Chapter 4
Research Results

4.1 Introduction

This chapter begins by displaying the characteristics (maximum, minimum and mean values) of all variables used in this study in their original linear form. The estimated empirical model is then given, followed by an evaluation of the accuracy and validity of this model. The implications of the empirical model are then discussed, followed by an exposition of how the model can be used to forecast future values of the dependent variable (the stock market index). Then a statement of the investment decision rule for investors is given. Finally, the seven hypotheses are re-stated and an assessment of whether or not these hypotheses have been confirmed or rejected is carried out. Explanations for rejected hypotheses are given.

4.2 Characteristics of Variables

The characteristics of all variables (in their original linear, and not natural logarithmic, form), for each country studied, are:

Table 4: Characteristics of Variables for Singapore

	Stock Market Index Value	CPI	Exchange Rate (Home Currency per Unit of USD)	Exchange Rate Risk	Short-Term Interest Rate (%)	Market Volatility	M2 Money Supply in Constant USD millions	Market Price-to-Earnings Ratio
Maximum	3,805.70	109.5	1.8510	2.8191	3.56	12.6454	324,260.849	74.47
Minimum	1,267.82	86.9	1.2041	0.7349	0.25	1.2018	96,375.520	5.79
Mean	2,311.13	93.6	1.5873	1.3784	1.58	5.5174	168,334.063	19.04

Table 5: Characteristics of Variables for Malaysia

	Stock Market Index	CPI	Exchange Rate (Home	Exchange Rate Risk	Short-Term Interest	Market Volatility	M2 Money Supply in Constant	Market Price-to-Earnings

	Value		Currency per Unit of USD)		Rate (%)		USD millions	Ratio
Maximum	1,579.07	103.80	3.8000	2.6242	3.56	12.8157	274,114.567	361.36
Minimum	572.88	80.30	2.9555	0.0000	1.82	1.6998	92,605.414	8.07
Mean	997.94	90.18	3.5928	0.7600	2.80	4.7190	158,342.544	20.91

Table 6: Characteristics of Variables for Thailand

	Stock Market Index Value	CPI	Exchange Rate (Home Currency per Unit of USD)	Exchange Rate Risk	Short-Term Interest Rate (%)	Market Volatility	M2 Money Supply in Constant USD millions	Market Price-to-Earnings Ratio
Maximum	1,133.53	113.23	45.5688	2.1970	3.50	14.0680	233,782.030	27.40
Minimum	269.19	82.90	29.8793	0.6620	0.65	3.8912	131,919.261	3.52
Mean	620.01	95.58	37.7751	1.4019	1.83	7.1407	170,052.172	11.46

Table 7: Characteristics of Variables for Indonesia

	Stock Market Index Value	CPI	Exchange Rate (Home Currency per Unit of USD)	Exchange Rate Risk	Short-Term Interest Rate (%)	Market Volatility	M2 Money Supply in Constant USD millions	Market Price-to-Earnings Ratio
Maximum	4,130.80	164.01	12,151	9.5834	17.95	14.3319	105,919.992	20.41
Minimum	358.23	96.95	7,425	1.1266	6.10	3.5186	64,770.187	4.70
Mean	1,505.17	123.16	9,309	3.6356	10.60	7.1042	81,684.102	11.79

Table 8: Characteristics of Variables for Philippines

	Stock Market Index Value	CPI	Exchange Rate (Home Currency per Unit of USD)	Exchange Rate Risk	Short-Term Interest Rate (%)	Market Volatility	M2 Money Supply in Constant USD millions	Market Price-to-Earnings Ratio
Maximum	4503.63	174.00	56.3600	4.5023	16.20	10.0854	62,138.446	22.08
Minimum	993.35	97.70	40.3600	0.4629	1.40	2.7273	26,190.292	9.23
Mean	2272.01	133.44	49.3794	1.7810	6.62	6.2985	40,662.377	14.94

4.3 Estimated Empirical Model

Using OLS and carrying out sequential hypothesis testing yielded a significant regression equation. The computer print-out, generated by the relevant statistical software, relating to this equation is shown in the table below:

Table 9: Computer Print-Out Related to the Significant Equation

Dependent Variable: LOGINDEX
Method: Panel Least Squares
Date: 04/22/12 Time: 15:02
Sample (adjusted): 2001M03 2011M09
Periods included: 127
Cross-sections included: 5
Total panel (unbalanced) observations: 561

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant Term	-0.629226	0.488603	-1.287808	0.1984
Deterministic Time Trend	0.000952	0.000217	4.394384	0.0000
LnINDEX(-1)	1.089964	0.041072	26.53818	0.0000
LnINDEX(-2)	-0.151887	0.040660	-3.735551	0.0002
LnCPI(-1)	0.246563	0.104460	2.360361	0.0186
LnCPI(-3)	-0.222165	0.103400	-2.148603	0.0321
LnEXRT	0.250441	0.050752	4.934564	0.0000
LnEXRTRISK	-0.032894	0.014880	-2.210639	0.0275
LnEXRTRISK(-2)	0.029116	0.014760	1.972596	0.0490
LnINTRT	-0.016762	0.006880	-2.436390	0.0152
LnMKTVOL(-3)	-0.026856	0.008859	-3.031518	0.0025
LnMONSPLYCONST(-2)	0.332886	0.110132	3.022617	0.0026
LnMONSPLYCONST(-3)	-0.332703	0.109366	-3.042092	0.0025
DMY1	0.842066	0.156868	5.367973	0.0000
DMY2	0.591639	0.113571	5.209406	0.0000
DMY3	-0.015341	0.037433	-0.409831	0.6821
DMY4	-1.318151	0.279338	-4.718841	0.0000

R-squared	0.991716	Mean dependent var	7.235823
Adjusted R-squared	0.991473	S.D. dependent var	0.657161
S.E. of regression	0.060685	Akaike info criterion	-2.736414
Sum squared resid	2.003356	Schwarz criterion	-2.605210
Log likelihood	784.5642	Hannan-Quinn criter.	-2.685186
F-statistic	4070.425	Durbin-Watson stat	2.058669
Prob(F-statistic)	0.000000		

The statistically significant equation is therefore:

LnINDEX = 0.9390 + 0.0010*$\mathfrak{I}$t + 1.0900*LnINDEX(-1) - 0.1519*LnINDEX(-2) + 0.2466*LnCPI(-1)

- 0.2222*LnCPI(-3) + 0.2504*LnEXRT – 0.0329*LnEXRTRISK + 0.0291*LnEXRTRISK(-2) - 0.0168*LnINTRT – 0.0269*LnMKTVOL(-3) + 0.3329*LnMONSPLYCONST(-2) – 0.3327*LnMONSPLYCONST(-3) + 0.8421*DMY1 + 0.5916*DMY2 – 0.0153*DMY3 - 1.3182*DMY4

In this equation the constant term has been *anti-logged* (the initial value in natural logarithmic form was -0.6292). The reasoning behind this is that the purpose of this equation is to find a *linear value* for the dependent variable. In order to do this, not only must the dependent variable that the equation computes be anti-logged, but so too must the constant term.

From this equation, five individual equations can be derived representing each of the five Southeast Asian countries. These equations are:

Singapore

LnINDEX = 0.9390 + 0.0010*ßt + 1.0900*LnINDEX(-1) - 0.1519*LnINDEX(-2) + 0.2466*LnCPI(-1) - 0.2222*LnCPI(-3) + 0.2504*LnEXRT - 0.0329*LnEXRTRISK + 0.0291*LnEXRTRISK(-2) - 0.0168*LnINTRT - 0.0269*LnMKTVOL(-3) + 0.3329*LnMONSPLYCONST(-2) - 0.3327*LnMONSPLYCONST(-3) + 0.8421

Malaysia

LnINDEX = 0.9390 + 0.0010*ßt + 1.0900*LnINDEX(-1) - 0.1519*LnINDEX(-2) + 0.2466*LnCPI(-1) - 0.2222*LnCPI(-3) + 0.2504*LnEXRT - 0.0329*LnEXRTRISK + 0.0291*LnEXRTRISK(-2) - 0.0168*LnINTRT - 0.0269*LnMKTVOL(-3) + 0.3329*LnMONSPLYCONST(-2) - 0.3327*LnMONSPLYCONST(-3) + 0.5916

