Queensland University of Technology

DISCUSSION PAPERS IN ECONOMICS, FINANCE AND INTERNATIONAL COMPETITIVENESS

Idiosyncratic Volatility: Evidence from Asia

Drew, M. & Veeraraghaven, M

Discussion Paper No. 107, March 2002

Series edited by
Dr Andrew Worthington

School of Economics and Finance

ISSN 1324-5910

All correspondance to:

Dr Andrew Worthington
Editor, *Discussion Papers in Economic, Finance and International Competitiveness*
School of Economics and Finance
Queensland University of Technology
GPO Box 2434, BRISBANE QLD 4001, Australia

Telephone: 61 7 3864 2658
Facsimilie: 61 7 3864 1500
Email: a.worthington@qut.edu.au

IDIOSYNCRATIC VOLATILITY: EVIDENCE FROM ASIA

Michael E. Drew[a] and Madhu Veeraraghavan[*b]

[a] School of Economics and Finance, Queensland University of Technology, GPO Box 2434, Brisbane, Queensland, 4001, Australia.
[b] School of Accounting and Finance, Griffith University, PMB 50 Gold Coast Mail Centre, Gold Coast, Queensland, 9726, Australia.

Abstract

The traditional Capital Asset Pricing Model states that assets can earn only higher returns if they have a high beta. However, evidence shows that the single risk factor is not quite adequate for describing the cross-section of stock returns. The current consensus is that firm size and book-to-market equity factors are pervasive risk factors besides the overall market factor. Malkiel and Xu (1997 and 2000) further the debate in empirical asset pricing by stating that idiosyncratic volatility is useful in explaining the cross-sectional expected returns. In this paper we provide international evidence on the relationship between expected stock returns, overall market factor, firm size and idiosyncratic volatility. Our findings suggest that size and idiosyncratic volatility premium are real and pervasive. We find that small and high idiosyncratic volatility stocks generate superior returns and hence suggest that such firms carry risk premia. Our findings also suggest that idiosyncratic volatility is more powerful than the CAPM beta and the firm size effect. Our findings challenge the portfolio theory of Markowitz (1952) and the CAPM of Sharpe (1964), which advances the notion that it is rational for a utility maximizing investor to hold a well-diversified portfolio of investments to eliminate idiosyncratic risks.

JEL Classification: G110, G120, G150
Keywords: Idiosyncratic risk, Portfolio Theory, Capital Asset Pricing Model, Size effect and Beta.

1. Introduction

The traditional Capital Asset Pricing Model (henceforth CAPM) states that assets can earn only higher returns if they have a high beta. However, recent evidence shows that the single risk factor is not quite adequate for describing the cross-section of stock returns. The current consensus is that firm size and book-to-market equity factors are pervasive risk factors besides the overall market factor[1]. In essence, a multifactor model has been shown to explain the data better than the CAPM. The firm size effect states that small firms tend to earn higher returns than big firm even after controlling for beta. The book-to-market equity effect states that firms with high book-to-market equity earn higher returns than firms with low book-to-market equity after controlling for firm size and the overall market factor.

[*] Correspondence: E-mail: M.Veeraraghavan@mailbox.gu.edu.au; Tel: 61-7-5594-8898; Fax: 61-7-5594-8068. We thank Pavlo Taranenko for excellent research assistance. Veeraraghavan acknowledges the financial support from a School of Accounting and Finance Grant, Griffith University. We are, of course, responsible for any remaining errors.

[1] Significant contributions have been made by Banz (1981), Basu (1983), Rosenberg, Reid and Lanstein (1985), Fama and French (1992, 1993, 1995, 1996 and 1998), Black (1993), Lakonishok, Shleifer and Vishny (1994), Kothari, Shanken and Sloan (1995), Mackinlay (1995), Jagannathan and Wang (1996), Daniel and Titman (1997), Berk (2000), Liew and Vassalou (2000), Davis, Fama and French (2000) and Daniel, Titman and Wei (2001).

In an important paper, Malkiel and Xu (1997) confirm the controversial finding of Fama and French (1992) that beta does not appear as an explanatory variable when attempting to model the annual returns on US stocks from 1963 through 1990. In addition, they observe that idiosyncratic volatility is highly correlated with the firm size and that it plays a powerful role in explaining the cross-section of expected returns. The finding that idiosyncratic volatility is priced naturally remains controversial as it violates the basic prediction of the CAPM which states that expected rates of return across all risky assets is a linear function of the market beta.

