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RELATIONSHIP BETWEEN ALL SHARE PRICE INDEX (ASPI) AND MACROECONOMIC VARIABLES: EVIDENCE FROM SRI LANKA

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ABSTRACT

The relationship between the All Share Price Index (ASPI) and macroeconomic variables namely the real economy, inflation rates, exchange rates, money supply, interest rates were investigated in the context of Sri Lanka. The empirical analysis was carried out by using 40 quarterly data observations where the period spanned from the 1st quarter of 2002 to the 4th quarter 2011. Data were collected from annual bulletins issued by the central bank of Sri Lanka. The methodology used in this study is the time series econometric techniques. Initially Unit root tests were conducted to check the time series stationary. For the stationary series Johansen Cointegration test is used to investigate the long run relationship and the short run relationship was investigated by using the Error correction model. Granger causality test was applied to test the causal relationship. It was revealed that there is a significant relationship between ASPI and the real economy in Sri Lanka. There is a moderate positive significant relationship between the narrow money supply and ASPI, and a moderately negative influence between the nominal wage rate of industrial and service sectors with ASPI at 5% significance level. It was noted that all other major branches of the economy insignificantly correlated to ASPI. Real economic variables and money supply variables have co-movement with the share price in long run equilibrium path. Neither long run nor short run relationship exists between ASPI and inflation rate, exchange rate and interest rates. Since all the real economy variables are leading indicators, they can be used to measure ASPI. Changes in inflation will have a certain impact on share market performance, and at the same time changes in share market will determine the flow of foreign investments to the economy. Wholesale Price Index (WPI) and interest rate variables are not good indicators to measure ASPI in Sri Lanka.

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INTRODUCTION

In modern economy the role of stock exchange is very important. It can be very helpful to diversify the domestic funds and channels into productive investment. However to perform this important task it is necessary for the stock market to have a significant relationship with the macroeconomics variables. Nowadays it is believed that government financial policy and macroeconomic events have large influence on general economic activities including the stock market. Efficient Market Hypothesis (EMH) (Fama, 1970) indicates that, it is impossible to beat the market because stock market efficiency causes existing share prices to always incorporate and reflect all of the relevant information. According to the efficient market hypothesis, all stocks are perfectly priced according to their inherent investment properties, and all market participants possess equal knowledge. This motivates many researchers to investigate the dynamic relationship between stock returns and macroeconomic variables. Macroeconomics is briefly defined as a branch of an economics dealing with the performance, structure, behavior, and decision making of the whole economy. Share Price Index is another name for Stock Index which measures the movement of price of the shares, but not of their dividends. Some fundamental macroeconomic variables such as Inflation Rates, Interest Rates, Exchange Rates, Money Supply and Real Economy have been argued to determine the Stock Prices and its Indices. A number of studies have been conducted to examine the relationship of macroeconomic variables on stock market price indices of different economies. Menike (2006) investigated the effect of macroeconomic variables on stock prices in emerging Sri Lankan stock market using monthly

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data from the period from September 1991 to 2002. Multiple Regression model was developed and used to examine the effect of macroeconomic variables on stock prices in selected companies in the CSE and results showed that inflation rate and exchange rate react mainly negatively to stock prices in the Colombo Stock Exchange (CSE). Further she stated that lagged money supply variables do not appear to have a strong prediction of movements of stock prices. Hosseini *et al*., (2011) investigated relationship between stock market indices and macroeconomic variables namely crude oil price (COP), money supply (M2), industrial production (IP) and inflation rate (IR) in China and India between January 1999 to January 2009. They used Augmented Dickey -Fuller (ADF) to show that underline series are non stationary at level, but stationary in first difference. Johansen-Juselius Multivariate Cointegration and Vector Error Correction Model technique were employed to indicate that there are both long and short run linkages between macroeconomic variables and stock market index in each of these two countries.