Thailand

LnINDEX = 0.9390 + 0.0010*ßt + 1.0900*LnINDEX(-1) - 0.1519*LnINDEX(-2) + 0.2466*LnCPI(-1) - 0.2222*LnCPI(-3) + 0.2504*LnEXRT - 0.0329*LnEXRTRISK + 0.0291*LnEXRTRISK(-2) - 0.0168*LnINTRT - 0.0269*LnMKTVOL(-3) + 0.3329*LnMONSPLYCONST(-2) - 0.3327*LnMONSPLYCONST(-3) - 0.0153

Indonesia

LnINDEX = 0.9390 + 0.0010*∯t + 1.0900*LnINDEX(-1) - 0.1519*LnINDEX(-2) + 0.2466*LnCPI(-1) - 0.2222*LnCPI(-3) + 0.2504*LnEXRT - 0.0329*LnEXRTRISK + 0.0291*LnEXRTRISK(-2) - 0.0168*LnINTRT - 0.0269*LnMKTVOL(-3) + 0.3329*LnMONSPLYCONST(-2) - 0.3327*LnMONSPLYCONST(-3) - 1.3182

<u>Philippines</u>

LnINDEX = 0.9390 + 0.0010*∯t + 1.0900*LnINDEX(-1) - 0.1519*LnINDEX(-2) + 0.2466*LnCPI(-1) - 0.2222*LnCPI(-3) + 0.2504*LnEXRT - 0.0329*LnEXRTRISK + 0.0291*LnEXRTRISK(-2) - 0.0168*LnINTRT - 0.0269*LnMKTVOL(-3) + 0.3329*LnMONSPLYCONST(-2) - 0.3327*LnMONSPLYCONST(-3)

4.4 Accuracy and Validity of the Estimated Model

The coefficients, t-statistics and P-values of the intercept, deterministic time trend, significant explanatory variables and dummy variables are:

Table 10: Coefficients, t-Statistics and P-Values of Intercept, Deterministic Time Trend, Significant Explanatory Variables and Dummy Variables

Name of Variable	**Coefficient**	**t-statistic**	**P-value**
Intercept (Anti-Logged Value)	0.9390	- 1.2878	0.1984
∯t (Deterministic Time Trend)	0.0010	4.3944	0.0000
LOGINDEX(-1)	1.0900	26.5382	0.0000
LOGINDEX(-2)	-0.1519	-3.7356	0.0002
LOGCPI(-1)	0.2466	2.3604	0.0186
LOGCPI(-3)	-0.2222	-2.1486	0.0321
LOGEXRT	0.2504	4.9346	0.0000
LOGEXRTRISK	-0.0329	-2.2106	0.0275
LOGEXRTRISK(-2)	0.0291	1.9726	0.0490
LOGINTRT	-0.0168	-2.4364	0.0152

LOGMKTVOL(-3)	-0.0269	-3.0315	0.0025
LOGMONSPLYCONST(-2)	0.3329	3.0226	0.0026
LOGMONSPLYCONST(-3)	-0.3327	-3.0421	0.0025
DMY1 (dummy variable for Singapore)	0.8421	5.3680	0.0000
DMY2 (dummy variable for Malaysia)	0.5916	5.2094	0.0000
DMY3 (dummy variable for Thailand)	-0.0153	- 0.4098	0.6821
DMY4 (dummy variable for Indonesia)	-1.3182	- 4.7188	0.0000

The t-statistics and P-values for each of the explanatory variables included in the final equation indicate that, at the 5% level of significance, the null hypotheses that the values of their coefficients equal zero can be rejected. It can be concluded therefore that, at the 5% significance level, *these variables are statistically significant*. Additionally, all of the explanatory variables (whether in current value of lagged form), with the exception of the P/E ratio, are included in the final equation. This suggests that *the initial choice of variables was good*.

One disappointing aspect, however, is that the *coefficient values* on the explanatory variables appear to be *comparatively low*, ranging from -0.2222 to 1.09. Larger coefficient values would have shown greater changes in the values of the relevant stock market indices in response to changes in the values of the explanatory variables. This would have had the effect of providing *clearer direction* to investors on how they should respond to changes in the values of the significant explanatory variables.

