesday, and Friday for Each Country

Country	Monday[a]	Tuesday	Friday (Saturday for Japan)[b]
U.S.	−6.17	−0.37	2.57
Japan	−1.75	−4.51	2.62
Canada	−4.88	−0.51	2.54
U.K.	−6.61	2.5	1.43
Australia	−1.83	−4.22	2.74

[a] Each t-statistic results from a difference of the means test comparing Monday's average return to the average return across the other trading days of the week.

[b] The last trading day is Saturday for Japan.

Table III

Test for Equality of Mean Return Across Days of the Week for Each Country[a]

Country	Degrees of Freedom (n_1, n_2)	F-Statistic[b] (F)
U.S.	4, 5388	13.68
Japan	5, 3687	6.09
Canada	4, 1990	7.27
U.K.	4, 8587	10.33
Australia	4, 2798	8.34

[a] The tests are based upon the regression (for each country)

$$r_t = \sum_{k=1}^{K} \alpha_k d_{t,k} + u_t$$

where K is the number of trading days in the week (5 or 6), and $d_{t,k}$ is a dummy variable for the k^{th} day of the week. The hypothesis tested is

$$\alpha_1 = \cdots = \alpha_k.$$

[b] $\text{Prob}(F > 3.32 \mid n_1 = 4, n_2 = \infty) = 0.01$;
$\text{Prob}(F > 3.02 \mid n_1 = 5, n_2 = \infty) = 0.01$.

II. The Structure of International Correlations and the Week-End Effect

The results of Section I suggest that each of our four foreign countries has a strong weekly pattern. It is important to determine whether these seasonal patterns are independent of that previously discovered in American common stock returns. We are particularly interested in whether the negative Tuesday returns in Japan and Australia are unique or, due to time zone differences, are merely a reflection of a world-wide Monday effect. In order to shed light on these issues, we investigate the relationships of returns across different countries. We first examine cross-correlations. Then more precise tests are presented.

We compute the correlation of daily returns on each foreign index with the daily returns on the S&P Index, for each pair of countries.[3] The results are reported at the bottom of Table IVA as the "overall" correlation.[4]

The correlations are generally significant with the largest positive values occurring for the contemporaneous calendar time returns. The highest correlation is between the U.S. and Canada (0.442), which is understandable because of the geographic proximity. By contrast, the returns in Australia are virtually uncorrelated (0.022) with returns on the S&P.

[3] For example, since our U.S. data originate in 1962 while the U.K. data start in 1950, the cross-correlations are calculated from data beginning in 1962.

[4] To conserve space, only pairwise correlations between the U.S. and a foreign country are presented in Table IV. However, correlations between any two foreign countries are generally quite similar to those in Table IV.

Table IV

Cross-Correlations: Day-of-the-Week Effects

Day of the Week	Japan	U.K.	Canada	Australia	Average
A. Contemporaneous Correlations of U.S. with Other Countries					
Monday	−0.036	0.090	0.419	0.087	0.111
	(−0.867)[a]	(2.81)	(8.57)	(1.87)	
Tuesday	0.042	0.036	0.306	0.106	0.101
	(1.05)	(1.19)	(6.44)	(2.50)	
Wednesday	0.077	0.061	0.347	−0.002	0.106
	(0.42)	(2.02)	(7.46)	(−0.44)	
Thursday	0.074	0.047	0.383	0.009	0.112
	(1.85)	(1.55)	(8.26)	(0.200)	
Friday	0.047	0.053	0.409	0.097	0.129
	(1.15)	(1.70)	(8.81)	(2.26)	
Average[b]	0.029	0.057	0.373	0.059	
Overall[c]	0.163	0.123	0.442	0.022	
Day of the Week (U.S.–Foreign)	**Japan**	**U.K.**	**Canada**	**Australia**	**Average**
B. U.S. Daily Correlation at Lead 1 with Other Countries					
Monday–Tuesday	0.076	0.129	0.062	0.177	0.102
	(1.86)	(4.16)	(1.20)	(4.08)	
Tuesday–Wednesday	0.162	0.109	0.143	−0.023	0.107
	(4.09)	(3.39)	(4.42)	(−0.55)	
Wednesday–Thursday	0.140	0.039	0.092	0.182	0.116
	(3.63)	(1.31)	(1.89)	(4.36)	
Thursday–Friday	0.147	0.102	0.153	0.059	0.125
	(3.69)	(3.31)	(3.03)	(1.35)	
Friday–Saturday	0.148				0.140
	(3.29)				
Friday–Monday	0.107	0.072	0.302	0.101	0.142
	(2.64)	(2.25)	(5.97)	(2.27)	
Average	0.130	0.090	0.150	0.099	
Overall	0.072	0.175	0.154	0.000	

[a] t-statistic is in parentheses.

[b] The average is computed from the contemporaneous correlations by day of the week.

[c] The overall correlation is computed without regard to the day of the week.

To investigate the possibility that the relationships between countries are stronger for some days of the week than for other days, cross-correlations are computed *conditional* upon the day of the week. We only report contemporaneous correlation by day of the week in Table IVA, and the lead 1 correlation by day of the week in Table IVB.

Although no statistical tests are performed, the average contemporaneous correlation coefficients across countries for each day, given in the last column of Table IVA, do not suggest any important differences across days. Similarly, from the far right of Table IVB, there appear to be no important differences in the lead 1 correlation across the different days of the week.

