Small Firm Effect: Evidence from Korean Stock Exchange

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ABSTRACT. The objective of the paper is to examine the small firm and earnings' yield effects on the Korean stock returns during 1982–1988. We find that smaller (or high E/P ratio) firms obtain higher risk-adjusted returns, on average, than larger (or low E/P ratio) firms. We also document that the existence of January effect in Korean stock returns. Unlike the findings for the US market, stock returns of small and as well as large Korean firms are found to be 2 or 3 times higher in January than the other months. However, the well known tax-loss-selling hypothesis can not be used to explained these anomalies because there are no capital tax or loss offsets in Korea.

1. Introduction

The small firm effect refers to the persistent abnormal stock returns obtained by the small capitalization firms. This effect is hard to explain within the framework of an efficient market. Attempts have been made to explain this effect and a detailed discussion can be found in Isberg and Thies (1991). This phenomenon has been well-documented for the U.S. market. For example, see Banz (1981), Reinganum (1981), Basu (1983), Levy and Lerman (1985), Jaffe, Keim and Westerfield (1989), and Keim (1990). However, Keim (1983) and Reinganum (1983) find that nearly half of the size effect is a result of the January effect and that most of the January effect takes place in the first few days of the year. Reinganum (1983) explain the January effect in terms of tax loss selling. The tax-loss-selling hypothesis states that the price of shares that have previously declined further in December as owners sell shares to realise capital losses for tax purposes. This prices jump back to their fair level after the selling pressure.

There are only a few studies of this type in the Asian securities markets. For example, Wong and Lye (1990) reports that stock returns are related to both size and E/P ratio. They also find that the size effect appears to be of secondary importance when compared with E/P effect. Aggrawal, Rao and Hiraki (1990) find the existence of the E/P effect for the Japan market.

This study proposes to examine the small firm effect and other related anomalies in an Asian emerging market-South Korea. This has important implication for the fund management houses which are about to set up mutual funds solely investing in the Korean Stock Exchange (KSE). Previous work shows that stock portfolio of small firms can outperform that of the large firms in the US market. Thus, it is of practical use for the fund managers to see whether this small firm effect exists in these Asian equity markets.

The more opening of the equity market in the Asian-Pacific region during the 1980s have resulted in a rising interest in investing in these markets. This is evidenced by the creation of huge various investment funds that focus in this region by international fund management houses. To wit, it is important to examine the efficiency and functioning of these markets. There are several reasons for studying the KSE. First, the growth of the south Korean economy over the past three

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decades has been described by the World Bank as 'one of the outstanding success stories of international development'. Second, the KSE, likes some other Asian-Pacific markets, is a closed market. The governments impose stringent restriction on foreign investors which prohibits foreigners from investing in local stocks. However, the Korean government has already announced plans for the gradual internationalization of the securities market for the 1990s. Under the plans, foreign securities companies may establish branches in Korea. In addition, foreigners may invest in Korean stocks in 1992 but only within the limits set by the Korean securities authorities. The market is gaining importance because of the huge growth potential; therefore, it is necessary to examine the efficiency and functioning of the KSE.

Our findings show that common stocks of small (or high E/P ratio) firms obtain a higher risk-adjusted returns that those of large (or low E/P ratio) firms. The Korean stock returns are further found to 2 or 3 times higher in January than during the rest of the year. The results are similar for the small and as well as the large firms. The tax-loss-selling hypothesis are unable to offer a satisfactory explanation for these anomalies obtained in the KSE.

The paper is organized as follows. The next section provides a brief discussion about the institutional framework of the KSE. Section 3 presents the data sources and methodologies used in this study. We present the results and conclusions in the last two sections.

2. Institutional Framework

The KSE, located in Seoul, is Korea's only exchange. KSE was founded in 1956. Until 1 March, 1988, the government owned 68%, with the remainder in the hands of the 25 member firms. In 1988 the government sold its shareholding to these member firms. The Exchange's primary index is the Composite Stock Price Index, based on aggregate market value. The index has a base data of January 4, 1980, and a base index of 100.

The stock market is divided into first- and second-section markets. Transactions are handled as either regular-way or cash transactions; the distinction between the two being the settlement day. Regular-way transactions are settled on the second business day following the contract data. Settlement for cash transactions is due on the day of the transaction.

