The Effects of International Diversification on the Risk of a Firm

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I. Introduction

The international diversification of operations may have two effects on the risk of a firm. First, to the extent that foreign earnings are not perfectly correlated with earnings from domestic operations, the variability of earnings stream may be reduced. Second, international diversification allows a firm to depend on the domestic economy less than without the international diversification. If the multinationality of a firm is recognized in the stock market, then shares of the firm should be less dependent on the movement of the domestic stock market than a domestic firm would be.

Rugman (1975, 1976, 1977) emphasizes a reduction in the total risk of earnings as an important economic motive for foreign direct investments by multinational corporations (MNCs). Rugman shows that the variance of profits is inversely related to the percentage of foreign sales. Any incentive to stabilize the earnings stream may, however, be contradictory to a goal of shareholder wealth maximization. Using option pricing theory, Galai and Masulis (1976) demonstrate that a reduction in the variability of a firm's earnings and value may increase systematic risk and result in a transfer of wealth from sharehol-

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ders to bondholders. Based on such arguments, Amihud and Lev (1981) advance a managerial motive for conglomerate mergers, to reduce the nondiversifiable employment risk of management. Because this risk is related to the operational risk of a firm, management may diversify operations internationally to reduce earnings variability. Shapiro (1978) conjectures that a reduction in total earnings variability could enable MNCs to achieve higher financial leverage, leading to a reduction in their marginal cost of capital since the risk of bankruptcy for a firm is dependent on total earnings variability instead of systematic earnings variability. However, an increase in financial leverage at any stage cannot always reduce the cost of capital.

Although it is doubtful whether a reduction in the total risk of earnings necessarily benefits shareholders, the multinationality of a firm may provide a reduction in the systematic risk of earnings; a transformation of a portion of domestic systematic risk into nonsystematic risk that can be diversified away by international diversification. Empirically, Severn (1974) finds that the greater the foreign involvement of a firm, the lower the covariance of its earnings per share with Standard and Poor's Composite Index. Moreover, Gordon and Halpern (1974) demonstrate a close positive correlation between the systematic risk of a firm's earnings and its market systematic risk (domestic beta), which implies that the market recognizes operational characteristics of a firm. Thus, if MNCs achieve reductions in the total and systematic risk of earnings, the result may be lower market systematic risk for MNCs relative to domestic companies.

Consequently, at a given rate of return, the lower level of systematic risk of MNCs assigned by the domestic stock market may result in the appearance of abnormal performance of investment in the shares of MNCs. Empirically, Hughes, Logue and Sweeney (1975), Mikhail and Shawky (1970) and Aggarwal (1980) show some evidence supporting the outperformance of investment in U.S.-based MNCs relative to investment in U.S. domestic firms. Furthermore, these studies have been cited as supporting evidence on the hypothesis of

benefits based on an imperfect international capital market from foreign direct investments by MNCs. This hypothesis states that operational diversification through foreign direct investment may provide benefits to shareholders, who face some difficulties in diversifying their own portfolio internationally.[1] Unlike operational diversification across industries by conglomerate[2] mergers within a country where homemade portfolio investment is easily executed, operational diversification across countries by foreign direct investment may provide diversification service to shareholders. However, it is doubtful whether the domestic systematic risk of a MNC can represent the total systematic risk of a MNC with which the expected rate of return should be corresponded. Agmon and Lessard (1977) argue that the total systematic risk of a MNC should be a weighted sum of the systematic risks associated with domestic market portfolios of the countries where the MNC has operational bases. Thus, the use of only the U.S. portion of the total systematic risk of a U.S.-based MNC may produce an upward bias in the empirical results regarding MNC performance. For instance, Hughes, Logue and Sweeney (1975) show that when systematic risk is calculated in association with an international market index, investment in MNCs does not outperform that in domestic firms.

The purpose of this study is to examine the relationship between market systematic risk associcated with the domestic stock market and the earnings variability of a firm after adjusting for firm size. More specifically, we hypothesize that MNCs have lower domestic market systematic risk as well as lower earnings variability. Therefore, a significantly positive relationship may exist between domestic market systematic risk and earnings variability after adjusting for size.[3] Such a relationship may suggest that stable earnings stream owing

(1) For a detailed discussion on this hypothesis, see Ho C. Yang (1983).

