

The Dynamics of Stock Market Performance Fundamentals and Economic Growth in Nigeria: A Causality Investigation

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Abstract

There is a plethora of theoretical arguments about the behavioural nature of the dynamics of the proxies of stock market performance fundamentals and economic growth and development of an economy. The specific objective of the paper is to examine the link between series of stock market fundamental and the proxy of real national development in Nigeria. Time series data were collected from the fact book of Nigerian Stock Exchange and Central Banks of Nigeria's Statistical Bulletin from 1980-2013. The methodology adopted is Error Correction Model and Granger Causality tests. The paper further establishes a significant positive relationship between the explanatory variables and explained variable at 5% Confidence Interval. It is therefore recommended that government should take the issue of eliminating corruption, and particularly insiders' abuse related cases and corporate governance issues in the market should be taken so seriously. This is to ensure that the market becomes more productive and represents real agent of economic development like it is in the stock market of developed nations of the world.

Keywords: Theoretical Arguments, Stock Market Fundamentals, Real Development, Time Series, Causality.

Introduction

In many countries of the world, the stock market plays invaluable roles in national development. Since the 1990's in the field of Economics and Finance have devoted serious attention on the study of the link and the relationship between stock market performance fundamentals and real economic growth. There are tremendous researches on the positive link between stock market fundamentals and real national development. Theorists have different contradictions and positions on the behavioural characteristics of stock market fundamental and economic growth and development. Some theorists emphasize that competitive stock markets reduce monopoly thereby affecting developments. Other theorists stress that the trends of stock market performance indices contribute significantly to national development. Referring to Levine and Zervos (1998), they evaluate the relationship between the stock market, banks and economic growth. Similarly, Levine and Zervos (1996) examine empirical relationship between stock market development and long-run economic growth using co integration analyses.

The Nigeria Stock Market has been undergoing tremendous growth over the years since the deregulation and various privatization exercises dating back to 1980 (Alile, 1996; Soyode, 1990). The stock market is important for economic growth and development. This development antecedent becomes evident because equity financing is the cheapest and the most flexible sources of funds that can be raised in the capital market. Besides, it is a crucial long term funds in the sustainable development of an economy. (Okereke-Onyinke, 1999 and 2000). The growth of the Nigeria Stock Market has not been in doubt. This is in spite of the cases of corruption and corporate governance issues that had been reported reported from time to time in the market. According to Onyema (2013), the Chief Executive Officer of the market, reiterated the negative effect of corruption on investors' confidence and the general development of the stock market. This was also corroborated by Oteh (2014), the Director General of the Securities and Exchange Commission (SEC) that corruption cases in the market deter economic growth. These corruption cases further reawaken research interests in the market. The essence of this research is to again examine the developmental roles of the market in spite of the recent corruption saga in the market. The variables employed to measure the relationship between stock market fundamentals and economic growth and development are slightly differ from earlier studies cited in this study. Against the backdrop of corruption challenges and importance of the stock market to economic development, research interest in the area will continue to be necessary to measure the linkage of stock market as a catalyst for national development. The rest of the paper is divided into five sections. The next section is section 2, which include Theoretical Framework, Literature, and The Short-run or Long-run Nature of Stock. Section three is on Methodology, Instrumentation and Empirics. Section four focuses on Presentation of Results (refer to appendix) and Interpretation of empirical models, finally Conclusion and Recommendations are reported in section five.