Mohammad *et al*. (2009) explored the correlation among the macroeconomic variables and share price of KSE (Karachi Stock Exchange) by considering several quarterly data for different macroeconomics variables which were foreign exchange reserve, foreign exchange rate, industrial production index (IPI),whole sale price index (WPI), gross fixed capital formation (GFCF) and broad money (M2). These variables were obtained from the period 1986-2008.They found that Industrial Production Index (IPI) and Gross Fixed Capital Formation (GFCF) do not significantly affect stock prices and also showed M2 and foreign exchange positively affected the share price. Acikalin *et al*. (2008) investigated the relationships between returns in Istanbul Stock Exchange (ISE) and macroeconomic variables of Turkish economy. Employing cointegration tests and vector error correction model (VECM) on a quarterly data set, relationships between ISE and four macroeconomic variables (GDP, exchange rate, interest rate, and current account balance) were identified. A unidirectional relationship between macro indicators and ISE index was found and it further stated that changes in GDP, foreign exchange rate and current account balance have an effect on ISE index.

In the long run, there was a positive impact of inflation, GDP growth, and exchange rate on KSE100 index (Hosseini *et al*., 2011) .They examined the long run and short run dynamic relationship between KSE100 index and five macroeconomic variables by using monthly data and employing Johansen cointegration and VECM techniques. It was found that money supply and three months treasury bills rate had a negative impact on the stock returns. The objectives of this study were to analyze the relationship between All Share Price Index (ASPI) and macroeconomic factors, to examine the long-run and short-run casual relationship between ASPI and selected macroeconomic variables, to find a suitable Cointegrating relationship model and to calculate the causality relationship between ASPI and selected macroeconomic variables.

Data Collection

The empirical analysis was carried out by using quarterly data where the period spanned from 1st quarter 2002 to 4th quarter 2011.This study was carried out using 40 quarterly observations. All Share Price Index (ASPI) value was used to reflect the Share prices in Sri Lanka (Rahman and Uddin, 2009; Çagli *et al*., 2010). End of the month values were collected and ASPI values were used to calculate quarterly ASPI value (Du, 2006). This study utilized 23 macroeconomic variables to represent the major sectors (Chancharat *et al*., 2007; Pilinkus, 2009 and Gan *et al*., 2006) of the economy. Economy was described under 5 main headings, which were Real Economy, Inflation, Exchange Rates, Money Supply and Interest Rates. Based on the economic theoretical definition and literature, the 23 macroeconomic variables were allocated into the 5 major branches of the economy.

Table 1. Description of data

Variable Name	Definition
ASPI	All Share Price Index
GDP	Gross Domestic Product
GNP	Gross National Product
UR	Unemployment Rate
NWRI(A)	Nominal Wage Rate Index (workers in Agriculture)
NWRI(IC)	Nominal Wage Rate Index (workers in Industry and Commerce)
NWRI(S)	Nominal Wage Rate Index (workers in Services)
WPI	Wholesale Price Index
CCPI	Colombo Consumers' Price Index
ER	Exchange Rate (Rs./ US $)
M1	Narrow Money Supply
M2	Broad Money Supply
M4	Broad Money
AWDR	Average Weighted Deposit Rate
TB(91)	Treasury Bills (91 Days)
TB(182)	Treasury Bills (182 Days)
TB(364)	Treasury Bills (364 Days)
SR(CB_MIN)	Commercial Banks Minimum Savings Rates
SR(CB_MAX)	Commercial Banks Maximum Savings Rates
SR(NSB)	National Savings Bank Savings Rates
FDR(CB_MIN)	Commercial Banks Minimum Fixed Deposit Rates
FDR(CB_MAX)	Commercial Banks Maximum Fixed Deposit Rates
FDR(NSB)	National savings Bank Fixed Deposit Rates
REPO	Central Bank Overnight Repurchase Rate

Source: Central Bank of Sri Lanka (Annual Report)

According to the table ASPI were used to represent the share price index in Sri Lanka.GDP, GNP, UR, NWRI (A), NWRI(IC) and NWRI(S) were used to describe the real economic function in Sri Lanka. This empirical study used CCPI, WPI to proxy Inflation in the Sri Lankan economy (Samarakoon, 1996). M1, M2 and M4 were used to reflect the money supply function in Sri Lankan economy. ER was used as a proxy to Exchange Rate in Sri Lankan economy. AWDR, TB(91), TB(182), TB(364), SR(CB_MIN), SR(CB_MAX), SR(NSB), FDR(CB_MIN), FDR(CB_MAX), FDR(NSB)), REPO to proxy interest rates.

