The Pricing Efficiency of Equity Warrants: A Malaysian Case

Razali Haron*

The objective of this paper is to determine the pricing efficiency and behavior of equity warrants traded in the Bursa Malaysia. Specifically, this paper focuses on the studies of 85 randomly selected samples of listed warrants (46 main board warrants, while the remaining 39 were second board warrants) for the trading period of 100 days from January 1, 2004 until May 31, 2004. The model for pricing of warrants in this study is primarily based on the Black-Scholes Option Pricing Model (BSOPM). The theoretical price derived using the BSOPM is then adjusted to incorporate the dilution effect. The adjusted theoretical pricing is then compared with the actual market prices of warrants to determine the pricing efficiency. The paper also looks into related issues such as the extent of mispricing, factors that could lead to the inefficiencies, volatility of the warrants and the underlying stocks, the behavior of price relationships and appropriate strategies to be adopted with regard to the findings. The study concludes that there is significant mispricing on most of the traded warrants, which can be categorized as underpriced, overpriced and extremely overpriced. A few warrants, nevertheless, are found to be insignificantly mispriced.

1. Introduction

1.1 Equity Warrants

Equity warrants, hereby referred to as warrants, belong to the family of call options. It basically gives the right to the holder to purchase new shares. The writer of the call option is required to deliver existing assets, in this case the share equity or type specified in the option terms, to the holder of the warrant. Therefore, the exercise of equity warrants by the holder will automatically increase the number of shares outstanding of a company.

Despite warrants belonging to the options family, there are significant differences between warrants and options, particularly relating to the dilution of the issuing company's share capital base, the originator of the transaction, and time to maturity.

The exercise of warrants will increase the number of shares outstanding and bring fresh cash into the firm, both of which will affect stock price. The exercising of option, nevertheless, does not affect the value of the underlying asset. On the maturity period, warrants have longer maturity than options. In Malaysia, warrants' maturities vary from five to ten years while options have a maturity of less than a year. Writers of warrants are, in effect, issuers or borrowers who are optioning their own securities. An issue of warrants is, thus, a capital raising or cost of

---

* Lecturer, Department of Business Administration, Kulliyyah of Economics and Management Sciences, International Islamic University Malaysia, Jalan Gombak, Gombak, Kuala Lumpur. E-mail: hrazali@iiu.edu.my

capital raising exercise. In the case of options, the writer of the call is most likely not the owner or custodian of the assets. The writer of a listed call option is someone other than the entity whose liabilities are being optioned. Such a writer could be regarded as an investor or speculator in the fortunes of a particular company.

1.2 Overview of the Warrants Market in Malaysia

Warrants were first introduced on the Bursa Malaysia (formerly known as the Kuala Lumpur Stock Exchange) in 1990. The first warrant listed was the RHB-Warrant, known then as Transferable Subscription Rights (TSRs), issued by RHB Berhad on May 28, 1990. There were 179 warrants listed on the Bursa Malaysia as on May 31, 2004.

Warrants are derivatives of a share. It is an option which gives the holder the right to subscribe for a given number of ordinary shares (conversion ratio of 1 to 1)[1] in the company at a predetermined exercise price within a specified time period. In Malaysia, warrants are normally issued on a detachable basis with maturity periods of five years to ten years. There are two types of warrants issued in Malaysia—equity warrants and call warrants.

The introduction of warrants had a significant impact on the local stock market as the market then started to offer derivative instrument to investors. With regard to the introduction of this instrument, the Securities Commission has since taken various measures and implemented certain proposals in the effort to continue ensuring that the rights of investors are protected while promoting the warrant market. Thus, a balance between investor protection and the ability of companies to raise funds from the stock market using this instrument will be achievable.

2. Objectives and Motivation for the Study

With the progressive development of the local capital market, warrants have become an important instrument. Due to its importance, this paper intends to determine the level of efficiency and the behavior of Malaysian warrants. A market could be considered efficient if the market prices of the assets are consistent to that determined by a fair price model.

The study will also look into related issues such as the extent of mispricing, factors that could lead to the inefficiencies, volatility of the warrants and the underlying stocks, the behavior of price relationships and appropriate strategies to be adopted with regard to the findings.

In determining the pricing efficiency of warrants, this paper uses the Black-Scholes Option Pricing Model (BSOPM). There are, however, many valuation models available to value warrants. The theoretical price derived using BSOPM will then be adjusted to incorporate the dilution effect. The adjustments are needed since several differences exist between warrants and options.

The model which was developed by Fischer Black and Myron Scholes (in collaboration with Robert Merton) in the 70s has proven to be a robust and reliable model for estimating option prices. The BSOPM could naturally be a viable model for valuing warrants. In fact, when the BSOPM was first developed, its principal innovators had used the model to value warrants to prove its practicality. However, Black and Scholes had also further elaborated on the problems

---

[1]   The conversion ratio is 1 to 1 as determined by the Securities Commission of Malaysia.

that could be faced when valuing warrants based on the BSOPM formula. These problems arise due to some inherent differences between options and warrants.

3. Literature Review

Veld (2000) categorized all existing warrants valuation models into the Constant Variance Model, the Constant Elasticity of Variance (CEV) Model and the Jump Diffusion Model. The BSOPM, which is the most commonly used model, is grouped under the Constant Variance Model. Most of the research on warrants originated from this model and many variations of this model were developed to suit the different characteristics of warrants.

Veld (2000) also conducted an extensive study comparing all the previous empirical studies and compared how the models fared in the international markets. Veld concluded that the CEV Model[2] gives a better estimation in estimating the value of warrants as compared to other tested models.

Noreen and Wolfson (1981) described two methods for valuing warrants. The first model is the BSOPM and the second is based on CEV Model. In their studies, they noted that in order to use the BSOPM to price warrants, stock prices had to follow a log normal distribution. They used stock prices of firms to estimate the standard deviation of the rate of return. This could be a problem if the volatility of warrants is more than the volatility of stocks. Since the volatility of warrants is also not stationary, the volatility of stocks will also be non-stationary. This will be made worse when the dilution factor is higher.

Lauterbach and Schultz (1990) studied the pricing of warrants using the dilution adjusted version of the BSOPM. They noted a problem with the model in pricing warrants. The constant variance assumption of the dilution adjusted BSOPM appears to cause biases for almost all warrants studied during the period. The studies also covered other models in pricing warrants and concluded that CEV Model provides better predictions than the BSOPM in predicting warrant prices.