The average correlations presented in the next to the last row of Table IVA

are generally lower than the overall correlations presented in the last row of Table IVA. This likely reflects nothing more than a statistical artifact. For example, imagine that the returns for two countries are completely independent except that both have the same low expected return on Monday and the same high expected return on Friday. The contemporaneous overall correlations would be positive simply because of a common seasonal. However, the conditional correlations in Table IVA should be about zero since the means for each day of the week are subtracted from returns for these calculations.

A. A Test Based Upon Differences: The International Day-of-the-Week Effect

Tables I, IVA, and IVB provide important background information on the relationship between returns in the U.S. and the returns in different countries. The data suggest that, while there are some similarities in the day-to-day pattern of stock returns, important differences between foreign countries and the U.S. exist. In order to test this hypothesis formally, we examine whether $\alpha_{i1} = \alpha_{i2} = \cdots = \alpha_{i5}$ in the following equation:

$$R_{US,t} - R_{it} = \alpha_{i1}d_{1t} + \alpha_{i2}d_{2t} + \cdots + \alpha_{i5}d_{5t} + u_{it},^{5} \tag{2}$$

where $R_{US,t}$ is the return on the S&P on day t, and R_{it} is the return on the i^{th} foreign index on day t. A dummy variable is included for each weekday.

The F-statistic, the coefficients, and standard errors are reported in Table V for each country. In every case, the F-statistic is significant at the 5% level and in most cases it is significant at the 1% level. Thus, we conclude that the daily return patterns in the U.K., Japan, Australia, and Canada differ from the pattern in the U.S.

Because of time zone differences, the pattern of daily returns in Australia and Japan could be identical to, but one day ahead of, the pattern in the U.S. The large negative Tuesday returns for Australia and Japan are casual evidence in support of this. This hypothesis is examined by the following regression for both Japan and Australia:

$$R_{US,t} - R_{i,t+1} = \alpha_{i1}d_{1t} + \alpha_{i2}d_{2t} + \cdots + \alpha_{i5}d_{5t} + u_{it}.^{6}$$

The results of this regression, which are displayed in the bottom half of Table V, are mixed. On the one hand, the F-statistic for Japan has risen from 3.04 to 3.75, suggesting that the lagged difference does not explain the Japanese day of the week effect. On the other hand, the Australian F-statistic has fallen to 1.85, which is slightly less than the F-value for 10% probability of 1.94. This suggests that the daily pattern of Australian stock returns may be better described by lagging the American pattern by one day.

[5] We exclude Saturday returns from the Japanese regression since a Saturday return in Japan can have no contemporaneous return in the U.S.

[6] The Saturday return in Japan is ignored here. Thus, the Friday return in the U.S. is matched with the Monday return in Japan. Similar results occur when the U.S. Friday return is matched with the Japanese Saturday return.

Table V

Day-of-the-Week Effect for the Difference Between U.S. Return and Return in Foreign Country

Country	Monday (α_{i1})	Tuesday (α_{i2})	Wednesday (α_{i3})	Thursday (α_{i4})	Friday (α_{i5})	Degrees of Freedom	F
A. Regression: $R_{US,t} - R_{it} = \alpha_{i1}d_{1t} + \alpha_{i2}d_{2t} + \alpha_{i3}d_{3t} + \alpha_{i4}d_{4t} + \alpha_{i5}d_{5t} + e_{it}$							
Japan	−0.107[a]	0.124	−0.050	0.006	0.011	4, 3066	3.04
(1/6/70–4/29/83)	(0.051)	(0.047)	(0.049)	(0.049)	(0.048)		
Canada	0.058	0.006	0.003	0.089	−0.059	4, 1950	3.09
(1/2/76–11/30/83)	(0.036)	(0.032)	(0.034)	(0.034)	(0.033)		
U.K.	0.040	−0.0138	−0.048	0.016	0.014	4, 5281	3.20
(7/2/62–11/30/83)	(0.044)	(0.043)	(0.042)	(0.042)	(0.041)		
Australia	−0.095	0.136	0.041	−0.134	−0.089	4, 2670	3.88
(1/3/73–2/30/83)	(0.063)	(0.057)	(0.059)	(0.059)	(0.058)		
B. Regression: $R_{US,t} - R_{i,t+1} = \alpha_{i1}d_{1t} + \alpha_{i2}d_{2t} + \alpha_{i3}d_{3t} + \alpha_{i4}d_{4t} + \alpha_{i5}d_{5t} + e_{it}$							
Japan	−0.038[b]	−0.113	0.072	−0.039	0.098	4, 3066	3.75
(1/5/70–4/30/83)	(0.046)	(0.046)	(0.045)	(0.044)	(0.045)		
Australia	0.024	−0.032	−0.087	−0.104	0.072	4, 2665	1.85
(1/3/73-2/30/83)	(0.056)	(0.055)	(0.052)	(0.053)	(0.054)		

[a] Estimates are expressed as daily percentages. Standard errors of the regression coefficients are reported in parentheses below the estimates.

[b] This represents the mean difference between the U.S. return on Monday and the Japanese return on Tuesday.

