Research Title:

The Bidirectional Effects of Stock Market Liquidity and the Business Cycle
"An Empirical Study on the Egyptian Stock Exchange"

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The Bidirectional Effects of Stock Market Liquidity and the Business Cycle "An Empirical Study on the Egyptian Stock Exchange"

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Abstract: Following the recent financial crisis there has been a huge increase in research on liquidity related topics both with respect to macro liquidity, funding liquidity, the liquidity of different asset classes and markets as well as the flow of funds between different assets and markets. The main objective of this research is to examine the bidirectional effects of the Egyptian Stock Exchange liquidity, and the Egyptian business cycle. This research depends upon the deductive approach which starts with generalities, after admitting its soundness, and ends up with particulars using the logical analysis to predict some findings of the hypotheses under study. This approach attempts to use specific theories in the interpretation of phenomena discovered by the researcher, and that's by reviewing previous studies, formulating some testable hypotheses and then collecting data to test hypotheses using statistical methods. The results of multiple regression and event study analyses shows that trading volume growth has a significant positive effect on real GDP growth. Also, real GDP growth has a significant positive effect upon market capitalization growth and bid-ask spread growth. This ensures that there are bidirectional effects between the Egyptian stock market liquidity and the Egyptian business cycle. The main contributions of this study are twofold. Firstly, the bidirectional effects of stock market liquidity and the business cycle is still puzzling, and not conclusive around the whole world. Secondly, this is the first time, to the best of his knowledge, to conduct a research about these effects in Egypt; which has the biggest and oldest Stock Exchange in the Arabic area.

Keywords: *Liquidity Preference Theory, the Recent Financial Crisis, Macro liquidity, Funding liquidity, the Liquidity of Different Asset Classes, Stock Market Liquidity, Business Cycle, Stock Returns, Stock Price.*

1. Introduction

Liquidity is a concept that is related to "Liquidity preference Theory". The economist John Maynard Keynes (1930) told in the description of liquidity preference theory that people value money for both the transaction of current business, and its use as a store of wealth. Thus, they will sacrifice the ability to earn interest on money that they want to spend in the present, and that they want to have it on hand as a precaution. On the other hand, when interest rates increase, they become willing to hold less money for these purposes in order to secure a profit.

Following the recent financial crisis there has been a huge increase in research on liquidity related topics both with respect to macro liquidity, funding liquidity, the liquidity of different asset classes and markets as well as the flow of funds between different assets and markets (Skjeltorp & Ødegaard, 2009). In this research, the researcher looks at the link between equity market liquidity and the business cycle. In the discussion of the recent financial crisis, much attention has been on the explicit causal effect from a decrease in the liquidity of financial assets to the crisis of the economy. Liquidity of financial assets moves in the business cycle with other macro variables, such as output (Næs, Skjeltorp & Ødegaard, 2011).

There is a significant decline in liquidity prior to key macroeconomic announcements, suggesting that inventory control concerns rise around public information release (Chordia, Roll & Subrahmanyam, 2001). Monetary intervention can improve liquidity during financial crises and mutual fund flows play an important role in explaining the dynamics of liquidity, and provides evidence of the existence of common factors driving liquidity and volatility in the stock and bond

markets (Chordia, Sarkar & Subrahmanyam, 2003). While their results suggest the existence of economy-wide factors affecting liquidity, their studies are limited for a short time period and do not allow an examination of broader macroeconomic influences on liquidity. The importance of studying the longer-horizon liquidity dynamics is emphasized in the statement of Chordia et al. (2001, p. 527): "***If macro variables anticipate economic downturns, they might also anticipate lower liquidity and trading activity in equity markets. As a long history of data becomes available, future studies must shed more light on this interesting issue.***" The main objective of this research is to examine the bidirectional effects of the Egyptian Stock Exchange liquidity, and the Egyptian business cycle.

The main contributions of this study are twofold. Firstly, the bidirectional effects of stock market liquidity and the business cycle is still puzzling, and not conclusive around the whole world. Secondly, this is the first time, to the best of his knowledge, to conduct a research about these effects in Egypt; which has the biggest and oldest Stock Exchange in the Arabic area. The results of multiple regression and event study analyses shows that trading volume growth has a significant positive effect on real GDP growth. Also, real GDP growth has a significant positive effect upon market capitalization growth and bid-ask spread growth. This ensures that there are bidirectional effects between the Egyptian stock market liquidity and the Egyptian business cycle.

This paper consists of six major sections. section one literature review. Section two is about hypotheses development. Section three is research methodology. It starts with sample selection. Then, sources of data collection. Finally, the variables are demonstrated. Section four includes results and discussion.

Section five presents the implications of the study. Finally, section six provides a conclusion about this paper.

2. Literature review

It is a common observation that stock market liquidity tends to decrease during economic downturns (Næs et al., 2011). However, the researcher will try showing that the bidirectional effects of stock market liquidity and the business cycle are much more universal than previously thought. This topic consists of four main sections. Section 2.1 discusses some literature that is related to the effect of stock market liquidity on the business cycle. Section 2.2 presents some literature that is related to the effect of the business cycle on stock market liquidity. Section 2.3 shows literature that is related to the bidirectional effects of stock market liquidity and the business cycle. This topic ends with a conclusion in Section 2.4.

2.1 THE EFFECT OF STOCK MARKET LIQUIDITY ON THE BUSINESS CYCLE

Several studies report a significant effect of stock market liquidity on the business cycle. These studies may be divided into three groups. According to the first group, this effect is only attributed to stock market liquidity on a direct manner (e.g. Gyu & Cook, 2006; Kaul & Kayacetin, 2009). Gya & Cook (2006) examine the relationship between the liquidity of the Japanese stock market and the macro economy over the period 1990 till 2001. They use the Tokyo Stock Exchange Topix index data. They use Consumer Price Index (CPI), unemployment rate, Indices of Industrial Production (IIP), and changes of business investment as dependent variables. Also, they use the simple average of the response of returns to signed trading volume as independent variable. Based on multiple regression models, they find that stock market liquidity shocks seem to have a

continuous negative effect on CPI, positive impacts on unemployment rate, negative but insignificant impacts on IIP, and negative impacts on changes of business investment. Except for IIP, the impacts are large and persistent. But the impacts seem to be too big and too persistent. That is stock market liquidity has a positive significant effect on business cycle.

Kaul & kayacetin (2009) examine the information content of aggregate equity-market order flow for future macro-economic fundamentals. They use two firm size categories, namely small or big, based on the median NYSE size in US over the period 1988 till 2004, and three Book-to-Market (BM) categories, namely high, medium, or low, based on the 30th and 70th BM percentiles. They use industrial production, real GDP, and corporate earnings growth as dependent variables. Also, they use Market Order Flow (MOF) and the Order Flow Differential (OFD) as independent variables. Additionally, they use multiple regression models. They find that the first measure, the cross-sectional average of individual stock order flows, predicts future growth rates for industrial production and real GDP, but not for corporate earnings. The second measure, the difference between the average order flow for big stocks and the average order flow for small stocks, has strong forecast power for industrial production and real GDP, as well as corporate earnings, up to four quarters ahead. That is the trading process in stock markets contains leading information about the business cycle.

The second group argues that the effect of stock market liquidity on the business cycle is attributed directly to stock market liquidity, but with the support of other driving forces, such as banking development (e.g. Levine & Zervos, 1998), limitations of new real investments (e.g. Sidharta, 2009), other frictions affecting the labor market (e.g. Bigio, 2010), the mean

preserving spreads in the quality of capital (e.g. Bigio, 2011), cost overruns (e.g. Gibson, 2012), shocks that reduce the need for investment sufficiently (e.g. Shi, 2012), and the yield curve parameter (e.g. Erdogan et al, 2014). Levine & Zervos (1998) examine the relationship between stock markets, banks, and economic growth for the purpose of proving that stock market liquidity and banking development both positively predict growth, capital accumulation, and productivity improvement when entered together in regression model, even after controlling for economic and political factors. Their sample was 36 countries over the period 1976 till 1993. Their dependent variables are output growth, capital stock growth, productivity growth, and Savings. They use bank credit and turnover ratio as independent variables. They find that even after controlling for many factors associated with growth, stock market liquidity and banking development are both positively and robustly correlated with contemporaneous and future rates of economic growth, capital accumulation, and productivity growth.

Sidharta (2009) examines the utility and importance of liquidity as a driving force behind stock market growth and return to inquire whether market-wide illiquidity cause bubbles to brust in US over the period 2006 till 2009. His sample is index values of Dow Jones Industrial Average (DJIA). He uses regression model that is built upon consumption, savings and investment spending as dependent variable. His independent variables are the high price, the low price and the close price of DJIA. He finds that liquidity shocks due to limitations of new real investments leads to noticeable decline in general economic activities, or simply, depressions.

Bigio (2010) examines the relationship between liquidity shocks and the business cycle using an inductive study for the purpose of studying the properties of an economy subject to

random liquidity shocks. He obtains a liquidity frontier which separates the state-space into two regions, namely liquidity constrained and unconstrained regions. In the unconstrained region, the economy behaves according to the dynamics of the standard real business cycle model. Below the frontier, liquidity shocks have the effects of investment shocks. In this region, investment is under-efficient and there is a wedge between the price of equity and the real cost of capital. He depends upon Kiyotaki and Moore's model. The model is formulated in discrete time with an infinite horizon. The model period is a quarter. There are two populations with unit measure, entrepreneurs and workers. Workers provide labor elastically and don't save. Entrepreneurs don't work but invest in physical capital which they use in privately owned firms. Each period, entrepreneurs are randomly assigned one of either of two types, investors and savers. Liquidity is interpreted as a property of an asset (an asset is liquid if gains from trade are sufficient to guarantee trade). Liquidity shocks are shocks to the fractions of assets which are liquid. The amount of liquidity is the fraction of liquid assets. Business cycle shocks are productivity shocks. The main quantitative result in the paper is that liquidity shocks may not explain strong recessions. In particular, he argues that one needs to introduce additional frictions on the labor market that interact with liquidity shocks in order to explain sizeable recessions.

Bigio (2011) examines the relationship between endogenous liquidity and the business cycle using an inductive study for the purpose of presenting a model in which asymmetric information in the degree of liquidity in an economy. He uses a model that is formulated in discrete time with an infinite horizon. The model period is a quarter. There are two goods: a perishable consumption goods, and capital goods. There are

three classes of agents in economy: workers, entrepreneurs, and financial firms. In his model, asymmetric information in the quality of capital endogenously determines the degree of liquidity in an economy. Liquidity is used to relax financial constraints that affect investment and employment decisions. Unlike real business cycle theory, aggregate fluctuation can be attributed to both mean preserving spreads in the quality of capital and real liquidity shocks. Quantitatively, the model generates sizeable recessions similar in magnitude to the financial crisis of 2008-2009.

Gibson (2012) examines the business cycle consequences of moral hazard and liquidity shocks for the purpose of developing a model where financial frictions not only magnify business cycle fluctuations, but also the effect is a symmetric, with disproportionately more severe downturns. It is an inductive study that uses a model with two periods (t, and t+1). The economy is populated by a continuum of households of measure one. Within each household there exists an investor, a continuum of entrepreneurs and a continuum of workers, each of measure one. He finds that firm level moral hazard and idiosyncratic liquidity shocks arising from cost overruns, lead to a magnification of economic downturns.

Shi (2012) examines the relationship between liquidity, assets and business cycles using an inductive study for the purpose of constructing a tractable model to evaluate the liquidity shock hypothesis that exogenous shocks to equity market liquidity represent an important cause of the business cycle. He considers an infinite-horizon economy with discrete time. The economy is populated by a continuum of households, with measure one. Each household has a unit measure of members. At the beginning of each period, all members of a household are identical and share the household's assets. During

the period, the members are separated from each other, and each member receives a shock that determines the role of the member in the period. He finds that a negative liquidity shock in the equity market can generate large drops in investment and output. However, contrary to what one may estimate, the shock generates an equity price boom. This response of equity price occurs as long as a negative liquidity shock tightens firms' financing constraints on investment. For equity price to fall as it typically does in a recession, the negative liquidity shock must be accompanied or caused by other shocks that reduce the need for investment sufficiently and relax firms' financing constraints on investment. The main message that should be taken from his analysis is not that shocks to equity market liquidity are not important for the business cycle but, rather, that such shocks are not the primary driving force of the business cycle.

