

THE DYNAMIC RELATIONSHIP BETWEEN INITIAL PUBLIC OFFERINGS (IPOS) AND MACROECONOMIC VARIABLES: EVIDENCE FROM EMERGING STOCK MARKET OF SRI LANKA

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Abstract

This paper examines the long run dynamic relationship between macroeconomic variables and Initial Public Offering (IPO) activities in Sri Lankan Stock market for the period 1989 to 2014. Interestingly, this period covers very turmoil period in Sri Lankan economy as well as very peaceful environment after the civil war. As the proxy for the IPO activities we used three proxies. Number of IPOs per year (NUM), Total IPO Proceeds (TP) and Average IPO Proceeds (AP) and the macro economic variables are Gross Domestic Production (GDP), 91 days Interest rate (I), Colombo Consumer Price index (CCIP) and Exchange Rate (EX). This study used Johansen cointegration test and Granger causality test for testing dynamic relationship. Cointegration test shows that long run relationship of macro-economic variables with Total Proceeds and Average Proceeds. Results of Granger causality test imply insignificant causality between macro-economic variables and IPO activities.

Key Words: IPO activities, Macroeconomic variable, Cointegration, Causality

1. Introduction

Sri Lanka is a south Asian country which suffered evil of civil war for more than 30 years. After ending the civil war in 1999 now country has a peaceful environment. The macro economic performance which could not sustain due to war condition has turned to upward move due to the peace dividend now. The country has now gained the international reputation as a new avenue for global investment. Locally, the business community is very confident on the prevailing atmosphere in the country. One of the indicators of the positive business environment is the performance of stock market. Now the stock market is experiencing rapid development in several dimensions such as foreign investor participation to the market, in 2010 the Colombo Stock Exchange (CSE) was recorded as the world second best performing market in terms of market capitalization, high liquidity in the market etc. One of the significant developments is the upward trends in the IPOs in the market. The theory and the empirical evidences suggest that the IPO activities are driven by firm specific determinants as well as macroeconomic determinants. However, it is invariably, believed that sound macroeconomic fundamentals one of the inducing factors of the expansion of IPO base in a market. Some argues that stock market volatility as key determinants of the IPOs. It is also important to look at the industry performance before timing the IPOs.

The long run macroeconomic determinants of timing of IPOs have gained attention of academics and practitioners largely during the recent past globally. The availability of rich evidences on the determinants of IPOs will enhance the corporate financing decisions with objective facts. Among the important decisions made by the financial manager of a company one crucial one is the decision to going public. The absence of scientific findings leads vague decisions. When compared to other areas in corporate finance little attention is given on IPO based researches in the finance literature .In Sri Lankan market there are some evidences on IPO underpricing and post IPO performances. However, no any single study is found on factors leading to IPO timing in Sri Lanka. Thus, the aim of this paper is to fill this gap at least to some extent in this knowledge vacuum in Sri Lankan market. We used some indicators of IPO activities in Sri Lankan market and some key macro-economic variables for this purpose. Thus, main purpose of this paper is to examine whether there is an impact of macroeconomic variables in determining the timing of an IPO in CSE in long run. We apply Johansen's Cointegration test to explore the long run equilibrium between IPO activities and macro-economic variables which is well accepted time series model for this purpose.

The rest of this paper is organized as follows. The section states the summary of the previous studies. Section 3 includes description of the data and the sample period of the study and statistical models. The results are presented and analyzed in section 4. Finally, the concluding remark is given in section 5.

2. Previous Studies

Although limited literature is available on this area. It is essentially, important to examine what others have focused their studies and their findings. Interestingly, the methodology adopted in this paper has been applied several studies for various purposes. (Maysami, Howe and Hamzah (2004) examined the long run relationship between macro economic variables and stock market sector indexes in Singapore's stock market and established long run dynamic relationship with some sectors only. Also, Mukherjee and Naka (1995) examined the Cointegration between Japanese stock market and macro economic variables by using Vector Error Correction Model (VECM) and concluded that the Cointegration relationship exists between stock market variables and macro economic variables. Gan, Lee, Yong and Zhang (2006) investigated the relationship between New Zealand stock market index and seven macro economic variables by using Johansen Maximum Likelihood and Granger-causality tests contended that there is no evidence that New Zealand stock index is a leading indicator for changes in macro economic variables. Moreover, Ibrahim

(1999) studied the dynamic interaction between macro economic variables and the stock prices for an emerging market Malaysia using Cointegration test and Granger causality tests findings strongly suggested the informational inefficiency in the market and analysis suggests Cointegration between the stock prices and three macroeconomic variables – consumer prices, credit aggregates and official reserves. Conversely, Nasseh and Strauss (2000) studied existence of long run relationship between stock prices and domestic and international activity in six European economies and established that stock price levels are significantly related to industrial production, business surveys of manufacturing orders, short- and long-term interest rates as well as foreign stock prices, short-term interest rates and production.