Table VI

Test for Equality of Mean Stock Return Across Days of the Week for Each Country, Adjusted for U.S. Returns[a]

Country	$F(Q, N-K)$	$(Q, N-K)$
Australia	6.61[b]	(4, 2521)
U.K.	9.73	(4, 4904)
Japan	18.65	(4, 2884)
Canada	10.7	(4, 1825)

[a] The test is based upon the regression (for each country)

$$r_t = \alpha_1 r_{US,t-1} + \alpha_2 r_{US,t} + \alpha_3 r_{US,t+1} + \sum_{k=1}^{5} \beta_k d_{t,k} + u_t$$

where r_t is return on foreign country index, $r_{US,t}$ is the return on the U.S. stock index at day t, and $d_{t,k}$ is a dummy variable for the k^{th} day. The hypothesis tested is $\beta_1 = \cdots = \beta_5$.

[b] $\text{Prob}[F(4, \infty) > 3.32] = 0.01$.

B. A Test Based Upon a Market Model

The correlations of Table IV suggest that the daily returns of different countries and those of the U.S. are highly correlated. In order to take these correlations into account and determine whether the week-end effects are common with the U.S. rather than unique, we test whether $\alpha_{i4} = \cdots = \alpha_{i8} = 0$ for country i in:

$$R_{it} = \alpha_{i1} R_{US,t-1} + \alpha_{i2} R_{US,t} + \alpha_{i3} R_{US,t+1} + \alpha_{i4} d_{1t} + \alpha_{i5} d_{2t} + \cdots + \alpha_{i8} d_{5t} + u_{it}.^{7} \quad (3)$$

The F-statistic[8] is reported in Table VI for each country. The table strongly suggests a significant weekly seasonal in the return distributions of each country after allowing for the common effects of the American stock market and confirms the previous results based upon a test of equation (2) (see Table V). Thus, we can conclude that foreign investors confront a week-end effect in their respective stock markets independent of the week-end effect in the U.S.

III. Institutional Explanations: Settlement Procedures and Pricing Misquotes

Several empirical investigations have attempted unsuccessfully to link the weekly seasonal to U.S. settlement procedures.[9] We now discuss settlement procedures in foreign countries and their impact on daily returns.

[7] As in regression (2), the Saturday return for Japan is ignored. See footnotes 5 and 6.

[8] This statistic is determined by comparing the sum of squared errors from our regression with the sum of squared errors from the regression when d_{1t} to d_{5t} are not included. See Pindyck and Rubinfield [8].

[9] For example, see Gibbons and Hess [3] and Lakonishok and Levi [5].

Canada. A regular way purchase or sale of common stock requires delivery of securities and receipt of payment on the fifth business day after the transaction date.[10] For example, without holidays, a purchase on, say, Wednesday must be paid for on the following Wednesday.

An investor buying Canadian common stock at Friday close and selling at Monday close pays for the stock next Friday and receives cash next Monday. Since the cash payment occurs three days before the cash receipt, Canadian common stocks should have *high* expected returns on Monday.[11] Of course, our data show low returns on Monday. This settlement procedure should not affect the expected return on any other day of the week.[12]

Japan. Delivery of securities and receipt of payment on the Tokyo Stock Exchange occurs on the third business day after the day of transaction. An individual buying at Wednesday close and selling at Thursday close will pay cash on Saturday and receive cash on Monday. Since cash payment occurs two days before cash receipt here, Japanese common stocks should have *high* expected returns on Thursday. This is inconsistent with our empirical result that the average return in Japan is low on Thursday. The settlement procedure does not affect the expected return on other days of the week.[13]

The U.K. A trading year in the U.K. is divided into 24 or 25 "account periods", each being of either two- or three-week duration. Almost every account period begins on a Monday and ends on a Friday. Currently, settlement for all transactions during the account period occurs on the second Monday following the last Friday of the account period.[14]

An individual buying at the close of the last day of an account period (Friday) and selling at the close of the following Monday pays for his shares two or three weeks before he receives cash for selling the shares. Therefore, the rate of return on 24 Mondays per year should be high. However, an individual buying and selling within a single account period settles gains and losses on the account day

[10] On the settlement date, payment by certified check is made from the buying broker to the Canadian Depository for Securities, Ltd. (CDS), which in turn issues a certified check to the selling broker. Because checks are processed rapidly in Canada, banks generally credit or debit bank accounts of brokerage houses on the day of deposit. And, if the selling broker makes payment to the CDS so late in the day that the CDS bank account will not be credited until the following day, the CDS will generally charge the selling broker one day's interest. (This information was kindly provided by D. Wentley, M. Dougherty, and M. Willis of the CDS.) Thus, the bank float problems in U.S. stock transactions mentioned by Lakonishok and Levi should not arise in Canada.

[11] In addition, the standard deviation of returns is greater than average on Monday in Canada, as well as in all other countries. Since required returns are likely a positive function of risk, this result suggests another reason for a high Monday return.

[12] Holidays were ignored in footnote 11. To handle this issue, we calculated average "net" returns for each day of the week after implicit interest costs due to settlement were subtracted. These interest costs took holidays into account. Although we do not present the figures, the "net" results for Monday are lower than those in Table I while the "net" results for other days were quite close to those in Table I.

[13] In order to handle holidays properly, we calculated "net" returns for each day of the week in a manner analogous to what we had done for Canada (see footnote 12). As with Canada, we find that holidays have virtually no effect.

[14] For much of our sample period, settlement occurred on the second Tuesday following the last Friday of the account period.

without previously making a cash investment. Thus, required returns on other days during the account period should not reflect any implicit interest costs. Since Table I does not separate first Mondays in an account period from other Mondays, one should simply expect the average return across all Mondays in this table to be high. This, of course, is inconsistent with the results of Table I.