The adjusted R-squared of 0.9915 is high and indicates that *the line of best fit that the equation estimates is a good fit*. The equation does extremely well in explaining the variation in the dependent variable. Appendix 1 should be referred to for a more detailed explanation of R squared and adjusted R squared. The F-statistic value of 4070.425, with a corresponding P-value of 0.000000, provides *strong statistical evidence* that the null hypothesis H_0: $R^2 = 0$ can be rejected in favour of the alternate hypothesis H_1: $R^2 \neq 0$. We can be confident therefore that the equation is *statistically significant*.

The DW statistic of 2.0587 indicates that the null hypothesis that $\rho=0$ can be accepted and there is, therefore, *no serial correlation.* Regarding critical values, the lower bound for DW (D_L) is 1.81928, and the upper bound (D_U) is 1.90084. 4-D_L is equal to 2.18072 and 4-D_U is equal to 2.09916. In this case, the null hypothesis of no serial correlation is accepted because $2 < DW < 4\text{-}D_U$. Alternatively, if the relevant values are 'plugged in', $2 < 2.0857 < 2.09916$.

Finally, there are no problems with multicollinearity in the equation. The adjusted R-squared is high and all of the explanatory variables that are included in the equation are individually statistically significant. [It should be stated, at this point, that the following pairs of explanatory variables exhibited correlation coefficient values with each other of either greater than 0.50 or less than -0.50: LnCPI and LnMONSPLYCONST (-0.56), LnEXRT and LnINT (0.71), and LnINT and LnMONSPLYCONST (-0.68). Excluding, firstly, LnMONSPLYCONST and LnEXRT (and their lagged values), and then, secondly, LnMONSPLYCONST and LnINT (and their lagged values), and then carrying out sequential hypothesis testing led to *inferior results*. The 2 equations that were derived, although they had adjusted R-squared values of 0.9911 and 0.9916 respectively, and DW-statistics of 1.9837 and 1.9865 respectively, only contained 4 significant explanatory variables each, in contrast with the 11 significant explanatory variables in the equation that is at the centre of this study[20]].

4.5 Implications of the Empirical Model

In order to understand the implications of the empirical model, it is necessary to interpret it. Firstly, the anti-logged value of the intercept is 0.9390. Usually, the value of the intercept is interpreted as being the value of the dependent variable when all the independent variables equal zero. In this study, however, there are two other factors to consider: firstly, the inclusion of the deterministic time trend, and, secondly, the four dummy variables. The coefficient value on the deterministic time trend is 0.0010 and, by way of example, the value of the time trend is 153 in September 2011 (the final sample observation). The significant equation has been generated from data coming from five countries, yet there are only four dummy variables (DMY1 for Singapore, DMY2 for Malaysia, DMY3 for Thailand, and DMY4 for Indonesia). Thus, when all four dummy variables are set to zero, the output of the equation applies to the fifth country, which is the Philippines. The coefficient values on the dummy variables are 0.8421, 0.5916, -0.0153 and -1.3182 respectively. Thus, to provide specific interpretations (and using September 2011 as the month that the example applies to):

[20] Both equations included the explanatory variables LnINDEX(-1), LnINDEX(-2) and LnMKTVOL(-3). The first equation also included LnINT(-1), whilst the second also included LnEXRT. A deterministic time trend was significant in the second equation, but not in the first.

- When all independent and dummy variables equal zero, the value of the index for Singapore is [0.9390 + (0.0010*153) + 0.8421] = 1.9341
- When all independent and dummy variables equal zero, the value of the index for Malaysia is [0.9390 + (0.0010*153) + 0.5916] = 1.6836
- When all independent and dummy variables equal zero, the value of the index for Thailand is [0.9390 + (0.0010*153) - 0.0153] = 1.0767
- When all independent and dummy variables equal zero, the value of the index for Indonesia is [0.9390 + (0.0010*153) – 1.3182] = -0.2262
- When all independent and dummy variables equal zero, the value of the index for the Philippines is [0.9390 + (0.0010*153)] = 1.092

These interpretations, however, are not particularly interesting concepts because it is extremely unlikely (in fact, almost certainly impossible) that all of the independent variables in the equation will be equal to zero. For example, the exchange rate variable will never be zero, and neither will money supply.

