Capital Controls and their financial impact on Greece, Cyprus and Russia

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I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

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Abstract

This research studies the impact of capital controls on the stock market. More specifically, the effects on the stock market of Greece, Cyprus and Russia were studied, before, during and after the imposition of capital controls in each country. The purpose of this study is to examine the behavior of the markets, the reaction of the investors before and after the announcement of the capital controls. The research was based on the returns and volume of transactions, approximately one year before (except for Cyprus where the time range was shorter) and one year after the introduction of the capital controls, regarding the general indices and the indices of high capitalization companies in the countries under review.

From the analysis, it was found that, the average values of the returns and the volume for both indexes of Greece, slightly increased compared to the period before and after the capital controls. An expected result of the analysis, was the increased volatility after the capital controls for the returns and mainly for the volume for both indexes, ASE & FTSE. This means that the market was more unstable and less predictable after the capital controls, even though the mean values were the same for the returns and the volume, between the two periods. An unexpected result was the increase in volume of transactions after the capital controls, a key difference compared to the countries under analysis. In Cyprus and Russia, the results are similar regarding the returns, for both indices. Nevertheless, volume dropped significantly after the capital controls, indicating that investors became more conservative. All three countries experienced higher volatility in returns (except for FTSE_CY) and volume, compared to the period before the capital controls. The findings indicate, finally, a co-movement between the returns and the volume of transactions for the countries under analysis.

Keywords: capital controls, returns, volume, Greece, Cyprus, Russia

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I. Introduction

i. Definitions and Basic Concepts

The concept of capital controls involves measures to achieve the regulation of the capital flows to and from an economy. Previously, the use of capital controls was a key tool for macroeconomic policy. Following the economic liberalization in the 1970s and 1980s, the imposition of capital controls was considered outdated and their imposition now takes place only in times of crisis and, most importantly, to minimize damage to the financial system (Economist, 2015). The possibilities of pursuing an independent monetary policy that is consistent with policies to achieve price stability, product growth and external sector development are more limited, and the use of capital controls constitutes a measure (Cordero & Montecino, 2010).

Events such as sudden changes in investor responses, external events, and government decisions have a major impact on the volatility of the short-term capital flows. A sharp increase in capital outflows may cause an imbalance of payments crisis, leading to a currency crisis that can also be combined with a financial crisis. A general distinction of capital controls measures, which also have a different impact on the economy, are the controls based on regulating market flows (by introducing tax-related or minimum reserve requirements) and controls based on in administrative or quantitative measures that entail more severe restrictions and limits (Cordero & Montecino, 2010). Also, the imposition of the capital controls can be distinguished in the measures taken in terms of capital inflows into a country and in capital outflows from a country, two different areas with different effects on the economy and macroeconomic developments (Magud, et al., 2011).

The Efficient Market Hypothesis is a theory stipulating that the markets are constantly and fully up to date or, alternatively, current securities prices fully reflect all relevant and available information in an effective way and are constantly changing to incorporate any new information that may arise (Ross, et al., 2010).

In practice, it has been proven that markets are not efficient, and decision-making is not always a rational process or a one-dimensional process, leading people to make mistakes in their decisions and actions. Thus, the need for a new approach

has emerged that will be able to interpret the behavior of financial markets and explain the market phenomena that the traditional economic theory has failed to interpret.

Behavioral finance attempts to explain and link the gap between theory and action as has been found that psychology influences considerably the investment decisions of individuals, leaving behind the financial models and the rational criteria for making a decision. In fact, behavioral finance deals with the study of the influence of social perceptions, emotional prejudices and psychological factors at both individual and collective level, and how these can cause turmoil in the capital market, the prices, the returns and resources. Especially in the extreme economic phenomena like today, human psychology has a negative impact on the economy, causing individuals operating in the financial markets to make a multitude of mistakes. These mistakes may come from false impressions and incomplete information and may lead to the dissolution of the entire financial system (Pompian, 2006).