(2) The availability of homemade portfolio investments within a domestic market may cause the risk-adjusted performance of conglomerate firms to be insignificantly different from that of single firms or portfolio or to provide no substantial benefits to shareholders. For more details, see Levy and Sarnat (1970), Ellert (1976), Halpern (1973), Mandelker (1974) and Dodd (1980).

(3) Large firms may have more stable earnings owing to product diversification.

to international diversification of operation is an important factor in explaining the low level of domestic systematic risk for MNCs, which, in turn, implies market recognition of multinationality of a firm.

In addition, the validity of domestic systematic risk of a MNC as an appropriate measure of total systematic risk is examined. We hypothesize that the explanatory power of domestic market systematic risk in accounting for rate of return is relatively poor for MNCs. Furthermore, the risk premium associated with domestic systematic risk is expected to be smaller for MNCs than for domestic firms since a partial risk premium should be compensated for a partial systematic risk.

In the following section II, the sample and data used in this study are described. Descriptions of the methodologies for the empirical tests and analyses are discussed in section III. Finally, a summary and conclusions are presented in section IV.

II. Sample and Data Description

A sample of 135 U.S.-based MNCs is drawn based on two previous studies; 187 U.S.-based MNCs identified by Vaupel and Curhan (1973) and 187 U.S.-based MNCs with more than 10% of foreign involvement suggested by Bruck and Lees (1968). From these firms, 135 MNCs are selected which meet the following criteria:

a. Each firm must have continuous data available on the Center for Research in Security Prices (CRSP) monthly file and on the Compustat industrial annual file from 1962 to 1979.
b. Each firm must have been identified by both Vaupel and Curhan (1973) and Bruck and Lees (1968).

A sample of domestic firms is obtained from the 1963 Fortune's list of the 500 Largest U.S. Industrial Corporation after eliminating the 187 MNCs suggested by Bruck add Lees. From these firms, 135 domestic firms are selected

arbitrarily after eliminating firms without continuously available data or firms that have increased the extent of foreign involvement substantially from 1965 to 1979. (4) The statistical data for this screen are obtained from the publication by *Forbes* in 1979. (5) Monthly and daily dividend-adjusted rates of return are obtained from the CRSP files for the time period of January 1963 to December 1978. Monthly and daily market indices are drawn from the market value-weighted index and the equal-weighted index of the CRSP index files. For other financial profiles, all data are obtained from the Compustat industrial annual file.

Financial Profile of MNCs and Domestic Firms

A substantial amout of evidence has shown the need to consider explicitly size effects and dividend effects when comparing the risk-adjusted performance of shares. Recent studies by Banz (1981) and Reinganum (1981a, b) have shown that small firms realize higher average rates of return than large firms, even after accounting for differences in estimated betas of firms. Brennan (1970), Elton and Gruber (1970) and Litzenberger and Ramaswamy (1979, 1982) show a positive and significant relationship between dividend yield and common stock returns, which is mainly attributed to the disadvantage of dividends with respect to personal taxes. Furthermore, Hamada (1972) and Rubinstein (1973) show that the systematic risk of a firm is positively related to its financial leverage. A firm with lower financial leverage is expected to have less systematic risk than another firm with a higher financial leverage, assuming the two firms are identical in every other respect. Thus, if the two samples are different from one another with respect to these financial variables, any empirical results might be biased.

Table 1 shows some financial data of the sample of MNCs and domestic firms

(4) For example, Xerox and Sun Oil Co. that were not included in the sample of MNCs based on 1965 data have increased foreign involvement substantially during this time period.
(5) Source: "The 150 Largest U.S. Multinationals," *Forbes*, June 25, 1979.