Erdogan et al (2014) perform recession prediction using yield curve and stock market liquidity deviation measures for the purpose of extending the benchmark Estrella and Hardouvelis (1991) term spread approach to recession forecasting by including the stock market macro liquidity deviation factor over the period 1959 till 2011. Their dependent variable is quarterly nominal GDP. Their independent variables are quarterly market capitalization and trading volume. They find that combining the yield curve parameter with the stock market liquidity deviation significantly improves their ability to predict the onset of a US recession based both on in and out-of-sample tests. In addition, changes in stock market depth further increase the accuracy of the model. Their findings suggest that economic forecasters would benefit from monitoring stock market depth and liquidity.

The third group assumes that the effect of stock market liquidity on the business cycle may be indirectly through investment channels (e.g. Bencivenga et al, 1995), and aggregate

portfolio shifts from individual investors (e.g. Longstaff, 2004). Bencivenga et al (1995) examine an illustration of equity markets, transaction costs, and capital accumulation using an inductive study for the purpose of knowing the way in which an economy's efficiency in physical production and the way in which the volume of financial transaction relate to the level of real activity. Their statistical technique is a two – period – lived, overlapping-generations model with production that is built upon linear regression. They find that stock market liquidity affects the business cycle, through investment channels. For example, a liquid secondary market may make it easier for investors to invest in productive, but highly illiquid, long-run projects.

Longstaff (2004) examines the flight-to-liquidity premium in US Treasury bond prices. The data consist of monthly (month-end) observations of yields for Treasury and Refcorp zero-coupon bonds for the 10-year period from April 1991 to March 2001. His model is regression. To measure the size of the flight-to-liquidity premium, He subtracts the yields on Treasury zero-coupon bonds from the yields for zero-coupon Refcorp bonds with corresponding maturities. His dependent variables are consumer confidence, and flows into equity and money market mutual funds. He find that the observed effect of stock market liquidity on the business cycle is a result of aggregate portfolio shifts from individual investors, where changes in desired portfolios are driven by changes in individuals' expectations of the business cycle.

Based on the previous discussions, the three groups don’t consider the possibility of causality going the other way.

2.2 THE EFFECT OF THE BUSINESS CYCLE ON STOCK MARKET LIQUIDITY

Other studies report a significant effect of the business cycle upon stock market liquidity. Some of them find that macro-economic variables affect stock market liquidity either directly (e.g. Chordia et al, 2001), or both directly and indirectly (e.g. Fujimoto, 2003; Kato, 2005). Chordia et al (2001) examine the common determinants of bond and stock market liquidity focusing on the impact of financial crises, monetary policy, and mutual fund flows in US over the 1991-98 period. They use quoted spreads, effective spreads, and trading volume as dependent variable. Also, their independent variables are money supply and mutual fund. They depended upon regression model. They find that the time-series properties of bond and stock liquidity are different during crises as compared to normal circumstances. Also, they note that levels of stock and bond volume, spread volatility, and the correlation between stock and bond liquidity are all significantly higher during crises with increased investor uncertainty leading to frequent and correlated portfolio reallocations during financial crises.

Fujimoto (2003) examines macroeconomic sources of systematic liquidity in US over the period 1962 till 2001. His dependent variables are market share turnover, term spread, and default spread. His independent variables are the monthly growth rate of the industrial production, the monthly inflation rate based on the consumer price index, the material price, the monthly federal funds rate, and the orthogonalized non-borrowed reserves. His model is regression. He finds that macro-economic factors not only influence liquidity directly, but also indirectly through their effects on the market variables. However, while he investigates whether time-varying stock

market liquidity has macroeconomic sources, he doesn't consider the possibility of causality going the other way.

Kato (2005) examines the relationship between liquidity, infinite horizons and macroeconomic fluctuations using an inductive study for the purpose of developing a computable dynamic general equilibrium model in which corporate demand for liquidity is endogenously determined. In the model, the corporate demand for liquidity from a financial intermediary (credit line, for instance) is pro-cyclical, while the degree of liquidity dependence (defined as liquidity demand divided by corporate investment) is counter-cyclical. These business cycle patterns are consistent with a stylized fact empirically verified in the lending view literature.

Others told that market conditions have a stronger impact on liquidity than macroeconomic conditions (e.g. S¨oderberg, 2008), and that stock liquidity is more sensitive to an increase in the rate of growth in industrial production in recessionary periods than in expansionary periods (e.g. Lu & Glascock, 2010). S¨oderberg (2008) evaluates fourteen macroeconomic variables' ability to forecast changes in monthly liquidity on the Scandinavian order-driven stock exchanges over the period 1993 till 2005. The sample for each of the Scandinavian Stock Exchanges consists of daily observations for all live and dead ordinary shares. The fourteen variables are divided into four groups of macroeconomic conditions, namely money and bond markets, monetary policy and funding liquidity, business cycle, and investor flows. He evaluates every macroeconomic variable both out and in-sample, and against three different benchmark models of market variables and asymmetries concerning up and down-markets. He found that market conditions have a strong impact on liquidity than macroeconomic conditions.

Lu & Glascock (2010) examine macroeconomic effects on stock liquidity in US over the period 1953 till 2009 for the purpose of studying the effects of macroeconomic factors on liquidity, focusing on the pricing of liquidity. Their independent variables are the rate of growth in industrial production, the change in realized inflation rate in percentage, the change in crude oil price, the change in M1 supply, and the change in M2 supply. They use the average monthly excess return and the value-weighted average portfolio return as dependent variables. Their models are Capital Asset Pricing Model (CAPM) and regression. They find that there exists indirect channel through which macroeconomic factors affect stock returns by affecting the stock liquidity. Additionally, the rate of growth in Industrial Production (IP) presents significant predictive power state. In recessionary periods stock liquidity is more sensitive to an increase in the rate of growth in industrial production than in expansionary periods.

2.3 THE BIDIRECTIONAL EFFECTS OF STOCK MARKET LIQUIDITY AND THE BUSINESS CYCLE

To the best of the researcher's knowledge, only four studies consider the possibility of the bidirectional causality between stock market liquidity and the business cycle (e.g. Skjeltorp & Ødegaard, 2009; Næs et al, 2011; Parkash & Sundararajan, 2012; Kim, 2013), but only Skjeltorp & Ødegaard (2009) find an evidence of the causality from market liquidity to real economic variables. Skjeltorp & Ødegaard (2009) examine the information content of aggregate stock market liquidity in Norway over the period 1980 till 2008 using an empirical analysis of liquidity at the Oslo Stock Exchange (OSE). They ask whether it may be a useful real time indicator for both financial stress and real economic activity. Their sample was all equities at the OSE with the exception of very illiquid stocks.

They use real GDP, unemployment-rate, real consumption, and real investment as dependent variables, and relative spread and illiquidity ratio as independent variables. The results of regression model indicate that market illiquidity is informative about the current and the future economic growth. For the purpose of financial stability monitoring, it may prove as a useful additional leading indicator to capture financial stress or changing views on the economy in real time. They look at the issue of the causality from real economic variables to market liquidity directly by performing Ganger causality tests. They find an evidence of the causality from real economic variables to market liquidity.

Næs et al (2011) examine the bidirectional relationship between stock market liquidity and the business cycle in US over the period 1947 till 2008, and in Norway over the period 1980 till 2008. Their dependent variables are real GDP, growth in unemployment rate, real consumption growth, and real growth in unemployment rate, real consumption growth, and real growth in private investment. Their independent variables are relative spread, the lesmond, ogden, and Trczika (1999) measure, the Amihud (2002) illiquidity ratio, and the Roll (1984) implicit spread estimator. They show that stock market liquidity contains useful information for estimating the current and future state of the economy. They look at the issue of the causality from real economic variables to market liquidity directly by performing Ganger causality tests. They find no evidence of the causality from real economic variables to market liquidity.

Parkash & Sundararajan (2012) investigate the bidirectional effects between stock market liquidity & business life cycle in the Indian Capital Markets over the period 2009 till 2011. They employ the same variables used in the study of Næs et al (2011). They show that stock market liquidity has useful

information for estimating the current end future state of the economy. They find evidence that time variation in equity market liquidity is related to changes in participation in the stock market, especially for the smallest firms. They find no evidence of the causality from real economic variables to market liquidity.

Kim (2013) examines the bidirectional effects between stock market liquidity and the real economy in Korea during the period 1995 till 2011. He constructs a dataset consisting of 437 manufacturing companies listed on the Korea Exchange (KRX). He finds that stock market liquidity, proxied by the Amihud (2002) illiquidity measure as independent variable, predicts next quarter real GDP growth as dependent variable. With respect to Granger causality tests, he finds one-way Granger causality from market liquidity to real GDP growth. Finally, information contents in liquidity differ depending on firm characteristics. That is, the illiquidity of small, young, non-dividend-paying, and high book-to-market stocks contributes to predicting future economic development whereas that of large, old, dividend-paying, and low book-to-market stocks does not provide significant predictive power.

2.4 CONCLUSION

First of all, several studies report a significant effect of stock market liquidity on the business cycle. These studies may be divided into three groups. According to the first group, this effect is only attributed to stock market liquidity on a direct manner (e.g. Gyu & Cook, 2006; Kaul & Kayacetin, 2009; Skjeltorp & Ødegaard, 2009). The second group argues that the effect of stock market liquidity on the business cycle may be attributed directly to stock market liquidity, but with the support of other driving forces, such as banking development (e.g. Levine & Zervos, 1998), limitations of new real investments (e.g. Sidharta, 2009), other frictions affecting the labor market (e.g. Bigio, 2010), the mean preserving spreads in the quality of capital (e.g. Bigio, 2011), cost overruns (e.g. Gibson, 2012),

shocks that reduce the need for investment sufficiently (e.g. Shi, 2012) , and the yield curve parameter (e.g. Erdogan et al, 2014). The third group assumes that the effect of stock market liquidity on the business cycle may be indirectly through investment channels (e.g. Bencivenga et al, 1995), and aggregate portfolio shifts from individual investors (e.g. Longstaff, 2004).

Secondly, other studies report a significant effect of the business cycle upon stock market liquidity. Some of them claim that macro-economic variables affects stock market liquidity directly (e.g. Chordia et al., 2001), or both directly and indirectly (e.g. Fujimoto, 2003; Kato, 2005). Others find that market conditions have a stronger impact on liquidity than macroeconomic conditions (e.g. S̈oderberg, 2008), and that stock liquidity is more sensitive to an increase in the rate of growth in industrial production in recessionary periods than in expansionary periods (e.g. Lu & Glascock, 2010). All of them didn't consider the possibility of causality going the other way. To the best of the researcher's knowledge, only four studies consider the possibility of the bidirectional causality between stock market liquidity and the business cycle (e.g. Skjeltorp & Ødegaard, 2009; Næs et al, 2011; Parkash & Sundararajan, 2012; Kim, 2013), but only Skjeltorp & Ødegaard (2009) find an evidence of the causality from market liquidity to real economic variables. The reverse causality conflict related to the impact of real economic variables on market liquidity in literature is one of the main motivations to conduct this research in a bidirectional manner.

Additionally, most of these studies are conducted in developed markets, particularly in the US market. This research will be conducted in the Egyptian Stock Exchange which is considered as an emerging market. The Egyptian Stock Exchange is considered as the largest and oldest stock market in the Arabic area (forexpeoples.com). Finally, among differences between this study, and other prior studies is the period of the

study which covers the recent financial crisis with consideration of tracing changes before, during, and after it.

3. Hypotheses Development

In light of the literature review, and in an attempt to reach the research objectives, hypotheses can be formulated as follows:

H1: There is a significant effect of the Egyptian Stock Exchange liquidity on the Egyptian business cycle.

H2: There is a significant effect of the Egyptian business cycle on the Egyptian Stock Exchange liquidity.

4. Methodology

This study uses the data of the EGX30 index from January 2004 to December 2010. The year 2004 is chosen as a starting year because EGX index committee was established on 7 April 2004 by the chairman of EGX. Meanwhile, December 2010 is chosen as an ending point because the year 2011 is considered a formidable year in the history of the Egyptian capital market. This year seems different where the Egyptian Exchange faces internal tensions. The year started with the 25th of January Revolution, according to the annual report of the Egyptian Exchange in 2011, the market capitalization lost about 194 billion pounds. A transitional phase started in order to rebuild the state institutions, a phase of unrest with political tensions and categorical demands, which lead the economy to draw back to one of its worst levels ever (www.sis.gov.eg). Thus, the research will depend upon data that covers seven years (2004: 2010) that are divided on monthly basis in order to create a long time series as much as possible with considering the collection of available data. Also, the period covers the recent financial crisis with consideration of tracing changes before, during and after it.