The main purpose of behavioral finance is to create a link between all the components of the social sciences (psychology, sociology) and financial sciences to present the intellectual and emotional mistakes of investors that do not allow them to make clear-headed decisions (Thaler, 2005).

ii. Research Objectives

The main objective of the present study is to present and examine the impact of capital controls on the Greek, Cypriot and Russian economies by integrating theoretical and empirical data, researching the pattern of stock markets reaction to the announcement of the implementation of capital controls in the under-analysis countries. The capital control measures are expected to have a negative impact on the stock market.

The study's theoretical part consists of the literature background regarding the capital controls' framework, the aspects of the efficient market hypothesis and behavioral finance, while the empirical results aim to examine if the capital controls

affect the efficiency of the markets, by analyzing the markets' determinants, return and volume, after the announcement of the capital restrictions.

Specifically, the concept of capital controls is presented, as well as the advantages and disadvantages they present and the measures taken in the economies under consideration. Moreover, the concept and conditions of the Efficient Market Hypothesis are determined, the role of Behavioral Finance is presented in an attempt to explain the phenomena that go beyond the limits of rational decisions and involve psychological and sociological implications. Furthermore, we present indicative examples of capital control practices. Finally, in the theoretical approach of the subject, empirical research and studies on capital controls are presented.

In the research part of the present study, the methodological research framework is also presented, then a series of tests are performed, analyzing and comparing the stock markets' returns and volume, leading to a descriptive analysis of the data, in order to identify the markets' patterns between the two periods. Meanwhile, the autocorrelation function of the returns is examined and the co-movement between the returns and volume is tested. The findings of the research will enable drawing useful conclusions on the subject under consideration, conclusions that may be useful as a guide to future decisions that will facilitate the orderly functioning of the markets and reduce the negative effects of measures and policies implemented.

Chapter 1: Literature Review

1.1 Capital Controls

1.1.1 Types of capital controls

Capital controls are imposed when governments set restrictions on the inflow and outflow of capital into the economy. As each government's goal is to ensure stability and long-term growth, in the context of a globalized market and economy, the effectiveness of the restrictive measures has been questioned in the past. Nowadays, in the modern economies, such restrictions are rarely imposed (Neely, 1999). The types of Capital Controls are the following:

a. ***Minimum Stay Requirements***: In relation to capital investments, many countries enable the free movement of capital in and out of the country. Nevertheless, there is a fixed time framework in relation to the movement of inflows and outflows that determines the lock in period or a minimum stay requirement.

b. ***Limitations***: The money transferring out of the country is restricted by some countries or the citizens are not allowed to purchase foreign assets, while the foreigners are prohibited from acquiring domestic assets.

c. ***Specific limitations based on the transaction***: There are no reserve requirements that bear interest, taxes on the flows of portfolios or foreign assets, credit rating requirements for borrowing abroad, multiple exchange rate systems.

d. ***Caps on Asset Sales:*** In many countries of the world, the strategic asset groups are prohibited from being sold to foreigners. The free movement of capital in and out of such economies is allowed in various sectors.

e. ***Limit the Currency Trading***: To maintain the currency exchange rate at steady levels, some countries impose restrictions on the amount of foreign

currency available for trading. In countries with particularly strong export activity, the control of the exchange rate can help in the better planning of the economic activity and increases the competitiveness of the economy.

1.1.2 Effectiveness of capital restrictions

Although the available literature on capital restrictions is widening over a long period of time, looking at different enforced regimes, the effectiveness of restrictions on capital controls still differs in the empirical studies conducted. To analyze the effectiveness of capital controls, researchers used a number of different methods, which largely depend on the frequency and quality of available data. In the study of Ariyoshi et al., descriptive statistics are used to achieve qualitative results of the capital restrictions' effectiveness in Malaysia (1998), Spain (1992) and Thailand (1997). The researchers concluded that the capital outflow controls had only a temporary effect and, at best, provided the government with the necessary time to tackle macroeconomic abnormalities and implement structural reforms (Ariyoshi, et al., 2000).

Through a comprehensive review of the empirical results on capital controls, little evidence suggests the effectiveness of capital restrictions, excluding Malaysia (1998), as the capital controls implemented were successful and favored the development of an autonomous monetary policy. However, several researchers support that Malaysia's success was correlated with the Asian crisis ending and the recovering of the Asian economy capital controls implication (Magud, et al., 2011).