Merton (1973) showed that the BSOPM model could be altered to accommodate stochastic interest rates. The studies used the yield to maturity for default-free bond that matures at the option's expiry date to represent interest rates. He also used the variances of a portfolio of stocks and riskless bond. Merton (1976) developed the Jump Diffusion Model to incorporate the jumps in the stock movement. He used a process called the stochastic process to calculate stock return.

Kremer and Roenfeldt (1993) said that the jumps in stock prices are in line with efficient market environments where information arrives infrequently and randomly. The BSOPM, nevertheless, despite its popularity, does not cater for such jumps. He further stated that the BSOPM assumption of small, continuous stock price movement is only suitable for short-lived options and may be too restrictive for long-lived options like warrants.

Crouhy and Galai (1991) noted that the dilution approach used for the BSOPM is only correct if the options are calculated for an identical firm that does not have warrants. This type of firms, they further noted, theoretically does not exist. Crouhy and Galai (1991) also noted that the

---

[2]   Also known as the Square Root Model.

volatility of equity is affected by the issue of warrants and the observed volatility will be smaller than the volatility of the rate of return distribution for the firm's assets. Therefore, they recommended that volatility should be estimated by tracking the volatility of equity at each point of time. They concluded by stating that a simple application of the BSOPM may be incorrect and extensive adjustment may be needed to make the model work efficiently.

In the case of Malaysian warrants, at least three studies have been conducted. Sy M and Chan (1997) used the BSOPM to price 12 Malaysian warrants for the period between September 1992 and August 1994. This could be the first study on the local warrants. They found that the model produced quite accurate pricing compared to actual market prices for 9 of the 12 warrants studied.

Chee Keong (1997) analyzed 34 Malaysian warrants to test market efficiency for the period between July 1994 and December 1995. Both studies on the warrants derived positive results for the BSOPM. Chee Keong (1997) noted that there were some indications of efficiency, particularly with respect to the market's ability to absorb information relating to dilution, transaction cost and underlying stock prices. However, the market also displayed signs of inefficiency. Statistical tests based on factors such as age, market performance, and mispricing levels between in-the-money and out-of-the-money produced results that were inconsistent with an efficient market. This has been found to be especially true for second board warrants.

Haja (2002) studied the efficiency of 54 warrants using the BSOPM and concluded that there was significant mispricing of locally traded warrants during the full year of 2001. The study also analyzed the effect of extension on 18 warrants during 2001 and found that the reaction of the warrants before and after the announcement was the same. Findings also showed that most of the warrants that were not extended followed the same trend as the extended warrants.

4. Data and Methodology

4.1 Data Sampling

This paper covers 85 randomly selected warrants out of a total 179 listed warrants as of May 31, 2004. Out of the 85 randomly selected warrants, 46 belong to the main board while 39 to the second board. The randomly selected warrants represent warrants issued by the main board and second board companies from the various sectors of the economy. To ensure a certain level of liquidity, the average daily volume of the randomly selected warrants must be above 50 lots. In addition, to ensure that the derived results are supported by strong supporting information, the warrants and their underlying stocks must have a full data of 100 trading days. In a case where the underlying stock has more than one outstanding warrant, only one warrant will be selected for the purpose of the analysis.

The studies used closing prices of stocks and warrants covering a period between October 1, 2003 and May 31, 2004. Out of the data available during this period, closing prices of stocks from the period of October 1, 2003 until December 31, 2003 were used to determine the volatility of stocks prices, while closing prices of stocks and warrants from the period of January 1, 2004 until May 31, 2004 were used to determine the theoretical values of warrants using the BSOPM adjusted for dilution. A comparison is made between the daily warrants prices and the computed daily theoretical prices during the period to determine the pricing efficiency

of the warrants. The daily quotes of the 3-month KLIBOR were collected between the period of January 1, 2004 and May 31, 2004. The average daily 3-month KLIBOR over the 6-month study period was 3.05%. This was used as the input for the risk-free rate in computing the option values. All stocks prices and warrants prices were sourced from BERNAMA while information on warrants was obtained from the Investors Digest (refer to Appendix 1 and Appendix 2 for the detailed information on the warrants and their underlying stocks).

4.2 Valuation of Warrants Using the Black-Scholes Option Pricing Model (BSOPM)

The Black-Scholes Option Pricing Model (BSOPM) is given by the following formula:

$$C = S. N(d_1) - K e^{-rT}. N(d_2) \qquad ...(1)$$

$$d_1 = \frac{In(S/K) + [r + (\sigma^2/2)]T}{\sigma\sqrt{T}} \qquad ...(2)$$

$$d_2 = d_1 - \sigma \sqrt{T} \qquad ...(3)$$

where,

C	=	Call value computed using BSOPM
S	=	Spot price of the underlying asset
K	=	Exercise price of the warrant
T	=	Time to expiration (as % of year)
r	=	Risk-free interest rate
e^{-rT}	=	Exponential function of r and T
N(.)	=	Cumulative standard normal distribution function
In (S/K)	=	Natural logarithm of S/K
σ	=	Volatility of underlying, measured by standard deviation
σ^2	=	Σ (InPR – Mean PR) ^{2}/ N-1.
Annualized σ	=	Daily Volatility (σ) x $\sqrt{240}$.

4.3 Adjustment for Dilution Effect

The theoretical value derived from the BSOPM formula will be adjusted to incorporate for the dilution effect due to the increase in the number of shares following conversion. Dubofsky (1992) proposed the following equation to adjust for dilution.

$$W_A = \frac{N}{(N/\gamma + M)} \times C \qquad ...(4)$$

where,

W_A	=	Theoretical value of warrant after dilution effect
C	=	Call value computed using the BSOPM
N	=	Number of stocks currently outstanding
M	=	Number of warrants issued
γ	=	Number of shares that can be purchased on exercise of each warrants (conversion ratio 1:1).

4.4 Determining of Pricing Efficiency

The final stage in this analysis is to determine the degree of mispricing in warrants. Basically, this will tell us how much the actual market price differs from the theoretical price. From the analysis, we can then determine whether the warrants are underpriced, overpriced or efficiently priced.

The following formula is used to calculate the degree of daily mispricing.

$$\% \text{ Daily Mispricing} = \frac{W_P - W_A}{W_A} \times 100$$

where,

W_P = Actual closing market price of warrant (January 1, 2004 - May 31, 2004)
W_A = Theoretical value of warrant after dilution effect (January 1, 2004 - May 31, 2004)

The average daily mispricing of warrants is determined throughout the period of 100 trading days.

$$\% \text{ Average Daily Mispricing} = \frac{\sum \% \text{ Daily Mispricing}}{100}$$

The determining of underpriced, overpriced, extremely overpriced and efficiently priced are based on the following:-

- Underpriced if negative % of average daily mispricing during the period.