MATERIALS AND METHODS

With a view to accomplish the stipulated set of objectives of this study, different methods were adopted. First of all basic descriptive analysis was used to give a basic idea about the research variables and its behaviors. Secondly the formal investigation was carried out by examining the stochastic properties of the variables. Unit Root Test was employed (Singh, 2010) to test the stationary of the variables. In this context, the widely used techniques were Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test. Then correlation analysis was carried out to identify the strength of the linear relationship which existed between ASPI and all the

macroeconomic variables. Long run relationship was investigated by applying the Johansen Cointegration test (Naka *et al*., 1998), and the short run relationship was investigated by Error Correction Model. The long run relationship was used to check whether both series moved together over time or not, and the short run relationship was used to identify the movements of the series in a short time period. Finally Granger causality test was applied to test casual relationship.

RESULTS AND DISCUSSION

Preliminary Analysis

According to the above table, ASPI is not normally distributed and values are concentrated on left of the mean, with extreme values to the right. The high standard deviation of ASPI with respect to the mean is an indication the high volatility in the stock market. All the macroeconomic variables which are used as to proxy real economy are normally distributed with positive skewness. Similar behavioral pattern can be seen from the macroeconomic variables which acted as the representatives of inflation rate and money supply. Except LER and LSR (NSB) all the other macroeconomic variables related to the interest rate are normally distributed.

Table 2. Descriptive Statistics

Variable Name	Mean	Std	Skewness	Jarque-Bera (probability)
ASPI	2684.25	1899.87	1.31	12.21 (0.00)
GDP	897941	412888	0.49	3.19(0.20)
GNP	886002	407049	0.5	3.21(0.20)
UR	6.57	1.63	0.19	2.08(0.35)
NWRI(A)	2018.72	740.4	0.8	5.31(0.70)
NWRI(IC)	1517.21	534.33	0.42	4.86(0.09)
NWRI(S)	1108.49	434.44	0.49	4.75(0.09)
WPI	2764.75	948.3	0.29	3.58(0.17)
CCPI	156.47	44.34	0.24	3.86(0.15)
ER	104.85	8.20	-0.69	4.62(0.10)
M1	249078	88842	0.5	2.14(0.34)
M2	1058448	481034	0.57	3.12(0.21)
M4	1555312	660238	0.66	3.47(0.18)
AWDR	7.72	2.22	0.63	3.87(0.14)
TB(91)	10.8	3.83	0.89	5.9(0.05)
TB(182)	11.11	3.93	0.87	5.68(0.06)
TB(364)	11.32	4.01	0.84	5.53(0.06)
SR(CB_MIN)	2.61	0.78	-0.12	1.27(0.53)
SR(CB_MAX)	11.08	2.97	0.68	3.99(0.14)
SR(NSB)	5.29	0.7	2.9	185.1(0.00)
FDR(CB_MIN)	6.58	1.45	0.55	4.36(0.11)
FDR(CB_MAX)	14.07	4.24	0.13	4.05(0.13)
FDR(NSB)	10.78	2.78	0.6	3.4(0.18)
REPO	8.74	1.52	0.32	3.47(0.18)

Unit Root Test

In time series analysis, it is mandatory to test the time series whether it was stationary or non stationary. To determine the stationary of the variable at 5% significant level Augmented Dickey Fuller (ADF) and Phillips Perron (PP) test were employed.

