2.0 LITERATURE REVIEW

2.1 LEHN & MAKHIJA (1996)

This was among the earliest academic studies undertaken to determine the efficacy of claims of the superiority of EVA (Lehn and Makhija 1996, pg. 37). It basically seeks to answer two fundamental questions: -

1. How do Disclosed EVA and Market Value Added (MVA) relate to stock performance?
2. How useful is EVA and MVA as measures for internal performance?

The research was based on data comprising of 241 firms in the United States covering the period 1987, 1988, 1992 and 1993 only. The data for the intervening periods were not available and about two thirds of the sample comprised of manufacturing firms.

In order to answer the first question, they determined the strength of correlation of six performance measures with stock returns. The performance measures comprise of three traditional accounting measures namely Return on Assets (ROA), Return on Equity (ROE), Return on Sales (ROS); stock returns; Disclosed EVA and MVA. All the measures had positive correlation with stock returns. They found that Disclosed EVA (DEVA) to be slightly higher correlated with stock returns compared to the other performance measures. This indicates that DEVA is indeed superior to some of the commonly used accounting measures (Lehn and Makhija 1996, pg. 36).

The second question was answered by determining the relationship between chief executive officer (CEO) turnover with DEVA and MVA. In order to do this, they firstly had to determine the average performance for each firm. They then began to proceed to classify the firms into two groups (i.e. firms with performance above and below the median level). The incidence of CEO turnover within each group was then compared. A summary of the result is indicated below:

Table 2.1.1: % CEO turnover compared with MVA performance

Grouping	% CEO Turnover
Below Median MVA performance	20.0%
Above Median MVA performance	8.3%

Table 2.1.2: % CEO turnover compared with DEVA performance

Grouping	% CEO Turnover
Below Median DEVA performance	19.3%
Above Median DEVA performance	9.0%

Table 2.1.3: % CEO turnover compared with Stock performance

Grouping	% CEO Turnover
Below Median Stock Performance	19.0%
Above Median Stock Performance	9.6%

The above results show that CEO turnover is higher when the performance of MVA, DEVA and stock performance is below median. Therefore Lehn and Makhija concluded that the relationship between Disclosed EVA or MVA and CEO turnover was inverse (Lehn and Makhija 1996, pg. 37).

2.2 CHEN & DODD (1997)

Slightly 1 year after Lehn and Makhija published their article, another academic article on the similar topic was written by Dodd and Chen. In their article, they focus solely on claim that EVA is superior to other performance measures. The study basically has three objectives: -

1. To determine the correlation between Disclosed EVA and stock returns.
2. To compare Disclosed EVA with accounting measures with respect to their association with stock returns.
3. To compare Disclosed EVA with Basic EVA with respect to their association with stock returns.

This study was based 566 American firms for a ten-year period from 1983 to 1992. The data were from the databases compiled by Stern Stewart Management Service and Standard & Poor's Compustat Services respectively.

In the first objective, stock return is the annualised compound rate of return to shareholders from capital gain and dividend. The EVA measures comprise of the following elements:

DEVAPS: Average DEVA per share;

STDDEVA: Change in standardized DEVA. This was obtained firstly by dividing the DEVA for that year and EVA for 1983 by 1983's beginning capital. Each item is then multiplied by 100 and the difference between the two measures determined. It basically shows the effect of EVA changes for $100 invested in 1983.

ROC: Average return on capital. It is the operating profit after taxes divided by capital outstanding at the beginning of year.

Spread: Average spread between ROC and the cost of capital.

Growth: Average annual compound rate of capital growth.

A summary of the results is given below:

Table 2.2.1: Correlations between stock returns and EVA measures

	1.	2.	3.	4.	5.
1. STOCK RETURNS					
2. DEVAPS	.449*				
3. STDDEVA	.275*	.017			
4. ROC	.491*	.371*	.258*		
5. SPREAD	.511*	.386*	.255*	.976*	
6. GROWTH	.419*	.260*	.064*	.476*	.463*

Note: * = $p < 0.01$

The above table indicates that the correlation between all EVA measures and stock returns are positive. Therefore DEVA measures can explain the stock returns but the relationship is not perfect. In order to further explore the association between EVA with stock returns, the researcher carried out a regression using all EVA measures except for ROC. This was because of the high collinearity between the independent variables ROC and Spread. This can be seen from the high correlation of 0.976 between the variables. It was therefore necessary to remove ROC as it does not provide any additional information while enabling us to clear identify the effects of the explanatory variable Spread on stock returns (Berenson and Levine 1999, p.884-885). Below is the regression from this further testing (Table 2.2.2).