The finding also challenges the efficient market hypothesis framework, which states that only systematic risk should be priced in the market, and that investors should be compensated for investing in assets with high systematic risk. Malkiel and Xu (1997) find that portfolios of smaller companies have a higher idiosyncratic – or non-market correlated – volatility, and that portfolios of smaller companies post significantly higher average returns[2]. The intention of this article is to extend their work (currently restricted to US stocks) by providing out of sample evidence from stockmarket performances in Hong Kong, India, Malaysia and Philippines. This paper is the first to provide international evidence on the relationship between expected stock returns, overall market factor, firm size and idiosyncratic volatility.

2. Data and Methodology

Monthly stock returns and the accounting data are obtained from the panel database, maintained by Primark Corporation[3]. In formulating the empirical approach to determine the relationship between expected returns, overall market factor, firm size and idiosyncratic volatility, we form size and idiosyncratic volatility portfolios following the multifactor model approach of Fama and French (1996). Fama and French (1996) form portfolios on size and book-to-market equity portfolios while we construct portfolios on size and idiosyncratic volatility. We are motivated to follow this path as Malkiel and Xu (1997 and 2000)[4] suggest that idiosyncratic risk may be relevant for asset pricing in the sense that it may serve as a useful proxy for systematic risk. Malkiel and Xu (1997) find that the portfolio with the highest idiosyncratic volatility generates superior returns. We investigate, the relationship between the expected return of a certain portfolio, and the overall market factor, firm size and idiosyncratic volatility by employing the following unconditional model:

$$R_{pt} – R_{ft} = a_i + b_i (R_{mt}-R_{ft}) + siSMB + hiHIVMLIV +\varepsilon_{it} \qquad (1)$$

R_{pt} is the average return of a certain portfolio (S/L, S/M, S/H; B/L, B/M and B/H). R_{ft} is the risk- free rate observed at the beginning of each month. Market is long the market portfolio and short the risk free asset; SMB is long small capitalization stocks and short large capitalization stocks; HIVMLIV is long high idiosyncratic volatility stocks and short low idiosyncratic volatility stocks. The factor loadings b_i, s_i and h_i are the slopes in the time-series regression.

---

[2] See Malkiel and Xu (2000) for the relationship between idiosyncratic risk and security returns. They observe that idiosyncratic volatility is more powerful than either beta or firm size effect in explaining the cross-section of stock returns. Also see Campbell et al (2001) for a detailed study of volatility of common stocks at the market, industry and firm levels.

[3] Primark Corporation is a global information services company. We used Datastream a Primark brand to obtain the data for this study.

[4] See French, Schwert and Stambaugh (1987), Malkiel and Xu (1997), and Malkiel and Xu (2001).

Table 1
Sample Periods, Risk Free Rates and Number of Firms

Country	Sample Period	Risk Free Rate	Number of firms
Hong Kong	01/01/95-12/99	Hong Kong Interbank 1 Year Rate	870
India	01/01/95-12/99	180 Day Bank Deposit Rate	342
Malaysia	01/01/95-12/99	Base Lending Rate	454
Philippines	01/01/95-12/99	Interbank Call Loan Rate	318

Table 2
Portfolio Aggregation Procedure for Six Portfolios formed on Size and Idiosyncratic Volatility for Hong Kong, India, Malaysia and Philippines

At the end of December of each year t stocks are assigned to two portfolios of size (Small and Big) based on whether their December Market equity (ME) defined as closing price times Number of shares outstanding is above or below the median ME. The same stocks are allocated in an independent sort to three idiosyncratic volatility portfolios (Low, Medium, and High) based on the median value of idiosyncratic volatility. Low portfolios consist of firms with values less than 33.33 percent of median idiosyncratic volatility. High portfolios consist of firms with values more than 66.67 percent of median idiosyncratic volatility and the balance firms are assigned the medium portfolio. Following Malkiel and Xu (1997) we define idiosyncratic volatility as the difference between the variance of returns for each stock and the variance of the index. We use the previous 24 months of average returns to calculate the variance of the stock[5]. Similarly, we use the previous 24 months of market returns to calculate the variance of the index. The difference is defined as the idiosyncratic volatility of the stock in the index[6].

Six Size-Idiosyncratic volatility portfolios are formed at the intersection of the two size portfolios and three idiosyncratic volatility portfolios. The six portfolios formed are (S/L, S/M, and S/H; B/L, B/M, and B/H). Value-weight monthly returns on the six portfolios are calculated from the following January to December. The explanatory variables **R_M, SMB, and HIVMLIV** are defined as follows: R_M (market return) is the value-weight market return on all stocks in the six portfolios. SMB (Small minus Big) is the difference each month between the average of the returns of the three small stock portfolios (S/L, S/M, and S/H) and the average of the returns of the three big portfolios (B/L, B/M, and B/H). HIVMLIV (High minus Low) is the difference between the average of the returns of the two high idiosyncratic volatility portfolios (S/H, B/H) and the average of the returns on the two low idiosyncratic volatility portfolios (S/L, B/L).

