CHAPTER 4: EMPIRICAL FINDINGS AND RESULTS

This chapter presents the empirical results and discusses the various findings from the tests. In this section, the summary descriptive statistics for both short run and long run returns are reported. Next, the relationship between the short run returns and long run returns are analyzed by univariate regression analysis. The Pearson correlation matrix is also used to determine the relationship for all the continuous variables used in the IPO underpricing model. The determinants of returns are then examined by multivariate regression analysis concerning the explanatory variables (IPO size, market volatility, underwriter status and reciprocal of IPO price) influencing the level of initial underpricing. Finally, the hypotheses are discussed based on the results, particularly the coefficient signs and significance levels results obtained from the multiple regression results.

4.1 Short Run Performance

Having defined the variables, this analysis is then carried out in two stages. In the first stage, the relationship between the returns is analyzed by comparing mean returns and by univariate regression analysis. In the second stage, the determinants of returns are examined by cross sectional analysis and multivariate regression analysis.

Table 4 : Short-Run Analysis of IPOs

Return	Number of Observations	Minimum %	Maximum %	Mean %	Std. Deviation
Initial market-adj returns	313	-18.0	82.0	9.4*	0.781
D1	313	-30.0	118.0	13.4*	1.122
D2	313	-33.0	121.0	13.7*	1.171
D3	313	-50.0	135.0	13.9*	1.291
D4	313	-53.0	127.0	13.9*	1.274
D5	313	-60.0	142.0	14.0*	1.332
D10	313	-62.0	146.0	19.0*	1.351
D20	313	-65.0	133.0	19.0*	1.321

* Indicates significance at the 5% level

Table 4 below shows the descriptive statistics for the initial market adjusted returns and after-market returns for Day 1, 2, 3, 4, 5, 10 and 20. The first day adjusted return is 9.4% for all companies. Regarding the magnitude of underpricing, the results show that, on average, an initial underpricing of 13.4% at the end of the first day, 13.7% for the second day, 13.9% for both third and fourth day, 14% for fifth day and 19% for the 10^{th} and 20^{th} day. These returns are statistically significant at 5% level.

These results demonstrate that IPOs in Malaysia, similar to other international IPOs, experience a statistically significant underpricing both on the initial day and in the immediate after-market periods. These results are in line with those of other international IPO studies.

Table 5: Univariate Regression Results

Dependent Variable	Independent Variable	Estimated Coefficient	t	Standard Error	R^2	F	D-W
RET_{12}	Initial market-adj returns	-0.022	-0.394	0.0781	0.001	0.155	2.024
RET_{24}	Initial market-adj returns	-0.101	-1.759	0.0788	0.007	3.094	2.050
RET_{36}	Initial market-adj returns	-0.195**	-3.32	0.0759	0.038	11.02	1.947

** Correlation is significant at the 1% level (2-tailed)

Table 5 exhibits the univariate regression results of market adjusted returns for 12-month, 24-month and 36 month periods. The estimated coefficients demonstrate the relationship between long-term returns, namely RET_{12}, RET_{24} and RET_{36} and short-term returns of IPOs tend to be negative. It is a noteworthy that market-adjusted returns for 36-month, RET_{36} is inversely related to initial returns and the negative coefficient of -0.195 is statistically significant at the 5% level. The results confirm that long term performance is negatively associated with short term returns which indicate that the market corrects the overvaluation or underpricing of IPOs once high initial returns are realized. Moreover, this result provides supporting evidence to the fads hypothesis. That is, in the long run, the market acts to correct the IPO overvaluation experienced in the short run. Moreover, the R^2 values are almost equal to 0 for the long term return regression equations showing the diminishing power of short term returns in explaining long term returns expected from the new issues.

Durbin-Watson test statistics is used to measure for correlations between errors. Specifically, it tests whether the residuals are correlated. The score can vary between 0 and 4 with a value of 2 meaning that the residuals are uncorrelated. As a rule of thumb, values less than 1 and greater than 3 are cause for concern.

Based on Table 5, the Durbin-Watson test statistics results are close to 2, suggesting that the residuals are uncorrelated. In the second stage, the relationship between the determinants of IPO returns and returns is investigated.