Using account period data from January 1, 1962 to December 31, 1983,[15] we calculate average returns across three samples: (1) all Mondays beginning account periods; (2) all Mondays not beginning account periods; and (3) all other days of the week beginning account periods. The results are given below:

	Column Sample		
	(1) Mondays Beginning Account Periods	(2) Mondays Not Beginning Periods	(3) First Days If Not Holidays
Average Return (%)	0.1480	−0.4486	0.2544
No. of Observations	488	569	57

The difference between column (1) and column (2) of 0.5966% = 0.1480% − (−0.4486%) has the predicted sign and is of a magnitude that can be justified by interest rates. Similarly, the average return of 0.2544 in column (3) is, as expected, above returns given in Table I.[16] The difference here is roughly comparable to that of Theobold and Price [9], who use a short (six-year) time period. However, while we are pleased that settlement effects show up here, the column (2) average return of −0.4486 is unexplained, just as the smaller negative average returns on Monday in other countries are unexplained.

Australia. Currently, the Australian stock exchanges permit the seller to deliver stock between one and ten business days after the transaction date.[17] Penalties are assessed if delivery is not made by the tenth day. Since the buying broker must pay upon receipt of the stock, sellers have a strong incentive to deliver as quickly as possible. Most institutions settle within 48 hours while about 65 to 70% of all deliveries occur within ten days.[18]

Because of the leeway in delivery, settlement effects in Australia are more difficult to analyze than in other countries. However, plausible scenarios can partially explain the high returns on Thursday and Friday, although probably not the low returns on Monday and Tuesday. Imagine that the marginal investor delivers in one day. Here, when buying on Thursday and selling on Friday, he would pay cash on Friday and receive cash on Monday. Thus, the Friday return

[15] These data were kindly supplied by the Settlement Services of the London Stock Exchange.

[16] Since a two-week period is 1/26th of a year, a difference of 0.5966% implies a yearly interest rate of approximately 0.5966% × 26 = 15.51%. The results of column (3) indicate a smaller implicit interest rate. The average return for the U.K. across Tuesday through Friday, 0.0680%, implies an "excess" return of 0.1864% = 0.2544% − 0.0680% for column (3). From this, we infer an approximate yearly interest rate of 0.1864 × 26 = 4.85%. Of course, one must be skeptical of this result because the sample size of 57 is quite small.

[17] During about half of our sample period, the outside limit was twenty days.

[18] This information was obtained from a conversation with R. Donahue of the Sydney Stock Exchange.

should be high due to two extra days of interest. Similarly, if settlement occurs within two days, Thursday should have the high return.

However, interest effects are unlikely to explain all of the high Thursday and Friday returns. For example, an annual interest rate of 10% translates into a two days yield of only 0.055%, assuming that daily interest rates are equal across all seven days of the week.

In sum, settlement procedures in the U.K., Japan, and Canada do not explain the weekly seasonal at all. In fact, seasonal patterns increase after an adjustment for settlement costs in each country. Procedures in Australia may account for part of the high returns on Thursday and Friday although probably not for the low returns on Monday and Tuesday.

It is possible that the way specialists close out their books on Friday could cause a week-end effect. Keim and Stambaugh [4] argue that upwardly biased quotes at the close of the week (for whatever reason) can cause high Friday (or Saturday) returns and low Monday returns. They argue that these "misquotes" can be diagnosed from two tests.

First, Keim and Stambaugh posit that quotations at Friday close are upwardly biased by a constant amount. They test this possibility on ten portfolios formed by ranking U.S. securities according to firm size. Keim and Stambaugh find that the average of Friday's (or Saturday's) mean return plus Monday's mean return is not significantly below the overall sample mean for each of the ten portfolios. However, a multivariate test over all ten portfolios yields significant results. Thus, they conclude that Friday (or Saturday) returns and Monday returns are not, on average, offsetting.

Our findings for foreign countries are consistent with theirs for the U.S. Although we do not present the results, the average of the mean return for Friday and the mean return for the following Monday is significantly below the average of the rest of the week for both Canada and the U.K. While we do not find a large difference here for either Japan or Australia, the strongly negative Tuesday return in both countries cannot easily be explained by measurement error on Friday.

Second, Keim and Stambaugh suggest that Friday's closing price might be affected by random errors which are generally positive, and Monday's closing price might be affected by generally negative random errors. If large positive errors on Friday are offset by large negative errors on Monday, the correlation between Friday's return and Monday's return would be low or even negative. However, Keim and Stambaugh find a higher than average correlation between returns on these two days for U.S. data. We repeat their tests for five countries in Table VII, also finding higher than average correlation between these two days. Thus, consistent with Keim and Stambaugh, we find no support for the random type of measurement errors.

IV. The International Week-End Effect and Foreign Currency Exchange

The evidence in previous sections suggests a seasonal pattern in common stock returns of five different countries. These results are of interest to an investor trading common stocks in his "home" country.

Table VII

Serial Correlation: Day-of-the-Week Effects (First Order)

	Country				
Day of the Week	Japan	U.S.	U.K.	Canada	Australia
Monday–Tuesday	0.012	0.048	−0.005	0.163	0.286
Tuesday–Wednesday	0.138	0.161	0.113	0.369	0.201
Wednesday–Thursday	0.149	0.169	0.184	0.369	0.294
Thursday–Friday	0.069	0.302	0.156	0.183	0.438
Friday–Saturday	0.236				
Saturday–Monday	0.141				
Friday–Monday		0.343	0.191	0.371	0.421
Overall[a]	0.122	0.187	0.128	0.283	0.338

[a] This refers to autocorrelation when all days of the week are included; it is not an average of coefficients across each pair of days of the week.

