Effect of Stock Market Development on Economic Growth: Case Study Egypt

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تأثير تطور سوق الأوراق المالية على النمو الاقتصادي: دراسة حالة مصر

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Abstract

The growing importance of financial markets around the world renews the interest to investigate whether development of the stock market specifically can promote long-run economic growth or not. The objective of this study is to investigate the empirical relationship between Stock Market Development and Economic Growth in Egypt during the critical economic period of 2009 to 2019 which has experienced many economic and political events.

Following the literature, the study uses secondary data collected from the World Bank, International Financial Statistics (IFS), and the Egyptian Ministry of Planning (MoP) and Central Bank of Egypt (CBE) for stock market indicators, economic growth indicators, banking sector variables and other relevant macroeconomic variables. The quarterly data used to estimate the relationship through hybrid method (both quantitative and qualitative) approach. The qualitative part uses a graphical illustration to depict the evolution of various stock market variables while the quantitative part focuses on investigating the empirical effect of stock market development on economic growth using ARDL model.

The main findings of the study are as follows: 1) there is no relationship over the short run between Stock Market Development and Economic Growth, 2) The effect of Stock Market Development on Economic Growth is negative over the long run (holds only for the turnover ration), 3) The main triggers for Economic Growth in Egypt during this period are other factors like higher Primary Education enrolment, 4) There is no relation between the banking sector and the economic growth neither in the short run nor in the long run, 5) The results match with the literature of some developing countries, including Egypt. The negative relationship may be due to the underdeveloped financial systems., and 6)The results of the test are stable, robust and correctly specified.

Keywords: Economic Growth, Stock Market, M2, Market Capitalization, Trade Openness

المستخلص

الأهمية المتزايدة للأسواق المالية في جميع أنحاء العالم تجدد دائمًا الرغبة في دراسة الدور الذي يمكن أن تلعبه سوق الأوراق المالية على وجه التحديد في تعزيز النمو الاقتصادي على المدى الطويل. لذلك يكمن الهدف من هذه الدراسة في التأكد من وجود علاقة بين التطور في سوق الأوراق المالية والنمو الاقتصادي في مصر خلال الفترة من ٢٠٠٩ إلى ٢٠١٩، والتي شهدت العديد من الأحداث الاقتصادية والسياسية.

تتبع هذه الورقة الأدبيات في استخدام بيانات ثانوية ربع سنوية لمؤشرات سوق الأوراق المالية ، ومؤشرات النمو الاقتصادي، والقطاع المصرفي، وبعض المتغيرات الاقتصادية الأخرى والتي تم جمعها من البنك الدولي، والإحصاءات المالية الدولية (IFS) ، ووزارة التخطيط والتنمية الاقتصادية المصرية (MOP) والبنك المركزي المصري (CBE). هذا و تسعى الدراسة لتقدير العلاقة من خلال استخدام الأسلوب الهجين (الكمي والنوعي معًا) بحيث يستخدم الجزء النوعي لتوضيح تطور متغيرات سوق الأوراق المالية المختلفة بينما يركز الجزء الكمي على دراسة تأثير التطور في سوق الأوراق المالية على النمو الاقتصادي، وذلك باستخدام منهج الانحدار الذاتي للإبطاء الموزع ARDL.

تشتمل النتائج الرئيسة للدراسة على ما يلي: ١) لا توجد علاقة على المدى القصير بين تطور سوق الأوراق المالية والنمو الاقتصادي. ٢) تأثير تطوير سوق الأوراق المالية على النمو الاقتصادي سلبي على المدى الطويل ٣) العوامل الرئيسة المؤثرة على النمو الاقتصادي في مصر خلال هذه الفترة قد تكمن في عوامل أخرى مثل التعليم. ٤) لا توجد علاقة بين القطاع المصرفي والنمو الاقتصادي على المدى القصير ولا على المدى الطويل. ٥) تتطابق النتائج مع أدبيات بعض الدول النامية ومنها مصر؛ فقد تكمن السبب وراء العلاقة السلبية في ضعف سوق الأوراق المالية وعدم تقدمه. ٦) النتائج التي تم التوصل إليها قوية ومستقرة.

الكلمات المفتاحية: النمو الاقتصادي – سوق الأوراق المالية – M2، القيمة السوقية – الانفتاح التجاري

Introduction

The stock market acts as a financial intermediary through allocating saving funds to mitigate the creditors' risks and enhance profitability by increasing the efficiency of financial intermediaries. It also provides investors with the opportunity to raise capital at reasonable costs away from credit market and thus escape from the issue of asymmetric information. This encourages companies to increase their investments, and hence improves the efficiency of resource allocation and thereby increasing economic growth (Mamun et al. 2018). To this end, national governments try to keep a close monitor and control on the activities of stock markets.

The growing importance of financial markets around the world renews the interest to investigate whether development of the stock market specifically can promote long-run economic growth or not. Traditional economists believe that there is no correlation between stock market and economic growth (Karki, 2016). However, a stream of research has begun to test this relationship deeply, starting by the pioneering work of Schumpeter (1911) and the works of McKinnon (1973) and Shaw (1973). However, others have found a negative impact for stock market on economic growth on the long run such as Pan and Mishra (2018). Knowing whether stock market development positively affects economic growth or not helps governments to reshape the financial sector and follow appropriate economic policies that support its economic growth. Accordingly, this paper is going to expand the literature and test the relationship between stock market development and economic growth in Egypt during the critical economic period of 2009 to 2019 which has experienced many economic and political events and to answer the following questions using both descriptive and econometric analysis: Does relationship exist between stock market development and economic growth in Egypt? If yes, is it positive or negative? Does it hold in the long-run?

The paper is organized as follows: Section 1 shows the literature and empirical review. Section 2 introduces an overview for stock market in Egypt and its development during the period 2009 till 2019. Section 3 highlights the methodology that is applied throughout the whole analysis performed. Section 4 visualizes the descriptive part of the stock market evolution. Section 5 explains the econometric model used. Section 6 pinpoints the main empirical findings. Then the conclusion is presented.

1- Literature Review

1-1 Theoretical framework

The growing importance of stock market role all over the world has motivated a stream of research to examine the relationship between financial development and economic growth, more specifically the effect of stock market development on economic growth. The general idea that financial development is related to economic growth can be explained theoretically within the framework of endogenous growth models, which argue that economic growth is self-sustaining without exogenous technological progress and is influenced by initial economic variables from inside the economy. The development of financial markets is endogenous as they represent normal part of the process of economic growth (Barro & Sala-i-Martin, 1995). Unlike the traditional growth theory that couldn't explain the relationship between the financial sector and economic growth, as it focuses on the steady state level of productivity not on the growth rate, the new framework of endogenous growth model explains this relationship by arguing that stock market development is a key element in fostering long-run economic growth. As it results in efficient allocation of resources, capital accumulation and technological innovation (Levine, 1997; Agarwal, 2001)

Mckinnon (1973) and Shaw (1973) have developed an important framework in literature to examine the relationship between financial development and economic growth. They show that financial market development is a key to economic growth and is significantly correlated with the level of per capita income. However, these two studies provide little analytical perspective to the outline of the role of stock markets, in fact Shaw argues that stock market development in early stages of development could be very costly to achieved for developing countries. Cho (1986) offers a more structural analysis of the role of stock market to the Mckinnon-Shaw framework by applying the theory of credit rationing that is introduced by Stiglitz and Weiss (1981). Cho argues that credit markets cannot work efficiently without stock market. His point of view can be summarized as follows: (i) the banking sector suffers from lack of information and cannot always achieve efficient allocation of capital in credit market. (ii) On the other hand, stock markets are free from adverse selection and moral hazard problems. Therefore, the expected return on equity investor would be the same as expected return from a project. (iii) Accordingly, the development of stock markets is rather a necessary condition for achieving financial liberalization.