Unlike the case of Malaysia (1998), Edison and Reinhart (2010) stated that exchange rate volatility in Thailand (1997) increased during the capital controls period and that capital restrictions failed to reduce the level of neither interest rates, nor even fluctuations in volatility. In addition, empirical analyses by Edison and Reinhart indicate that capital flows in Thailand increased during the period of the capital controls (Pasricha, et al., 2015).

Unlike previous studies, data by Binici et al. report that capital outflow controls can be effective towards their objective. The authors made a fixed-effect

panel of 74 countries over the period 1995-2005 in order to determine the effectiveness of capital outflows using a panel with annual data of the net capital inflows and net outflows. Binici et al. argue that by separating net capital flow into net inflows and net outflows, research shows precise conclusions about the effectiveness of capital controls, as economically strong countries appear to be able to effectively impose capital controls (Binici, et al., 2010).

1.1.3 Advantages and disadvantages of capital controls' implementation

It is difficult to identify the advantages and disadvantages of capital controls as they are directly linked to strategic choices of policy-makers to achieve objectives related to the regulation of national economies (Fratzscher, 2012; Neely, 1999). Capital controls are necessary in a system of fixed exchange rates if the monetary authority wishes to pursue an independent monetary policy centered on the domestic economy. This is a well-known option called Impossible trinity (also The Trilemma), which describes that only two of the following may occur in an open economy:

a. *Free flow of capital*
b. *Fixed exchange rate*
c. *Independent monetary policy*

Therefore, it is desired (b) and (c) to abandon (a) and impose some form of capital controls. Calvo & Reinhart found that many emerging market economies follow a de facto fixed exchange rate regime even when their exchange rate system is characterized as floating. Therefore, many of these countries have some form of capital controls.

If exchange rate fluctuations in a country are high, then exchange rate fluctuations are passed on to the country's economy as a sharp change in inflation. Small, open, emerging market economies are particularly sensitive to the outflow of money from domestic capital markets. Capital controls can be used to limit this impact. For example, the Indian central bank has a ceiling on the percentage of foreign currency loans that Indian companies can buy abroad. The bank regularly reviews the quota (upwards or downwards) according to the Rupee / Dollar exchange

rate situation. Another example is recorded in 2013 when the Indian central bank lowered the outflow of personal capital to mitigate panic in the foreign exchange market. Normally, in emerging markets domestic businesses and households are able to borrow at lower rate from international markets. Usually, this is the case when there is a hard currency like the Dollar, Euro etc. If this is performed without any capital restrictions for a long period of time, then the economy will accumulate a large amount of foreign currency debt, which will limit the ability of the central bank to act as the lender of last resort. That could lead to large scale bankruptcies in crises and financial turmoil and is a recurring problem in open emerging markets.

When countries consider the measures of capital controls, should be aware of the risks involved. There are significant disadvantages coming along with capital controls. The process of enforcing and implementing capital controls entails high costs, in energy and time, for regulatory authorities, with no certainty that there will be no capital leakage. When there are no capital controls the investors can practice portfolio diversification and invest in international markets. In this way, they may achieve better returns adjusted to the risk. Companies can also take advantage from lower rates in loans from the international markets. In the presence of capital controls, domestic investors and businesses may face many difficulties, as rigorous fiscal policies may be implemented by governments, especially when there are long-term budget deficits and/or central banks that pursue inflationary policies. The direct effects of the capital controls on the financial markets include the impact on asset prices and returns. Furthermore, policy makers may influence the economic behavior in order to achieve their macroeconomic goals. Past studies argue that the cost of the capital minimizes since the reduction in the risk premium compensates the foreign investment barriers. Consequently, it can be supported that the investment barriers hampering international capital flows will lead to an increase of the risk premium and the result will be an increase in the cost of capital.