[5] Assume that we want to calculate the variance of the stock / market as of January 1995. We require the previous 24 months of sample returns in order to calculate the variance. We define the difference between the variance of the stock and the market as idiosyncratic volatility.

[6] Alternatively idiosyncratic volatility can be measured as the standard deviation of the residuals from estimating each stock's beta using the CAPM. We adopted the variance approach as Malkiel and Xu (1997) suggest that this approach is useful when dealing with portfolios while the CAPM approach is useful when dealing with individual stocks.

3. Empirical Results

A. Tests of the multifactor asset-pricing model

A.1 Hong Kong

In this paper we investigate whether a multifactor asset-pricing model explains the cross-section of average stock returns. Specifically, we ask whether an overall market factor, firm size and idiosyncratic volatility can explain the cross-sectional pattern of stock returns. The mean monthly returns and regression coefficients for Hong Kong are reported in Table 3.

Table 3
Panel A: Summary Statistics (Hong Kong)
Mean Monthly Returns
Period: 12/95 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HIVMLIV
S/L	0.004822 (0.009636)[7]	0.08795 (0.09300)	0.1475 (0.4328)	0.4994 (0.7636)
S/M	0.1192 (0.1194)	0.08795 (0.09300)	0.1475 (0.4328)	0.4994 (0.7636)
S/H	0.2393 (0.1555)	0.08795 (0.09300)	0.1475 (0.4328)	0.4994 (0.7636)
B/L	0.001705 (0.007640)	0.08795 (0.09300)	0.1475 (0.4328)	0.4994 (0.7636)
B/M	0.03173 (0.01066)	0.08795 (0.09300)	0.1475 (0.4328)	0.4994 (0.7636)
B/H	-0.0560 (0.1359)	0.08795 (0.09300)	0.1475 (0.4328)	0.4994 (0.7636)

Table 3, Panel A reports the average excess returns on the six size to idiosyncratic volatility sorted portfolios for Hong Kong. The table shows that small stocks generate higher returns than big stocks and high idiosyncratic volatility stocks generate higher returns than low idiosyncratic volatility stocks suggesting that small and high idiosyncratic volatility stocks are riskier than big and low idiosyncratic volatility stocks. The overall market factor generates a return of 1.05 percent per annum while the two zero investment portfolios (SMB and HIVMLIV) generate a return of 1.77 and 5.99 per cent per annum respectively. Since, the strategy of investing in small and high idiosyncratic volatility stocks generate superior returns, we suggest that such firms carry risk premia.

[7] Standard Deviation in parentheses

Table 3-continued

Panel B: $R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHIVMLIV+e_{it}$

PORTFOLIO	a	b	s	h	R^2	DW
S/L	-0.124 (-1.518)[8]	0.642 (6.901)	0.667 (2.983)	0.349 (2.660)	0.66	1.920
S/M	-0.148 (-1.832)	0.610 (6.604)	1.249 (5.631)	0.598 (4.593)	0.78	1.811
S/H	-0.074 (-1.226)	0.745 (10.828)	1.299 (7.852)	1.128 (11.629)	0.93	1.817
B/L	-0.009 (-1.806)	0.685 (11.259)	0.317 (2.170)	0.131 (1.524)	0.77	1.828
B/M	-0.0124 (-1.687)	0.742 (8.829)	0.224 (1.108)	0.588 (4.973)	0.77	1.988
B/H	-0.125 (-1.588)	0.571 (6.329)	-0.326 (-1.504)	1.355 (10.660)	0.84	1.813

Table 3, Panel B reports the coefficients of the three-factor model. The results of Panel B show that the intercept, *a* coefficient, is statistically indistinguishable from zero for all six portfolios. Our results confirm the findings of Merton (1973) who states that standard asset-pricing models produce intercepts that are statistically indistinguishable from zero. Hence, if the model of (1) is parsimonious and describes expected return in a meaningful manner, the intercepts should be close to zero.

It is also observed that the overall market factor, b coefficient, is significant for all six portfolios. The *s* coefficient is positive and significant at the 1 per cent level for the (S/M and S/H) portfolios and at the 5-per cent level for (S/L) portfolio. The s coefficient for the (B/L and B/M) portfolios is diminishing positive and significant at the 5 per cent level for the (B/L) portfolio. The s coefficient for (B/H) portfolio is negative and not significant. The h coefficient increases monotonically for the three small stock portfolios and is significant at the 1-per cent level for the (S/M and S/H) portfolios. The h coefficient is significant at the 5-per cent level for the (S/L) portfolio. The h coefficient also increases monotonically for the three big portfolios and is significant at the 1-per cent level for the (B/M and B/H) portfolios. The h coefficient is not significant for the (B/L) portfolio. The average R^2 for the six portfolios is 0.79, which implies that the independent variables explain 79% of the variation in the cross-section of average stock returns.