Table 1. Financial Profile of MNCs and Domestic Firms[1]

	Size[2]		LV[3]		DP[4]		BETA[5]		RETURN[6]		CV[7]		DY[8]	
	MNC	DC[9]	MNC	DC	MNC	DC	MNC	DC	MNC	DC	MNC	DC	MNC	DC
Mean	1077.69	375.30	0.47	0.55	0.52	0.48	1.07	1.33	0.0161	0.0175	0.37	0.53	0.031	0.033
Std.	1469.03	635.90	0.93	0.75	0.16	0.22	0.23	0.31	0.0097	0.0116	0.24	0.42	0.02	0.03
ANOVA F-value	23.57**		0.61		1.94		35.50**		1.23		14.58**		0.42	

[1]All data are calculated employing observations from 1963 to 1978.
[2]Market value of equity (closing stock price multiplied by number of shares outstanding) is employed as a proxy for firm size ($ mil).
[3]LV (leverage ratio) is measured by long-term debt/common equity.
[4]DP (dividend payout ratio) is measured by dividends per share/earnings per share.
[5]BETA is measured in association with the CRSP dividend-adjusted value weighted monthly market index.
[6]RETURN is the average of monthly returns.
[7]CV (coefficient of earnings variation) is measured by the standard deviation of annual earnings/average earnings.
[8]DY (dividend yield) is measured by dividends/previous closing stock price.
[9]DC denotes domestic firms.
**Significant at the 0.01 level.

and ANOVA test statistics for the differences in such data between the samples. Although all firms in both samples are derived from the 1963 Fortune's list of the 500 Largest U.S. Industrial Corporations, the average market value of MNCs is significantly larger than that of domestic firms during 1963 to 1978. On the other hand, the systematic risk of MNCs measured in association with the CRSP value-weighted market index is significantly smaller than the average beta of domestic firms.(6) The earnings variability, measured by the coefficient of variance, of MNCs is also significantly smaller than that of domestic firms, which is consistent with findings by Rugman. Other financial data (financial leverage ratio, average monthly rate of return, dividend payout ratio and dividend yield) show no significant difference between the sample of MNCs and the sample of domestic firms. Thus, as far as Treyner's performance index is concerned, MNCs tend to have higher risk-adjusted performance than domestic firms, which is consistent with previous findings.

(6) This relationship is robust when the equal-weighted CRSP market index is employed. Furthermore, when betas are measured by the ordinary least square method and the method suggested by Scholes and Williams (1977) employing daily value-weighted and equal-weighted data, this relationship still remains.

Even though the sample of domestic firms show significantly smaller market value than that of MNCs, the small firm size effect is not expected to affect excess returns of the domestic firms significantly since the domestic firms are relatively large.[7] However, the firm size effect will be incorporated in the following empirical tests.

III. Methodology and Analysis

Domestic Systematic Risk and Earnings Variability

The domestic systematic risk of a firm is obtained from the market model given by:

$$R_{jt}=\alpha_j+\beta_j R_{dt}+\tilde{\delta}_{jt} \tag{1}$$

where R_{jt}=the rate of return on stock j at time t

R_{dt}=the rate of return on a domestic market index

$\beta_j=\text{cov}\ (\tilde{R}_j, \tilde{R}_d)/\sigma^2(\tilde{R}_d)$

$\tilde{\delta}_{jt}$=a random term with the following stochastic properties

$E(\tilde{\delta}_{jt})=0$

$\text{Cov}(\tilde{\delta}_{is},\ \tilde{\delta}_{jt})=\sigma_{ij}$ for all $s=t$ and for all i and j

$=0$ otherwise.

Monthly data from 1963 to 1978 are employed to measure the domestic systematic risk of a firm. The coefficient of variation of earnings (CV) is employed as a proxy for size-adjusted earnings variability. The annual data from 1963 to 1978 are used for CV and size of a firm (S).

In order to examine the relationship between a firm's systematic risk and its degree of earnings variability, the following two linear regressions are estimated.

$$\beta_i=\alpha_0+\alpha_1 S_i+\tilde{\varepsilon}_i \tag{2}$$

$$\beta_i=\alpha_0'+\alpha_1' CV_i+\tilde{\varepsilon}_i' \tag{3}$$

These regressions are fitted both for all sample firms as well as for the sample

(7) The domestic firms employed in this study are relatively large firms when compared with all firms listed on the AMEX and the NYSE (over 2500 firms), which were employed by Reinganum. The domestic firms are expected to be ranked at least within the third largest market value portfolio out of ten portfolios employed by Reinganum (1981b).