Theoretical Framework

The stock market has been identified by various researchers in the academia as an institution that contributes to the social-economic growth and development of emerging and developed economies. This is made possible through some key roles the market play in channelling resources to the industry and financial intermediation process to connect the deficit units to the surplus units in an economy. The market is a veritable tool in the mobilization and allocation of savings among competitive uses critical to economic growth and optimal productivity of an economy (Alile, 1984; Alile and Anao 1986, Alile, 1987). The market provides a veritable medium to attainment of economic expansion and growth. The equity and non current liabilities deployment functions of the stock exchange provides a lubricant that ensures the continuous turning of the wheel of an economy. The market provides the scarce funds needed for investment in portfolio of securities, allocates the scarce funds to equities with best returns to fund owners. Besides, the operation in the market has effect on liquidity, acquisition of information of entities, risks and diversification options, savings mobilization, corporate control and information asymmetry. Against the backdrop of the rife of corruption in the market and the germane activities the market has played in the social economic development of Nigeria as a haven of borrowing long by public entities and government institutions (i.e. issuing of loan notes, bonds and preference shares), raising of permanent long- term equity capital by public entities, privatization, consolidation and recapitalization of banks, mergers and acquisitions of certain firms; the need for research in the stock market cannot be saturated. (Riman, Esson and Eyo 2008).

There are myriad theories in finance on stock market. First to be considered here is the investment theory dating back to Keynes 1936 who first discussed the existence of independent investment function in an economy. Second, there is also the theory of firm and material views as a 'black box', which is operated to attain relevant marginal conditions with respect to inputs and outputs while at the same time maximizing profits of an entity and optimizing present values of equity. Third, there is also the investment accelerator's theory which makes investment a linear proportional change in output. In this theory, there exist two (2) main diverging theoretical paradigms. The "demand leading hypothesis, which posits a feedback relationship between economic growth and financial development; the supply leading hypothesis, which deduces a unidirectional causation that runs from financial dependency to economic growth (Patrick, 1966). Fourth to be viewed in this study is fundamentalist behavioural theory. It theorizes that an individual security has an intrinsic or true value, which represents the present value of future streams of income earnable by a security holder. The fundamentalists predict stock market price in an economy using series like performance indices of an entity, government policy in an industry, interest rate or opportunity cost of funds, level of corruption in the market. The fifth theory to be x-rayed in the paper is the chartist theory. It is premised on the view that future movement in prices of stock in the capital market ate influenced by the pattern of price movement in the past, (Daferighe and Aje 2009; Akinsulire, 2006). Also, the chartist attempt to forecast the direction of future stock price movement based on historical price, transaction volume and investment sentiment. This is also corroborated in Bodie, Kane and Marcus (1999), Olowe (1998) and Pandey (2004). The sixth one is random-walk theory, which emerges to refute the viewpoint of the chartist theory. The theory is premised wholly on the reaction of investors to new relevant information about the share in the stock market. It is totally independent of the past market prices. The random movement in stock prices are quite unpredictable, erratic and relatively staggering like the foot step of a drunk walking 50 meters from a restaurant to his house. The distance of foot step per meter to his house can never be the same. This is similar to changes in the prices of shares in the stock market daily, weekly, monthly, quarterly and annually. Most especially investors cannot be certain about price movements in the market to make major investment decisions as a result of insiders' abuse information, window dressed financial statements, poor corporate governance issues and corruption. Theories on Efficient Market Hypothesis (EMH) postulate that a stock market is efficient when stock market prices reflect all new relevant information about an entity instantaneously. This includes information available publicly in the financial statements, insiders' information and any other relevant information that can affect prices of shares in the capital market from time to time. Thus, the use of these theories particularly in the predictability of future prices of security in the stock market should be used wisely because of the inherent limitations highlighted in the preceding paragraph.