The Pearson correlation matrix was used to determine the relationship for all the continuous variables used in the IPO underpricing model. Table 6 exhibits the Pearson correlation coefficient (r) among all the variables used in the IPO underpricing model.

Table 6: Pearson Correlation Matrix for Continuous Variables

	Mean	Std. Deviation	Return	IPO Size	Market Volatility	Underwriter Status	Reciprocal of IPO price
Initial market-adj returns	9.36	0.08	1.000	0.729**	0.649**	0.13*	-0.099
IPO Size	74.67	20.79	0.729**	1.000	0.675**	0.091	-0.117*
Market Volatility	42.47	15.23	0.649**	0.675**	1.000	0.124	-0.171**
Underwriter status	0.46	0.50	0.13*	0.091	0.124	1.000	-0.039
Reciprocal of IPO price	1.35	1.67	-0.099	-0.117*	-0.171**	-0.039	1.000

* Correlation is significant at the 1% level (2-tailed)

** Correlation is significant at the 5% (2-tailed)

The Pearson correlation coefficient indicates the degree to which the variables are related. It can range from -1.00 (perfect negative correlation) to 1.00 (perfect positive correlation). According to Cohen (1988), a correlation coefficient between 0.10 and 0.29 indicate a small correlation, a correlation coefficient between 0.30 and 0.49 indicate a medium relationship and a coefficient between 0.50 and 1.0 indicate a large coefficient.

It is noted that although some of the independent variables are correlated but none of the coefficients is too high. To check for the possibility of multicollinearity problems, variance inflation factors (VIF) are determined. It is noted that none of the VIFs for the explanatory variables are greater than four, suggesting that multicollinearity is not a cause for concern in the IPO underpricing model.

Table 6 also reveals that IPO size, market volatility and underwriter status are positively correlated to initial return. The correlation analysis results showed that both IPO size and market volatility have significant positive relationship with initial return as the correlation coefficients (r) are large (r>0.50). The strongest relationship is seen between initial return and IPO size at r = 0.729 and statistically significant at 1% level. Market volatility showed r = 0.649 and statistically significant at 1% level while underwriter status showed a weaker positive relationship with initial return at r=0.13 and it is statistically significant at 5% level. It is worth noting that reciprocal of IPO price is inversely related to with initial return. The weakest correlation (r = 0.099) is observed between return and reciprocal of IPO price albeit insignificant at the conventional level.

4.2 Discussion on Determinants of IPO Underpricing

The regression results are reported in Table 7 concerning the explanatory variables (IPO size, market volatility, underwriter status and reciprocal of IPO price) influencing the level of initial underpricing in Malaysia based on the sample IPOs during 1998 to 2008.

Table 7: Results of Multiple Regression Analysis

Variables	Coefficient (1)	Coefficient (2)
Constant		
IPO Size	0.534*	0.534*
Market Volatility	0.286*	0.291*
Underwriter status	0.046	-
Reciprocal of IPO pric	0.014	0.014
Dummy Underwriter status (Reputable = 1)		
Observations	313	313
VIF range	1.016-1.878	1.030-1.865
R^2	0.580	0.577
Adjusted R^2	0.574	0.573

* indicates significant at 5% level (2-tailed)

The signs of the explanatory variables are in line with the theory and the fit of line 0.574 is satisfactory since this is a cross sectional data. In other words, the four explanatory variables taken together explain about 57.4% of the variation in the IPO initial underpricing.

The regression estimates as reported in Table 10 show that there is a positive correlation between initial underpricing and all the variables, namely IPO size, market volatility, underwriter status and reciprocal of IPO price. The IPO size was found to be the most significant variable influencing IPO initial underpricing with a coefficient of 0.534 and is statistically significant at 5% level. The least important variable influencing IPO underpricing is reciprocal of IPO price with a coefficient of 0.014 and it is not statistically significant at any meaningful level.

H_1: There is a positive relationship between size of an IPO offering and the level of initial undepricing.