EGX 30 index value is calculated in local currency terms and denominated in US dollars since 1998. EGX 30 index includes the top 30 companies in terms of liquidity and activity. EGX 30 index is measured by market capitalization and adjusted by the free float. Adjusted Market capitalization of a listed company is the number of its listed shares multiplied by the closing price of that company multiplied by the percent of freely floated shares. EGX 70 index value tracks the performance of the 70 active companies, after excluding the 30 most active constituent-companies of EGX 30 index. EGX 70 index measures the change in the companies' closing prices, without being measured by the market capitalization. EGX 100 index value tracks the performance of the 100 active companies, including both the 30 constituent-companies of EGX 30 index and the 70 constituent-companies of EGX 70 index. EGX 100 index measures the change in the companies' closing prices, without being measured by the market capitalization. The three indexes are always updated in terms of their listed companies twice per year in June and December (www.egx.com.eg).

Table 1 shows the sources of required data to achieve the objectives of this study.

Table 1: Sources of Data

No.	Variable Name	Required Data	Sources of Data
1	**Macro (Target) Variable**	-Nominal GDP -Consumer Price Index (CPI)	-Central Agency for Public Mobilization and Statistics in Cairo -www.data.worldbank.org -www.eip.gov.eg -www.en.wikipedia.org
2	**Liquidity Variable**	-Trading Volume -Trading Value -Market Capitalization -The Bid-Ask Spread -Market Return (EGX30 Return) -Number of Valid Observation Days	EGX30 Monthly Bulletin
3	**Control Variables**	-Market Volatility -The Excess Market Return -Term Spread	The Central Bank of Egypt Monthly Statistical Bulletin

Variables and their measurement are discussed in three subsections; namely Section 4.4.1 which indicates the measurement of the macro (target) variable (Real GDP), Section 4.4.2 which discusses the measurement of liquidity variable, and Section 4.4.3 which shows the measurement of control variables.

4.4.1 Macro (Target) Variable Measurement:

To proxy for the state of the Egyptian business cycle, the researcher uses *Real Gross Domestic Product (Real GDP)*. Gross Domestic Product (GDP) is the value of all goods and services produced in a country. The Nominal Gross Domestic Product (Nominal GDP) measures the value of all goods and services produced expressed in current prices. However, Real Gross Domestic Product (Real GDP) measures the value of all goods and services produced expressed in the prices of some base year. Real GDP is used as a proxy for business cycle in

several prior studies (e.g., Kohli, 2004; Charles et al., 2009; Feenstra et al., 2012; Kilian & Vigfusson, 2012; Levine, 2013). The researcher uses Real GDP to avoid inflation effect. Real GDP is calculated by dividing Nominal GDP by the Consumer Price Index (CPI) (Romer & Romer, 2007). Consumer Price Index is defined as a measure of the weighted aggregate change in retail prices paid by consumers for a given basket of goods and services, including housing, electricity, food, and transportation. Price changes are measured by re-pricing the same basket of goods and services at regular intervals, and comparing aggregate costs with the costs of the same basket in a selected base period. The percentage change of the CPI over a one-year period is what is usually referred to as inflation (Central Bureau of Statistics [Ministry of Finance and Planning], 2002).

4.4.2 Liquidity Variables Measurement:

While easy to define, liquidity has proved far more difficult measure (Heshmat, 2009). Aitken et al., (1997) report that there are some 68 extant measures used in the literature suggesting that there is little agreement on the best measure to use. Aitken et al., (1997) also report that there is little or no correlation between many of these metrics suggesting that inappropriate measures may result in wrong conclusions about changes in market structure.

Liquidity measures commonly used in previous literature include trading volume, trading value, market capitalization, turnover ratio of market capitalization, and the illiquidity ratio (e.g., Campbell et al., 1993; Chordia & Swaminathan, 2000; Datar, 2000; Domowitz et al., 2000; Lee & Swaminathan, 2000; Hobijn & Jovanovic, 2001; Lo & Wang, 2001; Amihud, 2002; Hong & Rady, 2002; Lukács, 2002; Sarr & Lybek, 2002; Wang, 2002 ; Sun, 2003; Anderson & Lavoie, 2004; Çetin et al., 2004; Nagel, 2005; Fang et al., 2006; Beaupain et al., 2007; Goyenko et al., 2009; Hearn et al., 2009; Matthew & Odularu, 2009;

Hearn, 2010; Khrawish et al., 2010; Ogunmuyiwa, 2010; Zhang, 2010; Bloomfield et al., 2011; Pathirawasam, 2011; Bogdan et al., 2012; Brennan et al., 2012; Edström, 2012; Vickery & Joshua, 2013).

1.Trading Volume

Trading volume per time interval (Q_t) is integrated in a lot of liquidity studies (e.g., Campbell et al., 1993; Lee & Swaminathan, 2000; Lo & Wang, 2001; Chordia & Swaminathan, 2000; Wang, 2002; Sun, 2003; Nagel, 2005; Hearn et al., 2009; Hearn, 2010; Pathirawasam, 2011). Trading volume can be defined as the average number of shares traded per day during year t-1 (Chordia and Swaminathan, 2000). Trading volume is an important aspect of the economic interactions in financial markets among different investors. Trading volume is driven by underlying economic forces, and thus notify important information about the workings of the market liquidity (Lo and Wang, 2001). It can be calculated on a daily, weekly, yearly or any other time interval which is thought to be appropriate for analysis (Wyss, 2004).

2.Trading Value

Trading Value represents the value of the firm with respect to current market price:

$$\text{Trading Value}_t = \sum_{i=1}^{N_t} p_i * q_i^* \quad (1)$$

Where, q_i^* is the number of outstanding shares minus treasury shares and P_i is the price of the stock i. Furthermore, the total number of outstanding shares used to calculate Trading Value is not equal to the number of shares that are in fact available to trade. Therefore, to measure the liquidity more precisely, the number of outstanding shares should be corrected for free float rate to get the number of shares actually available for trade. Free float represents the number of shares that are available for

trade. A certain amount of shares, owned by the strategic investor in the company or the State, is not available for trade on the market. Several prior studies (e.g., Domowitz et al., 2000; Hong & Rady, 2002; Çetin et al., 2004; Hearn et al., 2009; Hearn, 2010; Bloomfield et al., 2011; Edström, 2012; Vickery & Joshua, 2013) use trading value as a proxy for liquidity.

Both volume and prices are driven by underlying economic forces, and thus report important information about the workings of the market liquidity (Lo and Wang, 2001). Trading Value is calculated for a specific time interval and represents the product of the volume and the price in the same transaction (Wyss, 2004). It measures the value of equity transactions relative to the size of the equity market. This liquidity indicator does not directly measure how easily investors can buy and sell securities at posted prices. However, it measures the degree of trading in comparison to the size of both the economy and the market. Therefore, it positively reflects stock market liquidity on an economy wide and market wide basis (Garcia and Liu, 1999).

3.Market Capitalization

Market capitalization represents the value of the firm with respect to current market price:

$$\text{Market Capitalization}_t = \sum_{i=1}^{N_t} p_i * q_i \quad (2)$$

Where, q_i is the number of outstanding shares and P_i is the price of the stock i. Furthermore, the total number of outstanding shares used to calculate Market Capitalization is equal to the number of shares that are in fact available to trade and is used in several prior studies (e.g., Hobijn & Jovanovic, 2001; Lukács, 2002; Beaupain et al., 2007; Matthew & Odularu, 2009; Hearn et al., 2009; Hearn, 2010; Khrawish et al., 2010) as a proxy for liquidity. Both volume and prices are driven by underlying economic forces, and thus convey

important information about the workings of the market liquidity (Lo and Wang, 2001).

4. The Bid-Ask Spread

The bid-ask spread is the difference between buying and selling price of a particular security. It is often used as an indicator of liquidity. The narrower the spread, the greater the liquidity of a stock. Different securities have different spreads based on number of willing buyers or sellers for this particular security. There are several other factors that determine the difference between the bid and ask prices. The volume of a security traded on a daily basis is the first factor. The securities that have larger trading volume have a narrower spread than the securities that are traded infrequently. Another important factor is volatility. In volatile period the spread is much larger because market participants require a higher return for an extra amount of risk that they are willing to take. Another factor that affects bid-ask spread is a stock's price. Most of low-price securities have a wider spread as they have limited trades because most of them are new or small in size. Finally, the risk facing investors, such as inventory risk and asymmetric information risk arising from informed traders, is another determiner of bid-ask spread (Sargeant, N., n.d.). Using the methodology of this research, the researcher calculates the bid-ask spread for the Egx30 index as the difference between the monthly close and open prices of the index.

5.The Illiquidity Ratio

Amihud (2002) proposed a simple and intuitive liquidity measure, which is defined as the absolute daily return divided by daily trading volume. The illiquidity ratio ($ILLIQ_{it}$) is calculated as the daily stock price response to one unit of currency of trading volume. In other words the illiquidity ratio of stock (*i*) in month (*t*) is calculated in several prior studies as (e.g., Amihud, 2002; Fang et al., 2006; Goyenko et al., 2009;

Hearn et al., 2009; Hearn, 2010; Zhang, 2010; Bogdan et al., 2012; Brennan et al., 2012):

$$\text{ILLIQ}_{\text{it}} = \frac{1}{D_{it}} \sum_{d=1}^{D_{it}} \frac{|R_{itd}|}{V_{itd}} \quad (3)$$

Where, (R_{itd}) and (V_{itd}) are, respectively, the return and trading volume on day (d) in month (t), and (D_{it}) is the number of valid observation days in month (*t*) for stock (*i*). The intuition behind this illiquidity measure is that the stock has a high value of illiquidity ratio if the stock's price moves a lot in response to little volume (Heshmat, 2009).

4.4.3 Control Variables Affecting Business Cycle and Liquidity, and their Measurement:

Control variables commonly used in previous literature include excess market return, market volatility, term spread, and lag of the dependent variable. (e.g. Næs et al, 2011; Parkash & Sundararajan, 2012; Kim, 2013).

1.Excess Market Return

The *Excess market return* is calculated as the value weighted return in excess of the 3-month T-bill rate (Næs et al., 2011). The correlation between current period GDP growth and equity market returns does appear to be unstable over long time horizons. However, this does not mean that there is no relationship between the two variables over shorter time frames within the economic cycle. Since the global financial crisis of 2007-2008 there has been a positive correlation between equity performance and current period economic growth, and this seems likely to persist while remaining in the existing low interest rate environment.

Additionally, while there may be no significant long term relationship between equity returns and current period economic growth, a stable relationship does appear to exist between equity returns and expectations of future GDP growth. While

this relationship appears to be partly linked to wealth effects (with strong equity returns driving consumption, and thus GDP growth, in future periods), equity markets also appear to be significantly impacted by changes to assent expectations for future GDP growth. Given that consensus, GDP growth expectations are already priced in to the equity markets, a sustained period of weak economic growth will not necessarily lead to poor performance in the equity markets (as long as this weak growth is not unexpected). Because changes to growth expectations do seem to have a significant impact on equity returns, investors should pay close attention to surprises (on the upside or downside) which are likely to drive market returns (Wade & May, 2013).

There is a negative correlation between liquidity and the excess return on the market. The stock excess return, usually referred to as ‘‘risk premium’’, is in part a premium for stock illiquidity. The stock excess returns reflect not only the higher risk but also the lower liquidity of stock compared to Treasury securities (Amihud, 2002).

2.Market Volatility

The *Market volatility* is measured as the cross-sectional average volatility of the sample stocks, where volatility is calculated as the standard deviation of daily returns over the month (Næs et al., 2011). Schwert (1989a and 1989b) demonstrated how difficult it is to explain low frequency fluctuations in stock market volatility through low frequency variations in the volatility of other macroeconomic variables. Schwert showed that stock market volatility is countercyclical (Mele, 2008). A seemingly separate, yet very well-known, stylized fact is that risk-premia (i.e. the investors' expected return to invest in the stock market) is countercyclical (e.g., Fama & French, 1989; Ferson & Harvey, 1991). A simple possibility is that the economy is frequently hit by shocks that display the same qualitative behavior of return volatility,

expected returns and price dividend ratios. Another possibility is that the economy reacts to shocks thanks to some mechanism endogenously related to the investors' maximizing behavior, which then activates the previous phenomena. High growth is followed by high stock market volatility and high stock market volatility is followed by high growth (i.e. positive relationship). Stock market volatility does help in predicting the business cycle. The predictive power of traditional macroeconomic variables is considerably enhanced (almost doubled) with the inclusion of the volatility concept (Mele, 2008).