We now examine the day-of-the-week effect in foreign stock markets from the point of view of U.S. investors. This perspective requires that we consider daily currency exchange rates for each country. McFarland, Pettit and Sung [7] find that returns on foreign currencies to a U.S. investor are generally high on Mondays and Wednesdays and low on Thursdays and Fridays. Since the Friday–Monday result is the opposite of what we find in stocks, the foreign currency conversion may "offset" the common stock return. Therefore, if Americans are the marginal investors in foreign stock exchanges, an integration of foreign currency markets with stock markets may help to explain the day of the week effects of Table I.

To provide an overview, we first present daily foreign exchange return data, similar to that used in McFarland, Pettit, and Sung, by day of the week. We next integrate foreign exchange markets with foreign stock markets.

The Data. The foreign currency prices are dollar bids at 1:00 P.M. on the New York Interbank Market. Prices are observed on a daily basis from March 1973 to September 1981 for the British Pound, from December 1974 to September 1981 for the Japanese Yen, from February 1976 to September 1981 for the Canadian Dollar, and from December 1975 to September 1981 for the Australian Dollar. The return on a particular day is the percentage change in U.S. dollar bid prices from 1:00 P.M. on the previous trading day to 1:00 P.M. on the given day. The New York Interbank Market is open from Monday through Friday.

Foreign Exchange Seasonals. The foreign exchange average returns, by day of the week, are reported in Table VIII for the U.K., Japan, Canada, and Australia. A t-statistic resulting from a difference-of-the-means test between the average return on a particular day of the week and the average return on the remaining days is reported in parentheses. The evidence in Table VIII generally suggests significant daily seasonals similar to those found by McFarland, Pettit, and Sung. For example, there is a higher than average return on Wednesday and a lower than average return on Friday for all currencies.

There are some important differences between our findings and those of McFarland, Pettit, and Sung. No significant daily seasonal is apparent in Australian foreign exchange. Furthermore, with the obvious exception of Japan, we

Table VIII

Average Percent Daily Returns in Foreign Exchange for Four Countries (Dollar Values) by Day of the Week

Country	Monday	Tuesday	Wednesday	Thursday	Friday
U.K. (3/73–9/81)	−0.006	−0.014	0.094	−0.097	−0.056
Overall = −0.015	(0.40)[a]	(0.08)	(4.40)	(−3.24)	(−1.6)
Japan (12/74–9/81)	0.121	0.008	0.076	−0.065	−0.042
Overall = 0.017	(3.16)	(−0.38)	(1.75)	(−2.66)	(−1.94)
Canada (2/76–9/81)	−0.028	−0.032	0.014	0.025	−0.035
Overall = −0.011	(−1.06)	(−1.31)	(1.56)	(2.25)	(−1.5)
Australia (12/75–9/81)	−0.026	0.006	0.017	−0.005	−0.012
Overall = −0.003	(−1.39)	(0.42)	(1.09)	(−0.05)	(0.97)

[a] t-test statistic for difference between mean return for given day and mean return for rest of week.

do not find a positive average Monday return in foreign exchange. These differences may occur because our sample periods are generally longer than theirs and Canada is not included in their study.

Using the format of regression (1), we construct a test for differences in mean foreign exchange returns across days of the week. Although not reported, we find a significant day of the week effect in foreign exchange for the U.K. and Japan but not for Canada and Australia.

The seasonals presented in Table VIII are at least partially a function of settlement. Excluding Canada, spot foreign exchange settlement occurs two business days after the transaction. However, prior to September 1981, clearinghouse funds were acceptable payment when dollars were exchanged for another currency. These clearinghouse dollars became federal funds or "good" dollars on the next business day.

This arrangement leads to week-end games, as discussed by Levi [6], over our sample period. For example, an individual exchanging dollars for, say, francs on Tuesday would both receive francs and deliver clearinghouse dollars on Thursday. This would result in paying federal funds or good dollars on Friday. Reversing the transaction on Wednesday would result in paying francs on Friday while receiving good dollars on Monday. Since our trader could lend francs for one day while borrowing dollars for three days, Wednesday's return should reflect an extra two days of interest.[19]

Conversely, one can easily show that the Thursday return should be lower than average by two days interest. Spot settlement between the Canadian Dollar and the U.S. Dollar occurs after only one business day. Here, the analysis suggests that Thursday's return should be high and Friday's return should be low.

The sign of the theoretical settlement effects is borne out in every case; Wednesday's mean return is positive and Thursday's mean return is negative for all countries except Canada where Thursday's return is positive and Friday's return is negative.

[19] Actually, these effects will not net to exactly two days of interest if the franc-denominated interest rate differs from dollar-denominated interest rate.

Dollar Returns from Foreign Stock Market Investment. While it is pleasing that settlement effects seem to matter in foreign exchange, we are interested in these results mostly as background. Our primary purpose with foreign exchange data is to calculate rates of return from an American investor's viewpoint. These dollar-denominated returns are computed in Table IX for each country by day of the week. To illustrate, an American's total Monday return from investing in Japanese stocks is $(1 + R_{SM}) \cdot (1 + R_{FM}) - 1$, where R_{SM} is Monday's return on Japanese stocks, and R_{FM} is Monday's return on yen.