[8] T Statistics in parentheses

A.2 India

Table 4
Panel A: Summary Statistics (India)
Mean Monthly Returns
Period: 12/95 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HIVMLIV
S/L	-0.6096 (8.9697)[9]	-0.2462 (8.0189)	0.5066 (3.5038)	0.5934 (3.4783)
S/M	-0.5698 (9.6234)	-0.2462 (8.0189)	0.5066 (3.5038)	0.5934 (3.4783)
S/H	2.5689 (10.6977)	-0.2462 (8.0189)	0.5066 (3.5038)	0.5934 (3.4783)
B/L	-0.9181 (7.4442)	-0.2462 (8.0189)	0.5066 (3.5038)	0.5934 (3.4783)
B/M	-1.1642 (9.4380)	-0.2462 (8.0189)	0.5066 (3.5038)	0.5934 (3.4783)
B/H	-0.1463 (10.3660)	-0.2462 (8.0189)	0.5066 (3.5038)	0.5934 (3.4783)

Table 4, Panel A reports the average excess returns on the six size to idiosyncratic volatility sorted portfolios for India. The table shows that small stocks generate higher returns than big stocks and high idiosyncratic volatility stocks generate higher returns than low idiosyncratic volatility stocks suggesting that small and high idiosyncratic volatility stocks are riskier than big and low idiosyncratic volatility stocks. However, the excess return for the overall market factor is negative for all six portfolios. It is important to note that the overall market factor generates a return of –2.95 per cent per annum while the two zero investment portfolios (SMB and HIVMLIV) generate a return of 6.07 per cent and 7.12 per cent per annum respectively. The findings for India are similar to that of Hong Kong in that investing in small and high idiosyncratic volatility stocks generate superior returns. Hence, we argue that such firms carry risk premia.

Table 4-continued
Panel B: R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHIVMLIV+e_{it}

PORTFOLIO	a	b	s	h	R^2	DW
S/L	-0.0026 (-0.37)[10]	-0.806 (-8.139)	1.169 (5.548)	0.319 (1.430)	0.66	1.953
S/M	0.533 (0.787)	-0.646 (-6.824)	1.172 (5.820)	1.126 (5.277)	0.73	2.241
S/H	-1.277 (-2.329)	-0.789 (-10.305)	1.344 (8.241)	1.356 (7.852)	0.86	2.025
B/L	-0.734 (-1.394)	-0.719 (-9.769)	0.217 (1.385)	0.423 (2.549)	0.73	2.215
B/M	-0.578 (-0.952)	-0.817 (-9.635)	0.432 (2.396)	0.958 (5.015)	0.78	1.875
B/H	0.541 (0.723)	-0.705 (-6.741)	0.003 (0.164)	1.420 (6.021)	0.72	2.150

[9] Standard Deviation in parentheses
[10] T Statistics in parentheses

Table 4, Panel B reports the coefficients of the three-factor model. The results of Panel B show that the intercept, a coefficient, is statistically indistinguishable from zero in the sense of Merton (1973) for all portfolios with the exception of the (S/H) portfolio. It is also observed that the overall market factor, b coefficient, is negative but highly significant for all six portfolios. The s coefficient is positive and significant at the 1-per cent level for the three small stock portfolios. The s coefficient is positive for the three big stock portfolios and significant at the 5-per cent level for the (B/M) portfolio.

The h coefficient increases monotonically for the three small stock portfolios and is significant at the 1-per cent level for the (S/M and S/H) portfolios. The h coefficient is not significant for the (S/L) portfolio. The h coefficient also increases monotonically for the three big portfolios and is significant at the 1-per cent level for the (B/M and B/H) portfolios. The h coefficient is significant at the 5-per cent level for the (B/L) portfolio. The average R^2 for the six portfolios is 0.74, which implies that the independent variables explain 74% of the variation in the cross-section of stock returns.