The multiple regression results in Table 7 show that IPO size has the expected positive sign. The coefficient is 0.534 and is statistically significant at 5% level. This shows that the size of the IPO offering has a significant positive relationship on the level of initial underpricing. This result is consistent with the findings of Allen and Faulhaber (1989) who suggest that IPOs which are larger in size tend to underprice by a larger margin.

H_2: There is a positive relationship between market volatility and the level of initial underpricing.

Consistent with expectation, the market volatility has the expected positive sign. The coefficient of this variable is 0.286 is statistically significant at 5% level. This indicates market volatility is one of the main determinants of underpricing. This finding is supportive of the results by Menyah and Paudyal (1996) where they observed issuers tend to set the offer price below the true "intrinsic" price at a time of high market volatility.

H_3: There is a positive relationship between reciprocal of the IPO subscription price and the level of initial undepricing.

Multiple regression results as exhibited in Table 7 demonstrate that the reciprocal of IPO price has a positive relationship on the level of IPO underpricing.

This is reasonable as the larger the subscription price, the harder it will be for average investors to afford the stocks as the price can be too high. The coefficient for this variable is 0.046 and it is not statistically significant at any meaningful level. Although the result supports the empirical findings by Chalk and Peavy (1987) that the magnitude of underpricing is higher for lower-priced IPOs, but the result of this variable is statistically insignificant.

H_4: There is a positive relationship between the reputation of underwriter and the level of initial undepricing.

The results also reveal that reputation of underwriter reputation has a positive relationship with the magnitude of initial underpricing. The coefficient for this predictor is 0.014 and it is not statistically significant at 5% level. The result of this variable indicates that it has little power of explaining the level of underpricing. This result is in agreement with the findings by Beckman et al. (2001) which examined Japanese IPOs from 1980 to 1998, found no evidence that underwriter reputation influences the level of underpricing.

In order to examine the implication of underwriters' status on underpricing, a dummy variable is created to indicate the reputation of the underwriters (0 = non-reputable underwriter, 1 = reputable underwriter). When the regression is re-run using dummy variables to indicate whether the status of underwriter in an IPO influences IPO underpricing, both the results (coefficient 1 and 2) are qualitatively similar. The adjusted R^2 remains almost unchanged at 0.57 which indicates the status of

underwriter is not a significant variable. In other words, there is no significant difference in these 2 models and provide evidence against information advantage of reputable underwriters.

In all the regressions undertaken, the regressions coefficients of IPO size and market volatility are predominantly positive. The coefficients for IPO size and market volatility are statistically significant at 5% level, indicating their strong predictive power in influencing the magnitude of IPO initial underpricing.

In brief, only two variables (IPO size and market volatility) out of the four variables outlined in the model have a significant and positive impact on the magnitude of initial underpricing of IPOs in Malaysia. Overall, the analysis suggests that IPO size, market volatility, underwriter status and reciprocal of IPO price can explain over 57% of the variation in the level of undepricing.

4.3 Long Run Performance

In order to gain further understanding of IPO underpricing, IPO returns in the first three years subsequent to listing are calculated. The main emphasis of this section is to investigate the long term return performance of IPO. The analysis of longer-term returns will be used to see if the large initial returns are really evidence of underpricing or whether they are evidence of investor irrationality. While IPO underpricing is widely documented, there is relatively little evidence of long run performance.

Table 8 : Long-Run Analysis of IPOs

Return	Number of Observations	Minimum %	Maximum %	Mean %	Std. Deviation
RET_6	313	-37.0	51.0	1.0	0.085
RET_9	313	-37.0	54.0	1.0	0.086
RET_{12}	313	-40.0	47.0	-2.0	0.087
RET_{18}	313	-48.0	42.0	-5.0	0.087
RET_{24}	304	-66.0	38.0	-8.0*	0.086
RET_{30}	304	-90.0	32.0	-10.0*	0.103
RET_{36}	280	-93.0	23.0	-15.0*	0.110

* Indicates significance at the 5% level

Table 8 reports long run returns for IPOs up to 36 months subsequent to listing calculated on the basis of a buy-and-hold strategy where stock is purchased at the IPO offer price from the first day of listing and holding the stock for up to 36 months. The results in Table 8 reveal that IPOs on average performed quite poorly over the longer run.