Table 2.2.2: Regression 1 (EVA measures only)

Variables	Coefficient	t – Value	p Value
DEVAPS	0.584	8.33	0.0000
STDDEVA	0.027	6.71	0.0000
SPREAD	0.315	5.44	0.0000
GROWTH	0.251	6.83	0.0000

R^2 = 0.415; Adjusted R^2 = 0.411; F Statistics = 99.36; p = 0.0000

Coefficient of Partial Determination:

r^2_{DEVAPS} =0.110; $r^2_{STDDEVA}$ = 0.074;

r^2_{SPREAD} = 0.050; r^2_{GROWTH} = 0.077

The results from that Regression 1 above was superior in explaining stock returns compared to usage of a single EVA measure. This is because it can explain 41.5% of the total variation in stock returns. The researchers concluded that usage of an EVA system would contribute more towards explaining stock returns. The second critical observation from the regression was the relative importance of each individual EVA measure. The coefficient of partial determination explains each variable's ability to explain stock returns in the regression. The sequence of importance coefficient of partial correlation is as follows: DEVAPS, Growth, STDDEVA and SPREAD.

The second objective was to compare Disclosed EVA with accounting measures. This was carried out through comparison of R^2 using two regressions. The difference in R^2 indicates incremental information derived from one set of variables compared with the other. The accounting measures selected was earnings per share (EPS), return on assets (ROA) and return on equity (ROE). Below is a summary the selected regressions.

Table 2.2.3: Regression 2 (Accounting Measures only)

Variables	Coefficient	t – Value	p Value
EPS	0.619	5.41	0.0000
ROA	1.133	14.77	0.0000
ROE	0.072	8.53	0.0000

R^2 = 0.365; Adjusted R^2 = 0.362; F Statistics = 107.86; p = 0.0000

Table 2.2.4: Regression 3 (Combine DEVA and Accounting Measures)

Variables	Coefficient	t – Value	p Value
DEVAPS	0.728	5.33	0.0000
STDDEVA	0.025	6.36	0.0000
SPREAD	-0.127	-1.55	0.1214
GROWTH	0.233	6.28	0.0000
EPS	-0.328	-1.52	0.1290
ROA	0.737	6.23	0.0000
ROE	0.061	6.03	0.0000

R^2 = 0.470; Adjusted R^2 = 0.463; F Statistics = 0.64; p = 0.0000

The comparison of the R^2 between Regressions 2 & 3 indicates that EVA measure contributes an additional 10.5% (0.470-0.365) increase in explanation ability. This is equivalent to a relative increase of 28% of explanatory power. In comparing Regression 1 & 3, accounting measures contribute to only 5.5% (0.470-0.415) increase in R^2. Therefore EVA does provide superior additional information content.

The final objective was to compare the explanatory power of Disclosed EVA with Basic EVA. This basically seeks to determine the usefulness of making the accounting adjustments on earnings and capital. This was also carried out through comparison of R^2 using two regressions. The Basic EVA variables are the same as those of Disclosed EVA variables. It is denoted by the prefix "B" before the variable name to differentiate it with Disclosed EVA variables. Below is a summary of the selected regressions.

Table 2.2.5: Regression 4 (BEVA Measures)

Variables	Coefficient	t – Value	p Value
BEVAPS	1.026	8.22	0.0000
BSTDDEVA	0.053	8.15	0.0000
BSPREAD	0.195	5.32	0.0000
BGROWTH	0.247	7.83	0.0000

$R^2 = 0.414$; Adjusted $R^2 = 0.409$; F Statistics = 98.89; p = 0.0000

Table 2.2.6: Regression 5 (Combine DEVA and BEVA Measures)