Liquidity responds asymmetrically to changes in asset market values (Vayanos, 2004). Brunnermeier and Pedersen (2009) suggest that a drop of dealer capital leads to greater cross-sectional differences in liquidity of high and low volatility stocks. Consistent with theoretical models emphasizing changes in the supply of liquidity, negative market returns decrease liquidity much more than positive returns increase liquidity, with the effect being strongest for high volatility firms and during times when the market making sector is likely to face capital tightness (Hameed et al., 2010). There is a positive relationship between all liquidity measures and market volatility. Thus, when market volatility is high, market liquidity is high. (Næs et al., 2011).

3.Term Spread

The *term spread* is calculated as the difference between the yield on a 10-year Treasury bond benchmark and the yield on the 3-month T-bill (Næs et al., 2011). The term spread is useful for forecasting output growth, especially at horizons of 6 to 12 months. However, there is a considerable variation in the ability of the spread to forecast output growth across countries and time periods. The term spread is a more reliable predictor of recessions than of output growth and the spread provides good recession forecasts, especially up to one year ahead. The term

spread has a significantly positive relationship with GDP growth (Wheelock & Wohar, 2009).

Many studies attribute the apparent ability of the term spread to forecast economic activity to actions by monetary authorities to stabilize output growth. For example, monetary policy tightening causes both short- and long-term interest rates to rise. Short-term rates are likely to rise more than long-term rates, however, if policy is expected to ease once economic activity slows or inflation declines (Wheelock & Wohar, 2009).

Feroli (2004), Estrella (2005), and Estrella and Trubin (2006) argue that the extent to which the term spread is a good predictor of output growth depends on the monetary authority's policy objectives and reaction function. For example, the term spread forecasts output growth better the more responsive the monetary authority is to deviations of output growth from potential. The spread forecasts less accurately if monetary authorities concentrate exclusively on controlling inflation. Further, changes in the relative responsiveness of the monetary authority to either output growth or inflation could cause changes in the ability of the term spread to forecast output growth. In contrast to the explanations that focus on monetary policy, theories of inter-temporal consumption derive a relationship between the slope of the yield curve and future economic activity explicitly from the structure of the economy (e.g., Harvey, 1988; Hu, 1993). The central assumption of Harvey (1988), for example, is that individuals prefer stable consumption rather than high consumption during periods of rising income and low consumption when income is falling. Thus, when consumers expect a recession one year in the future, they will sell short-term financial instruments and purchase one-year discount bonds to obtain income during the recession year. As a result the term structure flattens or inverts (Wheelock & Wohar, 2009).

Much of the empirical literature has focused on estimating the accuracy with which the term spread forecasts economic activity, rather than on attempting to distinguish between the monetary policy and consumption-smoothing explanations. Laurent (1988, 1989) argues that the yield curve reflects the stance of monetary policy and finds that the term spread predicts changes in the growth rate of real GDP. On the other hand, several studies find that the term spread has significant predictive power for economic growth independent of the information contained in measures of current and future monetary policy, suggesting that monetary policy alone cannot explain all of the observed relationship (e.g., Estrella & Hardouvelis, 1991; Plosser & Rouwenhorst, 1994; Estrella & Mishkin, 1997; Benati & Goodhart, 2008).

The term spread is an important predictor variable and a model that contains this control variable in addition to liquidity has a higher prediction compared to the model just containing liquidity and the lag of the dependent variables. (Næs et al., 2011). Fluctuations of portfolio future profitability affect the ability to cover for any liquidity shortage and hence influence the premium that is required to carry maturity risk. In other words, there is negative relationship between term spread and liquidity (Aksoy & Basso, 2012).

4.Lag of the Dependent Variable

In time series applications, reasonable functional forms with no autoregressive terms often produce theoretically meaningful coefficients in a modestly successful fit. However, when one or more lagged dependent variables are added as explanatory factors, the autoregressive terms take on strongly significant coefficients which improve the fit but squash the effects of the other variables. The traditional conclusion is that the original variables make no real difference. In practice, the anomaly is often due to the combination of high serial correlation and heavy trending in the exogenous variables,

which can jointly produce dominating autoregressive terms even when they have little or no real explanatory power. The use of lag of the dependent variable is to minimize the autocorrelation problem between the error terms of the original dependent variable and its future lag. That is means that the original dependent variable and its future lag are treated as separate dependent variables to isolate the autocorrelation effects. This phenomenon is well-known in the case of variables that are affected by political conditions as the variables of this research (Achen, 2000).

The predictability of liquidity remains significant even after controlling for the lagged GDP growth rates (Lee, 2013). Estimating the models with different lag specifications with up to four lags of the dependent variable and the liquidity variables does not materially affect the results according to several studies such as the study of Næs et al. (2011).

The following are the used statistical techniques for analyzing the research data:

1. Time -Series Adjustment of Series:-

The sample period that the researcher uses covers 7 years. Over this long period changes in market structure, competition, technology, and activity in financial markets potentially generate non-stationarities in the liquidity series. Accordingly, the researcher performs KPSS unit root test for each series to determine whether the series needs to be transformed to stationary series. KPSS test is a test proposed by Kwiatkowski, Phillips, Schmidt, and Shin (1992), where the null hypothesis is that the series is stationary.

2. The Bidirectional Effects of Stock Market Liquidity and the Business Cycle:-

The models that the researcher examines are predictive regressions of the form:

$$y_{t+1} = \alpha + \beta LIQ_t + \gamma` X_t + u_{t+1}, \qquad (4)$$

where yt+1 is the realized growth in the macro variable of interest over month t + 1, LIQt is market liquidity measured for month t, Xt is a vector of control variables (Excess market return (erm), Market volatility (Vola), the term spread (Term), and the lag of the dependent variable observed at t, and γ' is the vector of coefficient estimates on the control variables. His main dependent variable (yt+1) is real GDP growth in the effect of stock market liquidity on business cycle model and he reverses both the dependent and independent variables in the previously mentioned model to build the second model of the effect of business cycle upon stock market liquidity.

The results on the predictive content of liquidity for macro variables can be visualized using an "event study." The researcher will take the onset of an expansion and a recession to be the "event dates," and plot the evolution of the various series of interest around this date.

5. Results & Discussion

This topic discusses the data analyses and research findings of this study. It is divided into four main sections. Section 5.1 shows time-series adjustments. Section 5.2 presents results on describing research variables statistically and the correlation matrix. Section 5.3 presents the multiple-regression models for predicting the macro-economic variable, namely growth in real GDP. Section 5.4 illustrates the event study.

5.1 TIME-SERIES ADJUSTMENT

Many time-series exhibit trend or non-stationary behavior. These characteristics are especially evident in the financial series such as indices of stock price. If a series is non-stationary, and unless it combined with other non-stationary series to form a stationary co-integration relationship, then the regressions involving the series can cause the spurious regression (Xu and

Sun, 2010). The sample period that the researcher uses covers seven years. Over this period changes in market structure, competition, technology, and activity in financial markets potentially generate non-stationarities in the data series. Accordingly, the researcher can perform several unit root tests for each series to determine whether the series needs to be transformed to stationary series. Many approaches can be performed to examine the stationarity of time series data. But the most popular approaches are Augmented Dickey-Fuller (ADF) test, Phillips-Perron test (PP), and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992) test.

Because of the fact that the ADF and PP tests usually give the same conclusion, the researcher can only perform the ADF and KPSS tests in his research. The main criticism of the Augmented Dickey-Fuller (ADF) test is that the power of the test is very low if the process is nearly non-stationary which means the process is stationary but with a root close to the non-stationary boundary (Brooks, 2002). The researchers therefore employ only KPSS test. KPSS test is a test proposed by Kwiatkowski, Phillips, Schmidt, and Shin (1992), where the null hypothesis is that the series is stationary.

(KPSS)

H_0: The series is stationary (The variable has no unit root).

In order to test for the presence of a unit root, the researcher needs to calculate the T-statistic and then compare it to the corresponding critical value at different significant level. The null hypothesis of stationary for the series is not rejected when the test statistic is less than the critical values at the chosen significance level. If the null hypothesis is rejected, it is concluded that a series contains unit root. However, in order to perform KPSS test, firstly the researcher needs to specify whether to include a constant, a constant and a linear trend, or neither in the test regression. One approach would be to run the

test with both a constant and a linear trend since the other two cases are just special cases of this more general specification (Verbeek 2004). This specification because it will be used in the present study represents most macro-economic time series that are growing over time (Xu and Sun, 2010).

The standard KPSS test is oversized for highly autoregressive processes because it employs a semiparametric heteroskedasticity and autocorrelation consistent covariance estimator (HAC) of the long run variance of the process with an important positive finite sample bias. However, for the HAC estimator one can choose other bandwidths than the ones suggested by KPSS. In finite samples, the choice of bandwidth implies the following trade-off. Choosing too large a bandwidth implies that the long run variance is overestimated: the test statistic becomes too small and the test will have little or no power in finite samples if one employs common nominal significance levels. On the other hand, if one chooses the bandwidth too small and the process is highly autoregressive, then the long run variance is underestimated, the test statistic becomes too large and the test is oversized.

The introduction of a more convenient estimator of the long run variance under the null hypothesis does not automatically repair the KPSS-type test.

Some long run variance estimators which work well under the null, lead to inconsistency of the KPSS-type test under random walk alternatives, i.e., the power of the test for some relevant alternatives does not approach 1 as the sample size increases. In this research, the researcher suggests an automatic form of the KPSS-test that reduces this size distortion without suffering from inconsistency (Hobijn, Franses, & Ooms, 2004).

Based on the results illustrated in Table 4.1, the null hypothesis of stationarity is not rejected for series. It is, however, rejected for the series of trading value, market capitalization, and the illiquidity ratio, with considering that the researcher obtains the naturel log for trading value and market

capitalization. In Table 4.1, the test statistic for real GDP growth, for example, is 0.096103 which is less than the critical value at the 1% significance level which is 0.216000. Similarly, this rule is applicable to the remaining stationary variables.

Also, in Table 4.1, the test statistics for non-stationary variables which are trading value, market capitalization, and the illiquidity ratio are 0.238431, 0.287374, and 0.304792 which are greater than the critical value at the 1% significance level which is 0.216000. The three non-stationary variables are treated using the first difference. Based on the results illustrated in Table 4.1, the null of stationarity is not rejected for these three series after taking the first difference (Batchelor, 2000).

Finally, in Table 2, the test statistics for the first differences for trading value, market capitalization, and the illiquidity ratio are 0.053594, 0.063110, and 0.097781 which are less than the critical value at the 1% significance level which is 0.216000. This means that the three variables are transformed to be stationary variables.

Table 2: Unit Root (KPSS) Test

Series to be Tested	1% Critical Value	Exogenous Regressors Assumptions	
		Constant, Linear Trend	
		KPSS Statistic	Band Width (Newey-West automatic) using Bartlett kernel
Before Differencing			
Real GDP Growth	0.216000	0.096103	6
Stock Market Liquidity Measures:	0.216000	0.209240	5
1. Log Trading Volume	0.216000	0.238431	6
2. Log Trading Value	0.216000	0.287374	6
3. Log Market Capitalization	0.216000	0.052142	5
4. The Bid-Ask Spread	0.216000	0.304792	5
5. The Illiquidity Ratio			
Stock Market Liquidity Control Variables Measures:			
1. Market Volatility	0.216000	0.031846	7
2. The Excess Market Return	0.216000	0.074018	6
6. Term Spread	0.216000	0.095998	10
After Differencing (First Difference)			
Stock Market Liquidity Measures			
1. Log Trading Value	0.216000	0.053594	10
2. Log Market Capitalization	0.216000	0.063110	3
3. The Illiquidity Ratio	0.216000	0.097781	7

5.2 STATISTICAL DESCRIPTION OF RESEARCH VARIABLES AND CORRELATION MATRIX

The sample covers the period from 2004 through 2010. The macro variable examined is real GDP growth. The liquidity measures examined are trading volume, market capitalization, trading value, bid-ask spread, and illiquidity ratio. The control variables examined are excess market return, market volatility, term spread, and lag of dependent variable, namely the lag of real GDP growth in the model which examines the effect of

stock market liquidity upon business cycle model with considering the use of lag of stock market liquidity variables as independent variables in the effect of business cycle on stock market liquidity model. All measures are calculated each month. The collected quarterly real GDP growth data are converted into monthly series in order to create a long time-series using EViews 7 statistical program using frequency conversion (Startz, 2009). In Table 4.2, the researcher presents descriptive statistics for the research variables of interest.