In contrast, interpretations of the coefficient values on the independent variables provide more useful information. The coefficient values on the independent variables are generally interpreted as representing the marginal effect of the relevant independent variable on the dependent variable. They are a measure of how much the explanatory variable influences the dependent variable. Interpretations of each of the coefficient values in the equation are:

- Holding all the other explanatory variables constant, an increase in the logged value of the market index lagged one period by 1% should lead to an increase in the current value of the index by 1.09%.
- Holding all the other explanatory variables constant, an increase in the logged value of the market index lagged two periods by 1% should lead to a decrease in the current value of the index by 0.1519%.
- Holding all the other explanatory variables constant, an increase in the logged value of CPI lagged one period by 1% should lead to an increase in the current value of the index by 0.2466%.
- Holding all the other explanatory variables constant, an increase in the logged value of CPI lagged three periods by 1% should lead to a decrease in the current value of the index by 0.2222%.

- Holding all the other explanatory variables constant, an increase in the logged value of the exchange rate by 1% should lead to an increase in the current value of the index by 0.2504%.
- Holding all the other explanatory variables constant, an increase in the logged value of exchange rate risk by 1% should lead to a decrease in the current value of the index by 0.0329%.
- Holding all the other explanatory variables constant, an increase in the logged value of exchange rate risk lagged two periods by 1% should lead to an increase in the current value of the index by 0.0291%.
- Holding all the other explanatory variables constant, an increase in the logged value of the short-term interest rate by 1% should lead to a decrease in the current value of the index by 0.0168%.
- Holding all the other explanatory variables constant, an increase in the logged value of market volatility lagged three periods by 1% should lead to a decrease in the current value of the index by 0.0269%.
- Holding all the other explanatory variables constant, an increase in the logged value of money supply lagged two periods by 1% should lead to an increase in the current value of the index by 0.3329%.
- Holding all the other explanatory variables constant, an increase in the logged value of money supply lagged three periods by 1% should lead to a decrease in the current value of the index by 0.3327%.

Thus, if investors wish to gain insight into how the ASEAN stock markets indices are likely to move, then they should be aware of these interpretations of the values of the coefficients on the independent variables. In particular, they should be aware of the *directions* of the relationships. They should closely monitor trends in the directions of these independent variables, in addition to forecasts of these variables. For example, knowing that the exchange rate (*measured as home currency per unit of USD*) has a positive correlation with the stock market index, investors should anticipate that an exchange rate that is trending 'upwards' or forecasted to be 'increasing' (actually depreciating according to the definition used in this study), is likely to be accompanied by increases in the value of the market index.

4.6 Predictive Ability of the Empirical Model

One of the primary purposes in developing multiple regression models is using them to compute values for the dependent variable, and, in many cases, future values (forecasts). Values for the independent variables are 'plugged into' the equation in order to compute a value for the dependent variable.

With regards to obtaining values for the independent variables, some of the significant independent variables are lags, meaning that they are past values. Thus, if a forecast is required for the not-too-distant future, then lagged values, being past values are easy to obtain. If, however, forecasts are required for further into the future, or if the significant independent variables are current, and not lagged values, then it may be possible to obtain or develop forecasts for the independent variables. The financial press, for example, will often contain articles discussing leading economists' consensus forecasts for say, inflation, or central bank decisions on interest rates.

It should be remembered that most of the variables in the significant equation are in natural logarithmic form. For this reason, when using the equation to find predicted (or fitted) values for the relevant indices, initially it is necessary to 'plug in' values for the explanatory variables in *natural logarithmic form*. Consequently, the value for the dependent variable, the index, will also be in *natural logarithmic form*. In order to get the true (linear) value for the index, the logged value will need to be *anti-logged*. As already mentioned, the *intercept* (or *constant term*) also needs to be *anti-logged*. This has already been done in the significant equation shown so far.

