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Causal nexus between stock market development and economic growth: The case of China

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Abstract
This paper examines the Granger causality nexus between stock market development and economic growth in China during the period 1994-2015. The study used four measuring tools to measure stock market development: market capitalization to GDP, number of listed companies, turnover ratio, and the total value traded. We adopted the simple linear regression and granger causality models for testing the links. The results showed that three of the measures of stock market development are positively associated with economic growth. The outcomes confirm the economic theory, the expectations and papers that explored this connection in other economies.

Keywords: Stock market development, China, economic growth, linear regression model, Granger Causality

1. Introduction
In recent years, the link concerning stock market development, henceforth SMD, and economic growth has become the subject of broad analysis. Would well organize stock markets stimulate economic growth? In the 20th century, economists focused their attention on the prominence of financial improvement, explicitly the stock market on economic growth. Development of stock market from suggestions of several studies can expand growth performance through its progressive effects on capital flows, provision of satisfactory liquidity and pooling funding for industrial projects in the long-term, and augmentation of investment risk. Improvement of stock markets pushes efficiency, financial innovation, greater resource allocation, and technological advancement. Stock market influence upon the socio-economic growth and evolution of emerging and developed economies and people has gained immense attention. It has lingered a controversial issue in recent periods from academicians, practitioners, and managers in an endeavor to study and understand on "how the financial market development underwrite the economy?" The leading factor might be their rigorous performance through the era, with yields in some markets as far surpassing those of established markets. Adding to this factor is the prospective divergence benefits. Emerging or developing markets tend to have a diminutive correlation with industrialized markets, thereby providing comprehensive risk discount benefits to the portfolio. Notwithstanding the rationale to explain the exceptional development of developing markets, the most likely account is that economic reforms in these markets ensued a trendy speedy upsurge in equity flows from prosperous to low market conditions.
In the early 1980s, quite a lot of emerging countries were incapable of overhauling their sovereign debts. The result was the well-known debt crisis, which several professionals and academics be apprehensive of bringing an austere predicament in developed countries' banking sector. The developing countries, however, were faced with a credibility problem which prevented them from borrowing the funds they needed from abroad, and when they did, it was at inflated interest charges. Many developing countries encouraged the development of stock markets and implemented a series of liberalization policies to attract funds from abroad. These intended at creating these economies gorgeous to foreign investors. Most of these countries in the last two decades managed to attract large funds from abroad. However, it is doubtful if this inflow of foreign investment resulted in higher levels of economic growth for these countries. During the last twenty years, research on the effect on this sudden foreign investment influx on the developing economies became important. Prior to the 1980s, such literature was almost non-existent and would have been irrelevant. Limited research have empirically inspected the liberalization policies impact on these economies, predominantly because of the insufficiency of macroeconomic data.Undeniably, financial markets are extremely pivotal for global financial integration promotion and the universe appears to portray a relatively diverse state of concerns. Senbnet and Ochere (2008) affirmed that a country's competitiveness in the markets for global capital is better positioned by a country's efficient functioning domestic financial market.
The global market rating for capital through a well-functioning financial system minimizes a country's dependence on both external borrowing and foreign aid.

Allocation of local security risks is allowed by globalisation as recommended by a handful number of financial analysts. Additionally, a display of significant regularities in the financial markets compliance policies, evolution of economic systems and prudential requirements is within reach. At the initial platforms of cost-effective growth, economies at their inception stages are comparatively poor with regards to financial and economic development and absence of stock market. Coupled with this, there is scarcity of financial intermediation even though financial instruments are very simple and basic. Moreover, as economies thrive, multifarious and articulated financial instruments appear in the market and consequently, stock markets become apparent. In comprehensive terms, these overall regularities describe and signify the interrelationship of financial development and capital accumulation with regards to financial markets. Nonetheless, more specific features of the transformation between financial and real variables are also rigged out by the data. Changes in these features from county to country and from period to period, might be feasible, but in the process of substantial resource distribution, financial variables are significant. As a result of the downfall of the USSR and the positive outcome of the capital market on most developed nations like the UK and the USA, capital market undertakings have occupied a centre stage in the dilation of financial sector amongst developing or emerging economies (UNITAR/DFM, 2005).

Nevertheless, there is a need for SMD, whether the country is developed or still in its developing stages. The setup of capital markets and money markets which constitutes the financial system in various economies accelerates capital accumulation and economic growth and financial deepening. Financial systems, at low stages of economic development, are very embryonic and are completely absent. Yet, when economies grow, financial intermediation and stock markets emerge and expand. In broad terms, this describes and represent the general regularities of growth in financial markets and the interrelationship of capital accumulation and financial development. The swiftness and magnitude of SMD in emerging or developing countries have been incomparable and have led to major shift both in the capital flows from industrialized nations and in the specific mixture of long–term debt and equity of countries with lower GDP relative to other countries. Yartey, (2008) submits that in the past, capital markets in the world have amplified immensely and coerced the regulatory body to move the decision on stock market for complex and sprouting countries. Though a huge amount of empirical studies have inspected the linkage between economic evolution and stock market, the deliberation on the contribution of stock markets to economic evolution is far from settled. Conversely, current empirical studies of Arcand *et al*. (2011), Demetriades and Rousseau, (2011) and Rousseau and Wachtel, (2011) purported conflicting evidences. Therefore, the current verdict on the financial development-growth relationship has remained inconclusive.