Another strand of the literature examines the direction of causality between financial market development and economic growth (Colombage, 2009). A major problem concerning this issue is which variable precedes the other: Is financial growth a stimulus or motivator for economic growth or does economic growth energize and enhance the financial growth? There are four broad views in literature regarding the relationship between financial development and economic growth. These possible directions of

causality between financial development and growth are labeled by as the supply-leading, demand following, support feedback hypothesis and finally the no causality relationship (Patrick, 1966).

The first and the most dominant view indicates that there is unidirectional causality relationship from stock market development to economic growth which is known as “supply-lending” view (Pradhan et al, 2014). Proponents to this view explain that financial intermediation result in economic growth through two main channels: (1) increasing the efficiency by which the capital is accumulated and (2) increasing the saving rate which results in raising the investment rate as well (Al-Yousif, 2002). In other words, the presence of a well-developed financial system reduces information and transaction costs and efficiently allocates capital, and thus promotes investment and technological innovation, and finally boosts economic growth (Levine & Zervos, 1996; ACMA, 2020) The second view clarifies that the there is also a unidirectional relationship between both variables. However, unlike the first view, it suggests that the causality relation goes from economic growth to stock market development which is known as “demand-following” view (Pradhan et al, 2014). Economists who support the demand following view explains that the surge in demand for economic activities has called for expanding and creating financial services, institutions, and markets. This means that financial development follows the lead of economic growth (Nwagu, 2020).

The third view “support feedback hypothesis” believes that the relationship between financial development and economic growth is rather a bidirectional one (Hou, & Cheng, 2010), thus, the causation runs in both directions simultaneously (Pradhan et al, 2014). Finally, the fourth view argues that there is no mutual relationship. Economists, who support this view, clarify that both financial development and economic growth are not causally related (Al-Yousif, 2002). Proponents of this view claim that economists badly overstress the role of financial factors in economic growth (Lucas Jr, 1988). Along this study, the focus is on the supply lending view. However, it is worth mentioning that the supply-leading finance neither imply that finance is a necessary condition nor a precondition for achieving or sustaining economic development. Rather, it presents an opportunity to induce and motivate real growth by financial means (Patrik,1996).

1-2 Empirical Review:

This section examines some of the related studies that focus on the relationship between stock market development and economic growth. Scholars do not reach consensus about the nature and direction of the relationship as the results depend on the model employed, type of data used in the analysis and the period of study (Paramati & Gupta, 2011). Thus, empirical studies could be categorized into four groups.

The first group is those studies that find a significant positive relationship between stock market development and economic growth as stock market development leads to economic growth. One of these studies is that of Arestis et al (2001). The paper has investigated the relationship between stock market development and economic growth, controlling the effects of banking system and stock market volatility by utilizing time varying quarterly data from five developed economies: France, Germany, Japan, the United Kingdom, and the United States for the time span of 1968 to 1998. The analysis is made using a vector autoregression (VAR) framework making use of the following variables: quarterly data on output and indicators of banking system development, stock market development and stock market volatility. Where, output is measured by the logarithm of real GDP; stock market development by the logarithm of the stock market capitalization ratio; banking system development by the logarithm of the ratio of domestic bank credit to nominal GDP; stock market volatility measured by an eight-quarter moving standard deviation of the end-of-quarter change of stock market price. The empirical results argue that both stock markets and banks seem to play an important role in the promotion of output growth in France; Germany and Japan in both the short run and the long run. Yet, in the case of United States stock market development is positively related to real GDP and to banking sector development but in the long-run evidence suggest that financial development does not cause real GDP growth in the long run. Also, one of the main findings is that bank-based financial systems is able to promote long-term growth more than capital-market-based ones. Stock market volatility on the other hand has negative real effects in Japan, France, the United States and the United Kingdom.

The second group of studies tackles those who find that economic growth and stock market development reinforce each other or mutually causal. From these studies one is performed by Pradhan, Arvin, Hall, and Bahmani (2014). The study analyzes the relationship among banking sector development, stock market development, economic growth, and four other macroeconomic variables in 25 member countries of ASEAN regional forum (ARF) using annual time series data over the period of 1961–2012. The analysis considers four samples of countries. The first sample consists of 10 countries that are recognized as ARF-Member Countries (AMC), the second sample consists of 9 countries that are recognized as ARF-Dialogue Partner Countries (ADC), the third sample consists of 6 countries that are recognized as ARF-Observer Countries (AOC), and the fourth sample consists of all 26 countries (ATC) that were included in AMC, ADC, and AOC. The variables used in the study are banking sector development, stock market development, per capita economic growth (GDP), and a set of four other macroeconomic variables namely foreign direct investment, trade openness, inflation rate, and government consumption expenditure. Banking sector development is measured by broad money supply, claims on private sector, domestic credit provided by the banking sector, and domestic credit to the private sector. While stock market development is measured using market capitalization,

percentage of change in the total value of traded stocks, turnover ratio, and the number of listed companies. The study relies on principal component analysis to construct the development indices and employs co-integration test to determine if there is a long-run equilibrium relationship among the variables in addition to panel vector auto-regressive model for testing the Granger causalities. Focusing only on stock market development and economic growth in the short run, the study finds for Dialogue Partner Countries (ADC) bidirectional causality between stock market development and economic growth while for the remaining three samples (AMC, AOC, ATC) unidirectional causality exists from stock market development to economic growth.

The third group of studies includes those who claims for negative relationship between stock market development and economic growth. Studies performed by Shleifer and Summers (1988), as well as Morck et al., (1990a) show that the stock market development could adversely affect economic growth of the country due to the fact that this kind of development would allow more counterproductive corporates to takeover. As some managers would rely on the stock market as the only source of information to make their decisions, which may or may not be correct about the future. For example, the takeover may happen due to low stock price. This low price prevents the top management from increasing investment in the firm due to the prospect of further erosion in the stock price. Also, Devereux and Smith (1994) mention the saving rates minimization potential that could occur as a result of greater risk sharing through internationally integrated stock markets, which would affect the economic growth negatively.

The fourth group of studies represent those who confirm the lack of significant relationship between stock market development and economic growth. A study was conducted by Naceur and Ghazouani (2007) using an unbalanced panel data from 11 MENA region countries over the period 1979–2003 in order to examine the relationship among stock markets, banks and economic growth. The variables used are the growth of real per capita GDP as a measure of economic growth, stock markets development measured by market capitalization to GDP ratio, value traded variable as a measure of liquidity and the turnover ratio to capture the efficiency of the domestic stock markets. The analysis is based on estimation of a dynamic panel model with the generalized method of moments estimators. The empirical results show no significant relationship between banking and stock market development, and growth. Therefore, further stock market development does not play a statistically significant role on stimulating further economic growth. This lack of relationship could be linked to underdeveloped financial systems in the MENA region that hamper economic growth. On another note, it is expected that empirical results may be a bit different for developing counties than developed countries, as they suffer from lack of a well-developed stock market. Thus, other empirical studies like Bencivenga and Smith (1991), Adajaski and Biekpe (2006) state that no significant relationship between stock market improvement and economic growth are recorded, especially in the case of developing countries.