A.3 Malaysia

Table 5
Panel A: Summary Statistics (Malaysia)
Mean Monthly Returns
Period: 12/95 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HIVMLIV
S/L	0.9177 (14.9593)[11]	-0.9160 (4.7684)	0.5004 (15.3114)	0.7329 (5.0990)
S/M	0.4220 (17.0627)	-0.9160 (4.7684)	0.5004 (15.3114)	0.7329 (5.0990)
S/H	0.3836 (18.6569)	-0.9160 (4.7684)	0.5004 (15.3114)	0.7329 (5.0990)
B/L	-0.3295 (12.4627)	-0.9160 (4.7684)	0.5004 (15.3114)	0.7329 (5.0990)
B/M	-0.2874 (15.1613)	-0.9160 (4.7684)	0.5004 (15.3114)	0.7329 (5.0990)
B/H	-1.0645 (15.4230)	-0.9160 (4.7684)	0.5004 (15.3114)	0.7329 (5.0990)

Table 5, Panel A reports the average excess returns on the six size to idiosyncratic volatility sorted portfolios for Malaysia. The table shows that small stocks generate higher returns than big stocks and high idiosyncratic volatility stocks generate higher returns than low idiosyncratic volatility stocks while the excess return for the overall market factor is negative for all six portfolios. This suggests that small and high idiosyncratic volatility stocks are riskier than big and low idiosyncratic volatility stocks. It is to be noted that the overall market factor generates a return of –10.99 per cent per annum while the two zero investment portfolios (SMB and HIVMLIV) generate a return of 6.00 and 8.79 per cent per annum respectively. The findings for Malaysia are similar to that of Hong Kong and India in that investing in small and

[11] Standard Deviation in parentheses

high idiosyncratic volatility stocks generate superior returns. Once again, we suggest that such firms carry risk premia.

Table 5-continued

Panel B: $R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+s_iSMB+h_iHIVMLIV+e_{it}$

PORTFOLIO	a	b	s	h	R^2	DW
S/L	-1.133 (-7.348)[12]	-0.434 (-10.317)	0.973 (68.583)	0.463 (13.802)	0.96	1.952
S/M	-0.935 (-4.453)	-0.133 (-2.328)	1.054 (54.518)	0.447 (9.776)	0.96	1.834
S/H	-0.002 (-0.131)	0.556 (10.926)	0.980 (57.116)	0.583 (14.362)	0.94	1.761
B/L	-0.791 (-5.542)	-0.385 (-9.870)	0.960 (73.038)	-0.506 (-16.296)	0.94	2.002
B/M	-0.797 (-4.839)	-0.260 (-5.788)	1.109 (72.425)	-0.380 (-10.594)	0.94	1.969
B/H	-0.504 (2.232)	0.633 (13.291)	0.949 (59.094)	0.621 (16.348)	0.92	1.991

Table 5, Panel B reports the coefficients of the three-factor model. The results of Panel B show that the intercept, a coefficient, is statistically significant for five out of six portfolios. It is also observed that the overall market factor, b coefficient, is negative but highly significant for (S/L, S/M, B/L and B/M) portfolios. The b coefficient is positive and significant for (S/H and B/H) portfolios. The s coefficient is positive and highly significant at the 1 per cent level for all six portfolios.

The h coefficient increases monotonically for the three small stock portfolios and is significant at the 1-per cent level for the three small stock portfolios. The h coefficient is negative for the (B/L and B/M) portfolios but becomes positive for the (B/H) portfolio. The h coefficient is significant at the 1-per cent level for the three big stock portfolios. The average R^2 for the six portfolios is 0.94, which implies that the independent variables explain 94% of the variation in the cross-section of stock returns.

[12] T Statistics in parentheses

A.4 Philippines

Table 6
Panel A: Summary Statistics (Philippines)
Mean Monthly Returns
Period: 12/95 to 12/99

PORTFOLIO	RPTRFT	RMRFT	SMB	HIVMLIV
S/L	1.6432 (12.4912)[13]	-1.2743 (10.0421)	5.4688 (23.8210)	0.5847 (8.8202)
S/M	1.2871 (11.1951)	-1.2743 (10.0421)	5.4688 (23.8210)	0.5847 (8.8202)
S/H	11.9939 (67.2573)	-1.2743 (10.0421)	5.4688 (23.8210)	0.5847 (8.8202)
B/L	-0.5439 (9.5929)	-1.2743 (10.0421)	5.4688 (23.8210)	0.5847 (8.8202)
B/M	-0.4354 (14.4569)	-1.2743 (10.0421)	5.4688 (23.8210)	0.5847 (8.8202)
B/H	-0.5029 (16.1290)	-1.2743 (10.0421)	5.4688 (23.8210)	0.5847 (8.8202)

Table 6, Panel A reports the average excess returns on the six size to idiosyncratic volatility sorted portfolios for Philippines. The table shows that small stocks generate higher returns than big stocks and high idiosyncratic volatility stocks generate higher returns than low idiosyncratic volatility stocks while the excess return for the overall market factor is negative for all six portfolios. This suggests that small and high idiosyncratic volatility stocks are riskier than big and low idiosyncratic volatility stocks. It is important to note that the overall market factor generates a return of –15.29 per cent per annum while the two zero investment portfolios (SMB and HIVMLIV) generate a return of 65.62 and 7.01 per cent per annum respectively. Our findings for Philippines are similar to that of Hong Kong, India and Malaysia in the sense that investing in small and high idiosyncratic volatility stocks generate superior returns. Hence, we conjecture that such firms carry risk premia.