Looking first at the descriptive statistics in Panel A of Table 3, for business cycle variable's measure, the maximum of real GDP growth is 1.79458%, its minimum is -1.61522%, its mean is 0.93052%, its median is 1.08688% and finally its standard deviation is 0.76306%. For stock market liquidity variables' measures, trading volume ranges between 11.25 Billion Egyptian pounds and 0.29 Million Egyptian pounds, its mean is 3.39 Billion Egyptian pounds, its median is 2.31 Million Egyptian pounds, and finally its standard deviation is 2.87 Million Egyptian pounds. The maximum of trading value is 221.72 Billion Egyptian pounds, its minimum is 3.89 Billion Egyptian pounds, its mean is 55.45 Billion Egyptian pounds, its median is 49.06 Billion Egyptian pounds, and finally its standard deviation is 42.03 Billion Egyptian pounds. Market capitalization ranges between 897.54 Billion Egyptian pounds and 167.34 Billion Egyptian pounds, its mean is 466.35 Billion Egyptian pounds, its median is 460.95 Billion Egyptian pounds, and finally its standard deviation is 180.05 Billion Egyptian pounds. The maximum of bid-ask spread is 2342.91 Egyptian pounds, its minimum is 2342.91 Egyptian pounds, its mean is -65.23 Egyptian pounds, its median is -143.53 Egyptian pounds, and finally its standard deviation is 611.51 Egyptian pounds. Finally, the maximum of illiquidity ratio is $136.1*10^{-11}$%, its minimum is $2.1*10^{-11}$%, its mean is $22.7 *10^{-11}$%, its median is $10.5*10^{-11}$%, and finally its standard deviation is $26.4 *10^{-11}$%.

For control variables' measures, the maximum of excess market return is 29.57 %, its minimum is -32.26 %, its mean is -7.84 %, its median is -9.06 %, and finally its standard deviation is 10.97 %. The maximum of market volatility is 3.52 %, its minimum is 0.45%, its mean is 1.14%, its median is 0.95 %, and finally its standard deviation is 0.55%. The maximum of term spread is 6.11 %, its minimum is -5.18 %, its mean is 2.21%, its median is 2.08%, and finally its standard deviation is 1.80%.

The differences between mean and median for trading volume, trading value, and market capitalization are great. For example, the difference between mean and median for market capitalization is 5.40 Billion Egyptian pounds which is the difference between the two values 466.35 and 460.95 Billion Egyptian pounds. Thus, the researcher calculates the natural log for these variables to reduce variability in their series.

Table 4.2: Describing Research Variables

Panel A: Descriptive Statistics

	Real GDP Growth (%)	Trading Volume (Billions L.E.)	Trading Value (Billions L.E.)	Market Capitalization (Billions L.E.)	Bid-Ask Spread (L.E.)	Illiquidity Ratio (10-11%)	Excess Market Return (%)	Market Volatility (%)	Term Spread (%)
Mean	0.93052	3.39	55.45	466.35	-65.23	22.7	-7.84	1.14	2.21
Median	1.08688	2.31	49.06	460.95	-143.53	10.5	-9.06	0.95	2.08
Standard Deviation	0.76306	2.87	42.03	180.05	611.51	26.4	10.97	0.55	1.80
Minimum	-1.61522	0.29	3.89	167.34	-1605.49	2.1	-32.26	0.45	-5.18
Maximum	1.79458	11.25	221.72	897.54	2342.91	136.1	29.57	3.52	6.11

Panel A shows descriptive statistics of research variables. The macro variable examined is real GDP growth. The liquidity measures examined are trading volume, trading value, market capitalization, bid-ask spread, and illiquidity ratio. The control variables examined are excess market return, market volatility, term spread, and the lag of dependent variable.

Table 4.2: Describing Research Variables (Continued)
Panel B: Correlations Matrix

	Real GDP Growth	*Trading Volume*	*Trading Value*	*Market Capitalization*	*The Bid-Ask Spread*	*The Illiquidity Ratio*	*Market Volatility*	*The Excess Market Return*	*Term Spread*
Real GDP Growth	1								
Trading Volume	0.51443	1							
Trading Value	0.16466	0.618785	1						
Market Capitalization	0.12116	0.401055	0.715591	1					
The Bid-Ask Spread	0.15791	0.038648	0.137438	0.058847	1				
The Illiquidity Ratio	-0.36265	-0.63934	-0.56792	-0.66735	-0.01666	1			
Market Volatility	-0.20262	-0.17215	-0.10951	-0.12022	-0.47965	0.281576	1		
The Excess Market Return	-0.20607	-0.1987	-0.00539	-0.057911	-0.1198	0.253352	0.04918	1	
Term Spread	0.33407	0.13437	0.265918	0.360528	0.30721	-0.00511	-0.31119	-0.44312	1

Panel B shows correlation between research variables. The macro variable examined is real GDP growth. The liquidity measures examined are trading volume, trading value, market capitalization, bid-ask spread, and illiquidity ratio. The control variables examined are excess market return, market volatility, term spread, and the lag of dependent variable.

Panel B of Table 3 shows the contemporaneous bivariate correlations between each two variables used in the analysis. Firstly, the correlations between each stock market liquidity variable and control variables, and between real GDP growth as an indicator of business cycle and control variables are less than 0.80 which means that that there are no multicollinearities between variables (Gujarat, 2003). The high correlation coefficients between stock market liquidity variables, such as the 0.618785 correlation value between trading volume and trading value is a good indicator for the representative power of stock market liquidity variables.

There are positive relationships between real GDP growth as an indicator of business cycle and all liquidity measures Longstaff (2004). Additionally, there is a positive relationship between term spread and liquidity (Næs et al., 2011). Additionally, there is a negative relationship between all liquidity measures and market volatility (Næs et al., 2011). Finally, there is a negative correlation between liquidity and the excess return on the market (Næs et al., 2011).

5.3 THE MULTIPLE REGRESSION MODELS

First of all, Durbin-Watson test is not applicable when a lagged dependent variable is used (Godfrey, 1978). Thus, the researcher uses an alternative test for examining auto-correlation problem in his regression models, namely the Breusch-Godfrey LM test. Table 4 illustrates the findings of Breusch-Godfrey LM test with a null of no autocorrelation which is accepted for all liquidity variables in the case of considering real GDP growth as dependent variable and is rejected in the opposite case using the first log difference for natural log of trading value depending upon the value of prob. Chi-Square.

(Breusch-Godfrey LM Test)

H_0: There is no autocorrelation.

The values of probability Chi- Square for real GDP growth effect upon trading volume and market capitalization in the model of the effect of the business cycle upon stock

market liquidity are 0.0013 and 0.0245 which are less than the 5% significance level. This means that the null of no autocorrelation is not rejected for trading volume and market capitalization variables. To solve the autocorrelation problem between real GDP growth and trading volume and market capitalization variables, the researcher uses the Cochrane-Orcutt iterative procedure (Cochrane & Orcutt, 1949) and Prais-Winsten test (Prais & Winsten, 1954) as illustrated in the multiple regression analyses.

Table 4: Breusch-Godfrey LM Test

Panel 1: The Effect of Stock Market Liquidity on the Business Cycle

A) Log Trading Volume

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.023162	Prob. F(1,77)	0.8794
Obs*R-squared	0.024960	Prob. Chi-Square(1)	0.8745

B) 1st. Diff. Log Trading Value

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.139156	Prob. F(1,77)	0.7101
Obs*R-squared	0.149729	Prob. Chi-Square(1)	0.6988

C)1st. Diff. Log Market Capitalization

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.010249	Prob. F(1,77)	0.9196
Obs*R-squared	0.011046	Prob. Chi-Square(1)	0.9163

D) The Bid-Ask Spread

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.216840	Prob. F(1,77)	0.6428
Obs*R-squared	0.233080	Prob. Chi-Square(1)	0.6292

E) 1st. Diff. The Illiquidity Ratio

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.009213	Prob. F(1,77)	0.9238
Obs*R-squared	0.009930	Prob. Chi-Square(1)	0.9206

Panel 2: The Effect of the Business Cycle on Stock Market Liquidity

A) Log Trading Volume

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	11.00163	Prob. F(1,77)	0.0014
Obs*R-squared	10.37635	Prob. Chi-Square(1)	0.0013

B) 1st. Diff. Log Trading Value

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	1.222229	Prob. F(1,76)	0.2724
Obs*R-squared	1.297848	Prob. Chi-Square(1)	0.2546

C)1st. Diff. Log Market Capitalization

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	4.999988	Prob. F(1,76)	0.0283
Obs*R-squared	5.061717	Prob. Chi-Square(1)	0.0245

D) The Bid-Ask Spread

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	2.608345	Prob. F(1,77)	0.1104
Obs*R-squared	2.719472	Prob. Chi-Square(1)	0.0991

E) 1st. Diff. The Illiquidity Ratio

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	2.374314	Prob. F(1,76)	0.1275
Obs*R-squared	2.484153	Prob. Chi-Square(1)	0.1150

The multiple regression analyses rely on the following regression model:

$$y_{t+1} = \alpha + \beta LIQ_t + \gamma` X_t + u_{t+1}, \quad (4.1)$$

where y_{t+1} is the realized growth in the macro variable of interest, namely growth in real GDP over month t + 1, LIQ_t is market liquidity measured for month t, X_t is a vector of control variables (*Excess market return (er_m), Market volatility (Vola)*, the *term spread (Term)*, and the lag of the dependent variable observed at t, and γ' is the vector of coefficient estimates on the control variables. The research main dependent variable (y_{t+1}) is real GDP growth in the effect of stock market liquidity on business cycle model and he reverses both the dependent and independent variables in the previously mentioned model to build the second model of the effect of business cycle upon stock market liquidity.

Table 5: The Multiple Regression Models

The Effect of Stock Market Liquidity on the Business Cycle

Business Cycle (Dependent Variable)	Estimates of Smaller Squares			R	SE	R^2	F	Sig-F	VIF
	B	T	Sig-T						
A) Log Trading Volume									
Constant	.010	.263	.308	.908	.0033	.825	72.389	0.000	
Excess Market Return	-.000	-.102	.919						1.280
Market Volatility	-.077	-1.069	.288						1.177
Term Spread	.025	1.021	.310						1.481
Lag of the Dependent Variable	.843	13.646	.000						1.687
Log Trading Volume	.001	.888	.377						1.602
B) 1st. Diff. Log Trading Value									
Constant	.002	1.138	.259	.908	.0033	.825	72.658	.000	
Excess Market Return	-.001	-.298	.766						1.239
Market Volatility	-.069	-.974	.333						1.144
Term Spread	.023	.927	.357						1.440
Lag of the Dependent Variable	.874	17.515	.000						1.104
1st. Diff. Log Trading Value	.002	1.014	.314						1.009
C) 1st. Diff. Log Market Capitalization									
Constant	.001	.425	.672	.913	.0032	.834	77.254	.000	
Excess Market Return	-.000	-.100	.920						1.245
Market Volatility	-.003	-.034	.973						1.363
Term Spread	.017	.732	.467						1.445
Lag of the Dependent Variable	.875	17.995	.000						1.104
1st. Diff. Log Market Capitalization	.027	2.258	.027						1.277
D) The Bid-Ask Spread									
Constant	.000	.143	.887	.918	.00312	.843	82.995	0.000	
Excess Market Return	-.001	-.176	.861						1.239
Market Volatility	-.039	-.519	.605						1.416
Term Spread	.008	.344	.732						1.485
Lag of the Dependent Variable	.899	18.816	.000						1.131
The Bid-Ask Spread	0.0000021	3.192	. 002						1.385

E) 1st. Diff. The Illiquidity Ratio									
Constant	.002	1.106	.272	.907	.0033	.823	71.541	0.000	
Excess Market Return	-.001	-.313	.755						1.369
Market Volatility	-.068	-.945	.348						1.167
Term Spread	.021	.869	.388						1.439
Lag of the Dependent Variable	.875	17.402	.000						1.106
1st. Diff. The Illiquidity Ratio	-60588	-.195	.846						1.143

Table 5 shows the results from the multiple regression models where the researcher regresses next month real GDP growth on five proxies for market liquidity for the period 2004 to 2010 on panel1. Market liquidity is proxied by one of five liquidity measures: trading volume, trading value, market capitalization, bid-ask spread, and the illiquidity ratio with considering that illiquidity ratio is a proxy for illiquidity. The values of VIF for all measures are less than 10. The significance levels of market capitalization and bid-ask spread are less than .05 significance level. Thus, the researcher accepts the first hypothesis of this research, in other words, there is an effect of stock market liquidity on the business cycle.