Augmented Dickey Fuller (ADF) unit root test for level variable suggests that LSR (NSB) is the only significant ($p<0.05$) stationary variable. ADF test results for first differenced series indicate that, DLASPI, DLGDP, DLGNP, DLUR, DLNWRI(A), DLNWRI(IC), DLNWRI(S), DLCCPI, DLWPI, DLER, DLM1, DLM2, DLM4, DLSR(CB_MIN), DLFDR(CB_MAX), DLSR(NSB) are stationary at 5% significant level where D indicates the differenced value of the respective variable.

Similarly Phillips Perron (PP) unit root test indicates that all the other macroeconomic variables except LER and LSR (NSB) are non stationary at 5% significant level. When applying PP test for the first differenced data it shows that only 2 macroeconomic variables (DLTB (182) and DLTB (364)) are non stationary at 5% significance level. If a time series model is stationary, it is believed that the estimated values will have an economic meaning. For non stationary time series spurious results will be obtained (Cagli *et al*., 2010). Hence variables which are stationary when first differenced were selected by combining the results of both ADF and PP tests. Selected macroeconomic variables are as follows:

LASPI, LGDP, LGNP, LUR, LNWRI(A), LNWRI(IC), LNWRI(S), LWPI, LCCPI, LER, LM1, LM2, LM4, LSR(CB_MIN), LSR(NSB), LFDR(CB_MAX)

Correlation Analysis

It was noted that DLNWRI(IC) and DLNWRI(S) have significant moderate negative correlation with DLASPI, and all the other real economic variables have insignificant correlation with DASPI. Although Inflation rate, exchange rate and interest rates are considered as main branches of economy they do not show significant correlation with ASPI (Sohail and Zakir, 2011). However narrow money supply has moderate positive correlation with ASPI.

Cointegration analysis and Error Correction Model

Cointegration test for the real economy suggests that there is a long run relationship between LASPI and LGDP, LGNP, LUR, LNWRI(A), LNWRI(IC) and LNWRI(S) at 5% significant level. In other word it indicates co-movement between share price index and real economy variables in a long-run equilibrium path. The normalized cointegration coefficients for LASPI, LGDP, LGNP, LUR, LNWRI (A), LNWRI(IC), LNWRI(S) and C are 1.00, 54.18,-55.86, 1.02,-0.32, 7.18,-5.05, and -2.12 respectively. The stationary linear combination can be written as,

$$\text{LASPI} + 54.18\text{LGDP} - 55.86\text{GNP} + 1.02\text{LUR} - 0.32\text{LNWRI (A)} + 7.18\ \text{LNWRI(IC)} - 5.05\text{LNWRI(S)} - 2.12 \sim \text{I(0)} \quad \textbf{(1)}$$

The 5% critical value of ADF test statistic for residual series (equation 1) is -2.94 and the computed ADF test statistic is -3.69. Hence residual series of the stationary linear combination is stationary at 5% significant level, and normal cointegration model can be written as,

$$\text{LASPI} = -54.18\text{LGDP} + 55.86\text{LGNP} - 1.02\text{LUR} + 0.32\text{LNWRI(A)} - 7.18\text{LNWRI(IC)} + 5.05\text{LNWRI(S)} + 2.12 \quad \textbf{(2)}$$

According to the normalized equation (equation 2) LASPI has negative relationships with LGDP, LUR and LNWRI(IC) and positive relationships with LGNP, LNWRI(A) and LNWRI(S). 1% increase in LGDP decreases LASPI by 54.2% and 1% increase in LGNP increases LASPI by 55.87%. These