Variables	Coefficient	t – Value	p Value
DEVAPS	0.370	2.29	0.0227
STDDEVA	0.008	0.96	0.3382
SPREAD	0.241	3.89	0.0001
GROWTH	0.203	2.29	0.0223
BEVAPS	0.340	1.19	0.2360
BSTDDEVA	0.037	2.74	0.0063
BSPREAD	0.133	3.36	0.0008
BGROWTH	0.006	0.07	0.9436

$R^2 = 0.443$; Adjusted $R^2 = 0.435$; F Statistics = 55.34; p = 0.0000

The comparison of the R^2 between Regressions 4 & 5 indicates that Disclosed EVA measure contributes only an additional 2.9% (0.443-0.414) increase in

explanation ability. This indicates that the accounting adjustment do contribute to additional information. However the increase explanatory power according to Dodd and Chen may not justify the additional cost incurred to make the adjustments. They therefore recommend usage of Basic EVA.

2.3 BRIDDLE, BOWEN & WALLACE (1997)

This was a research published about the same time as that by Chen and Dodd. It also focuses solely on the association of EVA with market adjusted stock returns by studying the relative information content. The objective of this study was to determine the following:

1. Is Disclosed EVA (DEVA) and/or Basic EVA (BEVA) superior to performance measures like earnings and operating cash flows in explaining market adjusted stock returns? and
2. Do components unique to Disclosed EVA and/or Basic EVA provide additional information on market adjusted stock returns beyond that explained by operating cash flows and earnings element in the EVA model?

The data was based on the databases compiled by Stern Stewart Management Service and Standard & Poor's Compustat Services. The sample consists of 6,174 observations of 773 firms with fiscal years ending June 1983 to May 1994.

The first research question was whether EVA (Disclosed and Basic) was superior to earnings and operating cash flow (OCF) in explaining market adjusted stock returns. Market adjusted stock returns is a firm's 12-month compounded stock return less the 12-month compounded value-weighted market return. The performance measure selected to represent earnings was earnings before extraordinary items (EBEI). This question was answered by conducting the relative information content test. It was done using pairwise comparisons of regressions using the below hypothesis:

H_R: Information content of X_1 is equal to X_2

Where X_1 and X_2 represent the independent variables.

In order to compare the independent variables, coefficients for the below equation on information content was firstly determined using ordinary least square regression. This was followed by comparison of the variation of stock returns (Adjusted $R^{2)}$ explained by each regression. This was done to rank each performance measure in terms of its ability to explain abnormal returns.

$$D_t = b_0 + b_1X_t/MVE_{t-1} + b_2X_{t-1}/MVE_{t-1} + e_t$$

Where:

Dt	- Market adjusted returns or (Firm's 12-month compounded stock return less the 12-month compounded value-weighted market return);
X_t	- Current value for one the performance measures;
X_{t-1}	- Laggard value for one the performance measures;
MVE_{t-1}	- Laggard market value of equity;
e_t	- Random disturbance term.

Once the above steps were completed, pair comparisons of adjusted R^2 to test the hypothesis were conducted. The test conducted by employing the Biddle Seow Siegel test. The null hypothesis for this test was that there is no difference in the ability of two competing independent variables. A summary result of this testing is indicated below.

Table 2.3.1: Test of Difference of adjusted R^2

	Ranking Of Relative Information Content						
	(1)		(2)		(3)		(4)
	EBEI	>	BEVA	>	DEVA	>	OCF
Adj. R^2	0.1278		0.0732		0.0649		0.0280
p-value (1)		(0.000)		(0.266)		(0.000)	
p-value (2)			(0.0000)		(0.0000)		
p-value (3)				(0.0000)			

Note: Pair comparisons of:

Row p-value (1); EBEI and BEVA, BEVA and DEVA, DEVA and OCF

Row p-value (2); EBEI and DEVA, BEVA and OCF

Row p-value (3); EBEI and OCF

The results above show that earnings are more significantly associated with annual stock returns than the other measures of performance. This is because EBEI can explain 12.78% of the variation in stock returns and the differences in adjusted R^2 between it and other performance measure is significant. The difference in adjusted R^2 between BEVA and DEVA was however not significant.