The sample values of average returns, standard deviation, kurtosis, and skewness by day of the week are reported for each index. U.S. investors in British and Canadian stocks confront a week-end effect that is consistent with previous findings. There is a negative average Monday return and a high positive Friday return. The results for Australia are consistent with this week-end effect but the results are no longer statistically significant. For Japan, the results are different from the previous findings. A U.S. investor's return from investing in Japanese stocks is positive on Monday and negative on Tuesday and Thursday.

Foreign Exchange Settlement and Stock Market Returns: The Cases of Japan and Canada. The above analysis does not consider settlement procedures. Because the settlement period for stocks differs from the settlement period for

Table IX

Average Percent Daily Returns for U.S. Investors in Foreign Stock Markets by Day of the Week: The Contemporaneous Calendar Time Case

Country	Monday	Tuesday	Wednesday	Thursday	Friday
UK (3/73–9/81)					
Mean (all days = 0.028)	−0.176	0.147	0.172	−0.123	0.092
Standard Error	0.098	0.086	0.081	0.086	0.080
Skewness	0.010	0.054	0.290	0.004	0.550
Kurtosis	2.118	2.111	0.770	2.982	5.786
Observations	344	389	402	397	398
Japan (12/74–9/81)					
Mean (all days = 0.018)	0.070	−0.101	0.187	−0.089	0.035
Standard Error	0.062	0.047	0.052	0.046	0.044
Skewness	−0.198	0.03	−0.230	−0.345	0.322
Kurtosis	4.143	1.197	3.085	1.924	1.314
Observations	271	292	299	302	296
Canada (2/76–9/81)					
Mean (all days = 0.025)	−0.192	−0.033	0.132	0.084	0.096
Standard Error	0.054	0.047	0.046	0.053	0.048
Skewness	−1.475	−0.953	−0.203	−1.624	−0.229
Kurtosis	5.560	3.459	1.939	7.537	9.368
Observations	251	282	291	281	281
Australia (2/76–9/81)					
Mean (all days = 0.067)	0.044	−0.162	0.076	0.247	0.087
Standard Error	0.079	0.051	0.048	0.046	0.044
Skewness	−3.048	−0.426	−0.044	−0.275	−0.091
Kurtosis	34.928	2.127	2.330	1.245	1.905
Observations	230	280	291	287	282

Table X

Transaction and Settlement Patterns in the Stock Market and Foreign Exchange

Transaction Set No.	Stock Market		Foreign Exchange	
	I	II	III	IV
	Transaction Dates	Settlement Dates	Transaction dates	Settlement Dates
		A. Japan		
1	Monday Buy Saturday, 2, Close[a]	Pay Wednesday, 6	Tuesday Buy ¥ Monday, 4[b]	Receive ¥ Wednesday, 6[c] Pay $ Thursday, 7
	Sell Monday, 4, Close	Receive Thursday, 7	Sell ¥ Tuesday, 5	Pay ¥ Thursday, 7 Receive $ Friday, 8
2	Tuesday Buy Monday, 4, Close	Pay Thursday, 7	Wednesday Buy ¥ Tuesday, 5	Receive ¥ Thursday, 7 Pay $ Friday
	Sell Tuesday, 5, Close	Receive Friday, 8	Sell ¥ Wednesday, 6	Pay ¥ Friday, 8 Receive $ Monday, 11*
3	Wednesday and Thursday Buy Tuesday, 5, Close	Pay Friday, 8	Thursday Buy ¥ Wednesday, 6	Receive ¥ Friday, 8 Pay $ Monday, 11
	Sell Thursday, 7, Close	Receive Monday, 11	Sell ¥ Thursday, 7	Pay ¥ Monday, 11 Receive $ Tuesday, 12
4	Friday Buy Thursday, 7, Close	Pay Monday, 11	Friday Buy ¥ Thursday, 7	Receive ¥ Monday, 11 Pay $ Tuesday, 12

	Sell Friday, 8, Close	Receive Tuesday, 12	Sell ¥ Friday, 8	Pay ¥ Tuesday, 12 Receive $ Wednesday, 13
	Saturday		Monday	
5	Buy Friday, 8, Close	Pay Tuesday, 12	Buy ¥ Friday, 8	Receive ¥ Tuesday, 12 Pay $ Wednesday, 13
	Sell Saturday, 9, Close	Receive Wednesday, 13	Sell ¥ Monday, 11	Pay ¥ Wednesday, 13 Receive $ Thursday, 14

B. Canada

	Monday		Friday	
6	Buy Friday, 1, Close	Pay Friday, 8	Buy C Thursday, 7[d]	Receive C Friday, 8 Pay US$ Monday, 11
	Sell Monday, 4, Close	Receive Monday, 11	Sell C Friday, 8	Pay C Monday, 11 Receive US$ Tuesday, 12
	Tuesday		Monday	
7	Buy Monday, 4, Close	Pay Monday, 11	Buy C Friday, 8	Receive C Monday, 11 Pay US$ Tuesday, 12
	Sell Tuesday, 5, Close	Receive Tuesday, 12	Sell C Monday, 11	Pay C Tuesday, 12 Receive US$ Wednesday, 13
	Wednesday		Tuesday	
8	Buy Tuesday, 5, Close	Pay Tuesday, 12	Buy C Monday, 11	Receive C Tuesday, 12 Pay US$ Wednesday, 13
	Sell Wednesday, 6, Close	Receive Wednesday, 13	Sell C Tuesday, 12	Pay C Wednesday, 13 Receive US$ Thursday, 14
	Thursday		Wednesday	
9	Buy Wednesday, 6, Close	Pay Wednesday, 13	Buy C Tuesday, 12	Receive C Wednesday, 13 Pay US$ Thursday, 14