Consequently, in the field of social sciences, there are still heated arguments regarding the link concerning economic growth and financial sector development. The debate is imprecise and hinders the formation of comprehensive policy advice. The debate is pertinent because the strength of the pivotal tie concerning SMD and economic growth has significant insinuations for policy makers. In this respect interrogations under deliberations are; is there an identification of a causative link between financial development and economic growth (Deb and Mukherjee, 2008)? According to the views of some schools of thought a well-functioning stock market (see Enisan and Olufisayo, 2009; Caporale and Spagnolo, 2011), enhance economic growth through the course of mobilization and effective distribution of inadequate resources and consequently pilot other economic sectors in their growth trajectory. This subject has gained importance in the twenty first century, where it is imperative to reference the papers of Adefeso, Egbetunde, and Alley, (2013) [1]; Usman and Alfa, (2013) [16]; Osamwonyi and Kasimu, (2013) [12]; Nowbutsing and Odit, (2011) [11]; Nazir, Nawaz, and Gilani, (2010) [10] and Ake, (2010) [2] has asserted affirmative connection between economic growth and financial market activities.

In contrast, Alghamedi, (2012) and Wang, (2010) maintain that SMD is insignificant for economic activity. Thus, acquainting the ties with reference to stock market and economic growth is of great significance for portfolio managers and financial institutions. Lately, with the role of the emerging markets becoming more significant, economists target not wholly on countries like the United Kingdom, Japan and the United States that are developed, but they correspondingly pay great consideration to the emerging markets.

Stock market development, according to Levine (2005) is viewed as endowing to economic growth over numerous channels: (i) enable the exchange of goods and services, (ii) expedite expansion and controlling of risk, (iii) produce facts about possible investments and allocate capital, (iv)monitors investments and utilize corporate control and (v) muster and pool savings. This thus implies that stock markets act as a fulcrum in economic growth. Alghamedi (2012) asserts that a properly operational stock market, through altering the worth of these functions, can influence a steady state of growth by varying economic adeptness, high-tech progress, and savings rate. By attracting the set of pecuniary instruments available to investors, the stock market contributes to the capital distribution process and expands their portfolios, providing a central source of investment capital at comparatively low cost.

Although stock market and economic growth have remained a subject of thorough theoretical and empirical research, there have been many challenges in finding the link concerning them. Those investigations and interpretations have diversified in procedures and outcomes from one person to another. For instance, various studies, including Adjasi and Biekpe (2005) in their investigation observed that the level of per capita income and the expansion of financial market and systems were significantly linked. Though a handful of studies being made, most of these findings have been relayed out in traditional economies and limited, distinct country-based studies exist on the upshot of emergent nations' stock markets. Among these studies, different writers have expressed different views concerning the stock market's influence on the economy.

From the background of this study, a clear gap between SMD impacts on economic growth can be observed in the literature. This study aims to fill in these gaps in such state of affairs by conducting a regression analysis targeting China. Consequently, the resulting research objectives were framed.

- To investigate the relationship between SMD and economic growth.
- To examine the causal link between SMD and economic

growth.

In order to realise the aim and objectives of the study, two research questions were designed. The ensuing questions are to be answered by this research.

- Does SMD have any significant impact on economic growth on China economy?
- Is there any existence of causality between SMD and economic growth in developing stock markets during the sample period?

This study contributes to the existing literature in the following ways: (i) this research will contribute to the current debate on the stock market and economic growth by providing further evidence. (ii) It is expected that this study will provide an in-depth analysis that will enable the Chinese government to develop an appropriate drive for implementation and incorporation of policies relating to SMD into the modern stock market. (iii) The study will be useful to policymakers and other key players to launch an appropriate mix of fiscal, legal, and regulatory reforms to develop the local stock market and thus entice foreign investors and boost the performance of higher economic growth.

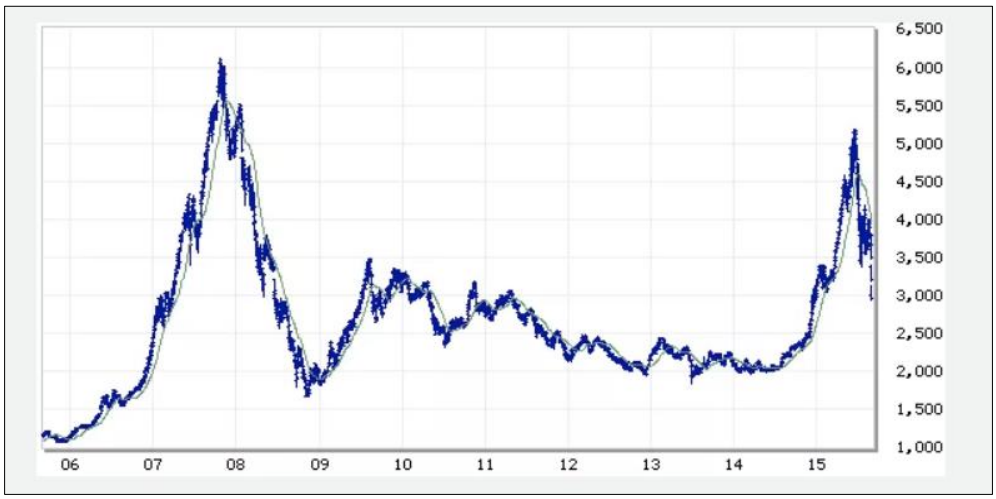
Following the introduction section**,** in section 2, we present an overview of China's stock market. Section 3 presents a review of related empirical literature followed in section 4 by data collection and research methodology. Section 5 provides analyses of the results and discussion and in section 6, we provide recommendations and conclusions.