Table 2. The Relationship between the Systematic Risk and Size of Firms

Model	Sample	Number of Firms	$\hat{\alpha}_0$	$\hat{\alpha}_1$	PR>F	R^2
2	ALL	270	1.2002** (50.53)	−0.0653** (−4.39)	0.0001	0.074
	MNC	135	1.1248** (44.49)	−0.0411** (−2.95)	0.0038	0.069
	DC	135	1.2634** (39.68)	−0.1071* (−2.48)	0.0146	0.048

The Relationship between the Systematic Risk and Earnings Variability of Firms

Model	Sample	Number of Firms	$\hat{\alpha}_0'$	$\hat{\alpha}_1'$	PR>F	R^2
3	ALL	270	1.0427** (36.61)	0.2358** (4.73)	0.0001	0.086
	MNC	135	0.9766** (26.50)	0.2641** (3.15)	0.0021	0.077
	DC	135	1.1314** (25.17)	0.1739** (2.62)	0.0099	0.055

**Significant at the 0.01 level.
*Significant at the 0.05 level.
Size(average market value of equity), in eq. (2), is divided by 1,000 million before running the regression. These tests employ the value-weighted CRSP monthly data.
The figures in parentheses indicate t-values.

MNCs and the sample of domestic firms separately.

The results of the regression analyses are reported in Table 2. The first regression line is obtained by regressing the domestic systematic risk of a firm (β_i) on the size (market value) of a firm. The hypothesis of zero slope of the regression line is rejected at the 0.01 level. The sign of the coefficient of the slope term (α_1) is negative (−0.0653) and significant at the 0.01 level. This result shows that larger systematic tends to be associated with smaller firm size, which is consistent with the relationship shown by Reinganum (1981b). This result is intact when the regression line is fitted for the sample of MNCs and the sample of domestic firms at the 0.05 level. The second regression line is constructed by regressing β_i cross-sectionally on the coefficient of variation of the annual earnings (EBIT). The second block in Table 2 shows that the sign of the slope term is positive (0.2358) and it is significantly different from zero. This finding remains unchanged when the second regression line is fitted for the sample of MNCs and the sample of domestic firms. A firm with a

relatively stable earnings stream tends to have a low level of systematic risk.

In order to examine whether CV_i can add to the explanatory power of S_i in explaining the variation of β_i, two new regressions are fitted based on the following models:

$$\beta_i=\gamma_0+\gamma_1 S_i+\gamma_2 CV_i+\tilde{Z}_i \tag{4}$$

$$\beta_i=\gamma_0'+\gamma_1'\tilde{R}_i+\tilde{Z}_i' \tag{5}$$

where $\tilde{R}_i$ is the pure earnings variability of the ith firm measured by a residual from regressing CV_i on S_i. The results of these analyses are reported in Table 3. The first regression line may suffer from econometric problems due to a

Table 3. The Relationship between the Systematic Risk and Size-Adjusted Earnings Variability of Firms

Model	Sample	$\hat{\gamma}_0$	$\hat{\gamma}_1$	$\hat{\gamma}_2$	PR>F	R^2
4	ALL	1.0877** (34.69)	−0.0535** (−3.67)	0.2340** (4.72)	0.0001	0.16
	MNC	1.0351** (25.76)	−0.0365** (−2.68)	0.2309** (2.82)	0.0003	0.13
	DC	1.1570** (23.05)	−0.0871** (2.02)	0.1948** (2.89)	0.0008	0.12

Model	Sample	$\hat{\gamma}_0'$	$\hat{\gamma}_1'$	PR>F	R^2
5	ALL	1.1539** (65.43)	0.2340** (4.53)	0.0001	0.08
	MNC	1.0917** (50.98)	0.1733* (2.06)	0.0414	0.04
	DC	1.2136** (43.36)	0.2110** (3.09)	0.0125	0.08

**Significant at the 0.01 level.
*Significant at the 0.05 level.
The figures in parentheses are t-values.

high degree of multicollinearity;[8] the estimates of the regression coefficients may be imprecise of the large variance of the least square estimators. However, since the difference between R^2 (0.16) and the "R^2 deletes" (0.08) is not small, the degree of multicollinearity is not harmful.[9] The introduction of CV_i into the regression equation (2) leads to a substantial increase in R^2 (from 0.03 to 0.16). All regression coefficients are significantly different from zero