At the end of 1990, the market capitalization of KSE was US$110,301 million, which ranked KSE just behind Japan among Asian markets. A total of 669 companies are listed, all of which are domestic companies.

3. Data sources and Methodologies

The data for the study is drawn from "Pacific-Basin Capital Markets (PACAP) Databases 1990", of the University of Rhode Island for the period 1982–1988. The files contains data on all common stocks traded in the KSE from 1980 to 1988.[1]

In this study, the sample includes all stocks which had trading activity at least in January for that year and had positive E/P ratio at the end of the previous year. The number of firms in the sample varies annually between 162 and 274. The monthly rates of return of individual stocks and the two market indices, equally weighted and value-weighted, are drawn from the files. All of the return series are properly adjusted for the dividends are stock splits. The monthly average yields on the government and public bonds[2] are used as the risk-free rate for the KSE.

The methodology used here basically follows that proposed by Basu (1983). First, we divide the stocks into five firm firms size[3] categories in ascending order to obtain portfolios MV1–MV5. Second we divide the stocks into five E/P[4] categories to obtain EP1–EP5.

To control the interactive effect between the size and E/P effects, two sets of randomized portfolios are formed. Each of the five (EP1–EP5) portfolios is further divided into five subgroups according to their market sizes. These 25 subgroups are then recombined to form five randomized size portfolios (MV1*–MV*), of which has stocks with a similar E/P ratio. Similar procedures are used to construct five randomized E/P portfolios (EP1*–EP5*), each of which has stocks with a similar market size. Portfolio returns are then computed for each of the portfolios by computing the arithmetic average of the returns of stocks included in each of the portfolios.

TABLE I
The number of stocks included in each portfolio
Portfolio: Korea

Year	1*	2*	3*	4*	5*	Annual total
1982	32	32	32	33	33	162
1983	39	40	40	40	40	199
1984	43	43	43	43	43	215
1985	42	42	42	42	42	210
1986	44	45	45	45	45	224
1987	52	52	52	53	53	262
1988	54	55	55	55	55	274
Period total	306	309	309	311	311	1546

The assignment procedure is repeated for each year from 1982 to 1988. Table I gives the number of stocks included in each portfolio. The median values of market value and E/P ratio are presented in Table II. The non-randomized size (MV1–MV5) and earnings' yield (EP1–EP5) portfolios differ significantly in terms of market value and E/P ratio respectively. Moreover, the randomized size (MV1*–MV5*) differs significantly in terms of market values but having similar E/P ratios. Similar remarks can be made with the five (EP1*–EP5*) portfolios: They differ significantly in terms of E/P ratios, but have similar market values. MV1 represents the portfolio of stocks of the smallest firms. MV5 consists of stocks of the largest firms. EP1 is the portfolio with high E/P stocks, and EP5, with low E/P stocks.

TABLE II
The median values of market value and E/P ratio of each portfolio

	Portfolio	Market value (Mn in US dollar)		E/P ratio	
		Median	Range	Median	Range
Panel A					
Market value	MV1	2.4651	11.760	0.177	13.946
	MV2	5.4795	17.790	0.196	1.309
	MV3	9.8731	35.140	0.192	1.091
	MV4	17.5020	83.690	0.157	0.806
	MV5	48.3744	1145.880	0.126	0.772
Earnings' yield	EP1	13.1486	800.480	0.051	0.129
	EP2	15.0156	1161.250	0.114	0.176
	EP3	10.9488	566.870	0.171	0.242
	EP4	9.1676	749.150	0.255	0.338
	EP5	7.3729	117.680	0.451	13.790
Panel B					
Market value	MV1*	2.4656	17.810	0.172	13.946
	MV2*	5.6193	33.010	0.179	1.316
	MV3*	9.6181	57.720	0.172	0.966
	MV4*	17.3657	137.950	0.170	1.088
	MV5*	43.2692	1154.220	0.164	0.800
Earnings' yield	EP1*	11.0582	794.790	0.051	0.197
	EP2*	11.2759	1161.250	0.119	0.265
	EP3*	10.9488	536.130	0.178	0.346
	EP4*	10.9850	567.160	0.261	0.511
	EP5*	11.1446	749.610	0.435	13.861

4. Empirical Results

4.1. *Mean Reurn Analysis*

Panel A of Table III gives the average monthly returns, r_p, and the total risk (standard deviation), σ_p, for the MV and EP portfolios. The results suggest that a) portfolio of firms with smallest size (MV1) obtains the highest average monthly return, b) portfolio of firms with highest E/P ratio (EP5) also obtains highest average monthly return, and c) both portfolios record the highest returns per unit of total risk which is shown in the third column of the Table III. Panel B of the same table presents the results for the MV* and EP* portfolios. We find similar results as for the MV and EP portfolios that MV* and EP* portfolios obtain the highest returns. This implies that the effect persists even when the other one is controlled.