Literature Review

There have been the growing debate, concerns and contradictions on the relationship of stock markets fundamentals on the economic growth and development. (Oyejide, 1994, Levine and Zervos 1996; Demirguc-Kunt and Levine 1996, Nyong 1997, Obadan 1998). The reactions have always been mixed. Some scholars revealed that the relationship is significantly positive, others postulate inverse relationship; and some do not find empirical evidences to validate such inferences. For instance, Schumpeter (1911) long time ago revealed a positive contribution of the financial system to economic growth. Stock markets play a positive role in allocation of funds, which in turn exert real shock on domestic growth of the economy. Also, Atje and Jovanovic (1993) found that there was a significant long-run effect and correlation between economic growth series and

market capitalization. They submit that stock market through liquidity, risk diversification; saving mobilization and corporate governance have induced positive shock on economic growth. Refer also to, Alile and Anao (1986) Levine (1996), Luinted and Khan (1999), Osei 2005, Surya and Neupane, 2006; Ahmed et al (2008); Agu and Chukwu (2008), Ezeoha, Ogamba and Okereke-Onyiuke (2009) where they demonstrated that stock market performance granger caused economic growth and development. Levine and Zervos (1996) revelation was whether there was a strong empirical relationship between stock market development and long-run economic growth. They found a strong correlation between stock market development and long-run economic growth series. A number of scholars in Finance, King and Levine (1993); Dermirguc-Kunt and Levine (1993), Demirguc-Kunt and Levine (1996), Hansson and Jonung (1997); Levine (1997, 2002), Garcia and Liu, (1999) Khan and Senhadji (2000), Ben and M'Rad (2000), Dermirguc-Kunt and Levine (2001), Blackburn, Bose and Capaso (2001), Agarwal (2001), Wachtel (2002) and Rioja and Valeu (2004), Trabelsi (2007), Riman, Esson and Eyo (2008), Daferighe (2009) and Donwa and Odia (2010) have provided plausible and fascinating arguments regarding the effect of stock market and long-run economic growth. In a financial system, stock market plays a crucial role in economic growth. It is therefore important to always measure the extent to which stock exerts shocks and economic growth. In some studies made in Nigeria, for example, Adelegan (2001), Ariyo and Adelegan (2005), Maku and Atanda (2009); Ologunde, Elumilade and Ashaolu (2006) demonstrated positive shocks between series of development and stock market fundamentals. The world stock market shock and the emerging market accounted for the broom in the past decades. There are several other academic works in the field, which show how stock market development exerts shock on long-run economic growth. More so, Robinson (1952), Caporate, Howells and Soliman, (2004); reveal the direction of causality between the increasing growth in the financial system and rate of growth of the economy.

Investment in Stock: Is it a Long-Run Investment in Nature?

Speculators or gamblers may engage in stock arbitrage in the stock market in the short-run or long-run. Investment in the stock market is a long run investment, (Akinde,2006). Investment made in the market in the short-run is similar to gambling, huge financial gain or losses may be derived in the process. However, Onagoruwa (2009) maintains that stock with history of better performance attributes are good to buy when the market demonstrate bearish trends than when the market is bullish. The price movements are likely to bounce back to higher prices in the long-run and better rate of return may accrue to the investors through arbitrage process. In another vein, Stiglitz (1985) argued that stock markets had the tendency to indicate information through frequent instability and movement in equity prices. Thus, prices may not be easily predictable in the market. Apart from making financial gain from securities, stock can also be a source of liquidity either in the short or long run. Bencivenga, Bruce and Ross (1996) and Levine (1991) have argued that liquidity and capacity to trade equity play a crucial in economic growth. The research conducted by Greenwood and Smith (1996), Rousseau and Wachtel (2000), Beck and Levine (2003) submit that stock market is relevant in savings mobilization, facilitate investment, liquidity and productivity. However, Demirguc-Kunt and Levine (1996) doubted the merit of stock market liquidity to long run economic growth. They submitted that stock liquidity deterred growth through reduction in savings rate, income and substitution effects, reduction in uncertainty on investment and investors narrow minded in decision making on how to take better advantage of stock market liquidity. The capital market efficiency differs across the world. In both developing and developed economies, the market exhibits different forms of market imperfection. These include information asymmetry, corruption, costly regulatory activities, moral dangers, contractual enforcement and related agency problems, diverse interest of equity holders. In Nigeria and most countries in the Sub-Sahara (SSA), the capital market is not perfect because market values of securities do not instantly and simultaneously all in information that are publicly or privately available. The market for derivative and options are almost nonexistent. This contributes major barriers to foreign investors.