Table 3. ADF Unit Root Test

Series	At Level		Series	At First Difference	
	t-Statistic	Probability		t-Statistic	Probability
LASPI	-1.29	0.62	DLASPI	-3.75	0.00
LGDP	0.31	0.97	DLGDP	-5.33	0.00
LGNP	0.33	0.97	DLGNP	-5.39	0.00
LUR	-0.53	0.87	DLUR	-5.16	0.00
LNWRI(A)	-0.36	0.90	DLNWRI(A)	-4.64	0.00
LNWRI(IC)	-0.17	0.93	DLNWRI(IC)	-3.75	0.00
LNWRI(S)	-0.13	0.93	DLNWRI(S)	-4.30	0.00
LWPI	-0.95	0.75	DLWPI	-5.78	0.00
LCCPI	-1.56	0.49	DLCCPI	-5.08	0.00
LER	-2.55	0.11	DLER	-7.08	0.00
LM1	-0.77	0.81	DLM1	-4.55	0.00
LM2	0.99	0.99	DLM2	-4.34	0.00
LM4	-0.02	0.95	DLM4	-6.85	0.00
LAWDR	-1.83	0.36	DLAWDR	-2.56	0.10
LTB(91)	-2.02	0.27	DLTB(91)	-2.28	0.18
LTB(182)	-2.02	0.27	DLTB(182)	-2.16	0.22
LTB(364)	-2.04	0.26	DLTB(364)	-2.08	0.25
LSR(CB_MIN)	-1.46	0.54	DLSR(CB_MIN)	-3.79	0.00
LSR(CB_MAX)	-1.61	0.46	DLSR(CB_MAX)	-2.73	0.07
LSR(NSB)	-3.71	0.00	DLSR(NSB)	-5.21	0.00
LFDR(CB_MIN)	-2.25	0.19	DLFDR(CB_MIN)	-2.85	0.05
LFDR(CB_MAX)	-1.58	0.48	DLFDR(CB_MAX)	-3.04	0.04
LFDR(NSB)	-1.36	0.59	DLFDR(NSB)	-2.40	0.14
LREPO	-2.16	0.22	DLREPO	-2.03	0.27

Table 4. PP Unit Root Test

Series	At Level		Series	At First Difference	
	t-Statistic	Probability		t-Statistic	Probability
LASPI	-1.18	0.67	DLASPI	-3.64	0.00
LGDP	1.21	0.99	DLGDP	-11.8	0.00
LGNP	1.24	0.99	DLGNP	-12.62	0.00
LUR	-0.17	0.93	DLUR	-8.64	0.00
LNWRI(A)	-0.11	0.94	DLNWRI(A)	-5.00	0.00
LNWRI(IC)	0.00	0.95	DLNWRI(IC)	-4.96	0.00
LNWRI(S)	0.04	0.95	DLNWRI(S)	-5.59	0.00
LWPI	-0.53	0.87	DLWPI	-3.59	0.01
LCCPI	-1.44	0.55	DLCCPI	-3.94	0.00
LER	-4.26	0.00	DLER	-13.81	0.00
LM1	-0.59	0.85	DLM1	-4.44	0.00
LM2	1.32	0.99	DLM2	-5.24	0.00
LM4	0.16	0.96	DLM4	-12.19	0.00
LAWDR	-1.70	0.41	DLAWDR	-3.52	0.01
LTB(91)	-1.45	0.54	DLTB(91)	-3.04	0.04
LTB(182)	-1.41	0.56	DLTB(182)	-2.90	>0.05
LTB(364)	-1.46	0.53	DLTB(364)	-2.93	>0.05
LSR(CB_MIN)	-1.18	0.67	DLSR(CB_MIN)	-4.31	0.00
LSR(CB_MAX)	-1.31	0.61	DLSR(CB_MAX)	-3.54	0.01
LSR(NSB)	-7.65	0.00	DLSR(NSB)	-6.53	0.00
LFDR(CB_MIN)	-2.05	0.26	DLFDR(CB_MIN)	-3.96	0.00
LFDR(CB_MAX)	-1.20	0.66	DLFDR(CB_MAX)	-3.19	0.02
LFDR(NSB)	-1.40	0.56	DLFDR(NSB)	-3.71	0.00
LREPO	-1.82	0.36	DLREPO	-3.03	0.04