- Overpriced if positive % of average daily mispricing during the period.

- Extremely overpriced if huge[3] positive % of daily average mispricing during the period.

- Efficiently priced if insignificant[4] % of average daily mispricing during the period.

The highest and lowest mispricings were also recorded throughout the period.

4.5 Assumptions Applied

The followings are the assumptions used in using the BSOPM for pricing the warrants:

- Efficient Markets with frictionless trading.

- Transaction cost is ignored.

- European style exercise.

- Dividends are not accounted.

- The constant risk-free rates over option maturity.

- Normal distribution of the logarithmic stock returns.

- Constant historical volatility of the underlying stock over option maturity, measured by the standard deviation (σ).

---

[3]   Refers to positive average daily mispricing of more than 1,000%.
[4]   Refers to average daily pricing in the range of between +/- 5%.

5. Results and Implications

5.1 Descriptive Statistics on the Pricing Efficiency

Appendix 3 and 4 show the descriptive statistics of the pricing efficiency of the warrants under study. The statistics described the various degrees of mispricing i.e., average, highest and lowest, on warrants recorded throughout the 100 trading days. From the statistics, it is concluded that there was significant mispricing on 78 warrants during the period. In other words, the warrants were not priced according to their theoretical values as computed using the model. While significant mispricing was noted on the pricing of warrants, it is important to note here that there were also seven warrants (four from main board and three from second board) which had insignificant mispricing, indicating pricing close to the theoretical values. The warrants were traded in the range of plus or minus average 0% to 5% difference from the theoretical values during the 100 trading days.

The warrants that had insignificant pricing are shown in Table 1.

Based on the average daily mispricing, the mispricing of warrants can be grouped into the following four categories.

a. Underpriced.

b. Overpriced.

c. Extremely overpriced (for mispricing exceeding 1,000%).

d. Insignificant mispricing (for mispricing ranging between +/- 5%).

The summary of the categories of mispricing and the number of warrants in each category is shown in Table 2. (Refer to Appendix 3 for details).

Due to the mispricing, it is concluded that there was pricing inefficiency in the market as most warrants were not traded according to their theoretical values derived from the BSOPM, except for the seven warrants stated earlier.

Table 1: Summary on Warrants with Insignificant Mispricing

Warrants	No.	Name of Warrants	Mean Mispricing (%)	Highest Mispricing (%)	Lowest Mispricing (%)
Main Board	1	AKN-W	-5	13	-20
	2	IJM-W	-3	12	-9
	3	Perstima-W	-0.4	36	-12
	4	Star-W	-2	25	-19
Second Board	1	BIG Ind-W	0.3	10	-6
	2	EPMB-W	4	45	-14
	3	HBJC-W	5	12	-4

Table 2: Summary on Mispricing Categories and Number of Warrants

Warrants	Underpriced	Overpriced	Extremely Overpriced	Insignificant Mispricing	Total
Main Board	10 warrants 22%	21 warrants 46%	11 warrants 24%	4 warrants 9%	46 warrants 100%
Second Board	12 warrants 31%	18 warrants 46%	6 warrants 15%	3 warrants 8%	39 warrants 100%

5.2 The Extent of Warrants Mispricing

Having established that there were inefficiencies in the pricing of warrants in the market, this paper will further look into the extent of the mispricing. Analysis showed that if warrants were extremely overpriced, the mispricing can be extremely high, higher on the main board warrants as compared to the second board. The warrants in this category are deep Out-the-Money (OTM)[5] warrants. In contrast, underpriced warrants recorded lower mispricing. Table 3 shows the summary on the extent of mispricing on warrants.

Table 3: Summary on the Extent of Warrants Mispricing			
Mispricing	**Warrants**	**Range of Mispricing**	**Name of Warrants**
Extremely Overpriced	Main Board Second Board	+15,495,640% +10,241%	HL Prop-W Sinmah-W
Underpriced	Main Board Second Board	-48% -37%	E&O-W Audrey-W

5.3 The Consistency of Mispricing

The findings showed that while 57 warrants were consistently underpriced or overpriced during the period, there were 28 warrants that were inconsistent in their mispricing i.e., were both underpriced as well as overpriced during the period. Table 4 shows the summary on mispricing consistency.

Table 4: Summary on Mispricing Consistency			
Warrants	**Consistently Underpriced**	**Consistently Overpriced**	**Inconsistent in Mispricing**
Main Board	5 warrants	26 warrants	15 warrants
Second Board	6 warrants	20 warrants	13 warrants
Total	11 warrants	46 warrants	28 warrants

Table 5: Inconsistent Mispricing on Main Board Warrants				
Main Board Warrants	**Mean (%)**	**Highest (%)**	**Lowest (%)**	**Option Moneyness**
AKN-W	-5	13	-20	OTM
Gamuda-WC	-6	6	-14	ITM
IGB-W	25	124	-11	ITM
IJM-W	-3	12	-9	ITM
Mamee-W	30	58	-9	ITM
MMM-W	7	64	-18	ITM
MK Land-W	-7	4	-16	ITM
Pilecon-W	1,674	6,415	-1	OTM
PDZ Holding-W	-8	10	-29	ITM
Perstima-W	-0.4	36	-12	ITM
SBB-W	7	35	-9	ITM
SP Setia-W	16	58	-7	ITM
Star-W	-2	25	-19	ITM
UMW-W	-7	1	-14	ITM
YTL Corp-W	-10	2	-19	ITM

---

[5] OTM warrants refer to warrants with current market price < Exercise Price.

Table 5 and Table 6 show the details of 28 warrants that were inconsistent in mispricing during the period. The findings showed that most of the inconsistent main board warrants were In-the-Money (ITM)[6] warrants. The finding, nevertheless, did not show the same on the second board warrants.

The paper also found that there were four warrants (two each from main board and second board), despite being Out-the-Money (OTM), were underpriced and consistently traded below their fair values. The warrants are shown in Table 7.