Methodology, Instrumentation and Empirics

Several studies have employed Error Correction Model (ECM) and co-integration series to answer the important research question on whether there is a linkage between stock market liquidity and economic growth. This study is not an exception. Also, the study engages the standard Granger-causality test as contained in Akaike (1969) to investigate whether previous deviations in one variable (say LMTA, that is log of Market Capitalization, Transaction Values, All Share Index) help to explicate the present changes in another variable (say Log of Real Gross Domestic Product (LRGDP)) over and above the clarification provided by earlier changes in variable LRGDP. If this contrary, then we can infer that LMTA does not Granger-cause LRGDP. To investigate whether causality runs in the opposite direction, that is., from RGD to LMTA (explanatory variables), the test on LRGD and LMTA repeated and the variables interchanged. Nzue (2006) investigates the relationship between development of the Ivorian stock market and the country's economic development. The results show market gross domestic product and stock market was co-integrated. Guryay et al (2007) examines the relationship between financial development and

economic growth, this reveals an insignificant positive relationship between financial development and economic growth and causality runs from growth to financial development without a feedback. The multiple regression that had hitherto been run in various studies consulted in this study defined their variables as total value of shares traded as a proportion of share of the Gross Domestic Product (Turnover Ratio, which represents liquidity); also, the value of traded securities as a percentage of total market capitalization, (the turnover ratio) and the value of traded ratio as a proportion of stock price movement. The study is different from the previous studies that had been done earlier in Nigeria and several other countries. The definitions of data as indicated earlier in the section differ. Besides, the paper log differences the endogenous and exogenous variables to deduce the elasticity of the coefficient of the co-integration model. The data collected from the Stock Exchange Fact Book and Central Bank Statistical Bulletin from 1980 to 2013 include Real Gross Domestic Product (RGDP), Market Capitalization (MC), Total Transaction Value (TRV) and All Share Index (ASI). It should be emphasized that All Share Index started in January, 1984 and from 1980 to 1983, the paper assumed the same figure in January, 1984 for 1980 to 1983 respectively.

The model is therefore specified as follows:

LRGDP = Log of Real Gross Domestic Product, which is the endogenous/explained variable
 LMC = Log of Market Capitalization, LTRV = Log of Transaction Value and LASI = Log of All Share Index as exogenous/explanatory variables

$$LRGDP_t = \alpha_0 + \alpha_1 LMC_t + \alpha_2 LTRV_t + \alpha_3 LASI_t + \varepsilon_t \dots \dots \dots (1)$$

$$\alpha_1 > 0, \alpha_2 > 0, \alpha_3 > 0 \dots \dots \dots (2)$$

$$\Delta LRGDP_t = \sum_{i=1}^k \alpha_i \Delta LRGDP_{t-i} + \sum_{j=1}^k \beta_j \Delta LMTA_{t-j} + e_t \dots \dots \dots (3)$$

$$\Delta LMTA_t = \sum_{i=1}^k \delta_i \Delta LMTA_{t-i} + \sum_{j=1}^k \gamma_j \Delta LRGDP_{t-j} + \varepsilon_t \dots \dots \dots (4)$$

$$LRGDP_t = \alpha_0 + \beta LRGDP_{t-1} + \sum_{i=1}^p \delta_i \Delta LRGDP_{t-i} - 1 + \sum_t \dots \dots \dots (5)$$

$$LRGDP_t + A_1 RGD_{t-1} + A_2 LRGDP_{t-2} + A_p LRGDP_{t-p} - 1 \beta X_{t-1} \sum t t - p \dots \dots \dots (6)$$

$$H_0: \beta = 0 \text{ i.e. There is a unit root – the time series is non stationary} \dots \dots \dots (7)$$

$$H_1: \beta < 0 \text{ There is no unit root- time series is stationary} \dots \dots \dots (8)$$