The next question was to determine the relative importance of the components unique to DEVA. The researchers did this by assessing the incremental information content of the DEVA components. Before the researchers did this, they had to come up with a conceptual model for DEVA. They did this because the concept of EVA itself was not fully defined at that time. It was only after the recent article by Shrieves and Wachowicz (1999) was the EVA concept and its relationship with other Discounted-Cash-Flow method mathematical reconciled. The elements of their DEVA model are as indicated below: -

DEVA = OCF + Accrual + ATInt – CapChg + Acctadj

EBEI = OCF + Accrual

Where:

OCF - Cash flow from operating;

Accrual - Accrual on operating items. Examples of these items would be depreciation, amortization and deferred tax.

ATInt - After-tax interest expense;

Capchg - Charge for the cost of debt and equity employed. It was defined as the weighted average of cost of capital (cost of debt and equity) multiplied with capital at the beginning of the year.

Acctadj - Accounting adjustments on operating profits and capital. This comprise of the difference between DEVA and BEVA.

The test of incremental information content basically is to determine the importance of each DEVA component. In order so, the researchers firstly carried out a regression containing all DEVA elements against market adjusted returns. This was to ensure that all the EVA elements were significant in explaining market adjusted returns (Refer to t-test values in Table 2.3.2). The t-test showed that all coefficients were significant except for the variable $Acctadj_{t-1}$. Below was the model of the regression equation analysed.

Market Adjusted Return for current year =

$b_0 + b_1OCF_t - b_2OCF_{t-1} + b_3Accrual_t - b_4Accrual_{t-1} - b_5ATInt_t + b_6ATInt_{t-1} - b_7CapChg_t + b_8CapChg_{t-1} - b_9Acctadj_t + b_{10}AcctAdj_{t-1} + e_t$

Table 2.3.2: Test of Incremental Information of EVA elements

Variables	Predicted Sign	Actual Coefficient	t-stats	F-stat	p-value
Constant		0.013	1.42		
OCF_t	+	+1.473	16.02		
				128.42	(0.0000)
OCF_{t-1}	-	-0.824	-8.53		
$Accrual_t$	+	+1.192	13.09		
				87.83	(0.0000)
$Accrual_{t-1}$	-	-0.751	-7.73		
$ATInt_t$	-	-0.594	-2.221		
				3.45	(0.032)
$ATInt_{t-1}$	+	+0.772	2.63		
$Capchg_t$	-	-0.391	-2.43		
				3.61	(0.027)
$Capchg_{t-1}$	+	+0.270	1.72		
$AcctAdj_t$	+	+0.357	3.12		
				6.55	(0.0001)
$AcctAdj_{t-1}$	-	+0.055	0.48		
Adj. R^2		0.0907			

Once each element and their signs were ascertained, F-test was conducted to determine the contribution of each DEVA component. F-test basically does this by comparing the variability of one sample with another sample (Zikmund 1997, p.599). The F-statistics indicates that OCF and Accrual contribute most towards information content compared with the DEVA unique variables. This clearly shows that the accounting adjustments in DEVA computations do not contribute much additional information.

2.4 AMEEN & YAU (1998)

This research was carried out by two researchers from National University of Singapore to test whether EVA as a performance measure provided any added advantage. The research was carried using data of 10 listed property companies on the Stock Exchange of Singapore for the financial years ending 1991, 1992 and 1993. This was done using Wilcoxon statistics test. Firstly, EVA and accounting performance measures were identified and grouped separately. The accounting performance measures selected were percentage increase in net tangible asset per share, profit margin, percentage increase in profit margin, ROE and return on total assets while the EVA performance measures were MVA, Basic EVA, increase in EVA and EVA per share. The measure "increase in EVA" was the difference between current period EVA and laggard period EVA. The researchers then ranked the companies based on the individual performance measures. Each measure was then given equal weight and is used to determine the weighted ranked performance. The weighted ranking for each company and each financial year was then derived. Wilcoxon test was subsequently carried out for each financial year to the test the below hypothesis. This test involves determining whether there were any substantial differences between ordinal rankings derived from weighted EVA measures compared with the weighted conventional accounting measures.

H_0: No differences in ranking derived from the two methods.