2- Overview for stock market evolution

2-1 Evolution and Establishment of the Stock Market:

Before 1989, there were only five stock markets existing in Sub Saharan Africa and three in North Africa. However, nowadays, there has been a significant development of capital markets in Africa as there are currently 19 stock exchanges that initiated from Uganda and Mozambique stock exchanges to the Nigeria and Johannesburg stock exchange markets between 1992 and 2002.

Alexandria witnesses the establishment of the first stock exchange in 1883 while Cairo's stock exchange dates back to 1903. In 1907, there was a significant increase in the number of listed companies as it reaches 228 with a market capital of about 91 million Egyptian pounds. However, post the 1952 Revolution and the move towards nationalization, the number of the listed companies decreased dramatically which affected the activity of the stock exchange until the government adopted economic reform and privatization programs. (Otaify, 2016)

The Capital Market Law was issued in 1992 , and there were subsequent regulations and decisions that leads to open the door again for revitalization of the Egyptian Exchange. Year after year, Improvements continues to take place in the form of activities and new institutions until the Egyptian Stock Exchange became one of the strongest in the region. (Otaify,2016)

2-2 Evolution of the Stock Markets in Egypt during (2009-2019)

The period of 2009 till 2019 witnessed many important national and international events that have affected the Egyptian Stock Exchange such as: the global financial crisis of 2008, the 25th of January 2011 Revolution, the 30th of June 2013 Revolution, the floatation of the Egyptian pound, and the Economic reform program of 2016. In response, the Government and authorities had taken corrective actions to mitigate the effects of these events on the stock market. There were great efforts directed towards restructuring the Over the Counter (OTC) market during this period to improve investment climate for non-listed companies. It is worth mentioning that during the period of 2009 to 2019 EGX has made intensive external and internal promotional campaigns to restore confidence in the Egyptian Market, which increased the number of newly coded investors as well as the listed companies. From 2009 till 2019, EGX launched a set of new indices, namely, EXG 70, EGX 100, and EGX 20 Capped Index. (EGX, various issues)

Despite the recession of 2008, Egypt witnessed a number of improvements in 2009 especially in the EGX front, namely, the establishment of the Egyptian Financial Supervisory Authority (EFSA), which merged many entities together with the financial leasing, factoring and securitization activities under one entity. This year has also witnessed a number of technological developments, such as the signature of EGX on an agreement with London Stock exchange (LSE) to connect the two markets via

FIX connectivity system. This provided EGX access to more liquidity and made it the hub in the Middle East and Africa region (EGX, 2009). The year 2009 witnessed a rising penetration of foreign investors into the Egyptian market with a large influx of investments (EGX, 2009).

The Egyptian stock market has passed many laws and decrees that regulate it, but one of the main decrees that is related to the study period is the presidential decree No. 121 of 2009 regarding the management of the Egyptian Stock Exchange and its financial affairs. This decree has been amended several times during the study period. The decree gives EGX the right to participate in establishing companies and identify the three main resources of the Egyptian stock market. The Nile Stock Exchange was introduced to represent the small and medium-sized companies that are listed in the stock exchange (Egypt's Presidency, 2009)

During the early days of the 25th of January Revolution in 2011, EGX was forced to suspend trading until things become more stable. The political instability occurred during and after the revolution affected the economic and financial climate negatively. All stock market indices experienced and the Egyptian participation steep declines due to the revolution outbreak and the political instability that the country had faced at that time (Ahmed, 2016). So, it was necessary to take precautionary measures to protect the market after re-opening. These measures encompass the amendment of the price limits on the listed shares and the suspension of intra-day trading.

In 2016, the government had launched the Economic Reform Program which aimed at regaining the economic stability. During that time, Egyptians had grown confidence in the market after the liberalization of the currency which had affected their decisions to participate in the Egyptian stock market, especially after IMF approved a three-year loan of USD 12 billion in order to restore the macroeconomic stability and promote inclusive growth (IMF, 2019).

From 2017 to 2019, Egypt had witnessed a lot of industrial, touristic, infrastructural and road projects as well as investments in the country as the Suez Canal and Ras Ghareb Wind Farm. Those all had been reflected in the foreign participation in the Egyptian stock market which had boomed compared to the previous years. Also, during this period there were some amended laws that have been implemented such as the amendment of 2018 which allow stock split more than once per stock per year, expanding price limits for companies that subject to tender offers with a price outside price limit, and reducing trading halt time from 15 minutes to 10 minutes (EGX, 2018). Also, in 2019, the short-selling mechanism was activated, such mechanism was initially issued in 2004, but was not yet activated (EGX, 2019). All these decrees aimed at facilitating decision making and the functioning of the stock market, as well as enhancing its independence and transparency and enhancing liquidity.

3- Methodology

The present study depends on secondary data collected from the World Bank, International Financial Statistics (IFS), The Egyptian Ministry of Planning (MOP) and Central Bank of Egypt (CBE). The time series data for Egypt is collected from 2009 till 2019 for stock market indicators, economic growth indicators, banking sector variables and other relevant macroeconomic variables. Following the literature, the following table highlights the definition of variables used, the indicators and its source.

Table 1 Definition of the variables used in the study and there source.

Variable	Indicators	Definition	Source
Stock Market	1-Stock Market Capitalization	It is defined as the market price at end of year times the number of shares outstanding of the domestic listed companies. It is calculated as a percentage of GDP at the end of the year	CBE
	2-Turnover ratio of stocks traded	It is calculated by the researchers as the total value of domestic securities traded divided by their market capitalization.	CBE
Economic Growth	GDP growth rate	It is calculated by the researchers as the annual percentage growth rate of the quarterly the real GDP based on expenditure approach using market prices and constant prices for the base year 2016/2017	MOP
Banking Sector	Ratio of M2 to GDP	It is calculated by the researchers where M2 is calculated by the CBE as money supply plus quasi-money.	CBE
Extent of integration with the rest of the world	Trade Openness	It is the trade of goods and services as a percentage of GDP in which trade is calculated as the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Bank
Human Capital Formation	Gross Primary enrollment ratio	It is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education	World Bank