Tabel 6: Inconsistent Mispricing on Second Board Warrants				
Second Board Warrants	Mean (%)	Highest (%)	Lowest (%)	Option Moneyness
BIG Ind-W	0.3	10	-6	ITM
Chuan Huat-W	28	117	-59	ITM
Eden-W	6	13	-8	OTM
Elba-W	-6	23	-17	OTM
EPMB-W	4	45	-14	OTM
Fed Furniture-W	-11	25	-55	OTM
HBJC-W	5	12	-4	ITM
HIL Ind-W	11	55	-2	OTM
K Jetson-W	22	37	-16	OTM
Pahanco-W	-21	11	-35	OTM
Public Pack-W	-32	27	-53	OTM
Stamford-W	-13	7	-34	OTM
Taiping Super-W	-9	2	-26	ITM

Table 7: Under-priced OTM Warrants					
Warrants	Category	Mean (%)	Highest (%)	Lowest (%)	Mean Warrant Price ($)	Mean Fair Value ($)
Pantai-W	Main	-16	-25	-2	0.37	0.45
Press Metal-W	Main	-11	-20	-2	0.60	0.68
L Cheong-W	Second	-25	-35	-15	0.31	0.42
Sugar Bun-W	Second	-20	-36	-11	0.32	0.40

Despite some warrants being underpriced, one may wonder why arbitrage did not take place to capitalize on the mispricing. It is our opinion that when OTM warrants are underpriced, the situation would remain as such since arbitraging could not take place due to prohibition of short selling (applied to the Malaysian market). The prohibition caused the inability of arbitrageurs to short the underlying stocks even though they may be able to take the long position in the underpriced warrants[7].

5.4 Strategies

As the findings showed that there was pricing inefficiency in warrants, this paper will further extend the discussion into the strategies that can be adopted in order to take advantage of the situation. There are basically two strategies to be proposed:-

5.4.1 Arbitrage Strategy

The portfolio manager may take an arbitrage strategy by buying the widely underpriced warrants and to short a certain proportion of the underlying stock—based on the hedge ratio as determined by delta (assuming the portfolio manager has the underlying stock in his portfolio

---

[6]   ITM warrants refer to warrants with current Market Price > Exercise Price.

[7]   Chee Keong (1997) also found that when OTM warrants were underpriced, they would remain so since arbitraging could not take place.

and to also ignore the rule on short selling[8]). The benefits from this arbitrage strategy are, first, riskless arbitrage profit to be derived from the mispricing and second, the portfolio could still maintain its investment exposure but with lower holding cost. This is due to the 'cheaper entry' provided by the warrant (assuming underlying price remains constant).

5.4.2. Investment Strategy

In contrast to the above strategy, the portfolio manager may liquidate his position in the continuously widely over-priced warrants. Holding these warrants is also not attractive considering they are deep OTM[9] and had zero fair values.

5.5 Comparison between the Volatility of Warrants to Underlying

The studies showed that all warrants had recorded higher average volatility to their underlying (as measured by the annualized standard deviation) during the 100 trading days. Only one stock, Gula Perak, had higher volatility as compared to its warrant. The higher volatility recorded in warrants, compared to stocks, was expected as warrants are comparatively cheaper to its underlying, hence attracting more participants from the retail investors, causing it to be more speculative. Investors' ignorance on the pricing mechanism of warrants may also add to the increase in its volatility. The summary of the annualized volatility of stocks and warrants is shown in Table 8.

Table 8: Stocks and Warrants Volatility						
Annualized σ	Main Board Stocks	Main Board Warrants	Diff	Second Board Stocks	Second Board Warrants	Diff
Average	0.4	0.8	0.4	1.0	4.1	3.1
Highest	2.1	3.4	1.3	1.0	0.4	0.2
Lowest	0.2	0.8	0.6	0.5	1.1	0.6

Based on the annualized volatility, for the main board stocks, Pilecon was found to be the most volatile during the period ($\sigma = 2.1$) while WCT Engineering the lowest ($\sigma = 0.2$). As for the second board stocks, Federal Furniture had the highest volatility ($\sigma = 1.0$) while the lowest was Pahanco ($\sigma = 0.25$).

For warrants, Pilecon-W recorded the highest volatility among the main board warrants ($\sigma = 3.4$) while Gula Perak-W recorded the lowest ($\sigma = 0.1$). As for the second board warrants, Bright Packaging-W was found to be the most volatile ($\sigma = 4.12$) while Audrey-W, the lowest ($\sigma = 0.4$).

Refer to Appendix 4 for details.

5.6 Delta and the Behavior of the Price Change Relationship

Delta[10], as known, describes the price change relationship between calls and its underlying stocks. Appendix 5 shows the average Deltas of 100 trading days on each of the warrants being studied. Analysis showed that higher average Deltas were recorded for the ITM warrants. The OTM (deep) warrants, on the other hand, had Deltas of close to zero. Meanwhile, average Deltas

---

[8] Otherwise not applicable since local regulations prohibit short selling.
[9] Deep OTM warrants have a strike price very much higher than the current stock price.
[10] Based on the computation in $N(d_1)$.

of 0.5 were recorded for warrants close to ATM. These findings are, therefore, in line with the theory of Deltas.[11] Table 9 shows the summary of average Deltas according to option moneyness.

Table 9: Average Deltas

Warrants	Option Moneyness	Average Deltas
Main Board	ITM	0.9
	OTM	0.3
Second Board	ITM	0.9
	OTM	0.5

6. Conclusion

The study, having its prime objective to determine the pricing efficiency of warrants in the Malaysian market using the adjusted Black-Scholes Option Pricing Model (BSOPM), has found that there was significant mispricing during the period under study on 78 warrants out of the 85 randomly selected warrants. The pricing inefficiency, therefore, has caused the market prices to differ from their fair values. The study also found that there were seven warrants out of the 85 warrants that had insignificant mispricing during the period, recorded plus or minus average daily mispricing of 0% to 5% differences from the computed theoretical values.

From the analysis, the percentage of mispricing was later sorted and grouped into four categories. There were underpriced, overpriced, extremely overpriced and insignificant mispricing. Having established that there were inefficiencies in the pricing of most of the sample warrants in the market, the paper further looked into the extent of the mispricing. Analysis showed that when warrants were extremely overpriced, the mispricing can be extremely high, higher on the main board warrants as compared to the second board. In contrast, underpriced warrants recorded lower mispricing. The findings showed that while some warrants were consistently underpriced or overpriced during the period, there were also warrants that were inconsistent in their mispricing.

Due to the mispricing, riskless arbitrage profit is possible and investors could take this opportunity by adopting an appropriate strategy i.e., taking opposite actions on the warrants and their underlying stocks. The portion of the underlying can be determined by using Delta. This paper proposed two basic strategies that can be adopted i.e., arbitrage and investment strategies.

Despite the existence of mispricing, investors might not be able to capitalize on this opportunity, had they not known the effective and tested valuation method to determine the fair or true value of warrants. In the case of option (warrants), the BSOPM, being a closed—form solution to warrant pricing, had proven to be effective in pricing warrants. The model, nevertheless, has its weaknesses, which might have resulted in the high level of mispricing in this study, especially for mispricing exceeding 1,000% with theoretical values of close to zero. This is perhaps due to the strict application of the parameters used in the model, particularly on the assumption of constant volatility, which might be more suitable for the pure options. This paper has shown the positive effect of higher volatility to warrants, thus an inaccurate determination of standard deviation can mislead the calculation of fair values.