(8) The correlation coefficient between S_i and CV_i is 0.18.
(9) For a detailed discussion on the measure of multicollinearity, see Kmenta (1971).

at the 0.05 level and the signs of $\hat{r}_1$ and $\hat{r}_2$ are consistent with the results shown in Table 2. In particular, the coefficients of CV_i are still positive and significantly different from zero at the 0.01 level for all cases. The $\hat{r}_1$ in the second regression line, which represents the effects of pure earnings variability on the variation of β, are significantly positive at the 0.05 level for all cases. Thus, after adjusting for firm size, a firm with lower earnings variability still have lower domestic systematic risk. This result seems to be contradictory to the argument by Bowman (1979) that earnings variability is not directly associated with market systematic risk. However, at a given level of earning variability for the market portfolio, a firm with a stable earnings stream may have a low covariability with the variability of the earnings of the market portfolio.

The stock market seems to regard a stable earnings stream of a firm as a less dependent on the U.S. economy and thus enable its stock price less likely to move with the rest of the U.S. stocks. MNCs have earnings stream that is significantly more stable than that of domestic firms, and there is a significantly positive relationship between domestic systematic risk and earnings variability. As hypothesized, stable earnings stream of MNCs can explain why MNCs tend to have a low level of domestic systematic risk, which also implies that the stock market recognizes the multinationality of a firm.

Expected Rate of Return and Domestic Systematic Risk

In order to examine the explanatory power of domestic systematic risk, the ex post Black's (1972) capital asset pricing model (CAPM) is employed.

$$\tilde{R}_{jt}=\hat{r}_{ot}+\hat{r}_{1t}\beta_j+\tilde{Z}_{jt} \tag{6}$$

where $\hat{r}_{ot}, \hat{r}_{1t}$=market-determined variables denoting the ex post relationship between risk and return at time t

$\tilde{Z}_{jt}$=a disturbance term

Empirical estimates, $\hat{r}_{ot}$ and $\hat{r}_{1t}$ for $\tilde{\gamma}_{ot}$ and $\tilde{\gamma}_{1t}$ are obtained by fitting the empirical

market line given by:

$$\tilde{R}_{jt}=\hat{r}_{ot}+\hat{r}_{1t}\hat{\beta}_j+\tilde{Z}_{jt} \quad (7)$$

where $\hat{\beta}_j$ is the estimate of β_j, which can be measured from the market model. In order to reduce bias in results due to measurement errors in β_j, the grouping with an instrument variable suggested by Black, Jensen and Scholes (1973) is adopted for the sample of MNCs and for the sample of domestic firms. For each sample, the procedure involves the following steps:

1) Estimate the beta (β_i) of each stock over the period of January 1963 to December 1969 employing CRSP monthly return data based on equation (1).

2) Rank the stocks by beta and place into 27 portfolios (each portfolio has 5 stocks).

3) Calculate the monthly returns for these portfolios for January 1970 to December 1970.

4) Obtain the monthly returns from 1971 by repeating the above steps using years from 1964 to 1970 forming portfolios, and so on. This procedure produces a time series of 96 monthly returns for each of the 54 portfolios over the period of January 1970 to December 1978.

Applying these 96 monthly returns to the portfolio version of the market model produces estimate of beta for each portfolio, $\hat{\beta}_p$. Finally, in order to estimate $\tilde{\gamma}_0$ and $\tilde{\gamma}_1$, a second-stage pooled cross-sectional regression is constructed based on the following equation:

$$R_{pt}=\hat{r}_0+\hat{r}_1\hat{\beta}_{pt}+\tilde{Z}_{pt} \quad (8)$$

The grouping procedure is expected to reduce the measurement errors in β_j. However, in the second-stage regression no procedure is employed to reduce bias in the $\hat{r}_1$ of MNCs due to the omission of possibly relevant explanatory variable (foreign systematic risk). If the stock market takes the multinationality of a firm into consideration, foreign systematic risk (or international systematic risk) may be relevant explanatory variables. In this case, the omission of such variable will reduce the explanatory power of the domestic CAPM.