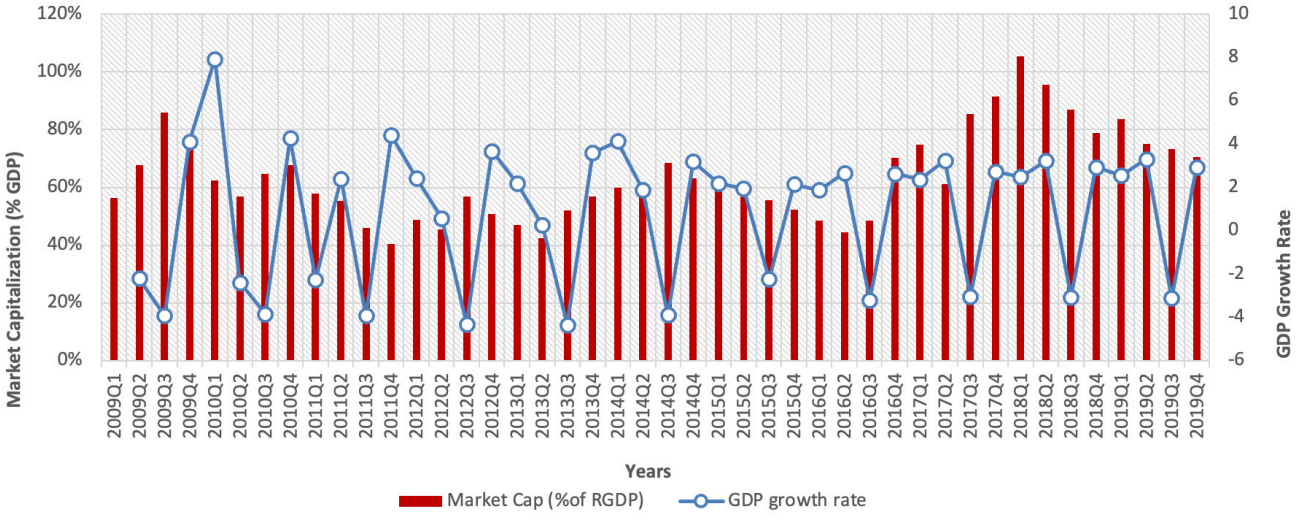
This study applies both quantitative and qualitative approach to investigate the relation between stock market and economic growth in Egypt in the period from 2009 till 2019. On the qualitative side, graphical illustration is applied to depict the evolution and trend of various stock market variables. On another front, the quantitative part focuses on investigating the empirical effect of stock market development on economic growth taking into consideration the other macroeconomic variables that may affect the economic growth. To carry out time series analysis, unit root tests are performed. Depending on the results of ADF test, the study employs the ARDL approach. Moreover, the ARDL model is preferred as it is suitable for small samples sizes in addition to providing unbiased estimates and statistically significant t-statistics in the long term (Elhassan & Braima, 2020).

4- Descriptive Analysis

Figures 1 and 2 examine both the evolution of the market capitalization to GDP and the GDP growth rate in Egypt and that of the shares turnover ratio with the GDP growth rate respectively. The market capitalization ratio of the GDP reflects the economic significance of stock market in the national economy and therefore researchers usually use this variable and the shares turnover ratio as a proxies of the stock market development and the GDP growth is used as a proxy for the economic growth (Otaify, 2016).

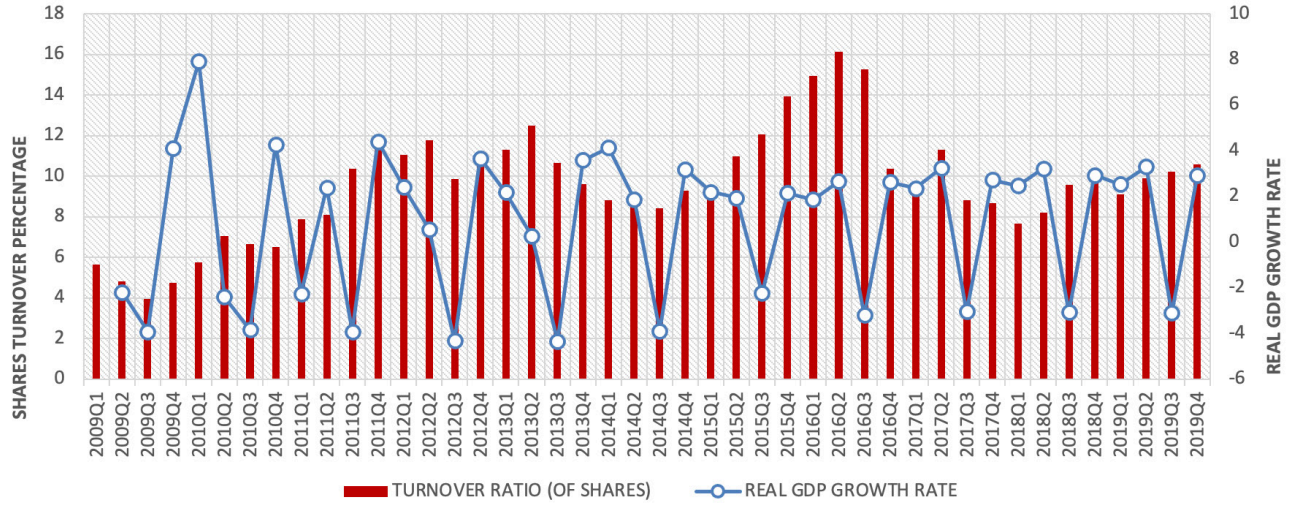
From both graphs it is obvious that: the GDP growth rate has reached one of its highest rates in Q1 2010. This has been driven by the increase in domestic consumption and the positive contribution of external demand. This is in addition to tourism that has shown solid growth and the Suez Canal revenues that has shown some signs of slow recovery. In addition to that, the turnover ratio increased significantly from 5% in Q1 of 2009 to almost 12% in Q4 2011 which made the stocks more attractive for the foreigners to invest in Egypt as it reflects the increasing activity over the listed stocks. As a result, the Foreign Participation percentage from the Total Traded Securities Value increased from 22% to 29%. (World Bank, 2010). During 2011, the GDP has suffered from a lot of fluctuations due to the political and economic instability prevailing during this time. Such instability took its toll on the stock market as well. The number of newly listed shares have declined to reach 213 by 2011 and the total value traded of stocks has plunged to reach EGP 148 billion also market capitalization to GDP has declined to reach its minimum at 41% this was partly caused due to closing the EGX around 55 days after the revolution. That was also reflected on the Turnover Ratio, as it reaches its highest value in the second quarter of 2013 that is 16.15% to be also reflected positively on the Foreign Participation Percentage in relation to 2012 and 2014 (Figure 1) (EGX, 2011). The market capitalization to GDP has increased in Q4 2016, the year in which The Economic Reform Program launched; this was was partly due to stability of the global economy and the new amendments to the listing rules which has led to increasing number of the listed companies to reach 222 companies (EGX, 2016). Then from 2017 to 2019, the Stock Turnover ratio begins to decline, especially from Q4 2016 up till the end of 2019. The values of the Turnover Ratio are just around the mean of 9% of the Market Capitalization. However, the greatest increase in the Market Capitalization to GDP has taken place in Q1 2018, this was mainly triggered by the new EGX amendments and rules which had worked on motivating investors to regain trust in the market (EGX, 2018). The graphical illustration presented above fails to capture any clear pattern of relation between stock market development and economic growth

Figure 1 GDP Growth Rate and Market Capitalization (% of GDP). (2009-2019)



Source: Researcher's Formulation according to CBE reports and Ministry of Planning reports.

Figure 2 Real GDP Growth Rate and Stock Turnover Ratio (2009-2019)



Source: Researcher's Formulation according to CBE reports and Ministry of Planning reports.