The average buy-and-hold return has a maximum return of 54% and the minimum return of -93%. The mean returns for 6-month and 9-month are both 1% with a standard deviation of 0.085 and 0.086 respectively. A notable point is that the mean returns turned into negative from 12-month onwards, indicating that IPOs underperformed the market after one year from the listing date. The average buy-and-hold returns for 24, 30 and 36-month are -8%, -10% and -15% respectively, and statistically significant at 5% level. These results suggest the same general findings as in Ritter (1991) which report that on average, IPOs performed poorly in the long run.

Finally, in order to examine the four determinants that may have significant influence on the long term returns of IPOs, the long term returns are regressed against a set of explanatory variables using the following equation:

$LR_i = \beta_0 + \beta_1$ (Size) + β_2 (MV) + β_3 (RECIPO) + β_4 (UW Status) + Єi

where:

LR = Long term return of firm *i* for year 1, 2 and 3

Size = Gross proceeds raised from IPO

MV = Market Volatility of FBM KLCI

RECIPO = Reciprocal of the IPO subscription price

UW Status = Underwriter Status

Єi = An error term

Table 9 below presents the estimation results for the multiple regression analysis.

Table 9 : Multivariate Regression Analysis

Variables	1-year returns	2-year returns	3-year returns
Constant	-0.053	-0.095	-0.145
IPO Size	-0.05	-0.251*	-0.463*
Market Volatility	0.156	0.096	0.024
Underwriter status	-0.023	-0.039	-0.016
Reciprocal of IPO pric	0.036	0.044	0.05
Observations	313	304	280
VIF range	1.016-1.878	1.016-1.878	1.016-1.878
R2	0.016	0.045	0.209
Adjusted R2	0.003	0.032	0.198

* indicates significant at 5% level (2-tailed)

Unlike the initial underpricing, the 1, 2 and 3-year returns are inversely related to the IPO size. However, this relationship does not remain stable as it has no significance on year 1 return but is statistically significant at 5% level on Year 2 and Year 3 returns. The market volatility variable is positively related to longer post-listing periods, but has no statistically significant association with the long term returns. Similarly, reciprocal of IPO price is also positively related to long term

returns and their coefficients are not significant at any meaningful level. The underwriter status has negative coefficients in the long run estimated regression equations of long term returns but none is found to be statistically significant. It is also noteworthy that the explanatory power of this model increases with the length of the period as the adjusted R^2 increases progressively from 0.3% for Year 1 model, 3.2% for Year 2 model and 19.8% for Year 3 model. This signifies that these variables are more applicable to Year 3 model compared to Year 1 and Year 2 models. These long run market adjusted returns models are not expected to have high predictive power as this would imply that the long run share market performance could be predicted at the IPO date.

4.4 Conclusion

Based on the results of cross sectional data of 313 sample IPOs listed in the Bursa during 1998 to 2008, there was empirical evidence to suggest the existence of underpricing of IPOs. On the average, the first day adjusted return is 9.4%. These results demonstrate that IPOs in Malaysia, similar to other international IPOs, experience a statistically significant underpricing both on the initial day and in the immediate after-market periods. Furthermore, the univariate regression analysis to determine the relationship between the short term results and long term IPO performance provides supporting evidence to the fads hypothesis. This is because the long term performance of IPOs is negatively related to the short term returns and it is significant at the 5% level.

Based on the multiple regression results, the signs of the explanatory variables are in line with the theory and the fit of line 0.574 is satisfactory since this is a cross sectional data. In other words, the four explanatory variables taken together, namely IPO size, market volatility, underwriter status and reciprocal of IPO price explain about 57.4% of the variation in the IPO initial underpricing. In all the regressions undertaken, the results show that there is a positive correlation between initial underpricing and all the variables, namely IPO size, market volatility, underwriter status and reciprocal of IPO price. These results are in line with those of other international IPO studies. Finally, the last chapter of the study will present summary and future suggestions of this study.