2. Overview of China's Stock Market

Over the preceding years, China has witnessed amazing cost-effective upsurge. Because of its rapid expansion and high volatility, its equity market draws lots of attention. In the late 1970s, China's economic reform started, which gave birth to its capital market (Shanghai Stock Exchange (SSE), 2010). By global standards, China's modern stock markets are young with trading recommencing two and half decades ago after being episodic for years of the Communist revolution. Its annual real GDP from 1979 to 2014 was around 10 percent. This infers that for every eight years China doubles the size of its economy in real terms. Because of its rapid expansion and high volatility, a lot of attention has been drawn to its equity market. China's capital market with the gradually improved trading rules and legal system has reached the international standard nowadays.

China is ranked as the third largest market capitalization in the world (SSE, 2010). There are two stock exchanges in the mainland: Shanghai and Shenzhen. The equities traded on these stock exchanges are recognized as A share and B share. The key difference between the two categorizations is that the former are measured in RMB and latter in foreign currency, specifically, Hong Kong dollars in Shenzhen exchange and US dollars in Shanghai stock exchange. A shares are the ordinary shares with good liquidity and account for the largest proportion of offered company shares. However, the domestic investors from mainland China can be the only investors for A shares. On the other hand, B shares are limited and only domestic investors from Hong Kong, Macau, Taiwan and international investors are allowed to invest. This regulatory restriction lasted until 2001, when in order to boost B share market, Chinese government removed the restrictions and made it open to mainland China residents who hold a valid foreign exchange deposits (SSE, 2010). Finally, in 2003, designated foreign institutions were allowed to invest in A shares. Neither A shares nor B shares are real stocks, trading is handled via electronic billing. Chinese government endeavors to protect stability of the stock market and prevent over speculation. Hence, two main policies are implemented by the government to achieve this goal: First, "T+1" trading rule in A share market and "T+3" trading rule in B share market, which means investors in A share market has to only wait for the next trading day if they want to sell the shares they purchased today. On the other hand the investors in B share market will have to wait till 3rd day after the day investors buy shares. Second, Chinese government sets the limit for stock price spread, that is, the fluctuation of price of a security on current day cannot exceed the 10 percent upper or lower limit of closing price on the previous day. Both stock market exchanges have surprising trading volumes and trading values each day. Almost 11 billion deals in terms of number of shares worth of 96 billion RMB happens on Shanghai stock exchange (SSE, 2015) and 9.8 billion trades with the value of 120 billion RMB on Shenzhen exchange per day respectively, (Shenzhen Stock Exchange (SZSE), 2015). With regards to domestic capitalization, the SSE and the SZSE are graded the third and fifth world's largest stock exchanges respectively as of mid-June 2015.

Conferring to a study by the Brookings Institution, China's stock markets are to a greater part pretentious by provisional investment than Western countries markets. This situation exists in part because shareholders in Chinese markets generally lace less reliance on underlying firm value and focus more on likely stock price movements in the short run since the shareholders have minute power over the companies they are investing in. Chinese stock exchanges are also piloted by personalities (retail investors), who total 200 million and account for a probable 85 percent of market trades. Many of these investors purportedly bought stocks on margin (i.e., expending loaned out money), wagering that stock prices would continue to rise. While many economists saw the decline in China's stock markets to be a normal correction, many raised concerns over how the Chinese government control the crisis and over its staunchness to setting off free market reforms.



***Source*:** (Market Watch)

The chart from Market Watch shows thatfrom 2005 to 2007, China's benchmark index, the Shanghai Composite sprouted six folding commencing 1,000 to 6,000. It dwindled to 2,000 as a result of the 2008 market crash. The reason of this previous boom –and –bust cycle was apparent: In the mid-2000s, the Chinese economy was developing immensely and so stocks went up. The last boom which started in June 2014, is different. It didn't match with mostly strong economic growth- the economy really grew more sluggishly in 2014 as compared to 2012 and 2013.