1.2 Efficient Market Hypothesis

1.2.1 Meaning and conditions

An effective capital market in which securities prices are rapidly adjusted to any new information emerging in the investment environment and therefore, at any time, share prices reflect all available information (or which may be disclosed) in the market. The Effective Market Theory is a field of academic research that displays the most contradictory conclusions and most peculiar views. The conditions for an effective market are as follows (Vasiliou, 2008):

a. There are many participants who, independently of each other, analyze and evaluate shares.

b. Any new information about a company or its share appears on the market entirely randomly and independently of other events.

c. Trading investors make adjustments to share prices so that at all times they reflect all available information.

The aforementioned conditions lead to the conclusion that, share prices must move completely randomly, regardless of the occurrence of any events involving listed companies. However, this does not apply either in absolute terms or in comparative terms. Also, an efficient market requires that a very large number of investors monitor and analyze each share, so when the price of the latter is "automatically" adjusted to each new piece of information, this is done by an increasing number of participants. The larger the number of investors participating in a market and indirectly "adjusting" its share prices, the more effective that market is. However, it should be noted that at any given time, the share prices must reflect not only all information available to the investors, but also the investment risk involved in the allocation of funds to the stock exchange.

1.2.2 Forms of EMH

Fama (1970) defined three types of an efficient market, the weak, the semi-strong and the strong form (Vasiliou, 2008). The weak form of efficiency argues that current share prices already reflect all the historical data of the market, such as past prices and volume of transactions. The claim of the weaker form of efficiency is very consistent with the findings of the random walk hypothesis that price changes over time are independent of each other. In other words, one cannot achieve excessive returns only by looking at the historical price trends. Therefore, techniques of trend analysis, techniques that use past share price movements to find indications to predict the future course of one or all of the stock markets, are useless. However, one can achieve excessive returns in the weak form of an efficient market by using fundamental analysis or by using confidential information.

The semi-strong form of efficiency implies that, in addition to past prices, all information available to the public, including core data on company products, profitability forecasts, dividends, split share announcements, management quality, balances, patents held by a company, accounting practices, etc., should be fully reflected in the current prices of the securities and cannot be used to predict future prices and excessive profits. Thus, one cannot achieve excessive returns using a fundamental market analysis that is effective in the semi-strong form. It is obvious that technical analysis cannot work in the semi-strong form of an efficient market because if a market is effective in a semi-strong form, it is also effective in the weak because information on past prices is also available to the public. However, investors with internal information can achieve excessive returns in the semi-strong form of efficiency.

A strong form of efficiency means that the market prices reflect all information, including past prices, all publicly available information, and all private information. Even unpublished information (or internal, unavailable to the investing public) is reflected in the current prices and cannot be used for future forecasts. In such a market, the prices will always be fair and any investor, even those holding confidential information, could not beat the market. That is, there is no special category of investors who have exclusive access to information that may affect share prices. Again, none of the technical or fundamental analyzes can lead to excessive

returns, since if a market is effective in its strong form, it must be effective in both the weak form and the semi-strong form. Thus, techniques that do not work in the weak and semi-strong form cannot function in the strong form of efficient markets. If a market is highly effective it is also effective in its semi-strong and weak form, but not the opposite.

1.3 Psychology and Behavior of Investors

According to traditional economic theory and the theory of market efficiency, investors and markets are rational in making financial decisions, i.e. trying to maximize the benefit and minimize costs. Rational thinking can lead to making irrational decisions when taken in a misunderstood context. Additional individual or social biases urge people to overstate or underestimate information, adhere to specific views, or fail to recognize opportunities. Thus, the objectivity of opinions and decisions is influenced by factors that ultimately form subjective views and actions. This assumption demonstrates that, the better understanding of the context that is shaped by behaviors and habits (factors that inhibit rational decision making), the easier it will be to overcome them or to deal with them more effectively. More specifically, the socio-psychological factors that determine the behavior of investors are (Siegel & Yacht, 2012):

a. ***Biases***: Predisposition to specific views that prevent rational decision making. Such biases are the availability of information (which, based on the frequency that is revealed, create opinions that are considered to be more or less valid), stereotypes, over-confidence, attachment to past knowledge, humans need to avoid unclear or uncertain situations, etc.

b. ***Framing***: The framework where each person determines and recognizes alternatives to decision-making. Any short-sighted views or oversimplified situations and data, form a more limited framework of thought, reducing the range of alternative actions and leading to subjective decisions.

c. ***The profile of investors***: The combination of all individual traits, such as personality, age, living conditions, income, etc., which stimulate the way people act. These traits determine the level of tolerance to risk and affect the economic decisions.