Table 5. Correlation coefficient between DLASPI and differenced log variables

Series	Correlation Coefficient DLASPI	t-Statistic	Probability
DLGDP	0.03	0.14	0.88
DLGNP	0.04	0.18	0.85
DLUR	0.01	0.08	0.93
DLNWRI(A)	0.21	1.02	0.31
DLNWRI(IC)*	-0.51	-2.78	0.01
DLNWRI(S)*	-0.46	-2.41	0.02
DLWPI	0.32	1.55	0.13
DLCCPI	-0.06	-0.31	0.75
DLER	-0.06	-0.31	0.75
DLM1*	0.42	2.13	0.04
DLM2	0.41	2.06	0.05
DLM4	-0.15	-0.69	0.49
DLSR(CB_MIN)	-0.18	-0.87	0.39
DLSR(NSB)	-0.12	-0.56	0.57
DLFDR(CB_MAX)	-0.18	-0.88	0.38

*Macroeconomic Variables with Significant Correlation Coefficient

Table 6. Cointegration test results for real economy and share price variables

Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Probability
None	0.72	123.90	125.61	0.06
At most 1	0.52	76.26	95.75	0.49
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Probability
None *	0.72	47.63	46.23	0.03
At most 1	0.52	27.90	40.07	0.56
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level.				

two real economy variables influence LASPI more than the other variables. 1% increase in LUR decreases LASPI by 1.02%, 1% increase in LNWRI (A) increases LASPI by 0.32%, 1% increase in LNWRI(IC) decreases LASPI by 7.18% and 1% increase LNWRI(S) decreases LASPI by 5.06%. Error Correction Model (ECM) indicates about 7%, 5%, 4%, 5%, 4% and 7% of disequilibrium corrected each quarter by changes in LGDP, LGNP, LUR, LNWRI (A), LNWRI(IC), LNWRI(S) respectively.

Table 7. Cointegration test results for money supply and share price variables

Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Probability
None *	0.67	60.82	47.86	0.00
At most 1	0.30	20.19	29.80	0.41
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Probability
None *	0.67	40.64	27.58	0.00
At most 1	0.30	12.99	21.13	0.45
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				

Cointegration test for Money supply indicates that there is long run co-integration relationship between ASPI and LM1, LM2 and LM4 at 5% significant level (Cassola and Morana, 2002). In other words it implies co-movement between share price index and money supply variables is in a long-run equilibrium path. The normalized cointegration coefficients for LASPI, LM1, LM2, LM4 and C are 1.00, -1.26, 3.26, -3.90 and 18.163 respectively. The stationary linear combination can be written as,

$$LASPI - 1.26\text{LM1} + 3.26\text{M2} - 3.90\text{LM4} + 18.16 \sim \text{I}(0) \quad \textbf{(3)}$$

The 5% critical value of ADF test statistic for residual series (equation 3) is -2.94 and computed ADF test statistic is -3.85. Hence residual series of the stationary linear combination is stationary at 5% significant level, and normal cointegration model can be written as,

$$LASPI = 1.26\text{LM1} - 3.26\text{LM2} + 3.90\text{M4} - 18.16 \quad \textbf{(4)}$$

According to the normalized equation (equation 4) LASPI has positive relationships with LM1, LM4 and a negative relationship with LM2. 1% increase in LM1 increases LASPI by 1.26% and 1% increase in LM4 increases LASPI by 3.90%. 1% increase in LM2 decreases LASPI by 3.26% .Here changes in LASPI is higher when compared to LM1, LM2 and LM4. Error Correction Model (ECM) suggests that about 2%, 1%, 39% of disequilibrium "corrected" each quarter by changes in LM1, LM2, and LM4 respectively.