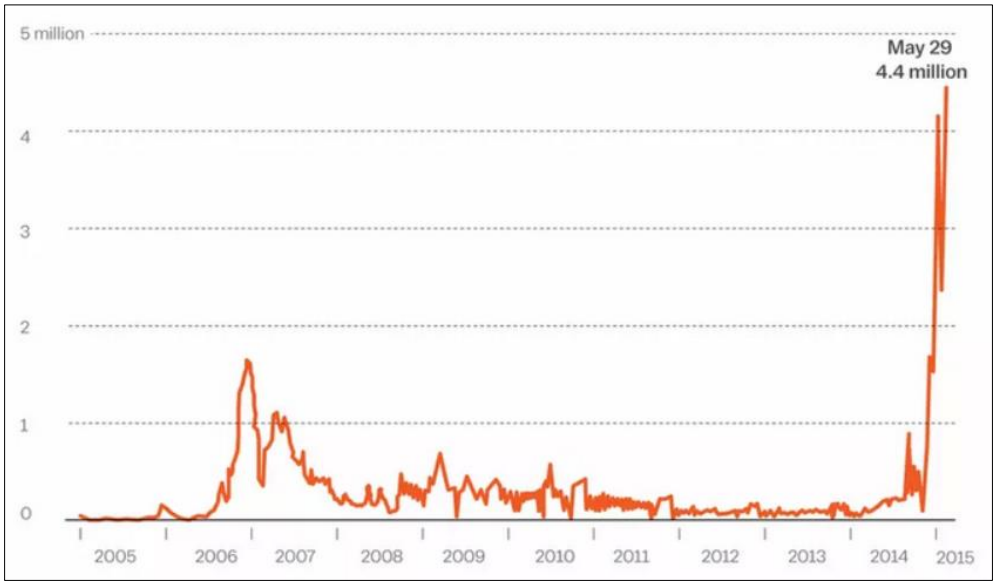


Fig 2: Ordinary Chinese have been getting into stocks from 2005 to 2015. Source: KKR.com (Javier Zarracina/Vox, based on a chart by KKR and data from China Securities Depository and clearing Corporations and Bloomberg)

This chart displays the quantity of stock transaction accounts that have been opened in China over the earlier periods. There was a huge jump in new accounts as the stock market bounced in 2006 and 2007. However, in getting on 2014 and early 2015 China saw an abundant higher flow in new accounts unbolted. More than 40 million accounts were opened between June 2014 and May 2015. In reality, there are now more stock traders in China.

The chart from Market Watch shows that from 2005 to 2007, China's benchmark index, the Shanghai Composite grew six fold from 1,000 to 6,000. The then market crashed falling below 2,000 by the end of 2008.The reason of this previous boom –and –bust cycle was apparent: In the mid-2000s, the Chinese economy was developing immensely and so stocks went up. The Chinese stocks crashed along with stocks far and wide as there was a crash in the global economy. The last boom which started in June 2014, is different. It didn't match with mostly strong economic growth- the economy really grew more sluggishly in 2014 as compared to 2012 and 2013.

3. Review of Related Literature

3.1 The Relationship between Stock Market Development and Economic Growth

Ujunwa and salami (2010), in their investigation of the bond relating to the stock market and economic evolution for the period 1986 to 2006, used per capita gross domestic product as the dependent variable whereas the stock market development indicators were value of the share traded, and the ratios of market capitalization and turnover. The authors' outcome confirms that liquidity of stock market is adversely connected with economic growth whereas turnover ratio and market capitalization are positively linked with economic growth. Loayza and Ranciere (2002) underscored the distinction concerning the short- and long-run effects of

financial sector development on economic growth. They find that the surge of financial crisis is as a result of the contrary short-term association.

Okodua&Ewetan (2013) scrutinize the association concerning the performance of stock market and sustainable economic tumor. The authors utilized data from 1981 to 2011 by employing the technique of bound testing co-integration methodology. The authors utilizes interest rate, financial depth, gross domestic product, value of traded securities, market capitalization and average dividend yield as explanatory variables in the study. At the 0.05 level, the premeditated f-statistic is greater than the corresponding value at the critical region of the upper bounds. As a consequence, the test point out that the dependent and independent variables have a long run relationship that is the variables are in equilibrium. Bakari *et al* (2014) supported the findins of Okodua&Ewetan (Owolabi and Ajaji (2013) posit a positive connection between economic evolution and the indicators of stock market employing ordinary least square.

Amna *et al*. (2013) use the perspective of brokers, employees and investors to investigate whether stock market fuel economic evolution in Libya. The study reports that stock market have a significant and positive effect on economic evolution after administering questionnaires for the role of stock market on economic evolution, the problem inherent to the stock market and the indicators taken by the market to develop its contribution in economic growth. Erasmus and Nicholas (2014) used ARLD-bounds technique to investigate whether SMD will have an impact on economic growth in Ghana. The findings of the study submitted no positive effect of Ghana SMD on its economic growth in the long run. They also find that credit increase to private sector is the key driver of economic growth in Ghana.

Similarly, Yadirichukwu and Chigbu (2014) utilize multivariate and error correction technique to examine the relation between capital market and economic growth. This study reveals that stock market capitalization ratio and economic growth have an inverse relationship but statistically significant. The study also demonstrates that the value of total transaction and economic growth have a long run relationship. They interpret this as favourable macroeconomic environment, efficiency and transparency develop investors' confidence.