In equation 1 and 2, the paper expresses the a priori regression function, LRGDP_t is the explained variable, LMC_t, LTRV_t and LASI_t are explanatory variables and ε_t is the stochastic term. In equation 3 and 4 LRGDP and LMTA stand for the pair-wise series that we investigated in the study and k is the suitable lag length established by Akaike (1969) as Final Prediction Error (FPE) benchmark. If ∑β_j = 0 and ∑γ_j = 0, then LMTA does not Granger cause LRGDP in equation (3) and LRGDP does not Granger cause LMTA in equation (4). This then implies that LMTA and RGDP are assumed to be independent. If the causality tests prove that both series cause economic growth, it means in effect that causality runs in both directions. In equation 5-8, P_tLRGDP_t is a k-vector of non-stationary I₍₁₎, explained variables, X_t is a vector of explanatory deterministic variables; A₁ A_p and βα² + β² = c² are matrices of the coefficients, which are to be estimated, ∑_t is a vector of stochastic term, they are synchronously and concomitantly correlated and they are not correlated with their lagged values and not also correlated with the right-hand side variables. The coefficients of the explanatory variables measure the degree the elasticity of the series to Log of Real Gross Domestic Product. The paper captures both the short and the long run effects of stock market fundamentals (explanatory variables) on economic growth (explanatory variable). The time series properties of series were first examined using Augmented-Dickey Fuller (ADF) and Phillip-Perron (PP) unit root tests. This was then followed by co-integration among the series using ADF test.

Presentation of Empirical Results

This section reveals the empirical results of the analyses carried out using Econometric-View 6. They are presented in table 1-4 as appendix after references.

Discussion and Interpretations of Empirical Results

The empirical results of the estimated stock growth model are reported in Table 1 in the appendix. From this table, there is a feedback of a well-defined error correction term with a feedback effect of 73 per cent approximately of the earlier year's disequilibrium from the long run elasticity of identified explanatory variables in the estimated stock growth model. The effect of the error correction is very high. Besides, it also has