The results of their test is indicated below (Table 2.4.1):

Where:

(a) – Weighted ranking by conventional financial measures

(b) – Weighted ranking by EVA measures

Table 2.4.1: Statistics Table for 1991

Companies	(a)	(b)	(a-b)	Absolute (a-b)	Rank (+)	Rank (-)
City Development Ltd	6	9	-3	3		6
Parkway Holdings Ltd	3	5	-2	2		3
Liang Court Holdings Ltd	-	-				
United Overseas Land Ltd	7	7	0	0		
DBS Land Ltd	8	10	-2	2		3
Hong Fok Corporation Ltd	2	4	-2	2		3
Central Properties Ltd	10	8	2	2	3	
Malayan Credit Ltd	5	7	-2	2		3
Singapore Land Ltd	4	4	0	0		
Straits Steamship Land Ltd	10	2	8	8	7	
				Sum:	10	18

Sample size = 7, computed Wilcoxon Statistics T = 10

Cutoff value = 3 for 2.5% level and 4 for 5% level test

The computed Wilcoxon Statistics is the smaller of either the sum of absolute (+) or absolute (-). The null hypothesis will not be rejected if the computed Wilcoxon statistic is larger than the critical cutoff value. Based on the table above, the null hypothesis was not rejected at the 2.5% level or 5% level cutoff level. This indicates that there was no difference between rankings from derived both methods for 1991.

Table 2.4.2: Statistics Table for 1992

Companies	(a)	(b)	(a-b)	Absolute (a-b)	Rank (+)	Rank (-)
City Development Ltd	9	10	-1	1		4
Parkway Holdings Ltd	3	6	-3	3		8
Liang Court Holdings Ltd	2	1	1	1	4	
United Overseas Land Ltd	6	5	1	1	4	
DBS Land Ltd	5	5	0	0		
Hong Fok Corporation Ltd	10	10	0	0		
Central Properties Ltd	8	7	1	1	4	
Malayan Credit Ltd	1	2	-1	1		4
Singapore Land Ltd	7	8	-1	1		4
Straits Steamship Land Ltd	4	3	1	1	4	
				Sum:	16	20

Sample size = 8, computed Wilcoxon Statistics T = 16

Cutoff value = 4 for 2.5% level and 4 for 5% level test

Based on the results above, the null hypothesis was also not rejected in 1992 at either the 2.5% level or 5% level. This once again indicates no difference between the rankings from derives both methods for 1992.

Table 2.4.3: Statistics Table for 1993

Companies	(a)	(b)	(a-b)	Absolute (a-b)	Rank (+)	Rank (-)
City Development Ltd	2	10	-8	8		7
Parkway Holdings Ltd	10	8	2	2	4	
Liang Court Holdings Ltd	4	5	-1	1		2
United Overseas Land Ltd	7	3	4	4	5.5	
DBS Land Ltd	7	7	0	0		
Hong Fok Corporation Ltd	1	1	0	0		
Central Properties Ltd	9	9	0	0		
Malayan Credit Ltd	5	6	-1	1		2
Singapore Land Ltd	8	4	4	4	5.5	
Straits Steamship Land Ltd	3	2	1	1	2	
				Sum:	17	11

Sample size = 7, computed Wilcoxon Statistics T = 11

Cutoff value = 3 for 2.5% level and 4 for 5% level test

The results for 1993 also indicate that the null hypothesis was not rejected. This once again indicates no difference between the rankings from derived both methods for 1993. All the results above consistently show that EVA does not provide any additional information.

2.5 LITERATURE REVIEW SUMMARY

The above are some of the studies done overseas comparing EVA with accounting performance measures. In order to building upon these studies, a summary review of the literature based on the two research questions is shown below:

Relationship between EVA and stock returns

All the literature above indicates that EVA has a positive correlation with stock returns. This means an increase in EVA should result in an increase in stock returns. EVA could therefore be used to measure wealth creation. It is therefore expected that the relationship between EVA and stock returns is also positive for Malaysia.

Comparison between EVA and accounting performance measures

All research above except for that of Lehn and Mahkija (1996) indicates that EVA does not have additional explanatory ability. Lehn and Makhija (1996) found EVA to be the best in its ability to explain stock returns compared with ROA, ROE, ROS and MVA. However their research was done for only 4 years (i.e. 1987, 1988, 1992 and 1993). Results from the above reviewed literature appear mixed and therefore we cannot make any inference whether EVA would be superior to accounting performance measures for Malaysia.