3.2 Direction of Relationship between Stock Markets Development and Economic Growth

Four main sets of opinions as highlighted by Akinlo and Egbtunde (2010) due to these differences within the existing literature can be found. First set of studies consider and offer evidence on the "The Finance-led growth or Supply-leading view" of the financial markets development.That is, the financial sector and intermediaries contribute to economic growth by increasing the size of saving and improving the efficiency of investment.

On the causality between financial deepening, economic growth and poverty in Nigeria, Aye (2013) utilizes Vector error correlation model and Vector Autocorrelation and the actuality of long run relationship concerning finance and economic tumor was not found. However, unidirectional causality from financial development to poverty via growth was posited by the author in the short-run. In 2008, Kaplan carried out a frame work of a VAR model employing the Johansen co-integration and Granger causality tests to evaluate Turkey's SMD and economic growth during the period 1987-2006. The results of his findings collaborates the presence of long run co-integration link between economic growth and stock market. Furthermore, a uni-directional relationship running from the stock market to economic growth is inferred by the causality test. (Kaplan 2008).

Using annual Korean data from 1971 to 2002, Yang and Yi (2008) professed that financial development causes economic growth and the manifestation of a uni-directional link from the stock market to economic evolution is time-honored. Antonios (2010) exploit the Granger causality tests within the VECM model and study the link concerning SMD and economic evolution for Germany during the period 1965 to 2007. The author echoed that a unidirectional link runs from stock market to economic growth. Using annual time-series data, Van Nieuwerburgh *et al*. (2006) found parallel outcomes after an extensive empirical investigation of the long-term affiliation concerning economic evolution and SMD. The authors conclude that Belgium SMD endorses economic evolution. Olweny and Kimani (2011) studied the Nairobi Stock Exchange and resolved that a vaster economic growth is an indicator of elevated stock index. They establish a one-way causality entering from SMD to economic growth, where the SMD (captured by NSE 20-share index) has a statistically affirmative sway on economic growth.

Second set of studies are in favor of causality from economic growth to the financial markets development. This view is called "demand-following" hypotheses. That is, high growth may create demand for certain financial services and the financial markets are effectively a response to this demand. Vacu (2013) examined the long-run association between SMD and economic growth in South Africa for the period from 1990Q1 to 2010Q4. To capture causative connection between economic growth and SMD, the author utilizes Johansen co-integration technique and Granger causality and further carried out a short-run relationship employing the VECM. Vacu (2013) demonstrates causality runs from economic growth to SMD. Thus, supporting the demand-following view. Allen *et al*. (2006) investigated real economy and financial structure nexus for ninety-three countries between 1976 and 2004. Historical factors; Real economy; Legal origins and Political factors were the four potential reasons forwarded by Allen *et al*, (2006) that explain the distinction concerning the financial edifices of these nations. From these, they selected the real economy, and posited that the structure of a financial system originating from the real sector is shaped by the demand of the financial facilities. Their findings infer a positive link between the real economy and financial structure, running from the real economy to the financial structure, endorsing their hypothesis.

Third set of studies are in support of the "feedback" hypothesis that favors the reality of two way causation between the financial markets development and the economic growth. This type of connection rests on the stage of economic development. Using data set for the period 1995-2007, D. Hongbin (2007) resolved that there ensues a two-way causation concerning China's SMD and economic growth, that is, economic evolution can not only uphold SMD, but also SMD correspondingly espouse economic evolution. Bernhard OI (2013) centers on the causal relationship between SMD and economic growth in Zimbabwe during the period 1990-2010; the author professed a bi-direction connection between SMD and economic growth. Shahbaz *et al*. (2008) scrutinize Pakistan's data over the period 1971-2006. The author acknowledged a bi-

directional causation concerning SMD and economic evolution. In the same vein, Osamwonyi and Kasimu (2013) [12] study the causal connection and the trend of causality of SMD with economic development during the period 1989 to 2009. They found that equity market development and economic expansion has no casual association in the economy of Ghana and Nigeria, while in Kenya a bidirectional causal connection is found between equity market advancement and economic development.

A fourth set of studies believe on "no relation" between the financial markets-The stock market is unimportant source of corporate finance and does not heighten economic growth. In the era 2000-2007, Carp (2012), using the causality tests of Granger asserted that stock value traded and market capitalization have no influence on economic evolution. By expending unbalanced weighting cross-correlation tactic and the generalized multivariate autoregressive conditional heteroscedasticity model, Guo (2014) inspects the causal relation concerning stock returns and real economic evolution in China. He established that there is no causal relationship concerning China's stock returns and the real economic evolution in the period before the subprime crisis. Yet, the presence of a one-way causal relation in variance from stock returns to real economic evolution is displayed for the period after the subprime crisis and likewise from real economic evolution to stock returns.

4. Methodology and Data Sources

4.1. Data Collection

This study adopts a quantitative approach that aims to examine the effect of stock market performance on economic growth in China using a secondary data set collected from World Bank data base for the period 1994-2015. The research findings of this study if used as a proxy by policy makers and implemented will improve income and better standard of living for human livelihood that ultimately leads to a sustainable economic growth and development for China.