The possible solution to this problem is perhaps to test other warrant pricing models such as the Jump Diffusion Model or the Constant Elasticity Variance (CEV) Model. From the literature review, these models were noted to respond better for warrant valuation. Veld (2000) concluded that the CEV Model is better suited to value warrants. His study, however, did not include the Malaysian market. We need to test this model on Malaysian warrants to confirm its applicability.

---

[11] Delta equals 0.5 when option is ATM, approaches one when deep ITM and progressively lower to approach zero when OTM.

The sharp difference between the exercise price and stock price is also another contributing factor to the huge mispricing, as the paper found that deep OTM warrants recorded huge mispricing as compared to other categories of warrants. The possible solution to this is that the regulator may consider the revision of exercise price in order to reflect the current economic scenario. This is necessary to enhance the pricing efficiency. ✧

References

1. Bacha, Obiyathulla (2002), Financial Derivatives: Markets and Application in Malaysia, UPM Press.

2. Black F (1989), "How We Came Up With The Option Formula", *The Journal of Portfolio Management*, Winter Issue, pp. 4-8.

3. Black F and Scholes M (1972), "The Valuation of Option Contracts and a Test of Market Efficiency", *The Journal of Finance*, pp. 339-417.

4. Black F and Scholes M (1973), "The Pricing of Options and Corporate Liabilities", *Journal of Political Economy*, pp. 637-654.

5. Chan F L and Sy M (1997), "Pricing Warrant in Thin Markets : Jump Diffusion vs Modified Black-Scholes in the Kuala Lumpur Stock Exchange", RMIT, Unpublished.

6. Chee Keong, Wan (1997), "The Efficiency and Characteristics of Malaysian Warrants", IIUM, Unpublished.

7. Crouhy M and Galai D (1991), Warrant Valuation and Equity Volatility, Advances in Futures and Options Research, F J Fabozzi (ed.) JAI Press Inc., pp. 203-215.

8. Dubofsky D A (1992), "Option and Financial Futures, Valuation and Uses", McGraw-Hill.

9. Haja S M Jamil (2002), "A Study on Pricing Efficiency of KLSE Traded Warrants", IIUM, Unpublished.

10. *Investor's Digest*, KLSE October 2003-May 2004.

11. Kremer J W and Roenfeldt R L (1993), "Warrant Pricing Jump-Diffusion vs. Black-Scholes", *Journal of Financial and Quantitative Analysis*, pp. 255-272.

12. Lauterbach B and Schultz P (1990), "Pricing Warrants: An Empirical Study of The Black Scholes Model and Its Alternatives", *The Journal of Finance*, pp. 1181-1209.

13. Merton R C (1973), "Theory of Rational Option Pricing", *Bell Journal of Economics and Management Science*, pp. 141-183.

14. Merton R C (1976), "Option Pricing When Underlying Stock Return Are Discontinuous", *Journal of Financial Economics*, pp. 125-144.

15. Noreen E and Wolfson M (1981), "Equilibrium Warrant Pricing Models and Accounting for Executive Stock Options", *Journal of Accounting Research*, pp. 384-389.

16. Veld C (2000), "Warrants Pricing: A Review of Empirical Research", *European Journal of Finance*, pp. 1-25.

Appendix 1: Information on Main Board Warrants and Underlying Stocks

No.	Main Board Warrants	Type of Industry	Number of Shares Outstanding	Number of Warrants Outstanding	Issued Date	Maturity Date	Exercise Price ($)	Annualized σ of Stock
1	Affin-WA	Finance	1,012,014,000	114,127,428	16/05/1995	15/5/2005	3.33	0.26
2	AIC-W	Technology	104,920,000	25,895,000	26/01/2000	15/1/2006	2.53	0.31
3	AKN-W	Technology	121,768,000	5,642,182	3/3/2000	2/9/2004	2.73	0.23
4	AMMB-W	Finance	1,860,109,000	143,534,069	14/05/1997	13/05/2007	11.15	0.37
5	Berjaya G-W	Trading/Services	1,498,171,000	2,560,100,512	18/10/1999	17/10/2009	1.00	0.43
6	Bolton-W	Property	320,343,000	45,495,958	16/12/1996	15/12/2006	4.25	0.34
7	DKLS-W	Industrial	92,700,000	39,827,000	17/09/2001	16/9/2006	1.00	0.32
8	DRB-Hicom-W	Industrial	981,087,000	122,600,020	10/7/2000	9/7/2005	2.88	0.32
9	E&O-W	Property	232,471,000	61,176,298	18/05/2001	17/5/2011	1.03	0.81
10	FCW-W	Industrial	278,660,000	92,886,400	12/11/2003	11/11/2013	0.50	1.42
11	FACB-W	Industrial	85,163,000	7,376,800	27/06/1997	27/3/2007	1.21	0.61
12	Gamuda-WC	Construction	734,742,000	128,408,698	22/02/2001	21/8/2007	3.75	0.38
13	G Perak-WB	Hotel	257,833,000	60,780,153	10/7/2001	21/12/2005	1.00	0.13
14	HL Ind-W	Industrial	225,322,000	35,081,200	13/11/1996	13/11/2006	8.00	0.36
15	HL Prop-W	Property	700,458,000	70,042,322	2/10/1995	1/10/2005	3.05	0.30
16	IGB-W	Property	1,213,236,000	177,825,571	30/12/1999	29/12/2004	1.00	0.46
17	Ipmuda-W	Trading/Services	72,470,000	34,995,500	24/09/1996	23/6/2006	3.80	0.67
18	Insas-W	Finance	618,966,000	567,863,464	20/04/1999	19/4/2009	1.00	0.48
19	IJM-W	Construction	427,504,000	21,087,725	29/02/2000	28/08/2004	2.76	0.20
20	Ireka-W	Construction	113,915,000	29,241,750	13/03/1996	12/3/2006	2.32	0.46
21	K Emas-W	Trading/Services	593,748,000	127,612,056	16/11/1999	15/11/2004	1.00	0.35
22	KFC-W	Trading/Services	198,275,000	37,350,630	8/8/1996	7/8/2006	9.50	0.26
23	LBA-W	Industrial	70,723,000	32,650,333	7/6/2000	7/6/2005	2.30	0.36
24	Mamee-W	Consumer	61,997,000	23,999,000	17/08/1998	16/2/2008	1.33	0.40
25	MMM-W	Trading/Services	113,369,000	19,525,450	19/07/2002	18/7/2007	1.03	0.52
26	M Plant-W	Finance	1,162,591,000	387,527,703	9/9/2002	8/6/2007	1.21	0.36
27	MTD-W	Construction	387,527,703	69,860,598	23/11/1996	23/5/2006	2.12	0.30
28	MK Land-W	Property	1,200,476,000	257,832,222	16/04/2003	30/06/2008	1.19	0.45
29	Pantai-W	Trading/Services	385,389,000	66,991,467	1/8/2002	31/7/2007	1.12	0.67
30	PIHP-WA	Trading/Services	623,032,000	145,407,687	11/1/1995	10/1/2005	2.10	0.37
31	Pilecon-W	Construction	399,642,000	199,788,491	3/4/2000	2/4/2005	1.20	1.10
32	Puncak-W	Infrastructure	458,468,000	109,374,869	20/11/2001	20/11/2006	2.62	0.23
33	PDZ Hldg-W	Trading/Services	76,317,000	12,281,297	12/10/2000	11/10/2005	1.35	0.53
34	Perstima-W	Industrial	94,169,000	5,778,934	17/11/2000	16/11/2005	1.00	0.30
35	Press Metal-W	Industrial	63,389,000	20,363,999	22/12/1995	21/12/2005	1.97	0.90
36	RHB-Cap-W	Finance	1,823,468,000	194,510,471	28/12/1994	27/12/2004	5.40	0.35
37	SBB-W	Finance	1,123,447,000	173,527,954	18/07/1996	17/6/2006	1.74	0.19
38	SP Setia-W	Property	566,823,000	76,729,769	16/06/2000	15/6/2005	2.78	0.18
39	Star-W	Trading/Services	321,761,000	37,952,456	15/12/2000	15/9/2005	5.48	0.26
40	Time-W	Infrastructure	765,053,000	136,936,877	5/8/1996	4/8/2006	6.30	0.46
41	TSH Res-W	Industrial	97,659,000	21,919,041	26/07/1995	25/07/2005	2.06	0.29
42	UMW-W	Consumer	472,270,000	34,626,239	27/01/1995	26/01/2005	3.60	0.23
43	YTL Corp-W	Construction	1,474,586,000	88,839,208	22/09/1997	21/9/2007	2.95	0.26
44	YTL Power-W	Infrastructure	4,586,876,000	1,144,319,648	11/1/2000	8/1/2010	1.45	0.22
45	YTL Cement-W	Industrial	382,320,000	97,102,756	9/12/1994	8/12/2004	0.77	0.19
46	WCT-W	Construction	117,525,000	35,463,200	6/10/2000	6/4/2005	2.25	0.13