Table X—*Continued*

Transaction Set No.	Stock Market		Foreign Exchange	
	I	II	III	IV
	Transaction Dates	Settlement Dates	Transaction dates	Settlement Dates
	Sell Thursday, 7, Close	Receive Thursday, 14	Sell C Wednesday, 13	Pay C Thursday, 14 Receive US$ Friday, 15
	Friday		Thursday	
10	Buy Thursday, 7, Close	Pay Thursday, 14	Buy C Wednesday, 13	Receive C Thursday, 14 Pay US$ Friday, 15
	Sell Friday, 8, Close	Receive Friday, 15	Sell C Thursday, 14	Pay C Friday, 15 Receive US$ Monday, 18*

[a] This indicates that Saturday is the second day of the month.
[b] ¥ denotes yen.
[c] US$ denotes U.S. Dollars.
[d] C denotes Canadian Dollars.
* Indicates investment of U.S. Dollars over week-end.

foreign exchange, we now match a transaction date in a stock market with another, generally different, date in the currency market. This is illustrated for Japan and Canada in Table X (and is discussed below).

The case of an American investing in a Japanese stock from Saturday close to Monday close is treated as transaction set 1. Assuming that Saturday is the second day of the month, the American buys stock on the close of Saturday the 2nd and sells stock on the close of Monday the 4th. Since the settlement period in stocks is three business days,[20] he pays for the security in yen on Wednesday the 6th, and receives yen for the security on Thursday the 7th. Because settlement occurs two business days following a foreign currency transaction, yen is purchased on Monday the 4th to pay for the stock, and yen is sold on Tuesday the 5th to convert the stock's sales proceeds to dollars. Thus, an American's total return is $(1 + R_{SM}) \cdot (1 + R_{FT}) - 1$, where R_{SM} is Monday's return on Japanese stock, and R_{FT} is Tuesday's return on foreign exchange. The remaining four transaction sets for Japan follow from the same principles.[21]

The Canadian settlement patterns are more straightforward because Canadian stocks do not trade on Saturday. Since the settlement period is long (five days) for Canadian stocks and short (one day) for Canadian foreign currency, the wait between a transaction in stock and a transaction in currency is greater in part B than in part A of Table X.

Implicit interest effects from each of the 10 sets of transactions in the table can be determined from column 4. In transaction sets 2 and 10, an American invests U.S. Dollars over a week-end while he invests U.S. Dollars for only one day in each of the other eight transaction sets. Thus, transaction sets 2 and 10 should have high rates of return.[22]

While the results of Table IX are dollar-denominated stock returns based on trading dates, Table XI presents dollar-denominated returns based on settlement dates. The seasonals in Table XI are closely related to the seasonals for foreign investors participating in their own stock market, as presented in Table I. In Table I, Japanese stocks do well on Wednesday and Saturday and poorly on Monday and Tuesday. In Table XI, the mean return for Saturday in the Japanese stock market (transaction set 5) is quite high and the mean return for Monday (transaction set 1) is the lowest of the five days. While Tuesday's return in Table XI is not as low as its return in Table I, the Table XI figure must be adjusted by

[20] While Saturday is not a business day for any foreign exchange transaction, it is a business day on the Japanese stock market.

[21] Note that transaction set 3 combines both the Wednesday return and the Thursday return from the Japanese stock market. It is not possible to combine separately either the Wednesday or the Thursday return with a foreign exchange transaction; both the Wednesday return and the Thursday return require a Saturday settlement, which is not allowed in the foreign exchange market.

[22] It should also be mentioned that the strategies in Table X make sense only if each closing foreign currency transaction can be placed *after* its paired stock market sale. This condition is necessary because the size of the currency transaction in terms of the foreign currency must equal the size of the stock market sale. Fortunately, this is always the case in our Table X. Even when both the stock market transaction and the foreign currency transaction of a pair occur on the same date, e.g., the two closing transactions on Transaction Set 3 in the table both occur on Thursday, the stock market transaction occurs first in calendar time. That is, the Japanese stock market closes at 3 P.M. Japanese time on Thursday or 1 A.M. New York time on Thursday, which is before the foreign exchange quotation time of 1 P.M. in New York.

Table XI

Average Percent Daily Returns for U.S. Investors in Foreign Stock Markets

Summary of Transaction Set	Transaction Set No.[a] 1 Monday Stock Return[b] Tuesday Foreign Exchange Return	2 Tuesday Stock Return Wednesday Foreign Exchange Return	3 Wednesday Stock Return Thursday Stock Return Thursday Foreign Exchange Return	4 Friday Stock Return Friday Foreign Exchange Return	5 Saturday Stock Return Next Monday Foreign Exchange Return
Japan (1/5/75–9/30/81)					
Mean	−0.059	−0.010	0.053	0.050	0.308
Standard Deviation	0.842	0.858	1.002	0.746	0.857
Standard Error	0.050	0.050	0.059	0.044	0.062
Skewness	−0.172	0.019	−0.016	0.325	0.928
Kurtosis	0.944	1.818	0.800	1.403	3.752
Observations	285	298	286	292	192