4.2. Methodology

This study uses the Ordinary Least Square (OLS) econometric technique to analyze the quantitative effects of stock market development on economic growth. The model was chosen based on the fact that OLS is unique and suitable in testing the nature of economic connection and testing specific hypothesis (Guajarati 2004). We tested the time series properties of the variables in the process. To estimate the economic impact of stock market on economic growth, we use GDP as a measure for economic growth.In conforming to the aim of this paper; the empirical analysis will consist of the computation of a multiple regression model in order to decipher the influence. Therefore we use the following model:

$$GDP = F (MCR, NLS, TR, TVT) \quad (1)$$

Equation (1), can further be represented in an econometric form as;

$$GDP_t = \alpha_0 + \alpha_1 MCR_t + \alpha_2 NLS_t + \alpha_3 TR_t + \alpha_4 TVT_t + \mu_t \quad (2)$$

From equation (2):
GDP= Real Gross Domestic Product
MCR = Stock market capitalization
TR = Stock market turnover ratio
NLS = Number of listed companies
TVT = Total value traded

μ_t = Error term
t = Time
α_0 is a constant and α_1 to α_4 are the coefficient parameters to be estimated

Model Estimation Procedure

It is a normal practice for every real research that necessitates the use of econometric technique to underscore the sway of examining the data engendering process that are essential to the variables before reckoning the parameters and carrying out various hypothesis testing. This technique is meant to circumvent the problem of spurious regression results.Therefore, we test for unit root of the series using the Augmented Dickey-Fuller (ADF) unit root test.

Tests for Unit Root

The Augmented Dickey-Fuller test (1979) is applied to test for the presence of unit root. We test the null hypothesis that the series is non-stationary I (1), against the alternative hypothesis that the series is stationary I (0). If the absolute value of the ADF test statistic is greater than the critical values, we reject the null hypothesis of non-stationary in favour of the alternative hypothesis and conclude that the variable is stationery. On the other hand, if the absolute value of the ADF is less than the critical values (in absolute terms), we fail to reject the null hypothesis and conclude that the variable is non-stationary. The Augmented Dickey Fuller (ADF) test regression is given by:

$$\Delta X_t = \beta_0 + \beta_1 X_{t-1} + \sum_{t=1}^{n} \beta \, \Delta X_t + \varepsilon_t \quad (3)$$
$$\Delta X_t = \beta_0 + \beta_1 X_{t-1} + \sum_{t=1}^{n} \beta \, \Delta X_t + \vartheta_t + \varepsilon_t \quad (4)$$

Equation (3) contains an intercept and no trend, while equation (4) contains intercept and time trend, and the lag terms are introduced in the model as additional regressors to account for heteroskedasticity and auto-correlation. β_0 and β_1 are constant and coefficients of autoregressive process. Where t is time trend, X_t is the variable under investigation, n is the number of lags and εt are error terms. The inclusion of the time trend in unit root tests equations signifies that we can drop it if found to be insignificance, but dropping it requires caution.

Co-Integration Test Analysis

It is important to note that, if the variables are assumed to be stationary-integrated of the same order, the co-integration analysis will be appropriate to estimate the long-run Real Gross Domestic Product function since the theory assert that non-stationary time series are co-integrated if their linear combination is stationary. The co-integration test is applied to test whether the dependent variable exhibit long run equilibrium - relationship with the explanatory variables through the formulation of co-integration equation(s).This test uses the maximum likelihood test method recommended by Johansen and Juselius (1988, 1990). The co-integration entails the error term in the long-run relation to be stationary.The Co-integration Augmented Dickey Fuller (CIADF) test regression equation is given by

$$\Delta e_t = \beta_1 e_{t-1} + \omega_1 \Delta e_{t-2} + \ldots + \varphi_m \Delta e_{t-m} + \varepsilon_t$$

The inclusion of the Δe terms is to remove any autocorrelation so that $\mu_t \sim ND(0, \delta^2)$, notice that there is no constant in the regression.A constant can be included in either the co-integrating regression or the CIADF but not both. With a constant in the co-integrating regression equation, the residuals have zero mean, we do not expect the residuals to have a deterministic trend and so linear trend is not included. We carry the CIADF test thus:

H_0: $\alpha = 0$ and the e_t are I (1), the series are not cointegrated.

H_1: $\alpha < 0$ *and* e_t are I (0), the series are cointegrated.

The test statistics under the null has a non-standard t-distribution, if the calculated value of the test statistic is less than the critical value then the null hypothesis of no co-integration is rejected; the series are co-integrated. m, is the number of lagged terms is selected in the same way as for the unit root tests. We use Mackinnon (1991) critical values to make a decision on the test statistic and not the individual unit root values of the ADF test.

5. Analysis of Empirical Results and Discussion

The empirical enquiry commences with an assessment of the unit root test. This is so because the unit root test is steered to check data stationarity. This step is very critical since it will lead to a nonsense regression if non-stationary variables are not detected and used in the model. The results recommend that there is a statistically significant and meaningful relationship amongst the variables in the stated regression model where in actual fact all that exists is concurrent association rather than reflective pivotal relationships. Table 1 presents the test outcomes after conducting the ADF test.