Table 6: The Multiple Regression Models

The Effect of the Business Cycle on Stock Market Liquidit

Stock Market Liquidity (Dependent Variable)	**Estimates of Smaller Squares**			**R**	**SE**	**R^2**	**F**	**Sig-F**	**VIF**
	B	**T**	**Sig-T**						

A) **Log Trading Volume**

Model 1: Cochrane-Orcutt, using observations 2004:03-2010:12 (T = 82)
Dependent variable: LogTradingVolume
rho = -0.354378

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.841248	0.313001	2.688	0.0088	**
RealGDPGrowth	4.91722	2.00189	2.456	0.0163	*
MarketVolatility	-2.12453	2.52262	-0.8422	0.4023	
TheExcessMarketReturn	-0.0300765	0.173477	-0.1734	0.8628	
TermSpread	0.953495	0.887760	1.074	0.2862	
LagLogTradingVolume	0.917057	0.0322065	28.47	<0.0001	**

Model 2: Prais-Winsten, using observations 2004:02-2010:12 (T = 83)
Dependent variable: LogTradingVolume
rho = -0.354374

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.842029	0.310032	2.716	0.0082	***
RealGDPGrowth	4.91927	1.98788	2.475	0.0155	**
MarketVolatility	-2.11812	2.49836	-0.8478	0.3992	
TheExcessMarketReturn	-0.0317454	0.164453	-0.1930	0.8474	
TermSpread	0.952983	0.881840	1.081	0.2832	
LagLogTradingVolume	0.916986	0.0319233	28.72	<0.0001	***

B) 1st. Diff. Log Trading Value

Constant	.010	.136	.892						
Excess Market Return	-.062	-.299	.766						1.196
Market Volatility	-.003	-.001	.999						1.177
Term Spread	1.361	1.065	.290	.449	.1709	.202	3.849	0.004	1.435
Lag of the Dependent Variable	.439	4.235	.000						1.022
Real GDP Growth	1.632	.619	.538						
									1.134

C) 1st. Diff. Log Market Capitalization

Model 1: **Cochrane-Orcutt**, using observations 2004:04-2010:12 (T = 81)
Dependent variable: stDiffLogMarketCapitaliz
rho = 0.223868

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0307404	0.0137442	2.237	0.0283	**
RealGDPGrowth	0.622671	0.571115	1.090	0.2791	
MarketVolatility	-2.60360	0.731178	-3.561	0.0006	***
TheExcessMarketReturn	-0.0228439	0.0344319	-0.6635	0.5091	
TermSpread	0.0375928	0.254741	0.1476	0.8831	
Lag1stDiffLogMarketCapit	0.00778367	0.107721	0.07226	0.9426	

Model 2: **Prais-Winsten**, using observations 2004:03-2010:12 (T = 82)
Dependent variable: stDiffLogMarketCapitaliz
rho = 0.218746

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0302052	0.0135965	2.222	0.0293	**
RealGDPGrowth	0.596190	0.564045	1.057	0.2939	
MarketVolatility	-2.58667	0.725380	-3.566	0.0006	***
TheExcessMarketReturn	-0.0189215	0.0333009	-0.5682	0.5716	
TermSpread	0.0335528	0.252588	0.1328	0.8947	
Lag1stDiffLogMarketCapit	0.000562569	0.106758	0.005270	0.9958	

D) The Bid-Ask Spread									
Constant	490.376	2.233	.028	.527	539.49	.277	5.915	0.000	
Excess Market Return	-141.37	-.231	.818						1.240
Market Volatility	-44707	-3.788	.000						1.199
Term Spread	3709.58	.896	.373						1.554
Lag of the Dependent Variable	.147	1.377	.173						1.212
Real GDP Growth	184.396	.022	.982						1.146
E) 1st. Diff. The Illiquidity Ratio									
Constant	0.000000001	2.023	.047	.324	0000000012	.105	1.779	.127	
Excess Market Return	0.000000003	2.310	.024						1.206
Market Volatility	0.000000037	1.410	.163						1.178
Term Spread	-0.000000004	-.471	.639						1.434
Lag of the Dependent Variable	.103	.961	.340						1.041
Real GDP Growth	-0.000000009	-.511	.611						1.134

Table 6 shows the results from the multiple regression models where the researcher regress five proxies for market liquidity on next month real GDP growth for the period 2004 to 2010 on panel 2. The values of VIF for all measures are less than 10. Only, the significance level of trading volume is less than .05 significance level. Thus, the researcher accepts the second hypothesis of this research, in other words, there is an effect of the business cycle on stock market liquidity.

Depending upon these findings with the findings of the contemporaneous bivariate correlations in Panel B of Table 3, market capitalization and bid-ask spread has significant positive effects on real GDP growth. Also, real GDP growth has a significant positive effect upon trading volume. This means that there are bidirectional effects between the Egyptian stock market liquidity and the Egyptian business cycle.

5.4 EVENT STUDY

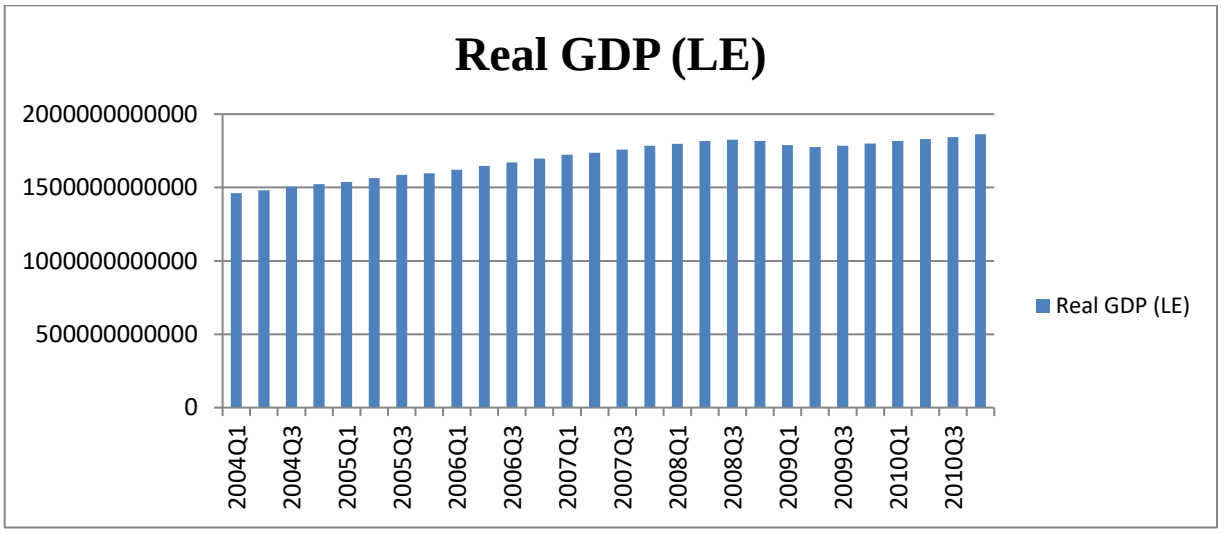


Figure 1: The Egyptian business cycle.

Figure 1 represents the Egyptian business cycle using the resulted Real GDP data over the first quarter on 2004 till the fourth quarter on 2010. Depending on the rule that a recession occurs when real GDP declines for two or more consecutive quarters (Nelson, 2005) and by using Figure 1, we can find that the Egyptian business cycle has one recession period over the first quarter on 2004 till the fourth quarter on 2010. The recession period is between the fourth quarter of 2008 and the third quarter of 2009. The year 2004 is chosen as a starting year because EGX index committee was established on 7 April 2004 by the chairman of EGX. Meanwhile, December 2010 is chosen as an ending point because the year 2011 is considered a formidable year in the history of the Egyptian capital market. This year seems different where the Egyptian Exchange faces internal tensions. The year started with the 25^{th} of January Revolution, according to the annual report of the Egyptian Exchange in 2011, the market capitalization lost about 194 billion pounds. A transitional phase started in order to rebuild the state institutions, a phase of unrest with political tensions and categorical demands, which lead the economy to draw back to one of its worst levels ever (www.sis.gov.eg).

Also, the period covers the recent financial crisis with consideration of tracing changes before, during and after it. Thus, the researcher can conduct his research because he has at least one recession period.

The period from a peak to a trough is a recession and the period from a trough to a peak is an expansion. A recession is a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real Gross Domestic Product (GDP), real income, real investment, the unemployment rate, industrial production, and wholesale-retail sales. A recession begins just after the economy reaches a peak of activity and ends as the economy reaches its trough. Between trough and peak, the economy is in an expansion. Expansion is the normal state of the economy; most recessions are brief and they have been rare in recent decades (www.nber.org). Depending upon this, the peak of the Egyptian business cycle during the research period is in third quarter of 2008 (2008 Q3). Before that, it is the expansion quarters.

The most first and important target of event study analysis is determining the research event. Moreover, the time period of changes, which may occur because of the event, should be decided. Using a macroeconomic event as an example; firstly, the suitable economic event should be selected, such as expansions and recessions. And then, the research time period of the event study before and after the event should be fixed, like 5 quarters (Wang, 2012).

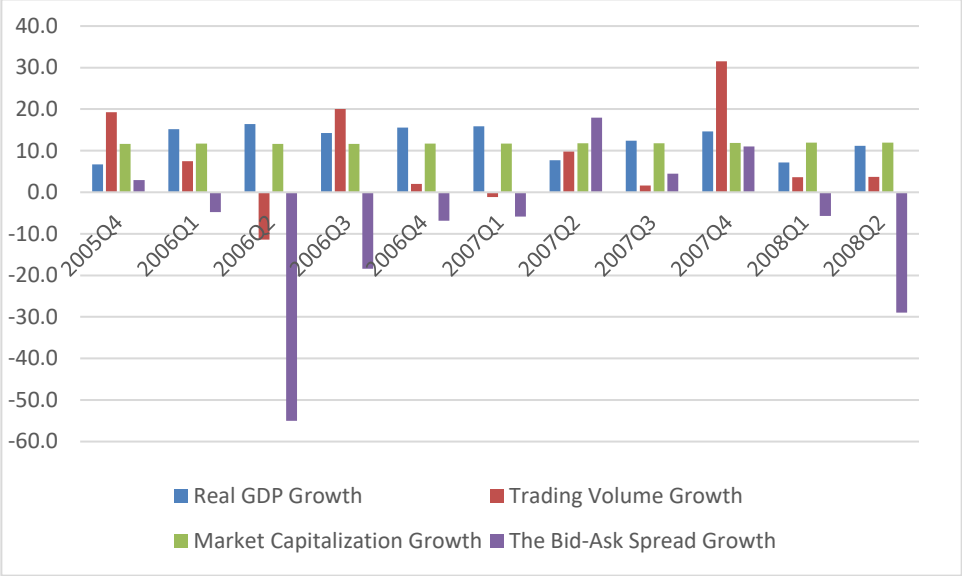
The results on the predictive content of liquidity for macro variable, namely real GDP growth can be visualized using an "event study." Considering that the suitable economic event is expansion. The event study time period could be chosen to be from the fourth quarter 2005 to the second quarter 2008 as illustrated in table 4.5. The researcher takes the onset of the expansion to be the "event date," and plots the evolution of the various significant series of interest, namely trading volume growth, market capitalization growth, and bid-ask spread growth around this date (Wang, 2012). In Figure 1, he

plots changes in the three liquidity measures to the onset of an expansion. He first calculates the quarterly GDP growth starting five quarters before (t =−5Q) the expansion quarter (2007Q1) and ending five quarters after the end of the recession (t = 5Q). Next, he averages the GDP growth for each quarter across the expansion, and he accumulates the average GDP growth over the event windows. He then does the same for the three liquidity measures as indicators for liquidity. Thus, the figure shows the average pattern in the three liquidity measures growth before, during, and after expansion period.

Table 7: Event Study Data (Expansion Event)

Quarter	Real GDP Growth	Trading Volume Growth	Market Capitalization Growth	The Bid-Ask Spread Growth
2005Q4	6.7	19.3	11.6	3.0
2006Q1	15.2	7.5	11.7	4.7
2006Q2	16.5	-11.4	11.6	55.0
2006Q3	14.3	20.0	11.7	18.4
2006Q4	15.6	2.0	11.7	6.8
2007Q1	15.9	-1.2	11.7	5.9
2007Q2	7.7	9.8	11.8	18.0
2007Q3	12.4	1.6	11.8	4.5
2007Q4	14.7	31.5	11.9	11.1
2008Q1	7.2	3.6	11.9	-5.7
2008Q2	11.2	3.7	11.9	-28.9

Figure 2: Event Study (Expansion Event)



From the Figure 2, the liquidity, namely trading volume growth starts to increase from 2 quarters before the onset of the expansion. Also, the business cycle, namely real GDP growth starts to increase from 5 quarters before the one set of increased market capitalization growth and bid-ask spread growth. These findings can be supported by the contemporaneous bivariate correlations between real GDP growth and market capitalization growth before and after the expansion event.