Note that the main purpose of the test is not to investigate the validity of

the CAPM or to measure investment performance. Roll (1977) warns that as long as the true market portfolio is not identified and employed, any test results must be interpreted carefully. Our attempt is simply to compare the explanatory power of domestic systematic risk in explaining rates of return between MNCs and domestic firms. Finally, to adjust for firm size effect, the following regression is run:

$$R_{p,t}=\hat{r}_0+\hat{r}_1\hat{\beta}_{p,t}+\hat{r}_2 Sp_{t-1}+\tilde{Z}p_t \qquad (9)$$

where Sp_t is a logarithm of average firm size (market value of equity) in portfolio P at the end of year t. A log transformation is applied to the market values since the observed relationship between those and returns is nonlinear. If the average value of $\hat{r}_2$ is statistically different from zero, then any conclusions drawn from equation (8) may be biased by firm size effect. On the other hand, if the average value of $\hat{r}_2$ is not statistically different from zero then any differences in the estimated coefficients in equation (8) between MNCs and domestic firms may be attributable to the multinationality of a firm.

Test results from the second-stage cross-sectional regression (eq. 8) for all

Table 4. Pooled Cross-Sectional Single Regression

	Sample	Number of Firms	$\hat{r}_0$	$\hat{r}_1$	$\bar{R}_p$	$\bar{\beta}_p$	PR>F	R^2
DEWR	ALL	270	0.0052** (3.72)	0.0061** (1.28)	0.0099	0.85	0.0001	0.26
	MNC	135	0.0061** (3.41)	0.0052* (2.45)	0.0091	0.77	0.0217	0.19
	DC	135	0.0038 (1.54)	0.0078** (3.17)	0.0101	0.94	0.0010	0.29
DVWR	ALL	270	0.0045* (2.35)	0.0058** (3.54)	0.0102	1.13	0.0009	0.19
	MNC	135	0.0062* (2.60)	0.0040 (1.89)	0.0097	1.07	0.0710	0.13
	DC	135	0.0021 (0.65)	0.0078** (2.88)	0.0107	1.19	0.0081	0.25

R_p=average monthly portfolio return.
$\bar{\beta}_p$=average monthly portfolio beta.
DEWR=equal-weighted CRSP monthly market index.
DVWR=value-weighted CRSP monthly market index.
The figures in parentheses are t-value.
**Significant at the 0.01 level.
*Significant at the 0.05 level.

sample firms, the sample of MNCs and the sample of domestic firms are reported in Table 4. The coefficient of the intercept term ($\hat{r}_0$) of MNCs is larger than that of domestic firms while the coefficient of the slope term ($\hat{r}_1$) of MNCs is smaller than that of domestic firms regardless of the market index employed for estimating β_p. When all sample firms are employed, $\hat{r}_0$ and $\hat{r}_1$ are significantly different from zero at the 0.01 level and R^2 is 0.26 with the equal-weighted CRSP market index. However, when only MNCs are employed, $\hat{r}_1$ is significant at only the 0.05 level and R^2 is 0.19. On the other hand, $\hat{r}_1$ of domestic firms is significant at the 0.01 level but $\hat{r}_0$ is insignificantly different from zero. With the value-weighted CRSP market index, $\hat{r}_1$ of MNCs is not significantly different from zero and R^2 is 0.13 while $\hat{r}_1$ of domestic firms is significant at the 0.01 level and R^2 is 0.25. The R^2*s* and *t*-values provide evidence that the domestic CAPM loses explanatory power when applied to MNCs, which implies that domestic systematic risk cannot explain as much of the variation of rates of return of MNCs as that of domestic firms. Furthermore, as hypothesized, the $\hat{r}_1$ of MNCs (proxy for risk-premium) appears to be smaller than that of domestic firms would provide.

In conclusion, MNCs appear to have a different security market line (SML), which has a smaller slope but a larger intercept than domestic firms would have. In order to examine the equality of SMLs between MNCs and domestic firms, Chow's (1960) pooling test is employed. The test statistics reported in Table 5 show that the null hypothesis of equality cannot be rejected at 0.05 level. This result implies that statistically MNCs and domestic firm have homogeneous SMLs, which is consistent with the findings by Brewer (1981). To elaborate, the risk premium provided by MNCs appears to be smaller but statistically it is not significantly smaller than that of domestic firms.