Table 1: Unit Root Test

Variables	Level/ΔLevel	Calculated ADF	ADF critical value 5%	Included in test equation	Inference
GDP	Level	-7.157116	-3.644963	Intercept & trend	Stationary
MCR	Level	-2.333811	-3.644963	Intercept & trend	Non-stationary
	ΔLevel	-4.167324	-3.658446		Stationary
NLS	Level	0.135868	-3.012363	Intercept & trend	Non-stationary
	ΔLevel	-2.753650	-3.020686		Stationary
TR	Level	-2.020821	-3.644963	Intercept & trend	Non-stationary
	ΔLevel	-5.794628	-3.658446		Stationary
TVT	Level	-0.650529	-3.012363	Intercept & trend	Non-stationary
	ΔLevel	-3.506582	-3.065585		Stationary

***Source*:** E-views output

From Table 1, with the exception of GDP, all the variables in the model are non-stationary at their levels but stationary at first difference. This suggests the use of co-integration analysis after differencing at least once the variables become stationary.

5.1. Co-integration Test Analysis

The concept of co-integration, presented by Granger (see, for example, Granger, 1988) is pertinent to the challenge of the resolve of long-run correlation concerning variables. The rudimentary notion behind co-integration is straightforward. If the transformation flanked by two non-stationary series converts stationary, then the two series have long-run relationship. If two or more series have long-run relationship, it is probable to infer the variables as co-integrated. On the other hand, nonexistence of co-integration poses no long-run relationship; i.e., in notion they are distant apart. Therefore, Johansen and Juselius (1988, 1990) co-integration technique was employed in order to investigate the stable long-run relationships between GDP, MCR, TR, TVT and NLS in China by using both the Trace and Maximum-Eigen tests statistics. The results are presented in Tables 2 and 3 respectively.

Table 2: Unrestricted Co-integration Rank Test Result (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.978377	126.3532	69.81889	0.0000
At most 1 *	0.784780	49.67333	47.85613	0.0334
At most 2	0.416152	18.95143	29.79707	0.4964
At most 3	0.321822	8.189127	15.49471	0.4454
At most 4	0.020889	0.422213	3.841466	0.5158

Trace test indicates 2 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

Table 3: Unrestricted Co-integration Rank Test Result (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.978377	76.67983	33.87687	0.0000
At most 1 *	0.784780	30.72190	27.58434	0.0191
At most 2	0.416152	10.76231	21.13162	0.6710
At most 3	0.321822	7.766914	14.26460	0.4029
At most 4	0.020889	0.422213	3.841466	0.5158

Max-eigenvalue test indicates 2 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

Table 4: Result of the long run co-integrating relationship

Dependent variable: GDP				
Independent variables	**coefficient**	**Standard error**	**t-statistics**	**conclusion**
MCR	-477.5509	89.3301	-5.3459	Significant
NLS	10.33591	0.8029	12.8721	Significant
TR	-98.7434	16.1741	-6.1050	Significant
TVT	-58.3307	52.9542	-1.1015	insignificant
C	-559.9478	……	……	……

The result of the long-run co-integrating relationship in the model shows that total value traded is negative and insignificant, market capitalization ratio, and turnover ratio have significant negative effect on GDP in China whereas number of listed companies is positive and significant.

Table 5: Regression Output Dependent variable GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2398.016	4006.110	0.598590	0.5597
D(MCR)	-393.9248	140.6718	-2.800312	0.0150
D(NLS)	-10.20499	27.81627	-0.366871	0.7196
D(TR)	125.8470	33.16029	3.795112	0.0022
D(TVT)	200.4753	140.0429	1.431528	0.1759
ECM(-1)	-0.157000	0.047445	-3.309066	0.0031
R-squared	0.737049	Mean dependent var		383.3474
Adjusted R-squared	0.635914	S.D. dependent var		16524.44
S.E. of regression	9970.772	Akaike info criterion		21.50479
Sum squared resid	1.29E+09	Schwarz criterion		21.80304
Log likelihood	-198.2955	Hannan-Quinn criter.		21.55527
F-statistic	7.287772	Durbin-Watson stat		1.239987
Prob(F-statistic)	0.001865			

***Source*:** computed by author from e-views output

R-squared = 0.737049, Adjusted R-squared = 0.635914, F-statistic = 7.287772, DW stat=1.239987

Market capitalization ratio (MCR) coefficient, -393.9248 though significant will have adverse effect on GDP in the country. This finding is in contrary with theories and findings from previous studies that there exists a positive relationship between them. Similarly, the coefficient of stock market turnover ratio 125.847has a positive and significant impact on the GDP. There is a direct relationship between turnover ratio and GDP. This implies that a 1% increase in turnover ratio can lead to approximately 125.85 increase in GDP on average. However, Total value traded (TVT) has a positive coefficient but insignificant. Number of listed companies' coefficient is negative and insignificant for the study. The adjusted R- squared (R^2) value is 0.635914, implying that approximately 64% of the variation in the GDP is explained by the independent variables, which is an indication of a very good fit. Nevertheless, the low value of Durbin-Watson statistic connote auto-correlation of first order. From the probability value of the F-statistic (0.001865), we infer that the general equation is statistically significant.