Interestingly, it is revealed that the relationship between stock market and macroeconomic variables highly debated topic in the existing literature. The literature on IPO activities and macro economic variables are very limited in the previous literature. Most of the studies have focused IPO in financing perspective of a company and firm specific determinants of IPOs For example, Deeds, Decarolis and Coombs (1997) examined the firm specific determinant of amounts raised in IPOs and the results provide strong support for the hypothesized positive relationship between the total amount of capital raised by a firm's IPO and the scientific capabilities of the firm. On the other hand Dunbar (2000) studied the several factors on the market share of the investment bankers and concluded that concerned factors have a more significant effect on market share changes in low volume IPO markets. Moreover, Erel, Julio, Kim and Weisbach (2011) investigated the impact of macro economic conditions for the firm capabilities to raise funds in the market and overall results suggested that macroeconomic condition influences for the firm to raise capital in the market. A similar study to current paper of Tran and Jeon (2011) examined the explanatory power and dynamic impact of macroeconomic conditions on IPO activities in US market for the period 1970 – 2005 and established a long run equilibrium between IPO activities and macroeconomic variables.

The review of literature limited in this paper due to the fact that less attention has been paid by the researchers on this matter in the literature. However, it is evidenced that academic interest on IPO and macro economic variables is emerging both in developed markets and emerging markets. The current paper attempts to fill this gap in an emerging economy of Sri Lanka.

3. Data and Methodology

This study utilized annual IPO data and macro-economic data covering the period from 1989 to 2014. We used three proxies for measure IPO activities, aggregate value of the IPO and average size of the IPO, namely: (1) Number of IPOs per year (NUM), (2) Total IPO Proceeds (TP) and (3) Average IPO Proceeds (AP) in respectively. Tran and Jeon (2011) also used above three measures as proxies for measure IOP activities. We selected four macro-economic variables for this analysis. Those are, (1) Gross Domestic Production (GDP) as a proxy for economic growth, (2) 91 days Interest rate for represent short run performance of the financial market (I), (3) Colombo Consumer Price index (CCIP) as a proxy for measure changes in the purchasing power of public (4) Exchange Rate (EX) to measure variation of foreign investors' return.

IPO data were collected from Colombo Stock Exchange (CSE) data Library and macro-economic variables were collected from annual report of Central Bank of Sri Lanka (CBSL). As an emerging market in Sri Lanka, the number of IPO listing per year is few. As the result of that, in Sri Lankan context, it is difficult to identify a continuous monthly data series regarding IPO activities and Central Bank not issues the GDP data on monthly basis. Due to the above facts, this study is utilized annual data for econometric analysis.

This empirical work based on time series data and it is necessary to underlying time series is stationary. Therefore the researchers performed stationarity test using Augmented Dickey Fuller (ADF) test. Augmented Dickey Fuller (ADF) estimation equation (1) is given as follows;

$$\Delta y_t = a_0 + a_1 t + \delta y_{t-1} + \alpha_j \sum_{j=1}^p \Delta y_{t-j} + \varepsilon_t \quad (1)$$

Where, y_t is time series to be tested, a_0 represents constant and δ is parameter to be estimated and ε_t is the error term. The study set the hypothesis for ADF test as follows,

$H_0: \alpha=0$ (non -stationary)

$H_1: \alpha \neq 0$ (stationary)

If the null hypothesis is rejected, this means that the time series data is stationary. When the unit root is confirmed in time series, then there is a matter of whether there is any possibility for exist long run equilibrium between variables which considered. Therefore to explore long run equilibrium relationship among IPO activities and macro-economic factors, this analysis applied multivariate cointegration analysis. For investigate existence of cointegration relationship, performed Johansen's cointegration test (1988, 1996). Trace statistic and Maximum Eigenvalue were used to testing the null hypothesis of no cointegration among IPO activities and macro-economic variables against the alternative hypothesis of cointegration between IPO activities and macro-economic variables. Trace value (equation 2) and maximum Eigen value (equation 3) derived from following equations,

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^n \ln(1 - \lambda_i) \quad (2)$$

$$\lambda_{max}(r, r+1) = -T \ln(1 - \lambda_{r+1}) \quad (3)$$

Where, λ_i is the estimated eigenvalue of the characteristic roots. T equals sample size. r means number of vectors.