TABLE III
Results of mean return analysis for the non-randomized and randomized experimental portfolios: Korean Stock Exchange

Portfoilio	r_p (1)	σ_p (2)	$\frac{r_p}{\sigma_p}$ (3)
Panel A			
MV1	0.0444	0.0801	0.554
MV2	0.0361	0.0705	0.511
MV3	0.0367	0.0713	0.514
MV4	0.0310	0.0642	0.483
MV5	0.0278	0.0679	0.409
EP1	0.0326	0.0699	0.466
EP2	0.0319	0.0657	0.485
EP3	0.0318	0.0667	0.477
EP4	0.0386	0.0687	0.562
EP5	0.0408	0.0720	0.566
Panel B			
MV1*	0.0443	0.0810	0.546
MV2*	0.0382	0.0717	0.533
MV3*	0.0314	0.0638	0.491
MV4*	0.0328	0.0669	0.490
MV5*	0.0294	0.0664	0.442
EP1*	0.0309	0.0697	0.444
EP2*	0.0343	0.0695	0.494
EP3*	0.0345	0.0632	0.545
EP4*	0.0371	0.0701	0.530
EP5*	0.0388	0.0690	0.563

Notes:
r_p – mean monthly return of the experimental portfolio
σ_p – standard deviation of the experimental portfolio

To summarize, portfolios with small MV or high E/P ratio firms obtain higher monthly average returns during the sample period. The unit amount of risk is also found to be relatively better compensated for the small MV and high E/P ratio firms.

4.2. *Risk-Adjusted Return*

We use the Sharpe-Lintner version of the two-parameter CAPM to examine the effect of the size and E/P ratio effects on the risk-adjusted portfolio returns.

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_p(r_{m,t} - r_{f,t})$$

where:
$r_{p,t}$ – return on portfolio p at month t,
$r_{f,t}$ – risk-free rate at month t,
$r_{m,t}$ – return on the equally weighted market portfolio at month t,
β_p – systematic risk for portfolio p,
α_p – abnormal return for portfolio p.

The portfolio risk-adjusted returns are presented in Table IV. Panel A gives the results for the MV and EP portfolios. We find that a) portfolio of small firms (MV1) obtains the highest and the only positive risk-adjusted return (0.16%), b) portfolio of high E/P ratio firms (EP5) also obtains the highest risk-adjusted return, and c) portfolio with low E/P ratio (EP1 and EP2) record significantly negative risk-adjusted returns. We also observe that the systematic risk of portfolio is inversely proportional to its size and the smallest size portfolio has the highest systematic risk of 1.074. Again, the findings for the EP* and MV* portfolios are similar to their non-randomized counterparts and the results are given in Panel B. To confirm the existence of the two anomalies, Hotelling's multivariate T^2-test is used to test the hypothesis that the risk-adjusted returns for each set of portfolio are jointly equal to zero. For all the four cases, the F-statistics are significant at least at the level of 10%. This implies that the risk-adjusted returns of the experimental portfolios are not jointly equal to zero.

4.3. *January Effect*

To examine the seasonal effect in stock return of

TABLE IV
Some CAPM results for the experimental portfolios based on the Equally Weighted (PACAP) Market Return: Korea

Portfoilio	β_p (1)	α_p (2)	$t(\alpha_p)$ (3)	$F(\alpha_p)$ (4)
Panel A				
MV1	1.074	0.0016	0.46	11.20[c]
MV2	0.938	–0.0027	–0.84	
MV3	0.929	–0.0018	–0.51	
MV4	0.832	–0.0046	–1.37	
MV5	0.787	–0.0065	–1.35	
EP1	0.937	–0.0061	–1.97[b]	14.59[b]
EP2	0.892	–0.0055	–2.12[b]	
EP3	0.889	–0.0055	–1.80	
EP4	0.911	0.0006	0.19	
EP5	0.927	0.0023	0.59	
Panel B				
MV1*	1.089	0.0010	0.29	12.76[b]
MV2*	0.953	–0.0010	–0.32	
MV3*	0.863	–0.0052	–1.99[b]	
MV4*	0.860	–0.0036	–1.01	
MV5*	0.791	–0.0051	–1.10	
EP1*	0.952	–0.0082	–3.08[a]	15.44[b]
EP2*	0.946	–0.0047	–1.67[c]	
EP3*	0.860	–0.0020	–0.83	
EP4*	0.899	–0.0005	–0.13	
EP5*	0.900	0.0011	0.33	