5- Quantitative Analysis

5-1 Unit Root Test:

First, the study employs the ADF stationary test to examine the stationarity of the time series for the variables used and to make sure that none of them is stationary at second difference. The ADF test results show that Real GDP Growth Rate variable is stationary at their level. According to the ADF results in Table 2, as the P-value is ≤ 0.05 the null hypothesis of having a unit root (non-stationary) is rejected for these variables at the 1%, 5%, 10% significance levels. The table also pinpoints that Stock Turnover Rate (%Real GDP), Trade Openness (%Real GDP), Market Capitalization (%Real GDP), and M2 (%Real GDP), Primary Education Enrollment Rate, variables are all stationary at the first level of difference. None of the variables is stationary at the second difference which allows for the employment of the ARDL approach.

Table 2:Summary for the results of ADF Test for stationarity

Variable	Abbreviation	t-statistic	ADF Test (P-value)	Decision
Real GDP Growth Rate	GRGDP	-3.586477	0.0000	I (0)
M2	M2	-7.376696	0.000	I (1)
Primary Education	PI	-5.378035	0.0001	I (1)
Market Capitalization	MCAP	-6.292906	0.000	I (1)
Stock Turnover Ratio	TR	-5.529848	0.0000	I (1)
Trade Openness	TRD_OP	-2.101369	0.0357	I (1)

Source: authors' analysis based on the findings of the ADF test.

5-2 ARDL Bounds Test:

Depending on the results of ADF test, the study employs the ARDL approach; the ARDL approach provides unbiased estimates and statistically significant t-statistics in the short term even when some of the regressors are endogenous (Odhiambo, 2011). The ARDL approach is applied as follows: after the unit roots test, the long-term and short-term models are estimated by the bounds test and error correction model (ECM). The decision is made depending on the F-statistic value as if it is the upper bound critical value or larger, the null hypothesis of having no cointegration (no long run relationship) is rejected. If the computed F-statistics is less than the lower bound critical value, this means that the null hypothesis of cointegration cannot be rejected. But in case the computed test F-statistics value falls within the lower and upper bound critical values, the decision will be inconclusive.

An ARDL bounds test is specified as follows:

$$GRGDP = \beta 1\ PIt + \beta 2\ M2t + \beta 3\ MCAPt + \beta 3\ TRt + \beta 4\ TRD\_OP\ t + \varepsilon t$$

Where the main hypothesis is as follows:

H0: β1=…… = β8 indicating that there is no cointegration

H1: β1≠……≠ β8 indicating that there is a cointegration

6- Empirical Findings:

This section shows the empirical findings. The ARDL model is estimated using Restricted, Constant trend specification with maximum lags= 4 for both the dependent variable and the regressors where the model selection criteria selected is Akaike Information Criterion (AIC), while the Ordinary option is selected for the Coefficient Covariance matrix.

The R-squared value for the estimated ARDL model in table (14) in the appendix is 0.944020 meaning that approximately 94% of the variance in real GDP growth rate is explained by the incorporated independent variables in the model which indicates overall goodness-of-fit for the model. Considering the F-bound test results in Table (3), the F-statistic is greater than the upper bound with all significance levels, so the null hypothesis of no cointegration is rejected which means that there is long run relationship between the variables at 1 % significance level; therefore, the results of the model can be used and the model is robust.

Table 3 F-Bounds test results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	38.23185	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	40		Finite Sample: n=40	
		10%	2.306	3.353
		5%	2.734	3.92
		1%	3.657	5.256

Source: authors' analysis based on the findings of the ARDL approach.

6-1 Short-term error correction:

The short-term results of the ARDL are depicted in Table (4) and Table (15) in the appendix. It shows that (i) primary education enrolment, the proxy for human capital formation, is statistically significant in the short-run at 0.05 significance level, hence when primary education enrolment increases by 1% real GDP growth rate increases by 2.206%. (ii) All other variables, including market capitalization and turnover ratio, are insignificant in the short-run as their p-value is greater than 0.05. These results support the previous findings by Bencivenga and Smith (1991), Adajaski and Biekpe (2006) and Naceur and Ghazouani (2007), who state that no significant relationship between stock market improvement and economic growth are recorded, especially in the case of developing countries. On the other hand, these results are in contrast to those of Elhassan and Braima (2020), who demonstrate that market capitalization and turnover ratio are significant in the short-run and have a negative impact on economic growth in Sudan.

Table 4 Short run effects of ECM test

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-55.02691	17.76151	-3.098098	0.0069
GRGDP(-1)*	-3.926090	0.258897	-15.16467	0.0000
PI(-1)	0.793002	0.217821	3.640620	0.0022
TRD_OP(-1)	-0.287549	0.087959	-3.269111	0.0048
MCAP(-1)	0.004527	0.089607	0.050516	0.9603
TR(-1)	-1.456486	0.603879	-2.411883	0.0282
M2(-1)	0.005735	0.011619	0.493604	0.6283
D(GRGDP(-1))	1.872430	0.173713	10.77889	0.0000
D(GRGDP(-2))	0.949264	0.095535	9.936259	0.0000
D(PI)	2.206282	0.344778	6.399132	0.0000
D(TRD_OP)	0.043086	0.228607	0.188470	0.8529
D(TRD_OP(-1))	0.153843	0.235263	0.653919	0.5225
D(TRD_OP(-2))	-0.317618	0.248466	-1.278315	0.2194
D(MCAP)	0.128464	0.106236	1.209233	0.2441
D(MCAP(-1))	-0.027849	0.087673	-0.317644	0.7549
D(MCAP(-2))	-0.061631	0.080808	-0.762679	0.4568
D(TR)	0.212933	0.572414	0.371992	0.7148
D(TR(-1))	0.614786	0.692005	0.888413	0.3875
D(TR(-2))	0.086705	0.703269	0.123289	0.9034
D(TR(-3))	0.330296	0.276873	1.192951	0.2503
D(M2)	0.009039	0.016793	0.538238	0.5978
D(M2(-1))	0.002570	0.014614	0.175859	0.8626
D(M2(-2))	0.038588	0.014961	2.579204	0.0202
D(M2(-3))	0.048121	0.017021	2.827138	0.0121

Source: authors' analysis based on the findings of the ARDL approach.

6-2 Estimation of Long Run coefficient:

Table 5 shows the long run relation between stock market development (market capitalization and turnover ratio) and economic growth (real GDP growth rate). The MCAP is statistically insignificant at 0.05 level of significance meaning that the MCAP does not affect the economic growth in the long term as well as the short run. This is contradicting with the findings of Osaseri and Osamwonyi (2019) and Rezina (2017).

Table 5 Long run results for the ECM Test

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PI	0.201983	0.054932	3.676982	0.0020
TRD_OP	-0.073241	0.023095	-3.171322	0.0059
MCAP	0.001153	0.022808	0.050550	0.9603
TR	-0.370976	0.157484	-2.355640	0.0316
M2	0.001461	0.002973	0.491306	0.6299
C	-14.01570	4.362275	-3.212934	0.0054
EC = GRGDP - (0.2020*PI -0.0732*TRD_OP + 0.0012*MCAP -0.3710*TR + 0.0015*M2 - 14.0157)				

Source: authors' analysis based on the findings of the ARDL approach.