significant a-priori negative sign. Except for the Log of Transaction Value (LTRV) that is negative and insignificant at levels and significant when false difference, other results clearly portend and give credence to earlier findings that the identified stock market fundamentals that is, the explanatory variables are indeed co-integrated with the Real Gross domestic Product (LRGDP) series. In spite of the fact that the study's variable definitions diverge from previous studies consulted, it can further be inferred in this study that Log of Market Capitalization (LMC) and Log of All Share Index (LASI) are elastic and significant positive real agent of economic growth and development at levels and lagged values because the t-statistics is close to 2 and the p-value is less than 5% confidence intervals. Whereas Log of Transaction Value (LTRV) has negative elasticity (-0.11 and -0.089) at levels and lagged values and this signifies an inverse relationship which is not significant at levels since the t-statistics of -3.02 is greater than 2 and the p-value is more than 5% confidence intervals. The elasticity is however negative and significant at lagged values because the t-statistics of 2.10 is close to 2 and the probability value of 0.0412 is less than 5% confidence intervals. The lagged value of the explained variable, Real Gross Domestic Product (LRGDP-1), is approximately 17% elastic. The elasticity is significantly positive because the probability value is less than 5% confidence interval. This implies that the immediate past level of stock market fundamental portends positive elasticity on the current level of real economic growth in Nigeria. This position validates and confirms the a priori expectations and the empirical evidences stated at the beginning of the study. It must be stressed that in some of the earlier studies consulted, the relationships between stock market variables and economic development were inverse which contradicts theoretical expectations. Thus, we can therefore infer that there will always be mixed reactions on empirical evidences on the link and elasticity between stock market fundamentals and proxy of economic development. In the models, the R-squared (0.73) and the Adjusted R-squared (0.51) portend strong elasticity between the Log of Real Gross Domestic Product (LRGDP) and Log of Market Capitalization (LMC) and Log All Share Index (LASI). The F-statistics of 1.86 with a p-value of 0.012, which is less than 5% confidence intervals suggest that the model is goodness fit. To make the study more robust, co-integration analysis has been carried out to examine long-run relationship among, Log of Market Capitalization (LMC), Log of Transaction Value (LTRV) and Log of All Share Index (LASI). In Econometrics analysis, two variables are co-integrated when they have long term, or equilibrium relationship between them. If the calculated ADF test statistics is higher than Mckinnon's critical values, it means the null hypothesis is accepted (i.e. $H_0: \beta = 0$, i.e. There is a unit root) therefore, the time series is considered non-stationary or not integrated of order Zero i.e. $I(0)$. Alternatively, the rejection of the null hypothesis ($H_1: \beta < 0$ There is no unit root- time series is stationary) implies that the time series are stationary and there is need for further differencing. Thus further differencing is carried out until stationarity is achieved and the null hypothesis is rejected. If the series are stationary in their first difference, they can therefore be said to be integrated of order 1, i.e. $I(1)$, if stationary in other second differences, then they are integrated of order 2, i.e. $I(2)$. Therefore, except for Log of Transaction Value (LTRV), the results in Table 2 reported as appendix shows apparently that all stock market fundamentals are non-stationary; they are indeed $I(1)$ series at 5 per cent level of significance using both the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. However, the Log of Transaction Value (LTRV) is $I(0)$ series. This implies it needs to be differenced once before it attains stationarity. The results of the unit root tests were then applied to test causality and the estimation of stock market growth fundamentals in equations 3 and 4. The Granger causality results reported in Table 3 in the appendix reveals that causality runs from the left and the right hand side of the models; i.e., bi-directional causal relationship which signifies that causation runs from the three (3) measures of stock market fundamentals and Log Real Gross Domestic Product (LRGDP) and vice versa. Thus, LMC, LTRV and LASI Granger caused real economic growth with opposite causality running from real economic growth to these series at 5 per cent level of significant. The table 4 in the appendix reveals the Eigen values and Trace statistics, these further give credence to long run co-integrating significant relationship of at most 1, 2 and 3 of the explanatory variables because the probability values are less than 5% confidence intervals. From this analysis, it is evident that stock market is an important lubricant for economic growth and development in Nigeria; several studies as pointed out in the study's literatures confirmed this, so government need to put in necessary regulations and policy instruments that will ensure efficient stock market and long run growth in the country. The market as it is gross inefficient because the prices of stock do not instantly reflect all available in information in the financial statements and insiders' information and any other means. The regulatory agencies need to be alive with their responsibility to eliminate corruption in the market.

Conclusion

Several studies have described the relationship between the stock market and economic development series. There have been mixed reactions in these studies, that is the relationship between stock market variables and proxy of economic development have always been positive and negative. This study measures the degree of responsiveness of log of stock market fundamentals to the Log of Real Gross Domestic Product (LRGDP). The

results reveal that Log of Market Capitalization (LMC) and log of All Share Index (LASI) do not only exhibit positive elasticity, they are also statistically significant. This is in tandem with our a priori expectation and also in conformity with some earlier studies. On the contrary, Log of Transaction Value (LTRV) has inverse or negative elasticity; it is not significant at levels. However, it is significant at lagged values refuting the theoretical paradigm and in agreement with some other studies on the subject matter. It can therefore be said that the stock market is either a positive or a negative agent of economic growth and development.