In 1987, Engle and Granger revealed that the evidence of cointegration rules out spurious correlation and suggests the presence of at least one direction of Granger causality. To determine the causal relationship among variables, this study applied Granger causality test. Granger causality test is importance for find out causality direction among the variables. Granger-Causality means the lagged Y influence X significantly in equation (4) and the lagged X influence Y significantly in equation (5). The test derived from estimating the following simple equations (4 and 5),

$$X_t = \sum_{i=1}^n \alpha_i y_{t-i} + \sum_{j=1}^n \beta_j X_{t-j} + \mu_{1t} \quad (4)$$

$$Y_t = \sum_{i=1}^m \lambda_i y_{t-i} + \sum_{j=1}^m \delta_j X_{t-j} + \mu_{2t} \quad (5)$$

4. Analysis and Discussion

In time series econometric modeling it is necessary to make data series stationary. Therefore this paper also begins with testing order of integrating through ADF test. The Table 01 gives the summary results of the ADF test at level series and first difference series. Table 01 reports that TP and AP are stationary at level and all other variables are non-stationary at level. In order to achieve integrating order of other variables we obtained first difference series and t- stat of first difference confirms that stationarity of all variables.

Once a stationarity is confirmed, this study applied Johansen's cointegration test for explore the long run equilibrium between IPO activities and macro-economic variables. In here, we test cointegration between macro-economic variables and IPO activities under three panels of each IPO activity measurements. Table 02, Table 03 and Table 04 show the results of cointegration test under each panel.

Table 02 represents the Trace and Maximum Eigen value of Johansen's cointegration test between number of IPO activities (NUM) and macro-economic variables. By looking at the Table 02 results, it appears that Trace statistics and Eigen values are lower than the critical value at 0.05 levels for vector zero to four. Therefore, we cannot reject null hypothesis of no cointegration. This implies that no cointegration between number of IPOs per year (NUM) and macro-economic variables. In other word, absences of long run equilibrium between number of IPOs per year and macro-economic variables.

The results Johansen's cointegration test among Total Proceeds (TP) and macro-economic variables are presented in the Table 03. The results for Trace statistic implies that two cointegration vectors (at vector zero and vector one) and the results of Eigen value shows that one cointegration vector at vector zero. It means that both Trace and Eigen value tests suggest at least one cointegration vector. This implies that long run equilibrium relationship among TP and macro-economic variables is presence in Sri Lankan context.

Table 04 shows the cointegration results of the Average Proceeds (AP) and macro-economic variables. Trace statistic shows that trace value is greater than 0.05 level critical values at vector zero and vector one and Eigen statistic shows that one cointegration vector at vector three. Thus, we can conclude that existence of long run equilibrium relationship between AP and macro-economic variables.

Then, we conduct the Granger causality tests on macro-economic factors with each IPO measurement of NUM, TP and AP. Table 05, Table 06 and Table 07 show the Granger causality results of macro variables and NUM, macro variables and TP, macro variables and AP. Table 05 shows the Granger causality test of macro-economic variables on NUM. The results clearly imply that no causal relationship between macro variables and NUM. Table 06 represents the Granger causality results of macro-economic variables on TP. Exchange rate (EX) and interest rate (I) granger cause with total proceeds but other variables does not granger cause with total proceeds. Table 07 shows the results of granger causality between macro variables and average proceeds (AP). In here also results same as number of IPOs. That means no granger causality between macro variables and average proceeds.

Table 1: The results of ADF test at level and difference series.

Series	Level	Difference
Number of IPOs (NUM)	-1.779136	-4.080054*
Total proceeds (TP)	-4.069736*	-4.684330*
Average proceeds (AP)	-4.075071*	-7.508557*
GDP (GDP)	-0.811022	-6.576956*
Exchange rate (EX)	-0.244853	-4.663734*
Interest rate (I)	-1.932673	-4.630114*
Colombo Consumer Price Index (CCPI)	-1.754054	-5.203486*

Notes: * shows significant at 5% significant level. The test critical values for the ADF test statistics at the 1%, 5%, and 10% levels are -3.752946, -2.998064 and -2.638752 respectively.