Table 6-continued
Panel B: R_{pt}-R_{ft} = a_i+b_i(R_{mt}-R_{ft})+siSMB+hiHIVMLIV+e_{it}

PORTFOLIO	a	b	s	h	R^2	DW
S/L	0.2086 (1.367)[14]	0.556 (3.595)	0.370 (0.587)	0.108 (0.619)	0.46	2.572
S/M	1.014 (0.966)	0.437 (4.107)	0.082 (1.885)	0.653 (5.431)	0.54	2.682
S/H	-0.121 (-0.607)	1.713 (9.154)	2.738 (35.808)	0.554 (2.620)	0.96	2.146
B/L	0.566 (0.898)	0.798 (12.469)	-0.0029 (-1.131)	0.116 (1.605)	0.77	2.339
B/M	1.067 (0.980)	1.068 (9.676)	-0.062 (-1.392)	0.347 (2.781)	0.70	2.411
B/H	0.346 (0.254)	0.841 (6.084)	-0.050 (-0.892)	0.853 (5.460)	0.62	1.945

[13] Standard Deviation in parentheses

[14] T Statistics in parentheses

Table 6, Panel B reports the coefficients of the three-factor model. The results of Panel B show that the intercept, a coefficient, is statistically indistinguishable from zero for four out of six portfolios. It is important to note that the intercept is not statistically significant for any of the six portfolios. It is also observed that the overall market factor, b coefficient, is positive and significant for all six portfolios at the 1-per cent level. The s coefficient is positive and significant at the 1 per cent level for the (S/H) portfolio. The s coefficient is not significant for (S/L and S/M) portfolios. The s coefficient is negative and not significant for the three big stock portfolios.

The h coefficient is positive for the three small stock portfolios. The h coefficient is significant at the 1-per cent level for the (S/M) portfolio and at the 5-per cent level for the (S/H) portfolio. The h coefficient increases monotonically for the three big stock portfolios. The h coefficient is significant at the 5-per cent level for the (B/M) portfolio and at the 1-per cent level for the (B/H) portfolio. The average R^2 for the six portfolios is 0.675, which implies that the independent variables explain 67.5% of the variation in the cross-section of stock returns.

B. Size and Value Premium

B.1 Hong Kong

Our findings suggest that size and idiosyncratic volatility premium is real and pervasive. The (S/H) portfolio generates the highest size premium of 0.1916 per cent per month (t-statistic = 7.852) while the (B/H) portfolio generates the highest idiosyncratic volatility premium of 0.6766 per cent per month (t-statistic = 10.660). It is also observed that the idiosyncratic volatility premium increases monotonically for the three small and big stock portfolios. Since, small and high idiosyncratic volatility firms generate superior risk premium we propose that the size and idiosyncratic volatility effect is compensation for the risk missed by the CAPM. The results are summarized in Figure 1.0.

Table 7
Market, Size and Idiosyncratic Volatility Premium
Hong Kong

Portfolio	Market Premium (%)	Size premium (%)	Idiosyncratic Volatility Premium (%)
S/L	0.0564 (6.901)[15]	0.0983 (2.983)	0.1742 (2.660)
S/M	0.0536 (6.604)	0.1842 (5.631)	0.2986 (4.593)
S/H	0.0655 (10.828)	0.1916 (7.852)	0.5633 (11.629)
B/L	0.0602 (11.259)	0.0467 (2.170)	0.0654 (1.524)
B/M	0.0652 (8.829)	0.0330 (1.108)	0.2936 (4.973)
B/H	0.0502 (6.329)	-0.0811 (-1.504)	0.6766 (10.660)

[15] T Statistics in parentheses

B.2 India

Our findings for India are similar to that of Hong Kong in that size and idiosyncratic volatility premium is real and pervasive. The (S/H) portfolio generates the highest size premium of 0.6908 per cent per month (t-statistic = 8.241) while the (B/H) portfolio generates the highest idiosyncratic volatility premium of 0.8426 per cent per month (t-statistic = 6.021). It is also observed that the idiosyncratic volatility premium increases monotonically for the three small and big stock portfolios. As, small and high idiosyncratic volatility firms generate higher risk premium we again suggest that the size and idiosyncratic volatility effect is a compensation for the risk missed by the CAPM. The results are summarized in Figure 2.0.