Notes:
β_p – estimated systematic risk of the experimental portfolio
α_p – estimated abnormal return of the experimental portfolio
$t(\alpha_p)$ – *t*-statistic for the hypothesis that the abnormal return is equal to zero
$F(\alpha_p)$ – F-statistic for the hypothesis that the abnormal returns are jointly equal to zero
[a] – significant at 1%
[b] – significant at 5%
[c] – significant at 10%

KSE, we use the following dummy regression model:

$$r_{p,t} = \alpha_1 + \alpha_2 D_2,$$

where:
$r_{p,t}$ – the monthly return of portfolio p at month t,
D_2 – a dummy variable where $D_2 = 0$ at month t and $D_2 = 1$ for the rest of the year.

The regression is run 12 times, once for each month, to examine the seasonal pattern of the market portfolio during our sample period. The findings for the equally-weighted and value-weighted market portfolios are presented in Table V For both market portfolios, average returns in January are the highest and significantly larger than the other months.

We use the dummy regression model to examine the January effect in stock returns of the size and E/P portfolios. As shown in Table VI, α_1 denotes the average return for January and α_2 denotes the difference between the January average returns and the non-January average returns. We find that α_1 is significantly positive

TABLE V
Result of the dumy-variable regression based on two versions of market returns in Korea

Month	Equally weighted market portfolio		Valued-weighted market portfolio	
	α_1	α_2	α_1	α_2
1	0.090[a]	–0.054[b]	0.072[a]	–0.043[c]
	(3.844)	(–1.992)	(2.987)	(–1.706)
2	0.068[a]	–0.036	0.034	–0.002
	(2.615)	(–1.110)	(1.396)	(–0.068)
3	0.077[a]	–0.039	0.066[a]	–0.037
	(2.941)	(–1.442)	(2.731)	(–1.445)
4	0.022	0.020	–0.002	0.037
	(0.083)	(0.745)	(–0.067)	(1.479)
5	0.042	–0.001	0.032	0.001
	(1.586)	(–0.047)	(1.308)	(0.024)
6	0.038	0.003	0.032	0.001
	(1.451)	(0.094)	(1.297)	(0.035)
7	0.043	–0.003	0.056[b]	–0.026
	(1.628)	(–0.091)	(2.306)	(–1.010)
8	–0.019	0.077[a]	–0.029	0.067[a]
	(0.064)	(2.425)	(–1.235)	(2.742)
9	0.001	0.043	0.002	0.033
	(0.032)	(1.600)	(0.101)	(1.299)
10	0.028	0.014	0.025	0.009
	(1.069)	(0.495)	(1.006)	(0.340)
11	0.048[c]	–0.008	0.043[c]	–0.011
	(1.807)	(–0.278)	(1.761)	(–0.448)
12	0.050[c]	–0.010	0.059[a]	–0.029
	(1.888)	(–0.361)	(2.448)	(–1.155)

Notes:
[a] – significantly different from zero at 1%
[b] – significantly different from zero at 5%
[c] – significantly different from zero at 10%
Figures in parentheses are the t-value of OLS coefficients.

TABLE VI
Results of the dummy-variable regression for January effect: for Korea (KSE)