The financial phenomena can be better explained when the financial models recognize that the market participants are not fully rational. Thus, while traditional financial theory is not discarded, an attempt is made to bridge it with the practice that in many cases (financial crises, financial bubbles, financial distortions, etc.) deviates from the theory (Barberis & Thaler, 2003).

1.4 Indicative examples of capital control practices

1.4.1 The case of Greece

Capital controls were imposed on Greece on June 28, 2015, when Greece's government came to the end of the rescue bail-out period without further agreement with its creditors, and therefore the European Central Bank decided not to increase the level of the emergency liquidity assistance (ELA) for Greek banks. The banks and the Athens Stock Exchange were closed until July 6th. In the wake of the decision to hold a referendum by the country's prime minister, an upheaval on the Asian and European stock exchanges occurred on 29 June (Monokrousos, et al., 2016; Newsbeast, 2017).

Controls on bank transfers from Greek banks to foreign banks, and limits on cash withdrawals (only €60 per day permitted) took place, to avoid an uncontrolled bank run and a complete collapse of the Greek banking system. Electronic transactions within the country were unaffected as all transactions using a credit or debit card and other electronic payment methods were normally conducted. The Government set up a special Bank Transactions Committee, the State Treasury, in cooperation with the Ministry of Finance, the Bank of Greece, the Hellenic Bank Association and the Cyprus Securities and Exchange Commission. The Committee's mission was to deal with requests for urgent and necessary payments, which could not be met by the cash withdrawal or electronic transactions.

Greek stock market suffered as international players and hedge funds liquidated their positions and could not be replaced by Greek investors who could not buy stock, resulting in the collapse of Greek companies as their market value lost up to 90 percent of their value in three days. The Athens stock exchange ended its torrid

first day of trading 16.2 percent lower, after it reopened for the first time in five weeks.

In September 2015, certain aspects of the imposed capital controls were relaxed. Four months after capital controls were imposed on 28 June 2015, the government published two important modifications: withdrawals were still up to €420 per week and account holders were able from this time to withdraw the entire amount in one transaction and not in sums of €60 per day. Therefore, the amount of time waiting in queues at banks and ATMs was dramatically reduced, and, furthermore, up to 10% could be withdrawn from funds deposited in Greece from abroad.

In the third quarter of 2015, shortly after the implementation of the capital controls, the Greek economy returned to negative growth rates (-1.7% in annual base) after 5 consecutive quarters of positive real GDP growth (+ 0.8% on average). Despite the negative impact of the restrictions on capital movements, the recession in the whole of the previous year proved to be much milder than the original projections. At the same time, domestic demand had a negative contribution, mainly due to the large drop in inventories while net exports moved in the opposite direction due to the significant contraction in imports.

Private sector deposits (non-financial corporations and households) showed stability following the restrictions on capital flows. According to the latest data deriving from the Bank of Greece, deposits in June 2016 increased by approximately € 1 billion (+ 0.9%) on a monthly basis and by € 1.9 billion (+ 1.6%). compared to July 2015 (the first month of implementation of restrictions). In addition, it is estimated that € 4 billion total bank notes have returned to the domestic banking system in the last 18 months. Greece, nowadays, remains under the restrictions of capital controls and is not expected to lift them completely, any sooner than the end of 2018. Since September 2017 citizens can withdraw a total of 1,800 euros in cash per month.

1.4.2 The case of Cyprus

During the major financial crisis in 14th April 2013, Cypriot banks remained closed for 12 days following a common decision of the Cyprus Government and the Central Bank of Cyprus. The closure of the banks was considered necessary to avoid the "bank run" phenomenon, i.e. the massive turnout of depositors with take-back requests because of the reduced confidence in the banking system. It should be noted that the size of the banking sector in Cyprus was disproportionate to the Cypriot economy, as it reached 800% of GDP (ACCB, 2016).