Table 8
Market, Size and Idiosyncratic Volatility Premium
India

Portfolio	Market Premium (%)	Size premium (%)	Idiosyncratic Volatility Premium (%)
S/L	0.1984 (-8.139)[16]	0.5922 (5.548)	0.1892 (1.430)
S/M	0.1590 (-6.824)	0.5937 (5.820)	0.6681 (5.277)
S/H	0.1942 (-10.305)	0.6908 (8.241)	0.8046 (7.852)
B/L	0.1770 (-9.769)	0.1099 (1.385)	0.2510 (2.549)
B/M	0.2011 (-9.635)	0.2188 (2.396)	0.5684 (5.015)
B/H	0.1735 (-6.741)	0.0015 (0.164)	0.8426 (6.021)

B.3 Malaysia

Our findings reveal that the (B/M) portfolio generates the highest size premium of 0.5540 per cent per month (t-statistic = 72.425) while the (B/H) portfolio generates the highest idiosyncratic volatility premium of 0.4551 per cent per month (t-statistic = 14.362). It is also observed that the idiosyncratic volatility premium increases monotonically for the three small and big stock portfolios. Once again, as small and high idiosyncratic volatility firms generate superior premium we conjecture that the size and idiosyncratic volatility effect is a compensation for the risk missed by the CAPM. The results are summarized in Figure 3.0.

[16] T Statistics in parentheses

Table 9
Market, Size and Idiosyncratic Volatility Premium
Malaysia

Portfolio	Market Premium (%)	Size premium (%)	Idiosyncratic Volatility Premium (%)
S/L	0.3975 (-10.317)[17]	0.4868 (68.583)	0.3393 (13.802)
S/M	0.1218 (-2.328)	0.5274 (54.518)	0.3276 (9.776)
S/H	0.5092 (10.926)	0.4903 (57.116)	0.4272 (14.362)
B/L	0.3526 (-9.870)	0.4803 (73.038)	-0.3708 (-16.296)
B/M	0.1886 (-5.788)	0.5540 (72.425)	-0.2785 (-10.594)
B/H	-0.5798 (13.291)	0.4748 (59.094)	0.4551 (16.348)

B.4 Philippines

Our findings for Philippines are similar to that of Hong Kong, India and Malaysia in that size and idiosyncratic volatility premium is real and pervasive. The (S/H) portfolio generates the highest size premium of 14.9735 per cent per month (t-statistic = 35.808) while the (B/H) portfolio generates the highest idiosyncratic volatility premium of 0.4987 per cent per month (t-statistic = 5.460). It is important to note that the three big stock portfolios generate a negative size premia. Similarly, medium and high idiosyncratic volatility portfolios generate superior returns than the low idiosyncratic volatility portfolio. Since, small and high idiosyncratic volatility firms generate higher risk premium we are of the view that this is a compensation for the risk missed by the CAPM. The results are summarized in Figure 4.0.

Table 10
Market, Size and Idiosyncratic Volatility Premium
Philippines

Portfolio	Market Premium (%)	Size premium (%)	Idiosyncratic Volatility Premium (%)
S/L	-0.7085 (3.595)[18]	2.0234 (0.587)	0.0631 (0.619)
S/M	-0.5568 (4.107)	0.4484 (1.885)	0.3818 (5.431)
S/H	-2.1828 (9.154)	14.9735 (35.808)	0.3239 (2.620)
B/L	-1.0168 (12.469)	-0.0158 (-1.131)	0.0678 (1.605)
B/M	-1.3609 (9.676)	-0.3390 (-1.392)	0.2028 (2.781)
B/H	-1.0716 (6.084)	-0.2734 (-0.892)	0.4987 (5.460)

[17] T Statistics in parentheses
[18] T Statistics in parentheses

4. Conclusion and implications

The central point of the Capital Asset Pricing Model of Sharpe (1964) is that expected returns on securities are a positive linear function of their market betas. The CAPM states that there is a reward for bearing systematic risk, which, is measured by the market risk premium. The CAPM implies that idiosyncratic risk can be eliminated in a diversified portfolio and hence investors will not be rewarded for bearing idiosyncratic risks. However, Malkiel and Xu (1997 and 2000) contradict the CAPM by observing that idiosyncratic volatility is priced in the market and hence related to stock returns.

Our findings suggest that size and idiosyncratic volatility premium are real and pervasive. We find that small and high idiosyncratic volatility stocks generate superior returns and hence suggest that such firms carry a risk premia. In essence, we conjecture that investors who invest in stocks with these characteristics tend to take greater risk and hence, higher average returns / premiums are compensation for these risks. Therefore, it is suggested that investors invest in some combination of small and high idiosyncratic volatility firms in addition to the overall market portfolio to generate higher returns. Our findings are consistent with Malkiel and Xu (2000) who find that idiosyncratic volatility is useful in explaining cross-sectional expected returns. Our findings are also consistent with Malkiel and Xu (1997) who observe that idiosyncratic volatility is related to the size of the firm in that small firms have high idiosyncratic volatility thus providing an alternative explanation to the FF (1992) conclusions.