No.	Second Board Warrants	Type of Industry	Number of Shares Outstanding	Number of Warrants Outstanding	Issued Date	Maturity Date	Exercise Price ($)	Annualized σ of Stock
1	Audrey-W	Consumer	52,870,000	6,166,667	18/02/2002	17/2/2012	1.15	0.60
2	Auto Air-W	Industrial	44,000,000	17,328,779	19/05/2000	18/5/2005	2.25	1.36
3	K Belton-W	Industrial	85,115,000	19,321,173	23/12/1999	22/12/2004	1.35	0.79
4	BIG Ind-W	Industrial	48,045,000	19,218,000	5/2/2004	4/2/2009	1.00	1.37
5	Bright Pack-W	Industrial	43,285,000	19,950,000	29/09/1999	28/9/2004	1.50	0.53
6	ChuanHuat-W	Industrial	41,230,000	13,089,283	14/08/1999	13/8/2004	1.00	0.28
7	Crest Petroleum-W	Trading/Services	878,905,000	249,929,025	19/02/2004	18/2/2009	3.51	0.64
8	Eden-W	Trading/Services	280,068,000	12,150,000	17/02/2003	15/2/2008	1.00	1.29
9	EG Ind-W	Industrial	50,011,000	6,659,570	15/12/1995	14/12/2005	4.80	0.95
10	Elba-W	Consumer	42,725,000	20,275,000	28/11/2002	27/11/2012	1.00	0.58
11	EPMB-W	Industrial	116,304,000	20,730,000	4/9/2003	4/9/2008	1.00	0.60
12	Fed Furn-W	Consumer	27,682,000	13,675,900	30/06/1995	29/6/2005	3.40	1.48
13	G Frontier-W	Industrial	62,257,000	31,128,602	16/11/2000	15/11/2007	1.44	0.40
14	HBJC-W	Trading/Services	180,800,000	67,800,000	31/12/2003	30/12/2013	1.00	2.39
15	Harn Len-W	Industrial	185,447,000	74,310,095	18/07/2003	17/7/2008	1.00	0.39
16	HIL Ind-W	Industrial	130,847,000	47,652,600	16/04/1999	15/4/2007	1.55	0.66
17	K Jetson-W	Construction	49,241,000	17,004,000	28/11/2002	27/11/2012	1.08	0.29
18	Juan Kuang-W	Trading/Services	53,020,000	18,149,996	10/4/1995	8/4/2005	5.13	0.88
19	Komark-W	Industrial	81,275,000	39,999,990	30/06/2000	30/6/2010	1.70	0.44
20	Lank Horst-W	Construction	40,869,000	5,066,750	14/12/2000	8/12/2005	2.00	0.64
21	L Cheong-W	Consumer	60,000,000	8,000,000	15/12/2003	14/12/2013	1.00	0.56
22	Mega Pascal-W	Industrial	60,490,000	30,245,000	22/08/2000	21/8/2010	3.50	0.50
23	Multi Usage-W	Industrial	52,728,000	21,241,000	5/4/2000	4/4/2005	1.42	0.76
24	Nepline-W	Trading/Services	73,264,000	33,038,667	28/02/2000	28/2/2010	1.04	0.57
25	Pahanco-W	Industrial	44,083,000	12,595,200	12/9/2002	11/9/2012	1.00	0.58
26	Pensonic-W	Industrial	46,310,000	11,345,000	5/1/2001	4/1/2006	2.85	0.52
27	Poly glass-W	Industrial	159,975,000	39,993,737	21/12/2000	20/12/2005	1.00	0.61
28	Public Pack-W	Industrial	54,948,000	25,690,004	8/8/1997	7/8/2007	3.25	0.89
29	Prompto-W	Industrial	46,002,000	20,425,990	23/06/1997	23/6/2007	7.45	0.64
30	Sarawak Con-W	Industrial	70,204,000	17,333,600	24/12/2003	10/12/2010	1.00	1.25
31	Sinmah-W	Consumer	50,530,000	14,799,260	18/09/1997	17/9/2007	5.95	0.38
32	SK Wangi-W	Industrial	16,276,000	8,108,227	8/8/1997	8/8/2007	1.45	0.42
33	Stamford-W	Trading/Services	40,000,000	16,000,000	22/12/2003	21/12/2013	1.12	0.57
34	SMPC-W	Industrial	64,645,000	14,924,500	22/11/2000	21/11/2005	1.75	0.39
35	Sugar Bun-W	Trading/Services	90,104,000	18,347,200	19/11/2002	18/11/2012	1.00	0.76
36	Scientex Pack-W	Industrial	67,582,000	9,997,496	22/03/2000	21/03/2005	1.35	0.53
37	Tamadam-W	Trading/Services	49,005,000	21,780,000	5/1/2000	5/1/2005	1.45	0.62
38	Taiping Super-W	Industrial	50,354,000	15,999,200	13/10/2003	13/10/2013	1.00	0.53
39	UBB-W	Industrial	54,005,000	17,995,000	25/11/2002	24/11/2007	1.00	0.60