Also, M2 is not significant at 0.05 level of significance which clarifies that there is no relation between the banking sector and the economic growth neither in the short run nor in the long run. Although the turnover ratio in not significant in the short run, it becomes statistically significant in the long run and negatively related to the economic growth, so a 1% increase in the turnover ratio results in 0.37% decrease in economic growth. These results contradict with those of Elhassan and Braima (2020) who found that there is no long run relationship between the turnover and economic growth. Nevertheless, the reports results are consistent with that of Rezina (2017) and Ishioro (2013) who demonstrate that

there is a negative relationship between the economic growth and turnover. The primary education appears to be significant in both the short and long run at 0.05 significance level, so a 1% increase in the primary education would increase the economic growth by 0.20%. Unlike the short run results, trade openness in the long run turns to be significant as its p-value is less than 0.05. It is apparent that there is a negative relationship between the trade openness and the economic growth so that a 1% increase in the trade openness would result in decreasing the economic growth by 0.07%.

6-3 Stability and Heteroskedasticity Tests:

Table 6 Ramsey RESET test results.

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: GRGDP GRGDP(-1) GRGDP(-2) GRGDP(-3) PI PI(-1) TRD_OP TRD_OP(-1) TRD_OP(-2) TRD_OP(-3) MCAP MCAP(-1) MCAP(-2) MCAP(-3) TR TR(-1) TR(-2) TR(-3) TR(-4) M2 M2(-1) M2(M2(-3) M2(-4) C

	Value	df	Probability
t-statistic	0.128140	15	0.8997
F-statistic	0.016420	(1, 15)	0.8997
Likelihood ratio	0.043762	1	0.8343

Table 7 Breusch-Pagan-Godfrey Heteroskedasticity test results

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.652429	Prob. F(23,16)	0.1519
Obs*R-squared	28.14944	Prob. Chi-Square(23)	0.2102
Scaled explained SS	4.702839	Prob. Chi-Square(23)	1.0000

Source: authors' analysis based on empirical findings.

Ramsey RESET test is performed to check the stability of the test with null hypothesis stating that there is correct specification in the model. In Table (6) the value of both t-statistic and F-statistic is greater than 0.05, so with 95% confidence level the null hypothesis is not rejected indicating that the used model is stable and correctly specified.

To check that the homoskedasticity assumption is not violated in the used model which may affect the results of the model, Breusch-Pagan-Godfrey Heteroskedasticity test is performed and the results is showed in Table (7). The results indicate that with 95% confidence level, the null hypothesis of homoskedasticity (equal error variances) is not rejected meaning that the results of this model can be used.

Conclusion

The aim of this study is to investigate the empirical relation between stock market development and economic growth in Egypt over both the short-run and long-run. This relationship is examined throughout the period 2009-2019 using both qualitative and quantitative analysis. The descriptive analysis shows that there is no obvious relationship between stock market development and the GDP growth rate which is a proxy for Economic Growth. While, the quantitative analysis is performed using ARDL model. The main variables used in the analysis are Market capitalization to GDP and the

turnover ratio to proxy stock market development, growth rate of real GDP to proxy economic growth, the ratio of M2 to GDP to represent the banking sector, trade openness which measures the extent of integration with the rest of the world, and Gross Primary School Enrolment rate which proxies human capital formation. The findings of the model indicate that the performed model is stable and its results are valid and robust. The main results are as follows: a long run relationship exists between real GDP growth rate and stock market development (holds only for the turnover ratio), human capital formation, and trade openness. Both the turnover ratio and trade openness affect the economic growth negatively, in contrast to primary education that affects the economic growth positively. In the short run, the only significant variable is the primary education that has the same positive effect on economic growth as in the long run, while the rest of the variables are insignificant. So, the empirical findings claim that economic growth is not always derived from stock market indicators as market capitalization or turnover ratio. Briefly, the stock market development has no relationship with economic growth in Egypt in the short run, while in the long run it can affect the economic growth negatively. This conclusion follows the literature of some developing countries, including Egypt, like the results of no relationship that is concluded by Naceur and Ghazouani (2007) in the MENA region due to the underdeveloped financial systems. This result is an alarm for decision makers to try to work on removing any challenges that hinder the development of the stock market so as to reap its real potential benefits.

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APPENDIX

The ADF test for all the ARDL model variables:

Table 8 ADF test results for the Real GDP Growth Rate (Dependent Variable)

Augmented Dickey-Fuller Unit Root Test on GRGDP

Null Hypothesis: GRGDP has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.586477	0.0106
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GRGDP)
Method: Least Squares
Date: 06/05/21 Time: 16:30
Sample (adjusted): 2010Q2 2019Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GRGDP(-1)	-1.912919	0.533370	-3.586477	0.0010
D(GRGDP(-1))	0.423518	0.404174	1.047860	0.3021
D(GRGDP(-2))	0.048658	0.271159	0.179446	0.8587
D(GRGDP(-3))	-0.346416	0.146227	-2.369030	0.0237
C	1.829561	0.593891	3.080636	0.0041

R-squared	0.892759	Mean dependent var	-0.127894
Adjusted R-squared	0.880142	S.D. dependent var	5.012892
S.E. of regression	1.735490	Akaike info criterion	4.059666
Sum squared resid	102.4054	Schwarz criterion	4.272943
Log likelihood	-74.16348	Hannan-Quinn criter.	4.136188
F-statistic	70.76039	Durbin-Watson stat	2.102896
Prob(F-statistic)	0.000000		

Table 9 ADF test results for the Primary Education

Augmented Dickey-Fuller Unit Root Test on D(PI)

Null Hypothesis: D(PI) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.378035	0.0001
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PI,2)
Method: Least Squares
Date: 06/05/21 Time: 15:54
Sample (adjusted): 2010Q2 2019Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PI(-1))	-1.033224	0.192119	-5.378035	0.0000
D(PI(-1),2)	0.355456	0.173021	2.054411	0.0477
D(PI(-2),2)	0.490187	0.159215	3.078779	0.0041
D(PI(-3),2)	0.547617	0.140470	3.898460	0.0004
C	0.129024	0.104062	1.239878	0.2235

R-squared	0.524124	Mean dependent var	-0.005117
Adjusted R-squared	0.468139	S.D. dependent var	0.864493
S.E. of regression	0.630465	Akaike info criterion	2.034490
Sum squared resid	13.51452	Schwarz criterion	2.247767
Log likelihood	-34.67256	Hannan-Quinn criter.	2.111012
F-statistic	9.361800	Durbin-Watson stat	1.852983
Prob(F-statistic)	0.000033		

Table 10 ADF test results for the Market Capitalization

Augmented Dickey-Fuller Unit Root Test on D(MCAP)

Null Hypothesis: D(MCAP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.292906	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MCAP,2)
Method: Least Squares
Date: 06/05/21 Time: 16:00
Sample (adjusted): 2009Q3 2019Q4
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MCAP(-1))	-0.977786	0.155379	-6.292906	0.0000
C	0.054016	1.415857	0.038150	0.9698

R-squared	0.497492	Mean dependent var	-0.340302
Adjusted R-squared	0.484929	S.D. dependent var	12.77276
S.E. of regression	9.166813	Akaike info criterion	7.315504
Sum squared resid	3361.218	Schwarz criterion	7.398250
Log likelihood	-151.6256	Hannan-Quinn criter.	7.345834
F-statistic	39.60067	Durbin-Watson stat	2.020048
Prob(F-statistic)	0.000000		

Table 11 ADF test results for the M2.