Recommendations

It is therefore recommended that for the stock market to really contribute to economic development, corruptions, insiders' abuse information, round tripping, influence of institutional investors, executive financial recklessness and all other forms of corporate governance problems should be eliminated. Besides, the regulatory agencies should ensure strict adherence to the rules and regulations governing the market and they should ensure that financial statements are not window dressed to deceive users of financial statements. Also, the instruments traded in the market are smaller in relation to the stock market of the developed economies, thus efforts should be made to develop the option and derivatives market and other long term instruments so that potential and existing investors in the market will have better and a wider variety of options to choose from.

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**APPENDIX
 PRESENTATION OF THE RESULTS**

Table 1: Modeling Economic Growth
Dependent Variable: D(LRGDP)
Method: Least Squares
Sample(adjusted): 1980 – 2013
Included observations: 34 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.090043	0.110611	2.049054	0.0040
D(LRGDP(-1))	0.170054	0.141071	2.214633	0.0300
D(LMC)	0.118226	0.289417	1.980871	0.0291
D(LMC(-1))	0.080043	0.230121	1.898265	0.0131
D(LTRV)	-0.115831	0.194013	-3.023894	0.0589
D(LTRV(-1))	-0.089062	0.182916	-2.097123	0.0412
D(LASI)	0.098241	0.118251	3.535712	0.0080
D(LASI(-1))	0.061265	0.157056	1.874449	0.0123
ECM(-1)	-0.795015	0.217078	-2.012516	0.0212
R-squared	0.730908	Mean dependent var	0.132214	
Adjusted R-squared	0.505979	S.D. dependent var	0.248446	
S.E. of regression	0.214430	Akaike info criterion	0.282141	
Sum squared resid	1.008856	Schwarz criterion	1.008231	
Log likelihood	12.79064	F-statistic	1.862110	
Durbin-Watson stat	2.010013	Prob(F-statistic)	0.012s202	

Table 2: Unit Root Test Results (1978-2013)

Series	Level		First Difference		Order of Integration
	ADF	PP	ADF	PP	
Log of Real Gross Domestic Product (LRGDP)	-1.3421	-1.4431	-5.0142**	-6.4351**	I(1)
Log of Market Capitalization (LMC)	-2.1322	-2.6647	-3.2146**	-4.1871**	I(1)
Log Transaction Value (LTRV)	-2.0443	-2.7102**	-5.6190***	-9.6845***	I(0)
Log of All Share Index (LASI)	-1.9154	-1.5087	-6.9470***	-6.8651***	I(1)
Mac-Kinnon Critical Values for rejection of hypothesis of unit root					
1% critical value	-3.8572	-3.8304	-3.8877	-3.8572	
5% critical value	-3.0400	-3.0294	-3.0521	-3.0400	

*** significant at 1%

** significant at 5%

Table 3: Pair-wise Granger Causality Test

Pairwise Granger Causality Tests

Date: 10/21/14 Time: 20:45

Sample: 1978 2013

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
LMC does not Granger Cause RGDP	36	3.20467	0.03322
RGDP does not Granger Cause LMC		4.94730	0.01905
LTRV does not Granger Cause RGDP	35	5.83401	0.02122
RGDP does not Granger Cause LTRV		6.01931	0.01643
LASI does not Granger Cause RGDP	35	3.00211	0.00151
RGDP does not Granger Cause LASI		4.30121	0.03651

Source: Estimates from E-View 6 Econometric Package

Table 4: Johansen Co-integration Test Using Eigen Values and Trace Statistics

Date: 01/01/15 Time: 06:17

Sample (adjusted): 1982 2013

Included observations: 32 after adjustments

Trend assumption: Linear deterministic trend

Series: RGDP MCR TRV ASI

Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)

Hypothesized	Eigen-value	Trace	0.05	
No. of CE(s)		Statistic	Critical Value	Prob.**
None *	0.915624	154.5998	47.85613	0.0000
At most 1 *	0.762873	75.48088	29.79707	0.0000
At most 2 *	0.536901	29.42781	15.49471	0.0002
At most 3 *	0.139123	4.793718	3.841466	0.0286

Trace test indicates 4 Co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

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