Appendix 2: Information on Second Board Warrants and Underlying Stocks

Appendix 3: Descriptive Statistics on the Pricing Efficiency of Warrants

No.	Main Board Warrants	Mean (%)	Highest (%)	Lowest (%)	No.	Second Board Warrants	Mean (%)	Highest (%)	Lowest (%)
1	Affin-WA	283,968	1,537,805	8,671	1	Audrey-W	(37)	(45)	(29)
2	AIC-W	108	150	63	2	Auto Air-W	(12)	22	(43)
3	AKN-W	(5)	13	(20)	3	K Belton-W	3,999	18,905	525
4	AMMB-W	214	449	123	4	BIG Ind-W	0.3	10	(6)
5	Berjaya G-W	1,982	3,654	1,146	5	Bright Pack-W	969	8,922	91
6	Bolton-W	15,791	74,726	1,468	6	Chuan Huat-W	28	117	(59)
7	DKLS-W	59	128	29	7	Crest Petroleum-W	161	201	106
8	DRB-Hicom-W	392	1,081	192	8	Eden-W	6	13	(8)
9	E&O-W	(48)	(42)	(57)	9	EG Ind-W	40	92	10
10	FCW-W	(31)	(39)	(27)	10	Elba-W	(6)	23	(17)
11	FACB-W	2,022	4,499	614	11	EPMB-W	4	45	(14)
12	Gamuda-WC	(6)	6	(14)	12	Fed Furn-W	(11)	25	(55)
13	G Perak -WB	166	253	69	13	G Frontier-W	155	267	114
14	HL Ind-W	78	154	32	14	HBJC-W	5	12	(4)
15	HL Prop-W	15,495,640	131,828,984	3,036,075	15	Harn Len-W	102	136	74
16	IGB-W	25	124	(11)	16	HIL Ind-W	11	55	(2)
17	Ipmuda-W	163	276	66	17	K Jetson-W	22	37	(16)
18	Insas-W	133	235	92	18	Juan Kuang-W	2,307	9,268	916
19	IJM-W	(3)	12	(9)	19	Komark-W	122	192	85
20	Ireka-W	372	589	174	20	Lank Horst-W	342	2,676	97
21	K Emas-W	2,468,624	40,069,085	1,779	21	L Cheong-W	(25)	(35)	(15)
22	KFC-W	2,720	4,640	1,601	22	Mega Pascal-W	57	144	13
23	LBA-W	181	380	76	23	Multi Usage-W	698	2,218	374
24	Mamee-W	30	58	(9)	24	Nepline-W	40	71	18
25	MMM-W	7	64	(18)	25	Pahanco-W	(21)	11	(35)
26	M Plant-W	36	56	23	26	Pensonic-W	526	856	284
27	MTD-W	18	43	8	27	Poly glass-W	473	615	360
28	MK Land-W	(7)	4	(16)	28	Public Pack-W	(32)	27	(53)
29	Pantai-W	(16)	(25)	(2)	29	Prompto-W	3,652	6,204	1,823
30	PIHP-WA	1,775,023	17,278,781	30,557	30	Sarawak Con-W	(23)	(10)	(33)
31	Pilecon-W	1,674	6,415	(1)	31	Sinmah-W	10,241	22,529	4,633
32	Puncak-W	60	143	38	32	SK Wangi-W	125	198	41
33	PDZ Hldg-W	(8)	10	(29)	33	Stamford-W	(13)	7	(34)
34	Perstima-W	(0.4)	36	(12)	34	SMPC-W	1,310	4,802	517
35	Press Metal-W	(11)	(20)	(2)	35	Sugar Bun-W	(20)	(36)	(11)
36	RHB-Cap-W	34,000	282,284	736	36	Scientex Pack-W	58	154	7
37	SBB-W	7	35	(9)	37	Tamadam-W	1,084	1,967	397
38	SP Setia-W	16	58	(7)	38	Taiping Super-W	(9)	2	(26)
39	Star-W	(2)	25	(19)	39	UBB-W	(21)	(0.4)	(53)
40	Time-W	13,572	45,727	5,076					
41	TSH Res-W	28	47	15					
42	UMW-W	(7)	1	(14)					
43	YTL Corp-W	(10)	2	(19)					
44	YTL Power-W	(24)	(16)	(33)					
45	YTL Cement-W	17	23	9					
46	WCT-W	22	31	15					