		Jan α_1 (1)	Non-Jan α_2 (2)			Jan α_1 (3)	Non-Jan α_2 (4)
Panel A							
Market value	MV1	0.098 (3.277)[a] [0.041]	−0.058 (−1.868)[c]	Earnings' yield	EP1	0.096 (0.090) [0.002]	−0.402 (−0.362)
	MV2	0.074 (2.782)[a] [0.026]	−0.038 (−1.482)		EP1	0.076 (3.083)[a] [0.041]	−0.048 (−1.860)[c]
	MV3	0.072 (2.683)[a] [0.023]	−0.038 (−1.373)		EP1	0.085 (3.449)[a] [0.058]	−0.058 (−2.251)[b]
	MV4	0.091 (0.087) [0.002]	−0.038 (−0.359)		EP1	0.075 (2.905)[a] [0.026]	−0.040 (−1.471)
	MV5	0.083 (3.303)[a] [0.060]	−0.060 (−2.291)[b]		EP1	0.086 (2.905)[a] [0.036]	−0.049 (−1.751)[c]
Panel B							
Market value	MV1*	0.101 (3.357)[a] [0.045]	−0.062 (−1.971)[c]	Earnings' yield	EP1*	0.094 (3.705)[a] [0.076]	−0.069 (−2.602)[a]
	MV2*	0.082 (3.079)[a] [0.035]	−0.048 (−1.727)[c]		EP2*	0.076 (0.073) [0.001]	−0.037 (−0.341)
	MV3*	0.065 (2.716)[a] [0.026]	−0.037 (−1.470)		EP3*	0.075 (3.168)[a] [0.037]	−0.044 (−1.783)[c]
	MV4*	0.086 (0.083) [0.002]	−0.038 (−0.353)		EP4*	0.086 (3.291)[a] [0.044]	−0.053 (−1.949)[c]
	MV5*	0.082 (3.341)[a] [0.058]	−0.057 (−2.239)[b]		EP5*	0.086 (3.364)[a] [0.032]	−0.052 (−1.939)[c]

and α_2 is significantly negative for most of the portfolios. This implies that most MV, EP, MV*, and EP* portfolios exhibit significantly larger returns in January than during the rest of the year.

5. Conclusion

This study examines the small firm and E/P effects in the KSE for the period 1982–1988. The common stocks of small (or high E/P ratio) firms appear to obtain, on average, higher monthly returns that those of the large (or low E/P ratio) firms. The effects persist even after the other effect is controlled. Similar conclusions are drawn for the case of risk-adjusted return. Further analysis shows that market portfolios in KSE exhibit significantly higher returns in January than the other months. Similar results are also found for the MV, EP, MV* and EP* portfolios. The difference is found to be a large as 2 or 3 times. Instead of dividing the stocks into 5 portfolios, we also separate them into 3 portfolio: MV1–MV3,

EP1–EP3, MV1*–MV3*, and EP1*–EP3* and repeat all the analysis. Interestingly, the additional findings[5], though not reported here, are essentially the same. It can be concluded that the results are robust to the number of portfolios.

Attempts have been made to explain the January effect in US market since the stock returns are significantly higher in January. For example, the tax-loss-selling hypothesis states that investors sell stocks near year-end to realise capital loss to minimize tax payments. After the end of the year, this selling pressure is off the prices jump back to their fair level. However, the Korean government does not impose any capital gain tax on the local investors and the market is relatively closed for any foreign investors. Therefore, this study provides an international evidence that the tax-loss-selling hypothesis can not be used to explained these anomalies. Nevertheless, it can be concluded that these anomalies are not unique to the US market and, in fact, exist in the Asian-Pacific emerging markets. Further research remains to be done to try and explain these anomalies.

To summarize, stock portfolio of small firm (MV1) in the KSE has obtained, on average, a positive risk-adjusted return of 0.16%. Similar results are obtained for the randomized portfolio of small firms (MV1*). As a result, the findings suggest that it is more profitable to invest in the Korean small capitalization firms. It seems to be a good investment channel to invest in the mutual funds that solely invest in the Korean small firms.

Notes

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[1] The tape contains data on all common stocks traded in KSE from 1980 to 1988. Unfortunately, the relevant information needed to calculate the E/P ratio is only available starting from 1981. Therefore, the period of study is from 1982 to 1988.

[2] The data are obtained from the Monthly Statistical Bulletin, published by the Bank of Korea.

[3] The market capitalization for each stock at the end of each calendar year is computed by multiplying the stock market price at the end of year by the total number of outstanding shares at year end.

[4] E/P ratio is computed as follows:

$$E/P = \frac{EPS}{\text{end-year stock price}},$$

where

$$EPS = \frac{\text{Earning after tax} - \text{Extraordinary items} - \text{Preferred stock dividends}}{\text{Number of outstanding shares at year end}}$$

All of the relevant data are obtained from the PACAP 1990 Databases.

[5] Additional results are available from the authors.

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