Table 8 shows the contemporaneous bivariate correlations between real GDP growth and trading volume growth, market capitalization growth, and bid-ask spread growth before and after the expansion event. Before the expansion event in Panel A, there is a negative correlation between real GDP growth and the selected stock market liquidity measures' growth. This negative correlation is a result of the resistance to the recession that occurs before this expansion. After the expansion event in Panel B, there is a positive correlation between real GDP growth and the selected stock market liquidity measures' growth in order to move to the recession that occurs after this expansion.

Table 8: The Contemporaneous Bivariate Correlations between Real GDP Growth and Market Capitalization Growth Before and After the Expansion Event

Panel A: Before the Expansion Event

	Real GDP Growth	***Trading Volume Growth***	***Market Capitalization Growth***	***The Bid-Ask Spread Growth***
Real GDP Growth	1			
Trading Volume Growth	-0.66603	1		
Market Capitalization Growth	-0.42202	0.076145	1	
The Bid-Ask Spread Growth	-0.57315	0.735573	0.494448	1

Panel B: After the Expansion Event

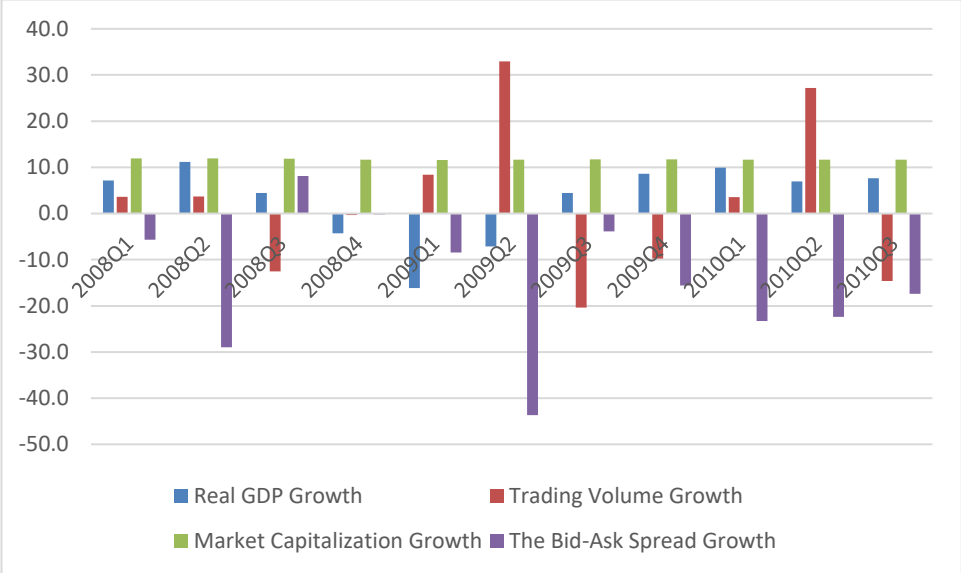
	Real GDP Growth	***Trading Volume Growth***	***Market Capitalization Growth***	***The Bid-Ask Spread Growth***
Real GDP Growth	1			
Trading Volume Growth	0.580597	1		
Market Capitalization Growth	0.05576	0.09735	1	
The Bid-Ask Spread Growth	0.016766	0.458877	0.79034	1

Considering that the suitable economic event is recession. The event study time period could be chosen to be from the first quarter 2008 to the third quarter 2010 as illustrated in table 9.

Table 9: Event Study Data (Recession Event)
Figure 4.2: Event Study (Recession Event)

Quarter	Real GDP Growth	Trading Volume Growth	Market Capitalization Growth	The Bid-Ask Spread Growth
2008Q1	7.2	3.6	11.9	-5.7
2008Q2	11.2	3.7	11.9	-28.9
2008Q3	4.5	-12.5	11.8	8.1
2008Q4	-4.3	-0.3	11.7	-0.2
2009Q1	-16.2	-8.4	11.6	-8.5
2009Q2	-7.1	-32.9	11.7	-43.7
2009Q3	4.4	-20.4	11.7	-3.9
2009Q4	8.6	-9.7	11.7	-15.6
2010Q1	9.9	3.5	11.6	-23.3
2010Q2	7.0	27.2	11.6	-22.4
2010Q3	7.6	-14.6	11.6	-17.4

Figure 3: Event Study (Recession Event)



The results on the predictive content of liquidity for macro variable, namely real GDP growth can be visualized using an "event study." The researcher takes the onset of the recession to be the "event date," and plots the evolution of the various significant series of interest, namely trading volume growth, market capitalization growth and bid-ask spread growth around this date (Wang, 2012).

In Figure 3, he plots changes in the three liquidity measures to the onset of a recession. He first calculates the quarterly GDP growth starting five quarters before (t =−5Q) the recession quarter (2009Q2) and ending five quarters after the end of the recession (t = 5Q). Next, he averages the GDP growth for each quarter across the recession, and he accumulates the average GDP growth over the event windows. He then does the same for the three liquidity measures as indicators for liquidity. Thus, the figure shows the average pattern in the three liquidity measures growth before, during, and after recession period.

From the Figure 3, the liquidity, namely trading volume growth starts to worsen from 3 quarters before the onset of the recession, with the fact that the economy is dis-expanding. Additionally, the business cycle, namely real GDP growth starts to dry up from 2 quarters before the one set of decreased market capitalization growth and bid-ask spread growth. These findings can be supported by the contemporaneous bivariate correlations between real GDP growth and market capitalization growth before and after the recession event.

Table 10 shows the contemporaneous bivariate correlations between real GDP growth and trading volume growth, market capitalization growth, and bid-ask spread growth before and after the recession event. Before the recession event in Panel A, there is a positive correlation between real GDP growth and the selected stock market liquidity measures' growth. After the recession event in Panel B, there is a negative correlation between real GDP growth and the selected stock market liquidity measures' growth as a mean for resistance in order to move to the expansion that occurs after this recession.

Table 10: The Contemporaneous Bivariate Correlations between Real GDP Growth and Market Capitalization Growth Before and After the Recession Event

Panel A: Before the Recession Event

	Real GDP Growth	***Trading Volume Growth***	***Market Capitalization Growth***	***The Bid-Ask Spread Growth***
Real GDP Growth	1			
Trading Volume Growth	0.35866	1		
Market Capitalization Growth	0.962894	0.23532	1	
The Bid-Ask Spread Growth	0.28909	0.63857	0.31423	1

Panel B: After the Recession Event

	Real GDP Growth	***Trading Volume Growth***	***Market Capitalization Growth***	***The Bid-Ask Spread Growth***
Real GDP Growth	1			
Trading Volume Growth	-0.28426	1		
Market Capitalization Growth	-0.52023	0.58521	1	
The Bid-Ask Spread Growth	-0.805	0.74042	0.845238	1

The results of event study means that trading volume growth has a significant positive effect on real GDP growth. Also, real GDP growth has a significant positive effect upon market capitalization growth and bid-ask spread growth. This ensures that there are bidirectional effects between the

Egyptian stock market liquidity and the Egyptian business cycle.

5. The implications

5.1 Implications to Theory

One of the implications of the study is the introduction of a new variable, namely trading volume as potential predictor of the Egyptian business cycle. In addition, this study verifies the importance of real GDP growth that is found to be a significant determinant of market capitalization and bid-ask spread which are proxies of Egyptian stock market liquidity. Moreover, theories that are related the bidirectional effects between stock market liquidity and the business cycle are tested and supported in this study.

5.2 Practical Implications

Two implications for investors and economists are concluded from this study. The main message to investors is considering business cycle fluctuations, namely real GDP growth fluctuations as a predictor of Egyptian stock market liquidity, namely trading volume fluctuations. On the other hand, economists must take in account the fluctuations of stock market liquidity, namely market capitalization and bid-ask spread fluctuations as indicators of Egyptian business cycle fluctuations, namely real GDP growth fluctuations, especially recession and expansion periods.

6. Conclusion

The results of this study indicates that trading volume growth has a significant positive effect on real GDP growth. Also, real GDP growth has a significant positive effect upon market capitalization growth and bid-ask spread growth. This ensures that there are bidirectional effects between the Egyptian stock market liquidity and the Egyptian business cycle. The findings of this study are constrained by some limitations. Firstly, this study uses the data of the EGX30

index from January 2004 to December 2010. Secondly, the researcher depends upon monthly data for his statistical analyses of research and on quarterly data for constructing his business cycle and event study using that rule which says that a recession occurs when real GDP declines for two or more consecutive quarters. Thirdly, sample size is relatively small compared with other studies in that field. To detail only 30 companies of EGX30 are used in the analysis. However, EGX 30 index value is calculated in local currency terms and denominated in US dollars since 1998. EGX 30 index includes the top 30 companies in terms of liquidity and activity. EGX 30 index is measured by market capitalization and adjusted by the free float. Adjusted Market capitalization of a listed company is the number of its listed shares multiplied by the closing price of that company multiplied by the percent of freely floated shares.

This study provides several suggestions for future research not only for stock market liquidity, but also for business cycle. Firstly, the term business cycle can be expanded to be monetary policy. Secondly, other variables such as unemployment rate, real consumption, and real investment can be included to represent additional proxies for business cycle. Thirdly, liquidity variables can include other additional measures for stock market liquidity, such as The Lesmond, Ogden, and Trczika (1999) measure (the difference between the percent buying cost and the percent selling cost) and The Roll (1984) implicit spread estimator (the serial covariance of successive price movements). Fourthly, the bidirectional effects between stock market liquidity and the business cycle can be examined using EGX100, EGX70, or even listed firms instead of EGX30. Finally, the bidirectional effects between stock market liquidity and the business cycle can be examined using the Granger causality test.

References

- Achen, C., H., (2000). Why lagged dependent variables can supress the explanatory power of other independent variables. *Working Paper*.
- Aitken, M., & C., Comerton-Ford (2003). How should liquidity be measured? *Pacific-Basin Finance Journal*, 11, 45-59(15).
- _____, & Frino, A., Jarnecic, E., McCorry, M., & R. Winn (1997). The microstructure of the australian stock exchange: An introduction. *Asia Pacific Capital Markets Foundation Book Series 1997*.
- Aksoy, Y., & H., S., Basso, (2012). Liquidity, term spreads and monetary policy, *Working Paper*.
- Amihud, Y., (2002). Illiquidity and stock returns: Cross-section and time-series effects, *Journal of Financial Markets*, 5, 31-56.
- Anderson, S., & S., Lavoie, (2004). The evolution of liquidity in the market for government of Canada bonds. *Bank of Canada Review*, Summer 2004, 19-31.
- Batchelor, R., (2000). EVIEWS tutorial: Co-integration and error corrections , *City University Business School, London &ESCP, Paris*.
- Beaupain, R., Giot, P., & M., Petitjean, (2007). Liquidity co-movements, market capitalization, and volatility. *Working Paper*.
- Benati, L., & Goodhart, C., (2008). Investigating time-variation in the marginal predictive power of the yield spread. *Journal of Economic Dynamics and Control*, 32(4), 1236-72.
- Bencivenga, V. R., Smith, B. D. & R. M. Starr, (1995). Equity markets, transaction costs, and capital accumulation. *The World Bank Policy Research Working Paper Series 1456*.
- Bigio, S., (2010). Liquidity shocks and the business cycle. *Banco Central de Reserva del Perú Working Paper*.
- _____, (2011), Endogenous liquidity and the business cycle. *New York University Working Paper*.