Appendix 4: Volatility of Stock and Warrants

No.	Main Board	Annualized σ Stocks	Annualized σ Warrants	Difference	No.	Second Board	Annualized σ Stocks	Annualized σ Warrants	Difference
1	Affin	0.5	1.3	0.8	1	Audrey	0.3	0.4	0.1
2	AIC	0.2	0.4	0.2	2	Auto Air	0.5	1.6	1.1
3	AKN	0.2	0.3	0.1	3	K Belton	0.7	2.4	1.7
4	AMMB	0.3	0.7	0.4	4	BIG Ind	0.5	0.6	0.1
5	Berjaya Group	0.5	1.3	0.7	5	Bright Pack	0.5	4.1	3.6
6	Bolton	0.6	0.8	0.2	6	Chase Perdana	0.5	1.6	1.0
7	DKLS	0.4	0.6	0.2	7	Chuan Huat	0.4	1.5	1.1
8	DRB-Hicom	0.3	0.8	0.5	8	Crest Petroleum	0.7	1.1	0.5
9	E&O	0.4	0.5	0.2	9	Eden	0.5	0.7	0.1
10	FCW	0.6	0.7	0.1	10	EG Ind	0.5	0.6	0.1
11	FACB	0.5	2.1	1.6	11	Elba	0.3	1.2	0.9
12	Gamuda	0.3	0.3	0.1	12	EPMB	0.3	1.1	0.8
13	G Perak	0.6	0.1	(0.5)	13	Fed Furn	1.0	1.6	0.6
14	HL Ind	0.2	0.4	0.1	14	G Frontier	0.3	0.9	0.6
15	HL Properties	0.2	1.3	1.0	15	HBJC	0.4	0.5	0.1
16	IGB	0.3	0.8	0.5	16	Harn Len	0.4	0.5	0.2
17	Ipmuda	0.4	1.5	1.0	17	HIL Ind	0.5	0.6	0.1
18	Insas	0.4	0.5	0.1	18	K Jetson	0.5	0.7	0.1
19	IJM	0.2	0.5	0.2	19	Juan Kuang	0.5	1.5	0.9
20	Ireka	0.4	0.8	0.4	20	Komark	0.3	0.6	0.2
21	K Emas	0.2	2.5	2.3	21	Lank Horst	0.9	1.5	0.5
22	KFC	0.3	0.7	0.4	22	L Cheong	0.5	0.8	0.3
23	LBA	0.3	0.5	0.2	23	Mega Pascal	0.5	0.7	0.2
24	Mamee	0.5	0.8	0.2	24	Multi Usage	0.4	1.1	0.6
25	MMM	0.5	0.8	0.3	25	Nepline	0.5	0.8	0.3
26	M Plant	0.5	0.8	0.3	26	Pahanco	0.2	0.9	0.7
27	MTD	0.2	0.5	0.2	27	Pensonic	0.4	0.6	0.2
28	MK Land	0.5	0.6	0.1	28	Public Pack	0.4	1.3	0.8
29	Pantai	0.3	-0.5	0.2	29	Prompto	0.6	0.8	0.2
30	PIHP	0.5	1.8	1.2	30	Sarawak Con	0.6	0.8	0.2
31	Pilecon	2.1	3.4	1.3	31	Sinmah	0.3	0.5	0.2
32	Puncak	0.2	0.4	0.2	32	SK Wangi	0.7	1.0	0.4
33	PDZ Hldg	0.9	1.4	0.6	33	Stamford	0.3	0.6	0.3
34	Perstima	0.2	0.9	0.7	34	SMPC	0.4	1.0	0.6
35	Press Metal	0.4	0.6	0.2	35	Sugar Bun	0.4	0.7	0.4
36	RHB-Cap	0.3	2.3	2.0	36	Scientex Pack	0.4	1.1	0.7
37	SBB	0.3	0.5	0.2	37	Tamadam	0.7	1.5	0.8
38	SP Setia	0.2	0.5	0.3	38	Taiping Super	0.6	0.9	0.4
39	Star	0.3	0.6	0.3	39	UBB	0.8	1.4	0.6
40	Time	0.4	0.7	0.4					
41	TSH Res	0.4	0.7	0.4					
42	UMW	0.2	0.4	0.1					
43	YTL Corp	0.2	0.3	0.1					
44	YTL Power	0.2	0.3	0.1					
45	YTL Cement	0.2	0.2	0.0					
46	WCT	0.2	0.3	0.1					

Appendix 5: Average Deltas

No.	Main Board Warrants	Option Moneyness		No.	Second Board Warrants	Option Moneyness	
		ITM	OTM			ITM	OTM
1	Affin-WA		0.0	1	Audrey-W	0.9	
2	AIC-W	0.7		2	Auto Air-W		0.6
3	AKN-W		1.0	3	K Belton-W		0.1
4	AMMB-W		0.1	4	BIG Ind-W	1.0	
5	Berjaya G-W		0.1	5	Bright Pack-W		0.2
6	Bolton-W		0.0	6	Chuan Huat-W	0.9	
7	DKLS-W	0.9		7	Crest Petroleum-W		0.6
8	DRB-Hicom-W		0.3	8	Eden-W		0.9
9	E&O-W	0.9		9	EG Ind-W		0.6
10	FCW-W	1.0		10	Elba-W		0.8
11	FACB-W		0.1	11	EPMB-W		0.8
12	Gamuda-WC	0.9		12	Fed Furn-W		0.4
13	G Perak -WB	1.0		13	G Frontier-W		0.4
14	HL Ind-W		0.4	14	HBJC-W	1.0	
15	HL Prop-W	0.8	0.0	15	Harn Len-W		0.6
16	IGB-W			16	HIL Ind-W		0.7
17	Ipmuda-W		0.2	17	K Jetson-W		0.8
18	Insas-W		0.5	18	Juan Kuang-W		0.0
19	IJM-W	1.0		19	Komark-W		0.5
20	Ireka-W		0.3	20	Lank Horst-W		0.3
21	K Emas-W		0.0	21	L Cheong-W		0.8
22	KFC-W		0.0	22	Mega Pascal-W		0.4
23	LBA-W		0.6	23	Multi Usage-W		0.2
24	Mamee-W	0.8		24	Nepline-W		0.7
25	MMM-W	0.9		25	Pahanco-W		0.8
26	M Plant-W	0.9		26	Pensonic-W		0.2
27	MTD-W	0.9		27	Poly glass-W		0.2
28	MK Land-W	0.9		28	Public Pack-W		0.6
29	Pantai-W		0.7	29	Prompto-W		0.0
30	PIHP-WA		0.0	30	Sarawak Con-W	1.0	
31	Pilecon-W		0.1	31	Sinmah-W		0.0
32	Puncak-W	0.9		32	SK Wangi-W		0.6
33	PDZ Hldg-W	0.9		33	Stamford-W		0.8
34	Perstima-W	1.0		34	SMPC-W		0.2
35	Press Metal-W		0.7	35	Sugar Bun-W		0.9
36	RHB-Cap-W	1.0	0.0	36	Scientex Pack-W		0.6
37	SBB-W			37	Tamadam-W		0.1
38	SP Setia-W	1.0		38	Taiping Super-W	0.8	
39	Star-W	0.8		39	UBB-W	0.8	
40	Time-W		0.0				
41	TSH Res-W	1.0					
42	UMW-W	1.0					
43	YTL Corp-W	0.9					
44	YTL Power-W	0.8					
45	YTL Cement-W	1.0					
46	WCT-W	1.0					
	Average	0.9	0.3		Average	0.9	0.5