Table 8. Cointegration test results for interest rate and share price variables

Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.73	89.97	47.85	0.000
At most 1 *	0.45	44.49	29.79	0.001
At most 2 *	0.36	23.31	15.49	0.003
At most 3 *	0.21	8.21	3.84	0.004
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Probability
None *	0.72	45.48	27.58	0.000
At most 1 *	0.45	21.17	21.13	0.049
At most 2 *	0.35	15.10	14.26	0.037
At most 3 *	0.21	8.22	3.84	0.004
Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level				

Cointegration test for the interest rates at 5% significant level shows that there is long run co movement between ASPI and interest rates variables. The normalized cointegration coefficients for LASPI, LSR (CB_MIN), LSR (NSB), LFDR (CB_MAX) and C are 1.00, 142.05, -661.31, 57.63 and 795.37 respectively. The linear cointegration equation can be written as,

$$LASPI + 142.0471\text{LSR(CB\_MIN)} - 661.31\text{LSR(NSB)} + 57.63\text{LFDR(CB\_MAX)} + 795.37 \sim \text{I}(0). \quad \textbf{(5)}$$

The ADF unit root test values on residual series (equation 5) of LASPI and LSR (CB_MIN), LSR(NSB), LFDR(CB_MAX) is non stationary(at the 5% critical value of ADF test statistic is -2.94 and computed ADF test statistic is -1.85). Hence it suggests that the interest rate is not a long run model and short run relationship was not considered. Cointegration test for the ASPI and Inflation rate indicates that there is no cointegration between ASPI and inflation rate at 5% significant level. Since there is no long run relationship between the variables LASPI, LCCPI and LWPI it also indicates that there is no short run relationships between these variables. Similarly cointegration test for Exchange rate indicates that there is no co-movement between ASPI and exchange rate at 5% significant level in long run equilibrium path. Hence there is no short run relationship between the ASPI and exchange rate.

Granger Causality Test

Ganger causality test indicates at 10% significant level that all real economy variables have at least a unidirectional relationship with ASPI, and nominal wage rates in the agricultural sector shows bidirectional relationship. Hence all the real economy variables used here can be taken as good indicators to determine ASPI. However WPI cannot be used as a successful indicator to measure the inflation or ASPI. Unidirectional relationship of CCPI indicates that inflation has a certain impact on ASPI in Sri Lankan market. ASPI has a unidirectional relationship with exchange rate (Agrawal and

Srivastav, 2010), and therefore exchange rate can be successfully predicted using ASPI. Though monetary variables are not good indicators to determine ASPI, ASPI can successfully used to predict monetary variables. However SR (NSB) and FDR (CB_MAX) are neither result variables nor the cause variables of ASPI.

Table 9. Granger causality between macroeconomic variable and ASPI

Lag	Null Hypothesis	F Statistic	Probability
4	DLGDP does not Granger Cause DLASPI	2.48	0.07
4	DLGNP does not Granger Cause DLASPI	2.30	0.09
1	DLUR does not Granger Cause DLASPI	8.33	0.01
5	DLNWRIA does not Granger Cause DLASPI	2.14	0.09
6	DLNWRIIC does not Granger Cause DLASPI	2.72	0.04
1	DLNWRIS does not Granger Cause DLASPI	3.79	0.06
5	DLASPI does not Granger Cause DLNWRIA	2.80	0.04
3	DLCCPI does not Granger Cause DLASPI	2.60	0.07
1	DLASPI does not Granger Cause DLER	4.17425	<0.05
2	DLASPI does not Granger Cause DLM1	9.46	0.00
3	DLASPI does not Granger Cause DLM4	9.43	0.00
2	DLASPI does not Granger Cause DLSRMIN	7.89	0.00

Conclusion

Sri Lankan stock market is highly volatile and several macroeconomic variables have significant relationship with ASPI. Generally this study shows that there is a moderate positive significant relationship between narrow money supply and ASPI, and a moderately negative influence between nominal wage rate of industrial and service sector with ASPI. It was noted that all other major branches of economy insignificantly correlated to ASPI. Real economic variables and money supply variables have co-movement with share price in long run equilibrium path. Neither long run nor short run relationship exists between ASPI and inflation rate, exchange rate and interest rates. Since all the real economy variables are leading indicators, they can be used to measure ASPI. Changes in inflation will have a certain impact on share market, and well performance in share market open for more foreign investments. WPI and interest rate variables are not good indicators to measure ASPI in Sri Lanka.

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