Summary of Transaction Set	Transaction Set No.[a] 6 Monday Stock Return Friday Foreign Exchange Return	7 Tuesday Stock Return Next Monday Foreign Exchange Return	8 Wednesday Stock Return Next Tuesday Foreign Exchange Return	9 Thursday Stock Return Next Wednesday Foreign Exchange Return	10 Friday Stock Return Next Thursday Foreign Exchange Return
Canada (1/05/76–9/30/81)					
Mean	−0.179	−0.005	0.078	0.083	0.175
Standard Deviation	0.807	0.815	0.771	0.858	0.805
Standard Error	0.050	0.050	0.046	0.050	0.049
Skewness	−1.651	−0.945	−0.433	−1.785	−0.040
Kurtosis	7.159	2.994	1.770	7.051	8.098
Observations	261	263	284	290	275

[a] These numbers are taken from Table X.

[b] The return for a given week for transaction set 1 is defined as $(1 + R_{SM})\ (1 + R_{FT}) - 1$, where R_{SM} is the Monday return on stocks, and R_{FT} is the Tuesday return on foreign exchange. The returns for the other nine transactions sets are defined in a similar manner.

two days of implicit interest. After this adjustment, Tuesday's return could be as low or lower than Monday's return. Unfortunately, Wednesday's stock market return and Thursday's stock market return must be combined (see footnote 21) so that the high Wednesday return in Table I cannot be verified in Table XI.

The fit between returns in Table I and returns in Table XI is perhaps even closer for Canada than for Japan. For example, for both tables the lowest average return occurs on Monday and the highest average return occurs on Friday.[23] In addition, for both Japan and Canada, the methodology of (1) was used for returns from the transaction sets of Table X. Although the results are not reported, they are significant for both countries. Thus, the seasonal in foreign exchange does not seem to offset the seasonal in the foreign stock markets when returns are computed by matching settlement dates in foreign exchange and the stock market.

The Case of the U.K. In the case of the U.K., the distinction between contemporaneous returns in trading time versus settlement time is not important. Because of the account period system, an investment by an American in English securities does not fit into a format such as Table X. Instead, we need focus only on two investment horizons, one stretching over two account periods and the other beginning and ending in the same account period.

First, consider an Englishman buying stock on the last Friday of an account period, say May 1, and selling on the following Monday (May 4), which is the first day of the next accounting period. This individual settles by investing pounds on Monday, May 11 and receiving pounds on Monday, May 25. Because the individual must tie up pounds for two weeks, we have argued that the return on Mondays should be high, a prediction inconsistent with our data.

Similarly, an American must tie up dollars for the same two weeks, converting dollars to pounds on May 11 and reconverting the proceeds back to dollars on May 25. This investment generates an opportunity cost unless pounds appreciate at a rate that is higher than the U.S. interest rate. This unlikely possibility did not occur over our sample period; Table VIII indicates that the pound actually depreciated. Thus, the negative return on Monday for the U.K. should almost certainly be adjusted downward, not upward, to reflect the opportunity costs of either American or British investors.

Next, consider an American buying British securities on any day but Friday and selling the next business day. The investor receives (pays) pounds on the account date if a gain (loss) occurs. Since no dollars are tied up over time here, there appears to be little likelihood that the profits we find on Tuesday through Friday on the LSE could actually result in losses for an American investor.[24]

[23] Of course, Friday's stock return (transaction set 10) in Table XI must be adjusted downward to reflect two days of implicit interest.

[24] One must posit what are, in our opinion, highly contrived situations in order to explain how the seasonal in English common stock returns can be offset by foreign currency fluctuations. For example, if a positive (negative) return on stocks on, say, Wednesday is generally followed by a continual drop (rise) in the British pound up to the account day, the average Wednesday return to an American could conceivably be negative while the average Wednesday return could be positive to an Englishman. We discount this possibility because it depends on strong cross-correlations between stock prices and later exchange rates, a relationship for which we find no support. By contrast, before viewing Table X, one could entertain scenarios where foreign exchange fluctuations offset stock returns for Japan and Canada, even though the scenarios do not depend on the above type of cross-correlation.

Thus, our findings of losses on Monday and gains on the other days of the week for an English investor should also hold for an American investor.

The Case of Australia. Because there is no precise delivery date for Australian stocks, we cannot integrate stock returns and foreign exchange fluctuations successfully here. However, since no seasonal pattern in Australian foreign exchange returns is uncovered from Table VIII, it is unlikely that returns in this market are offsetting returns in the Australian Stock Exchanges.

V. Conclusions

Our paper has examined daily stock market returns for the U.S., U.K., Japan, Canada, and Australia. We find the so-called week-end effect in each country. In contrast to previous studies of the U.S., the lowest mean returns for both the Japanese and Australian stock markets occur on Tuesday.

It is clear that there is a significant independent seasonal in the return distributions of each country after allowing for the common effects of the U.S. stock market. We conclude that foreign investors confront a week-end effect in their respective stock markets independent of the week-end effect in the U.S. The "time zone" theory is unable to explain the Japanese seasonal but may explain some of the Australian seasonal. We find no evidence that either measurement error or settlement procedures cause the weekly seasonal in stock market returns.

We examine daily foreign exchange rates for each country to determine if an integration of foreign currency markets with stock markets may help to explain the day-of-the-week effects—in particular if they "offset" the common stock returns to the U.S. investor. We conclude that the seasonals found in foreign exchange do not offset the seasonal in the foreign stock markets.

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