Table 2: Johansen's Cointegration results between NUM and macro-economic variables

Hypothesized No. of CE(s)	Trace criterion		Maximum Eigen value criterion	
	Trace Statistic	0.05 Critical Value	Eigen Value	0.05 Critical Value
None	66.23860	69.81889	21.68792	33.87687
At most 1	44.55068	47.85613	16.04609	27.58434
At most 2	28.50460	29.79707	15.10296	21.13162
At most 3	13.40163	15.49471	11.22550	14.26460
At most 4	2.176140	3.841466	2.176140	3.841466

Table 3: Johansen's Cointegration results between TP and macro-economic variables

Hypothesized No. of CE(s)	Trace criterion		Maximum Eigen value criterion	
	Trace Statistic	0.05 Critical Value	Eigen Value	0.05 Critical Value
None	92.23862*	69.81889	39.55061*	33.87687
At most 1	52.68801*	47.85613	27.20077	27.58434
At most 2	25.48724	29.79707	12.62898	21.13162
At most 3	12.85826	15.49471	11.41217	14.26460
At most 4	1.446090	3.841466	1.446090	3.841466

Note: * shows significant cointegration vectors

Table 4: Johansen's cointegration results between AP and macro-economic variables

Hypothesized No. of CE(s)	Trace criterion		Maximum Eigen value criterion	
	Trace Statistic	0.05 Critical Value	Eigen Value	0.05 Critical Value
None	77.70360*	69.81889	26.53480	33.87687
At most 1	51.16879*	47.85613	21.38624	27.58434
At most 2	29.78255	29.79707	15.23023	21.13162
At most 3	14.55232	15.49471	14.51739*	14.26460
At most 4	0.034935	3.841466	0.034935	3.841466

Note: * shows significant cointegration vectors

Table 5: Granger causality test of the macro variables on the NUM

Null Hypothesis	F stat	Prob.
NUM does not Granger Cause GDP	0.17133	0.8439
GDP does not Granger Cause NUM	1.45088	0.2605
NUM does not Granger Cause EX	0.03321	0.9674
EX does not Granger Cause NUM	0.86694	0.4371
NUM does not Granger Cause I	0.07695	0.9262
I does not Granger Cause NUM	0.72736	0.4969
NUM does not Granger Cause CCIP	0.01442	0.9857
CCIP does not Granger Cause NUM	2.49193	0.1108

Table 6: Granger causality test of the macro variables on the TP

Null Hypothesis	F stat	Prob.
TP does not Granger Cause GDP	0.19545	0.8242
GDP does not Granger Cause TP	1.70531	0.2098
TP does not Granger Cause EX	1.51048	0.2475
EX does not Granger Cause TP	3.26225	0.0618**
TP does not Granger Cause I	0.11297	0.8938
I does not Granger Cause TP	3.80451	0.0419*
TP does not Granger Cause CCIP	0.04865	0.9526
CCIP does not Granger Cause TP	0.30573	0.7403

Notes: * (**) shows significant at 5% (10%) significant level

Table 7: Granger causality test of the macro variables on the AP

Null Hypothesis	F stat	Prob.
AP does not Granger Cause GDP	1.89945	0.1785
GDP does not Granger Cause AP	1.70192	0.2104
AP does not Granger Cause EX	0.29610	0.7473
EX does not Granger Cause AP	2.26341	0.1328
AP does not Granger Cause I	0.55178	0.5854
I does not Granger Cause AP	1.56729	0.2358
AP does not Granger Cause CCIP	0.21084	0.8119
CCIP does not Granger Cause AP	0.02905	0.9714

5. Conclusion

In this study we have explored dynamic linkage between Initial Public offerings and macro-economic variables in Sri Lankan context covering the period from 1989 to 2014. Firstly, we applied Augmented Dickey Fuller test to achieve integrating order of time series data. The results imply that all data series are integrated of order one. Then, we applied Johansen's Cointegration test to determine long run equilibrium relationship between variables. Results show that there is a cointegration between IPO activities and macro-economic variables except for the number of IPOs per year. This suggests that there is a long term co-movement between macro-economic variables and Total proceeds and Average Proceeds and those variables are predictable on the basis of past values of other variables.

Then, we used Granger causality test to examine causal relationship between macro variables and IP activities. The results imply that there is no significant causal relationship between variables and indicate Exchange rate and Interest rate granger cause with Total proceeds only. Thus, these findings not provide supportive evidence to conclude that macroeconomic variables influence on IPO activities in Sri Lanka.

6. References

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