Augmented Dickey-Fuller Unit Root Test on D(M2)

Null Hypothesis: D(M2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.376696	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2,2)
Method: Least Squares
Date: 06/05/21 Time: 16:40
Sample (adjusted): 2009Q3 2019Q4
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	-1.155214	0.156603	-7.376696	0.0000
C	7.935585	3.118941	2.544320	0.0149

R-squared	0.576341	Mean dependent var	-0.181759
Adjusted R-squared	0.565750	S.D. dependent var	28.70091
S.E. of regression	18.91323	Akaike info criterion	8.764048
Sum squared resid	14308.40	Schwarz criterion	8.846794
Log likelihood	-182.0450	Hannan-Quinn criter.	8.794378
F-statistic	54.41565	Durbin-Watson stat	2.045358
Prob(F-statistic)	0.000000		

Table 12 ADF test results for the Trade Openness.

Augmented Dickey-Fuller Unit Root Test on D(TRD_OP)

Null Hypothesis: D(TRD_OP) has a unit root
Exogenous: None
Lag Length: 4 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.101369	0.0357
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRD_OP,2)
Method: Least Squares
Date: 06/05/21 Time: 16:44
Sample (adjusted): 2010Q3 2019Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TRD_OP(-1))	-0.363537	0.173000	-2.101369	0.0433
D(TRD_OP(-1),2)	0.042787	0.165179	0.259034	0.7972
D(TRD_OP(-2),2)	0.205765	0.161837	1.271430	0.2125
D(TRD_OP(-3),2)	0.250198	0.161518	1.549041	0.1309
D(TRD_OP(-4),2)	-0.376187	0.157745	-2.384784	0.0230

R-squared	0.442599	Mean dependent var	-0.026339
Adjusted R-squared	0.375035	S.D. dependent var	1.832198
S.E. of regression	1.448439	Akaike info criterion	3.700929
Sum squared resid	69.23315	Schwarz criterion	3.916400
Log likelihood	-65.31764	Hannan-Quinn criter.	3.777592
Durbin-Watson stat	1.977482		

Table 13 ADF test results for the stock Turnover ratio.

Augmented Dickey-Fuller Unit Root Test on D(TR)

Null Hypothesis: D(TR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.529848	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TR,2)
Method: Least Squares
Date: 06/05/21 Time: 16:46
Sample (adjusted): 2009Q3 2019Q4
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TR(-1))	-0.861050	0.155710	-5.529848	0.0000
C	0.122063	0.208962	0.584138	0.5624

R-squared	0.433261	Mean dependent var	0.028670
Adjusted R-squared	0.419092	S.D. dependent var	1.770989
S.E. of regression	1.349800	Akaike info criterion	3.484237
Sum squared resid	72.87837	Schwarz criterion	3.566984
Log likelihood	-71.16899	Hannan-Quinn criter.	3.514567
F-statistic	30.57922	Durbin-Watson stat	1.996329
Prob(F-statistic)	0.000002		

Estimation Results:

Table 14 ARDL model results

Dependent Variable: GRGDP
Method: ARDL
Date: 06/04/21 Time: 18:47
Sample (adjusted): 2010Q1 2019Q4
Included observations: 40 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): PI TRD_OP MCAP TR M2
Fixed regressors: C
Number of models evalulated: 12500
Selected Model: ARDL(3, 1, 3, 3, 4, 4)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GRGDP(-1)	-1.053660	0.108644	-9.698243	0.0000
GRGDP(-2)	-0.923166	0.103056	-8.957939	0.0000
GRGDP(-3)	-0.949264	0.095535	-9.936259	0.0000
PI	2.206282	0.344778	6.399132	0.0000
PI(-1)	-1.413280	0.312344	-4.524749	0.0003
TRD_OP	0.043086	0.228607	0.188470	0.8529
TRD_OP(-1)	-0.176792	0.363992	-0.485702	0.6338
TRD_OP(-2)	-0.471461	0.387510	-1.216641	0.2414
TRD_OP(-3)	0.317618	0.248466	1.278315	0.2194
MCAP	0.128464	0.106236	1.209233	0.2441
MCAP(-1)	-0.151786	0.117712	-1.289473	0.2156
MCAP(-2)	-0.033782	0.087858	-0.384508	0.7057
MCAP(-3)	0.061631	0.080808	0.762679	0.4568
TR	0.212933	0.572414	0.371992	0.7148
TR(-1)	-1.054633	0.779088	-1.353677	0.1947
TR(-2)	-0.528081	0.670059	-0.788111	0.4422
TR(-3)	0.243590	0.663896	0.366911	0.7185
TR(-4)	-0.330296	0.276873	-1.192951	0.2503
M2	0.009039	0.016793	0.538238	0.5978
M2(-1)	-0.000733	0.020626	-0.035558	0.9721
M2(-2)	0.036018	0.018264	1.972050	0.0661
M2(-3)	0.009534	0.021833	0.436663	0.6682
M2(-4)	-0.048121	0.017021	-2.827138	0.0121
C	-55.02691	17.76151	-3.098098	0.0069

R-squared	0.944020	Mean dependent var	1.014076
Adjusted R-squared	0.863549	S.D. dependent var	3.102983
S.E. of regression	1.146219	Akaike info criterion	3.394524
Sum squared resid	21.02108	Schwarz criterion	4.407851
Log likelihood	-43.89047	Hannan-Quinn criter.	3.760911
F-statistic	11.73118	Durbin-Watson stat	2.198517
Prob(F-statistic)	0.000003		

*Note: p-values and any subsequent tests do not account for model selection.

Table 15 Bounds test, short-run and long-run coefficients estimates

ARDL Long Run Form and Bounds Test
Dependent Variable: D(REAL_GDP_GROWTH_RATE)
Selected Model: ARDL(3, 1, 3, 4, 3, 4)
Case 2: Restricted Constant and No Trend
Date: 06/05/21 Time: 15:39
Sample: 2009Q1 2019Q4
Included observations: 40

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-55.02691	17.76151	-3.098098	0.0069
REAL_GDP_GROWTH_	-3.926090	0.258897	-15.16467	0.0000
PRIMARY_EDUCATION(	0.793002	0.217821	3.640620	0.0022
MCAP(-1)	0.004527	0.089607	0.050516	0.9603
M2_GDP(-1)	0.005735	0.011619	0.493604	0.6283
TRADE____OF_GDP_(-	-0.287549	0.087959	-3.269111	0.0048
TURNOVER_RATIO__O	-1.456486	0.603879	-2.411883	0.0282
D(REAL_GDP_GROWT	1.872430	0.173713	10.77889	0.0000
D(REAL_GDP_GROWT	0.949264	0.095535	9.936259	0.0000
D(PRIMARY_EDUCATI	2.206282	0.344778	6.399132	0.0000
D(MCAP)	0.128464	0.106236	1.209233	0.2441
D(MCAP(-1))	-0.027849	0.087673	-0.317644	0.7549
D(MCAP(-2))	-0.061631	0.080808	-0.762679	0.4568
D(M2_GDP)	0.009039	0.016793	0.538238	0.5978
D(M2_GDP(-1))	0.002570	0.014614	0.175859	0.8626
D(M2_GDP(-2))	0.038588	0.014961	2.579204	0.0202
D(M2_GDP(-3))	0.048121	0.017021	2.827138	0.0121
D(TRADE____OF_GDP_)	0.043086	0.228607	0.188470	0.8529
D(TRADE____OF_GDP_	0.153843	0.235263	0.653919	0.5225
D(TRADE____OF_GDP_	-0.317618	0.248466	-1.278315	0.2194
D(TURNOVER_RATIO_	0.212933	0.572414	0.371992	0.7148
D(TURNOVER_RATIO_	0.614786	0.692005	0.888413	0.3875
D(TURNOVER_RATIO_	0.086705	0.703269	0.123289	0.9034
D(TURNOVER_RATIO_	0.330296	0.276873	1.192951	0.2503