In order to overcome the crisis, Cyprus, the International Monetary Fund and the European Union signed an agreement, a ‘’Memorandum of Understanding’’, that consisted of 40% "haircut" in the deposits exceeding 100,000 Euros. The merger of the two major country’s banks of the, the Laiki Bank and the Bank of Cyprus was the result of the joint agreement. Capital controls had been maintained for 2 years after their implementation and have led to significant economic difficulties in Cyprus; blowing off the country's credibility and reporting tourism’s decline. The capital controls were lifted in 2015, with the last controls being removed in April 2015. The main points of the imposed restrictive measures were the following:

- A daily take-over cap was established at 300 Euros.
- Foreign travelers were allowed to have up to 2,000 Euros with them.
- Especially for students abroad, they could receive a wire transfer of up to 5,000 Euros per quarter.
- Any currency export for foreign investment was banned.
- It was possible to use a check only for deposits in the name of the beneficiary.
- The intra-Cypriot transactions required supporting documents for the transfer of funds.
- The tourists who were in Cyprus at that time were not allowed to leave the island with more than 1,000 Euros in cash with them.

1.4.3 The case of Russia

In 2014, there was a political and diplomatic crisis between Russia and Ukraine ongoing, due to the Russian invasion in Crimea that contributed to international sanctions against Russia. These sanctions demolished the ruble, destabilized the Russian economy, leading to a financial crisis. Russia imposed unofficial capital controls, to prevent a recurrence of inflation and another financial crisis like 1998. The Russian stock market experienced large decline, with a 30% drop in the RTS Index during December of 2014. The Russian government set limits on the net foreign exchange assets of state-owned exporters. Furthermore, to protect additional currency devaluation, government agencies with a strong export activity (such as Gazprom, Rosneft) have been instructed to reduce their foreign currency reserves. The unofficial measures aimed at increasing the strength of the national currency and reducing capital outflows from the country. Russian legal entities ought to buy foreign currency on the local currency market in order to pay invoices of foreign suppliers or to make interest and dividends payments (Kelly et al., 2014).

1.5 Review of previous empirical studies on capital controls

Edison and Reinhart (2000) studied the impact of capital controls on exchange rates, the stock market and interest rates, in time of crisis, in Malaysia where the measures were imposed in the period from 1998 to 1999 and in Thailand in 1997. The purpose of both measures was to protect the currency against speculative attacks and to stabilize the exchange rate. In the case of Malaysia, various measures were enacted, including the ban on foreign currency exportation, the requirement to repatriate capital held abroad, the blocking of non-residents' transfer of capital abroad and other restrictions on the transfer of capital by residents. In the case of Thailand, a two-tier currency market was created, blocking the access to finance for opportunists. The effect of the measures on Malaysia on the stock exchange was negative, affecting in particular the stock prices and not so much the volume of transactions, while the fluctuations increased in both countries (Edison & Reinhart, 2000).

The case of capital audits in Malaysia was also studied in a 2003 research by Johnson & Mitton. Focusing on the effect of the measures on the stock exchange rates

(using the country's most liquid shares), it was found that in all (financial and non-financial) companies there was a significant drop in prices over the period (within one year their value decreased by 78.5%). During the measures there was an increase of 39.7% and then the increase reached 81.9%. It was also found that companies linked to the government were more affected than the rest, both negatively before the measures and positively afterwards (Johnson & Mitton, 2003).

On December 18, 2006, capital controls were announced by the Bank of Thailand, the day zero for the stock market control before and after the imposition of the measures according to Vithessonthi and Tongurai (2009). The measures taken were related to the short-term capital inflows, namely the mandatory advance payment (30% of the value) as a mandatory reserve for foreign exchange transactions worth more than $20,000. This measure aimed at discouraging short-term speculative capital inflows as only 70% of the total capital transferred will be at the disposal of the traders to invest in the domestic stock market. The return of 30% of the capital (mandatory reserve) is reimbursed if the capital remains in the country for more than one year, and if it is repatriated that amount is seized. This measure excludes foreign exchange transactions related to trade in goods and services, and the repatriation of capital by residents of the country that have acquired foreign investment and foreign direct investment. The control of the stock market returns was performed in 60 listed companies (belonging to the industrial sector) and before the date of the announcement of the measures, while no statistically significant correlations of abnormal returns were found, as opposed to the following period. On the day of the announcement, the stock index fell by 2.39%, while the next day by 14.84%, showing a maximum decrease of 19.52%. Two days later (December 20th), after the bank gave details of the measures, the stock market reacted positively (+ 1.24%) (Vithessonthi & Tongurai, 2009).