Our findings demonstrate that idiosyncratic volatility plays an important role in empirical asset pricing. Our findings challenge the portfolio theory of Markowitz (1952) and the CAPM of Sharpe (1964), which advances the notion that it is rational for a utility maximizing investor to hold a well-diversified portfolio of investments to eliminate idiosyncratic risks. In our view, a fascinating area of future research is to conduct additional empirical tests on the role of idiosyncratic risk in asset pricing and also determine whether idiosyncratic volatility is relevant in evaluating portfolio performance. In addition, our intention is also to understand the role of idiosyncratic volatility in theoretical asset pricing. We will attempt to understand the role in theoretical asset pricing by linking firm size and idiosyncratic volatility to economic fundamentals. This is an issue we explore in our next paper.

References

Banz, Rolf W., 1981, The relation between return and market value of common stocks, Journal of Financial Economics 9, 3-18.

Basu, Sanjoy, 1983, The relationship between earnings yield, market value, and return for NYSE common stocks: Further evidence, Journal of Financial Economics 12, 129-156.

Berk, Jonathan B., 2000, Sorting Out Sorts, Journal of Finance 55, 407-427.

Black, Fischer, 1993, Beta and return, Journal of Portfolio Management 20, 8-18.

Campbell, John Y., Martin Lettau, Burton G. Malkiel and Yexiao Xu, 2001, Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk, Journal of Finance 56, 1-43.

Daniel, Kent, and Sheridan, Titman, 1997, Evidence on the Characteristics of Cross Sectional Variation in Stock Returns, Journal of Finance 52, 1-33.

Daniel, Kent, Sheridan Titman, and K.C. John Wei, 2001, Explaining the cross-section of stock returns in Japan: Factors or Characteristics?, Journal of Finance 56, 743-766.

Davis, J, Eugene F. Fama, and Kenneth R. French., 2000, Characteristics, Covariances and average returns: 1929-1997. Journal of Finance 55, 389-406.

Fama, Eugene F., and Kenneth R. French, 1992, The cross-section of expected stock returns, Journal of Finance 47, 427-465.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, Journal of Financial Economics 33, 3-56.

Fama, Eugene F., and Kenneth R. French, 1995, Size and Book-to-Market factors in earnings and returns, Journal of Finance 50, 131-155.

Fama, Eugene F., and Kenneth R. French, 1996, Multifactor explanations of asset pricing anomalies, Journal of Finance 51, 55-84.

Fama, Eugene F., and Kenneth R. French, 1998, Value versus growth: The international evidence, Journal of Finance 53, 1975-1999.

French, Kenneth R., William G. Schwert, and Robert F. Stambaugh, 1987, Expected Stock Returns and Volatility, Journal of Financial Economics 19, 3-29.

Jagannathan, Ravi, and Zhenyu Wang, 1996, The Conditional CAPM and the cross-section of expected returns, Journal of Finance 51, 3-53.

Kothari, S. P., Jay Shanken, and Richard G. Sloan, 1995, Another look at the cross-section of expected stock returns, Journal of Finance 50, 185-224.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, Contrarian investment, extrapolation and risk, Journal of Finance 49, 1541-1578.

Liew, Jimmy and Maria, Vassalou, 2000, Can book-to-market, size and momentum be risk factors that predict economic growth, Journal of Financial Economics 57, 221-245.

MacKinlay, A. Craig, 1995, Multifactor models do not explain deviations from the CAPM, Journal of Financial Economics 38, 3-28.

Malkiel, Burton G., and Yexiao Xu, 1997, Risk and return revisited, Journal of Portfolio Management 23, 9-14.

Malkiel, Burton G., and Yexiao Xu, 2000, Idiosyncratic risk and security returns, working paper, Department of Economics, Princeton University.

Malkiel, Burton G., and Yexiao Xu, 2001, Investigating the Behavior of Idiosyncratic Volatility, working paper, Department of Economics, Princeton University.

Markowitz, Harry M., 1952, Portfolio Selection, Journal of Finance 7, 77-91.

Rosenberg, Barr, Kenneth, Reid and Ronald, Lanstein, 1985, Persuasive evidence of market inefficiency, Journal of Portfolio Management 11, 9-17.

Sharpe, William F., 1964, Capital asset prices: A theory of market equilibrium under conditions of risk, Journal of Finance 19, 425-442.

Figure 1.0 Market, Size and Idiosyncratic Volatility Premium (Hong Kong)