5.2 Granger Causality Test

The result of the co-integration tests discussed above indicates that causality exists by definition in at least one direction, since the tests revealed the actuality of co-integration regarding economic evolution and the several measures of SMD. Of course, the confirmation of a relationship between SMD and economic growth is insufficient, on its own, to establish the direction of the causal relationship between SMD and economic growth. With this in mind, the Granger causality tests were designed to conduct further analysis. The Granger causality test simply can be used to show that, if the SMD variables can predict economic growth better than economic growth can predict itself, then SMD has a pivotal upshot on economic growth or vice- versa. The technique can further suggest that, if the coefficient of economic growth is significant, then economic growth causes SMD and vice versa. The technique also suggests that, if the coefficient of SMD is significant and the coefficient of economic growth is not, then there is a unidirectional causality between SMD and economic growth and vice versa. If both coefficients are insignificant, then no Granger causality is found between the variables. Bidirectional relationships exist where the coefficients for SMD and economic growth are both significant. Table 6 presents a summary of the results of the Granger causality tests.

Table 6: Granger Causality Tests

Variables (SMD)	SMD does not Granger Cause GDP F-statistics p-values		Obs	GDP does not Granger Cause SMD F-statistics p-values	
MCR	8.52123	0.0034	20	0.57198	0.5762
TR	0.76510	0.4826	20	0.06031	0.9417
TVT	5.52678	0.0159	20	1.71528	0.2134
NLS	0.58062	0.5716	20	8.05539	0.0042

The Granger Causality test show the presence of unidirectional causality from two indicators of SMD to GDP [MCR = > GDP, TVT = > GDP]. This substantiates the supply-leading view concerning SMD and economic growth and is in compatible with the outcomes in studies by Aye (2013), (Kaplan 2008), Yang and Yi (2008), Antonios (2010), Van Nieuwerburgh *et al* (2006) and Olweny and Kimani (2011). This result indicates that more improvement of stock market must to be a main concern for China. In order to expedite that, the laws and regulations relating to listing requirements need to be composed for both local and foreign investors. Additional players working in the stock market will likely heighten rivalry and the eminence of securities offered on the floor of these markets. Lastly, binding and judicious revelation of correct information will likely lead to augmented stock activity and stimulate positive derivatives for the economy and hence heighten investor assurance. Our findings also uncover existence of unidirectional existence from GDP to NLS [GDP = > NLS] which supports the demand-following hypotheses between GDP and SMD and is in matching with the discoveries of Vacu (2013) and Allen *et al*. (2006). On the basis of this finding, we can argue that GDP has a significant role in determining SMD in China.

Finally, causation links could not be detected for TR and GDP. This result supports the No-View hypothesis and is in congruent with the studies of Carp (2012) and Guo (2014). The outcomes of the study have some treasured policy implications. The policy makers need to formulate effective and prudent policy in order to expand stock market and encourage foreign investment. Given these sound policies, the outcome will further improve the macroeconomic performance of these economies.

6. Conclusion

This paper intended to find the link between stock market development and economic growth in China. The empirical and econometric analysis performed in this paper showed that there is existence of long run functional relationship between GDP as a dependent variable on one side, stock market capitalization, stock market turnover ratio, number of listed companies and total value traded as explanatory variables on the other side. Furthermore, results from regression output indicated an inverse relationship between GDP and market capitalization ratio.This implies that a 1% increase in the market capitalization ratio leads to approximately 13.9 percent decrease in GDP. This outcome is not in line with theories and previous studies that there exist a positive relationship between them. With regards to number of listed companies, the sign of its coefficient1.8339 has a positive and significant impact on the GDP. There is a direct relationship between number of listed companies and GDP. This implies that a 1% increase in NLS can lead to approximately 1.83 % increase in GDP in China. This finding is in conformity with theories and findings from previous studies that there exists a positive relationship between them. Similarly, the coefficient of stock market turnover ratio1.3732 has a positive and significant impact on the GDP. There is a direct relationship between turnover ratio and GDP. This implies that a 1% increase in turnover ratio can lead to approximately 1.37% increase in GDP in China. This finding is also in conformity with theories and findings from previous studies that there exist a positive relationship between turnover ratio and GDP. Additionally, the coefficient of total value traded 10.0562 has a positive impact on GDP. There is a direct relationship between number of turnover ratio and GDP. This implies that a 1% increase in total value traded can lead to 10.0562 % of GDP. In the end it can be concluded that an increase in market capitalization, turnover ratio, number of listed companies and the total value traded in SSE and SZSE Stock Exchanges can contribute to the development of the Chinese stock market, which, by the allocation, mobilization and other functions of the financial system, will have a positive impact on the economic growth of the Peoples' Republic of China.

Policy Recommendations

The study suggested that significant institutions and other policy makers should put effort towards tuning market capitalization values, trade ratios into significant positive in the near future, so as to encourage economic growth in line with stock market performance. Therefore, encouraging more informal sectors and private limited liability companiesto access market for fresh capital.

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