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRIMARY_EDUCATION	0.201983	0.054932	3.676982	0.0020
MCAP	0.001153	0.022808	0.050550	0.9603
M2_GDP	0.001461	0.002973	0.491306	0.6299
TRADE____OF_GDP_	-0.073241	0.023095	-3.171322	0.0059
TURNOVER_RATIO__O	-0.370976	0.157484	-2.355640	0.0316
C	-14.01570	4.362275	-3.212934	0.0054

EC = REAL_GDP_GROWTH_RATE - (0.2020*PRIMARY_EDUCATION + 0.0012*MCAP + 0.0015*M2_GDP -0.0732*TRADE____OF_GDP_ -0.3 *TURNOVER_RATIO__OF_SHARES_ - 14.0157)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	38.23185	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	40		Finite Sample: n=40	
		10%	2.306	3.353
		5%	2.734	3.92
		1%	3.657	5.256

Stability and Heteroskedasticity tests

Table 16 Ramsey RESET test results

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: GRGDP GRGDP(-1) GRGDP(-2) GRGDP(-3) PI PI(-1) TRD_OP TRD_OP(-1) TRD_OP(-2) TRD_OP(-3) MCAP MCAP(-1) MCAP(-2) MCAP(-3) TR TR(-1) TR(-2) TR(-3) TR(-4) M2 M2(-1) M2(M2(-3) M2(-4) C

	Value	df	Probability
t-statistic	0.128140	15	0.8997
F-statistic	0.016420	(1, 15)	0.8997
Likelihood ratio	0.043762	1	0.8343

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.022986	1	0.022986
Restricted SSR	21.02108	16	1.313818
Unrestricted SSR	20.99810	15	1.399873

LR test summary:

	Value
Restricted LogL	-43.89047
Unrestricted LogL	-43.86859

Unrestricted Test Equation:
Dependent Variable: GRGDP
Method: Least Squares
Date: 06/05/21 Time: 17:17
Sample: 2010Q1 2019Q4
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GRGDP(-1)	-1.055537	0.113098	-9.332905	0.0000
GRGDP(-2)	-0.923402	0.106393	-8.679151	0.0000
GRGDP(-3)	-0.946091	0.101676	-9.304912	0.0000
PI	2.215175	0.362594	6.109245	0.0000
PI(-1)	-1.425810	0.336913	-4.231983	0.0007
TRD_OP	0.042034	0.236118	0.178022	0.8611
TRD_OP(-1)	-0.178795	0.376049	-0.475456	0.6413
TRD_OP(-2)	-0.468457	0.400686	-1.169138	0.2606
TRD_OP(-3)	0.319550	0.256917	1.243785	0.2327
MCAP	0.126022	0.111304	1.132230	0.2753
MCAP(-1)	-0.150965	0.121675	-1.240732	0.2338
MCAP(-2)	-0.030882	0.093471	-0.330387	0.7457
MCAP(-3)	0.059875	0.084532	0.708310	0.4896
TR	0.200748	0.598466	0.335437	0.7419
TR(-1)	-1.051258	0.804630	-1.306512	0.2111
TR(-2)	-0.516500	0.697534	-0.740466	0.4705
TR(-3)	0.233111	0.690156	0.337766	0.7402
TR(-4)	-0.320567	0.295710	-1.084060	0.2955
M2	0.009019	0.017335	0.520263	0.6105
M2(-1)	-0.000456	0.021401	-0.021297	0.9833
M2(-2)	0.035932	0.018864	1.904744	0.0762
M2(-3)	0.009427	0.022552	0.418042	0.6818
M2(-4)	-0.048167	0.017573	-2.740920	0.0152
C	-54.67986	18.53295	-2.950413	0.0099
FITTED^2	-0.004446	0.034693	-0.128140	0.8997

R-squared	0.944081	Mean dependent var	1.014076
Adjusted R-squared	0.854612	S.D. dependent var	3.102983
S.E. of regression	1.183162	Akaike info criterion	3.443429
Sum squared resid	20.99810	Schwarz criterion	4.498979

Table 17 Breusch-Pagan-Godfrey Heteroskedasticity test results

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.652429	Prob. F(23,16)	0.1519
Obs*R-squared	28.14944	Prob. Chi-Square(23)	0.2102
Scaled explained SS	4.702839	Prob. Chi-Square(23)	1.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/05/21 Time: 17:22
Sample: 2010Q1 2019Q4
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.76146	10.12785	-1.161299	0.2626
GRGDP(-1)	-0.007295	0.061950	-0.117750	0.9077
GRGDP(-2)	-0.073446	0.058764	-1.249862	0.2293
GRGDP(-3)	0.013798	0.054476	0.253293	0.8033
PI	-0.085419	0.196597	-0.434489	0.6697
PI(-1)	0.266861	0.178103	1.498353	0.1535
TRD_OP	0.104515	0.130355	0.801770	0.4344
TRD_OP(-1)	0.052165	0.207553	0.251334	0.8048
TRD_OP(-2)	-0.211590	0.220964	-0.957579	0.3525
TRD_OP(-3)	0.070585	0.141679	0.498205	0.6251
MCAP	-0.045379	0.060577	-0.749109	0.4647
MCAP(-1)	0.057740	0.067121	0.860243	0.4024
MCAP(-2)	0.029063	0.050098	0.580121	0.5699
MCAP(-3)	-0.104554	0.046078	-2.269076	0.0375
TR	-0.270061	0.326398	-0.827399	0.4202
TR(-1)	0.340120	0.444246	0.765612	0.4551
TR(-2)	0.379042	0.382076	0.992057	0.3359
TR(-3)	-0.872962	0.378562	-2.305994	0.0348
TR(-4)	-0.035841	0.157877	-0.227020	0.8233
M2	-0.002373	0.009576	-0.247851	0.8074
M2(-1)	0.012557	0.011761	1.067710	0.3015
M2(-2)	-0.008993	0.010414	-0.863548	0.4006
M2(-3)	0.015849	0.012449	1.273120	0.2212
M2(-4)	-0.011910	0.009706	-1.227137	0.2375

R-squared	0.703736	Mean dependent var	0.525527
Adjusted R-squared	0.277856	S.D. dependent var	0.769118
S.E. of regression	0.653589	Akaike info criterion	2.271034
Sum squared resid	6.834861	Schwarz criterion	3.284361
Log likelihood	-21.42067	Hannan-Quinn criter.	2.637421
F-statistic	1.652429	Durbin-Watson stat	1.756930
Prob(F-statistic)	0.151927		