The result of a pooled cross-sectional multiple regression analysis based on equation (9) is reported in Table 6. The coefficients of the size term ($\hat{r}_2$) in all three cases are insignificantly different from zero. The average premium on the size term for all sample firms is 0.00009, which is less than 0.2 standard errors

Table 5. Statistics for Pooling Test

	DEWR	DVWR
Coincidence	F = 0.286 (4.03)	F = 0.778 (4.03)
Parallel	F = 0.571 (3.18)	F = 1.222 (3.18)

The figures in parentheses are critical F-values at the 0.05 level.
Coincidence denotes the null hypothesis of equality in the intercept and the slope of two regression lines.
Parallel denotes the null hypothesis of equality in the slope of two regression lines.

Table 6. Pooled Cross-sectional Multiple Regression

Sample	Number of Firms	$\hat{\gamma}_0$	$\hat{\gamma}_1$	$\hat{\gamma}_2$	$PR>F$	R^2
ALL	270	0.0052** (3.20)	0.0064** (3.39)	0.00009 (0.17)	0.0049	0.20
MNC	135	0.0061** (3.36)	0.0052* (2.36)	−0.00024 (−0.24)	0.0735	0.19
DC	135	0.0025 (0.64)	0.0101** (2.46)	0.00054 (0.53)	0.0638	0.23

Betas are measured in association with the DVWR.
The figures in parentheses are t-values.
**Significant at the 0.01 level.
*Significant at the 0.05 level.

away from zero.[10] Furthermore, the signs of these coefficients are different between MNCs and domestic firms. On the other hand, for all cases the average risk premia associated with domestic betas are all significantly greater than zero at the 0.05 level. The systematic ordering of risk premia associated with domestic and R^2s of the domestic CAPM for three cases remains. To elaborate, domestic firms seem to provide larger risk premium and have larger explanatory power with the domestic CAPM than MNCs do. Differences in firm size can explain little of the differences in average portfolio returns for sample firms during this time period.[11] Thus, the overall conclusion drawn from Table 4 may be attributable to the difference in the degree of multinationality of a firm.

(10) When the absolute value of size is employed without a log transformation, the average premium on it for all sample firms is −0.00002, which is not significantly different form zero.

(11) This overall conclusion remains unchanged when betas are calculated in association with the equal-weighted market index.

IV. Summary and Conclusions

Two possible effects of the foreign involvement of a firm on the risk of firm are examined; reductions in total risk of earnings and in market systematic risk. In an attempt to explain the low level of domestic market systematic risk of MNCs, the regression analyses employing earnings variability as an explanatory variable show that a firm with low earnings variability tends to have low domestic systematic risk. Since MNCs have lower earnings variability than domestic firms have, it follows that MNCs also have lower domestic market systematic risk.

However, as far as investment performance is concerned, the validity of domestic systematic risk of MNCs as the total systematic risk of a firm is questioned and examined. The test results from the application of the domestic CAPM to the sample of MNCs and the sample of domestic firms show that for MNCs, domestic systematic risk does not represent total systematic risk. Instead, domestic systematic risk seems to capture only a portion of the total systematic risk that is supposed to be related to the expected rate of return. Therefore, any empirical findings regarding the abnormal performance of investment in the shares of MNCs based on such partial systematic risk must be interpreted with great caution.

The test results provide indirect evidence that the stock market recognizes the foreign involvement of a firm, which in turn, requires a pricing model incorporating multinationality of a firm.[12] Since the domestic CAPM is impli-

(12) There has been a substantial number of studies which consider international factors in the risk-return relationship of risky assets. For example, Solnik (1974) presents an equilibrium model of the international capital market where foreign exchange risk stems from differences in consumption tastes among countries. Under the assumption that foreign exchange risk results from pure monetary uncertainty, Grauer, Litzenberger and Stehle (1976) suggest an equilibrium model of an international capital market in which an investor's portfolio decision depends on the non-diversifiable fluctuations of relative prices. Stehle (1977) advances this model to a two-factor testable pricing model. Black (1974) and Stulz (1981a) present equilibrium models which incorporate additional costs (barriers) for domestic investors to hold

citly based on the assumption of a segmented pricing hypothesis, it cannot be a proper model for a risky asset that may be affected by international factors.

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