Also, when using the significant equation to develop forecasts, it should be remembered that the value for the deterministic time trend should be adjusted accordingly. For example, in September 2011, the value for the deterministic time trend is 153. If a forecast is required for, say, September 2012 (which would be twelve periods further into the future), then the value for the deterministic time trend should be adjusted to 165.

4.7 Decision Rule for Investors

When using the significant equation to develop forecasts for stock market index values, the decision rule is:

If forecasted index value > current index value → BUY
If forecasted index value < current index value → SELL
If forecasted index value > current index value → HOLD

This decision rule is explained in greater detail in the Recommendations section (Recommendations for Investors).

4.8 Hypothesis Testing Results

The table below summarises the hypothesised relationships between the explanatory variables and the stock market indices. It also states whether or not the results of this research confirm these hypotheses.

Table 11: Comparison of the Research Results with the Hypothesised Relationships

Hypothesis Number	Explanatory Variable	Null and Alternate Hypotheses	t-Statistics	Is Variable Statistically Significant at the 5% Level of Significance ?	Hypothesised Direction of Relationship with the Stock Market Index	Coefficient Value	Do the Results Confirm the Hypothesis ?
Hypothesis 1	Inflation Rate (current period)	$H_0: d = 0$ $H_A: d \neq 0$	0.1086	No	Negative	0.0159	N/A
	Inflation Rate (lagged 1 period)	$H_0: e = 0$ $H_A: e \neq 0$	2.3604	Yes	Negative	0.2466	No
	Inflation Rate (lagged 2 periods)	$H_0: f = 0$ $H_A: f \neq 0$	0.7254	No	Negative	0.1462	N/A
	Inflation Rate (lagged 3 periods)	$H_0: g = 0$ $H_A: g \neq 0$	-2.1486	Yes	Negative	-0.2222	Yes
Hypothesis 2	Exchange Rate (current period)	$H_0: h = 0$ $H_A: h \neq 0$	4.9346	Yes	Positive	0.2504	Yes
	Exchange Rate (lagged 1 period)	$H_0: i = 0$ $H_A: i \neq 0$	-0.1549	No	Positive	-0.0538	N/A
	Exchange Rate (lagged 2 periods)	$H_0: j = 0$ $H_A: j \neq 0$	-0.1546	No	Positive	-0.0538	N/A
	Exchange Rate (lagged 3 periods)	$H_0: k = 0$ $H_A: k \neq 0$	0.3504	No	Positive	0.0848	N/A
Hypothesis 3	Exchange Rate Risk (current period)	$H_0: l = 0$ $H_A: l \neq 0$	-2.2106	Yes	Negative	-0.0329	Yes

	Exchange Rate Risk (lagged 1 period)	H_0: m = 0 H_A: m ≠ 0	-0.6004	No	Negative	-0.0191	N/A
	Exchange Rate Risk (lagged 2 periods)	H_0: n = 0 H_A: n ≠ 0	1.9726	Yes	Negative	0.0291	No
	Exchange Rate Risk (lagged 3 periods)	H_0: o = 0 H_A: o ≠ 0	-0.2555	No	Negative	-0.0058	N/A
Hypothesis 4	Interest Rate (current period)	H_0: p = 0 H_A: p ≠ 0	-2.4364	Yes	Negative	-0.0168	Yes
	Interest Rate (lagged 1 period)	H_0: q = 0 H_A: q ≠ 0	-0.6828	No	Negative	-0.0267	N/A
	Interest Rate (lagged 2 periods)	H_0: r = 0 H_A: r ≠ 0	0.2166	No	Negative	0.0086	N/A
	Interest Rate (lagged 3 periods)	H_0: s = 0 H_A: s ≠ 0	0.8201	No	Negative	0.0225	N/A
Hypothesis 5	Market Volatility (current period)	H_0: t = 0 H_A: t ≠ 0	0.0714	No	Negative	0.0016	N/A
	Market Volatility (lagged 1 period)	H_0: u = 0 H_A: u ≠ 0	-0.3486	No	Negative	-0.0110	N/A
	Market Volatility (lagged 2 periods)	H_0: v = 0 H_A: v ≠ 0	1.2590	No	Negative	0.0396	N/A
	Market Volatility (lagged 3 periods)	H_0: w = 0 H_A: w ≠ 0	-3.0315	Yes	Negative	-0.0269	Yes
Hypothesis 6	Money Supply (current period)	H_0: x = 0 H_A: x ≠ 0	0.4773	No	Positive	0.0895	N/A
	Money Supply (lagged 1	H_0: y = 0 H_A: y ≠ 0	-0.3710	No	Positive	-0.0941	N/A