- Bloomfield, R., O'Hara, M., & G., Saar, (2011). Hidden liquidity: Some new light on dark trading. *Working Paper.*
- Bogdan, S., Bareša, S., S., Ivanovic, (2012). Measuring liquidity on stock market: Impact on liquidity ratio. *Tourism and Hospitality Management*, 18(2), 183-193.
- Brennan, M., Huhb, S., A.,Subrahmanyamc, (2012). An analysis of the Amihud illiquidity premium. *Working Paper*.
- Breusch, T.S. (1979). Testing for autocorrelation in dynamic linear models, *Australian Economic Papers*, 17, 334–355.
- Brooks, C., (2002). *Introductory econometrics for finance*. United Kingdom, Cambridge University Press.
- Brunnermeier, M., K., & L., H., Pedersen, (2009). Market liquidity and funding liquidity. *Working Paper*.
- Campbell, J., Grossman, S., & J., Wang (1993). Trading volume and serial correlation in stock returns. *The Quarterly Journal of Economics*, 6(2), 905-939.
- Central Bureau of Statistics, Ministry of Finance & Planning (2002). The new kenyan consumer price index: Guide for producing the consumer price index. *Working Paper*.
- C¸etin, U., Jarrow, R., P., Protter (2004). Liquidity risk and arbitrage pricing theory. *Working Paper*.
- Charles, A., Darne, O., & J. Hoarau (2009). Does the real GDP per capita convergence hold in the Common Market for Eastern and Southern Africa? *Université de Nantes Working Paper.*
- Cochrane, D., & G., H., Orcutt, (1949). Application of least squares regression to relationships containing auto-correlated error terms. *Journal of the American Statistical Association*, 44 (245), 32–61
- Chordia, T., Roll, R. & A. Subrahmanyam, (2001). Market liquidity and trading activity. *Journal of Finance* 56(2), 501-530.

- _____, Sarkar, A. & A. Subrahmanyam, (2003). An empirical analysis of stock and bond market liquidity, *Federal Reserve Bank of New York Working Paper*.
- _____, & B., Swaminathan, (2000). Trading volume and cross-autocorrelations in stock returns. The Journal of Finance, 55(2), 913-935.
- Datar, M., K., (2000). Stock market liquidity: Measurement and implications. *Working Paper*.
- Dickey, D., & W., Fuller, (1979). Distribution of the estimators for autoregressive time series with a unit root, *Journal of the American Statistical Association*, 74, 427-431.
- Domowitz, I., Glen, J., & A., Madhavan, (2000). Liquidity, volatility, and equity trading costs across countries and over time. *Working Paper Number 322.*
- Edström, H., (2012). A quantitative analysis of liquidity and funding value adjustments. *Working Paper*.
- Erdogan, O., Bennett P., C., Ozyildirim, (2014). Recession prediction using yield curve and stock market liquidity deviation measures. *Review of Finance*, forthcoming.
- Estrella, A., (2005). Why does the yield curve predict output and inflation? *Economic Journal*, 115(505), 722-44.
- _____, & Hardouvelis, A., (1991). The term structure as a predictor of real economic activity. *Journal of Finance*, 46(2), 555-76.
- _____, & Mishkin, F., S., (1997). The predictive power of the term structure of interest rates in Europe and the United States: Implications for the European Central Bank. *European Economic Review*, 41(7), 1375-401.
- _____, & Trubin, R., (2006). The yield curve as a leading indicator: Some practical issues. *Federal Reserve Bank of New York Current Issues in Economics and Finance*, 12(5), 1-7.
- Fama, E., F., & K., R., French, (1989). Business conditions and expected returns on stock and bonds. *Journal of Financial Economics*, 25, 23-49.

- Fang, J., Sun, Q., C., Wang, (2006). Illiquidity, illiquidity risk and stock returns: Evidence from Japan. *Working Paper*.
- Feenstra, R., C., Hong, M., G., Neary, P. & D.S. Prasada Rao (2012). Who shrunk China? Puzzles in the measurement of Real GDP. *NBER working paper series 17729.*
- Feroli, M., (2004). Monetary policy and the information content of the yield spread. *Topics in Macroeconomics*, 4(1), Article 13.
- Ferson, W., E., & Harvey, C., R., (1991). The variation of economic risk premiums. *Journal of Political Economy*, University of Chicago Press, 99(2), 385-415.
- Fujimoto, A., (2003). Macroeconomic sources of systematic liquidity. *Yale University Unpublished Working Paper*.
- Garcia, F., V., & L., Liu, (1999). Macroeconomic determinants of stock market development. *Journal of Applied Economics*, 2 (1), 29–59.
- Gibson, J., (2012). The business cycle consequences of moral hazard and liquidity shocks. *Florida State University Working Paper*.
- Godfrey, L.G. (1978). Testing against general autoregressive and moving average error models when the regressors include lagged dependent variables", *Econometrica*, 46, 1293–1302.
- Goyenko, Y., Holden, C., & C.,Trzcinka, (2009). Do liquidity measures measure liquidity? *Journal of Financial Economics*, 92, 153–181.
- Gujarati, D.N. (2003). *Basic Econometrics*. New York: McGraw Hill Book Co.

- Gyu, C., & D. Cook, (2006). Stock market liquidity and the macro economy: Evidence from Japan. *NBER Chapters in: Monetary Policy under Very Low Inflation in the Pacific Rim*, NBER-EASE, 15, 309-340.

- Hameed, A., Kang, W., & Viswanathan, S., (2010). Stock market declines and liquidity. *Journal of Finance,* 65(1), 257-293.
- Harvey, R., (1988). The real term structure and consumption growth, *Journal of Financial Economics*, 22(2), 305-33.
- Hearn, B., (2010). Liquidity and valuation in East African securities markets. *South African Journal of Economics* 77 (4), 553–576.
- _____, Piesse, J., & R., Strange, (2009). Market liquidity and stock size premia in emerging financial markets: The implications for foreign investment. *International Business Review*, 16, special issue.
- Heshmat, N., (2009). Illiquidity risk and asset pricing: Empirical evidence from the Egyptian stock market. *Accounting, Management, & Insurance Review*, Cairo University Press, 13, 501-528.
- Hobijn, B., & B., Jovanovic, (2001). The information-technology Revolution and the stock market: Evidence. *The American Economic Review*, 91(5), 1203-1220.
- Hobijn, B., Franses, P., & M., Ooms (2004). Generalizations of the KPSS-test for stationarity. Statistica Neerlandica, *Netherlands Society for Statistics and Operations Research*, 58(4), 483-502.
- Hong, H., & S., Rady, (2002). Strategic trading and learning about liquidity. *Journal of Financial Markets*, 5 (2002), 419–450.
- Hu, Z., (1993). The yield curve and real economic activity. *IMF Staff Papers*, 40(4), 781-806.
- Kato, R., (2005). Liquidity, infinite horizons and macroeconomic fluctuations. *European Economic Review* 50 (2006) 1105–1130.
- Kaul, A., & V. Kayacetin, (2009). Forecasting economic fundamentals and stock returns with equity market order flows: Macro Information in a micro measure? *University .of Alberta Working paper.*
- Keynes, J. M., (1930). *Treatise on Money*, Macmillan, London.

- Khrawish, H., Siam, W., M., Jaradat, (2010). The relationships between stock market capitalization rate and interest rate: Evidence from Jordan. *BEH - Business and Economic Horizons*, 2(2), 60-66.
- Kilian, L., & R. Vigfusson (2012). Do oil prices help forecast U.S. Real GDP? The role of nonlinearities and asymmetries. Board of Governors of the Federal Reserve System, *International Finance Discussion Papers* 1050.
- Kim, J., (2013). How does stock market liquidity forecast economic growth? European Journal of Business and Management, 31(5), 155-163.
- Kohli, U., (2004). Real GDP, real domestic income, and terms-of-trade changes. *Journal of International Economics* 62 (2004) 83– 106.
- Kwiatkowski, D., Phillips, p., C., B., Schmidt, p., & Y., Shin, (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?, *Journal of Econometrics*, 54, 159–178.
- Lee, C., & & B., Swaminathan, (2000). Price momentum and trading volume. *The Journal of Finance*, 55(5), 2017-2069.
- Lee, Y., (2013). Model selection in the presence of incidental parameters. *Unpublished working paper*, University of Michigan.
- Lesmond, D., Ogden J., & C., Trzcinka, (1999). A new estimate of transaction costs. *Review of Financial Studies* 12, 1113-1141.

- Levine, L., (2013). Economic growth and the unemployment rate. *Congressional Research Service (CRS Report for Congress)* 7-5700.
- Levine, R. & S. Zervos, (1998). Stock markets, banks, and economic growth. *American Economic Review*, American Economic Association, 88(3), 537-58.
- Lo, A., & J., Wang, (2001). Stock Market trading volume. *Working Paper*.

- Longstaff, F. A., (2004). The flight-to-liquidity premium in U.S. treasury bond prices, *The Journal of Business* 77(3), 511-526.
- Lukács, P., (2002). Stock return distribution and market capitalization. *Hungarian Statistical Review*, Special number 7, 138-148.
- Matthew, O., & G., Odularu, (2009). The impact of share market capitalization on a company's performance: A case study in the Nigerian confectionary industry. *African Journal of Business Management*, 3 (5), 220-226.
- Mele, A., (2008). Understanding stock market volatility: A business cycle perspective. *London School of Economics Working Paper*.
- Nagel, S., (2005). Trading styles and trading volume. *Stanford University Working Paper.*
- Næs, R., Skjeltorp, J. A., & B. A. Ødegaard, (2011). Stock market liquidity and the business cycle. *Journal of Finance*, 66(1), 139-176.
- Nelson, C. R., (2005). *Macroeconomics : An Introduction*, Internet Edition.
- Ogunmuyiwa, M., S., (2010). Investor's sentiment, stock market liquidity and economic growth in Nigeria. *J Soc Sci*, 23(1), 63-67.
- Parkash, P., & S. Sundararajan, (2012). A study on stock market liquidity & business life cycle with special reference to Indian capital markets. *International Journal of Research in Finance & Marketing*, 2(2), 639-651.
- Pathirawasam, C., (2011). The relationship between trading volume and stock returns. *Journal of Competitiveness*, 2011, 41-49.
- Plosser, C., I., & Rouwenhorst, K., G., (1994). International term structures and real economic growth. *Journal of Monetary Economics*, 33(1), 133-55.
- Prais, S., J., & C., B., Winsten, (1954). *Trend estimators and serial correlation.* Chicago: Cowles Commission.
- Roll, R., (1984). A simple implicit measure of the effective bid-ask spread in an efficient market. The Journal of Finance, 39(4), 1127-1139.

- Sarr, A., & T., Lybek, (2002). Measuring liquidity in financial markets. *IMF Working Paper*.
- Schwert, G., W., (1989a). Why does stock market volatility change over time? *Journal of Finance*, 44(4), 1115-1153.
- _____, (1989b). Business cycles, financial crises and stock volatility. *Carnegie-Rochester Conference Series on Public Policy*, 31(Autumn), 83-125.
- Shi, S., (2012). Liquidity, assets and business cycles, *University of Toronto Working Paper*.
- Sidharta, C., (2009). Market wide liquidity instability in business cycles. *MPRA Paper Series 18117*, University Library of Munich, Germany.
- Skjeltorp, J., & B. A. Ødegaard, (2009). Why do firms pay for liquidity provision in limit order markets? *Working paper*, Norges Bank, 2010/12.
- S¨oderberg, J., (2008). Do macroeconomic variables forecast changes in liquidity? An out-of-sample study on the order driven stock markets in Scandinavia, *Unpublished Working Paper*, Copenhagen Business School.

- Startz, R. (2009). EViews illustrated for version 7, *2nd ed. Irvine, CA: Quantitative Micro Software*.
- Sun, W., (2003). Relationship between trading volume and security prices and returns. Area Exam Report, MIT Laboratory for Information and Decision Systems, *Technical Report* P-2638.
- Vayanos, D., (2004). Flight to quality, flight to liquidity, and the pricing of risk. *NBER Working Papers*, 10327, National Bureau of Economic Research, Inc.
- Verbeek, M., (2004). *A guide to modern econometrics*. Rotterdam, Johan Wiley& Sons.
- Vickery, J., & J., Joshua, (2013). TBA trading and liquidity in the agency MBS market. *FRBNY Economic Policy Review*, 5, 1-18.
- Wang, J., (2002). Trading volume and asset prices. Analysis of economics and finance, 3, 299–359.

- Wade, K., & A., May, (2013). GDP growth and equity market returns. *Working Paper*.
- Wheelock, D., and Wohar, M., (2009). Can the term spread predict output growth and recessions? *A survey of the literature*. Federal Reserve Bank of St. Louis Review 91: 419-440.
- Wyss, R., (2004). Measuring and predicting liquidity in the stock market, *doctoral disertation*, St. Gallen University.
- Xu, Y., & Y., Sun, (2010). Dynamic linkages between China and US equity markets under two recent financial crises, *A Thesis Presented in Fulfillment of the Requirements of Master Degree*, LUND University, School of Economics and Management.
- Zhang, H., (2010). Measuring liquidity in emerging markets, *Working Paper*.
- _____, & S., Hodges, (2012). An extended model of effective bid-ask spread. *Working paper*.

Electronic Sites

- www.data.worldbank.org
- www.eip.gov.eg
- www.egx.com.eg
- www.en.wikipedia.org
- www.nber.org
- www.sis.gov.eg