	period)						
	Money Supply (lagged 2 periods)	H_0: z = 0 H_A: z ≠ 0	3.0226	Yes	Positive	0.3329	Yes
	Money Supply (lagged 3 periods)	H_0: ab = 0 H_A: ab ≠ 0	-3.0421	Yes	Positive	-0.3327	No
Hypothesis 7	P/E Ratio (current period)	H_0: ac = 0 H_A: ac ≠ 0	0.5080	No	Positive	0.0245	N/A
	P/E Ratio (lagged 1 period)	H_0: ad = 0 H_A: ad ≠ 0	0.1380	No	Negative	0.0098	N/A
	P/E Ratio (lagged 3 periods)	H_0: ae = 0 H_A: ae ≠ 0	-0.3300	No	Negative	-0.0196	N/A
	P/E Ratio (lagged 3 periods)	H_0: af = 0 H_A: af ≠ 0	-0.6118	No	Negative	-0.0204	N/A

In the Hypotheses section reasons were given for the hypothesised relationships. Thus, where the results of this research confirm the hypotheses, these explanations will not be repeated in this section. Here, explanations will only be given for research findings that contradict the hypothesised relationships.

As would be expected the index values are correlated with their values in the previous month (1.09) and in the month before that (-0.15). Time-series variables are often correlated with their lagged values. No hypotheses were made regarding the relationship between lagged index values and the current index value.

Hypothesis 1: Index values are mildly positively correlated with inflation lagged one period (0.25) and mildly negatively correlated with inflation lagged three periods (-0.22). This is consistent with the findings of some other researchers (they have found both negative and positive correlations between inflation measures and index values) and also with theory in the case of the negative correlation. Menike, for example, when studying the Sri Lankan stock market discovered a negative relationship between the relevant stock index and inflation, whilst Maysami et al discovered a positive relationship between inflation and the Singaporean index (Menike, 2006) (Maysami et al, 2004). To posit a theory for the 'unusual' positive relationship between inflation and the market index, periods of rapid growth in an economy are often accompanied by higher levels of inflation. High levels of growth would probably also be accompanied by higher profits for listed companies, which could translate into higher stock valuations.

Hypothesis 2: The positive correlation (0.25) of the exchange rate variable in the current period with the index values is also consistent with theory: depreciation in the exchange rate should lead to an increase in the value of the relevant stock market index. Whilst Menike also found a similar relationship between the Sri Lankan stock market index and the relevant exchange rate, Maysami et al and Islam et al discovered positive relationships between the relevant exchange rates and the Singaporean and Thai stock indices respectively (Menike, 2006) (Maysami et al, 2004) (Islam et al, 2004).

Hypothesis 3: Exchange rate risk in the current period is mildly negatively correlated (-0.03) with the index values, which is consistent with the hypothesised relationship. Exchange rate risk lagged two periods, however, is mildly positively correlated with index values (0.03). This is not consistent with the hypothesised relationship. The literature review did not reveal any other researchers who have used a measure of exchange rate risk as an explanatory variable in their studies. A reason for the unusual positive relationship between exchange rate risk lagged two periods and the index values *could* be explained by the exchange rate risk measure increasing in value due to foreign investors investing money into attractive stock markets, thereby pushing up the relevant indices. In other words, if a particular country is appealing to foreign investors then they will want to invest in that market. As they do so they will buy stocks denominated in the home currency. This increased demand for the home currency could lead that currency to appreciate in value. This appreciation would lead to an increase in the value of the exchange rate measure used in this study (which is based on the standard deviation of the previous twelve months' exchange rate movements). Simultaneously, increased demand for the stocks in the relevant country will push up the corresponding market index. Thus, there will be a correlation between the index value and the exchange rate risk variable.

Hypothesis 4: The results yielded a mildly negative relationship (-0.02) between short-term interest rates in the current period and the index values. This is consistent with theory and with the findings of some other researchers. Islam et al and Menike too also discovered similar negative relationships between the interest rate and the stock market indices in the Thai and Sri Lankan stock markets (Islam et al, 2004) (Menike, 2006). It should be mentioned, however, that Maysami et al, when studying the Singaporean stock market found a positive relationship between the short-term interest rate and the Singaporean stock market index (Maysami et al, 2004). This was inconsistent with theory and they posited explanations for this unusual finding.

Hypothesis 5: Market volatility lagged three periods is mildly negatively correlated (-0.03) with the index values. This is consistent with the hypothesised relationship. The literature review did not discover any other researchers who have used a measure of market volatility as an explanatory variable.

Hypothesis 6: Money supply lagged two periods is positively correlated (0.33) with the index values, which is consistent with both theory and the findings of some other researchers. Maysami et al, when studying the Singaporean stock market, and Menike, when studying the Sri Lankan stock market, also discovered similar positive relationships between money supply and the relevant stock market indices (Maysami et al, 2004) (Menike, 2006). Money supply lagged three periods, however, is negatively correlated (-0.33) with index values. This result is an anomaly since it is neither consistent with theory nor with the findings of other researchers. An explanation will be posited here. Increased money supply can, in the long-term, lead to higher levels of inflation. To conjecture, the anomaly here *could* be explained by increased money supply increasing inflation expectations, thereby leading investors to arrive at intrinsic values for stocks that are lower than previously estimated. This would lead to a decline in index values as investors sold off 'over-valued' stocks.

Hypothesis 7: None of the P/E variables (whether current or lagged) were found to be significant. It can be concluded therefore that, when the five relevant stock markets are considered together the P/E ratio should not be a factor that influences investors' decision-making.

What could be interesting to note is that in the cases of the inflation, exchange rate risk and the money supply explanatory variables, initial correlation coefficient values are effectively '*cancelled out*' by coefficient values in subsequent lags. In the case of inflation, CPI lagged one period has a coefficient value of +0.25, whilst inflation lagged three periods has a coefficient value of -0.22. Equally, exchange rate risk in the current period has a negative correlation coefficient value of -0.03, whilst exchange rate risk lagged two periods has a positive coefficient value of +0.03. Finally, money supply lagged two periods has a positive correlation of 0.33, whilst money supply lagged three periods has a negative coefficient value of -0.33. Thus, the overall effect of these explanatory variables on the index values will be negligible. It would very much be conjecture, but it could be conjectured that this 'cancelling out' effect is due to market '*corrections*'. In other words, investors initially react to changes in the values of these explanatory variables and buy or sell shares accordingly, leading to changes in the relevant index values. Subsequent re-evaluation of the impact of these changes, however, lead investors to conclude that the changes will not have the impact on stock valuations as initially thought, thus leading to market corrections.[21]

In conclusion, it could be argued that, in view of the comparatively low coefficients on the explanatory variables and the 'cancelling out' effect (as highlighted above), the findings of this study lend some support to the Efficient Market Hypothesis (EMH), in particular in its semi-strong form. The semi-strong form EMH asserts that security prices adjust rapidly to the release of all public information, which would include the economic information that constitute the explanatory variables used in this study. Thus, the semi-strong form EMH would contend that *past values* (and *consensus forecasts of future values*, based on public information) of the explanatory variables used in this study could not be used to predict future market returns. This would certainly seem to be the case in this study, since there are no high correlation coefficient values corresponding to values of the explanatory variables. No investor could, for example, look at past values, or consensus forecasts of future values of, say, inflation, and use them to predict *significant* movements of the relevant market index in the future.

[21] Although there is no universal definition of a market 'correction', they are generally considered to be *decreases* in the value of stocks by at least 10% following a 'bull' market. Generally, however, and in the context of this study, a 'correction' can be thought of as an adjustment in the market price of a stock to a level closer to its true, intrinsic value, following a period where the market price has not been close to the intrinsic value.