Alfaro, Chari, and Kanczuk (2014) investigated the impact on stock exchange returns of the capital controls imposed on Brazil in 2008-2009. In the pre-crisis period of 2008-2009, the Brazilian economy experienced significant growth in economic activity abroad. The crisis, coupled with an increase in inflows of foreign capital into the country, brought upward pressures on the currency's exchange rate. In order to prevent a massive influx of foreign capital, currency stabilization and inflation, in

2008 the central bank announced measures. In March 2008, inbound fixed income foreign investment, a financial transaction tax of 1.5% was imposed, although this measure was withdrawn in early 2009 to reduce the outflow of investment. Under a new wave of massive capital inflows, the measure was reinstated in October 2009, raising the tax to 2%, excluding foreign direct investment, while in October 2010 the tax rose to 6% and was removed in December 2011. This measure led to an increase in the capital cost of enterprises and a significant reduction in abnormal returns. The measure mainly affected the stock prices of smaller and more introverted firms, as well as firms with greater dependence on external financing (Alfaro, et al., 2014).

It appears that the nature and intensity of the measures taken when imposing capital controls and the intended purpose are decisive factors for the reaction of the domestic market to them. It is certain that any interventions in the transactions create uncertainty in the market and in particular to investors, which usually translates into increased volatility in stock exchange transactions. At the same time, the general economic situation and the economic conjuncture seem to be influenced by the way investors perceive the measures imposed and thus their reaction to them. The study of three different situations, both in terms of the general economic situation and the diversity of the capital controls imposed on Greece, Cyprus and Russia, is expected to provide useful information on how capital measures affect the stock market.

Chapter 2: Methodology

2.1 Sample

This research consists of the analysis of the returns and volume of the main stock market indices and afterwards the big capitalization indices respectively, for Greece, Cyprus and Russia. In specific, we analyzed for Greece, the Athens Stock Exchange General Index ASE and Large Capitalization Index FTSE. For Cyprus, likewise, the general stock market index CYSM and FTSE_CY. Lastly, for Russia, the general stock market index INDEXCF and MXR respectively. Data were derived from Bloomberg Database, such as the acronyms for the indices under analysis, using a sample of 250 observations for each period. The data consist of daily last prices of the indices, from 2012 to 2017, due to the limitations of the Bloomberg Database.

2.2 Statistical Analysis

In this study, we presented at first, the charts of the stock prices of the indices. Then, we analyzed the stock exchange returns and volume of each index before and after the implementation of the capital controls, testing for stationarity and autocorrelation. After that, we presented the descriptive statistics for the return and volume. Finally, we tested for cointegration between the returns and volume for each index.

In specific, we have used initially diagrams in order to examine the time series development over time. We have examined whether the time series are stationary or not, graphically. A non-stationarity variable is a variable with a changing mean, variance. Non–stationarity is caused by trends in variables and there are two broad types of trends: deterministic trend and a stochastic trend (Baddeley M.C, 2009). After that, we used the Augmented Dickey-Fuller test to test if a variable follows a unit-root process. The null hypothesis is that the variable contains a unit root, and the alternative is that the variable was generated by a stationary process. In case that the variable is not stationary we take the first difference, second, third, etc. Moreover, we have examined the correlogram for the returns (the returns of the time series were calculated as Ln of the ratio of Rt to Rt-1 for each index), whether there is an autocorrelation.

Additionally, in order to test whether the returns and the volume cointegrate we have used the Engle-Granger two-step method since we have two time series. Also, a t-test comparison has been conducted for all the indexes comparing their mean values before and after the capital controls.

Last but not least, we have constructed three dummy variables for each country labeled as “crisis” (1=after the capital control, before the capital controls).

Chapter 3: Results

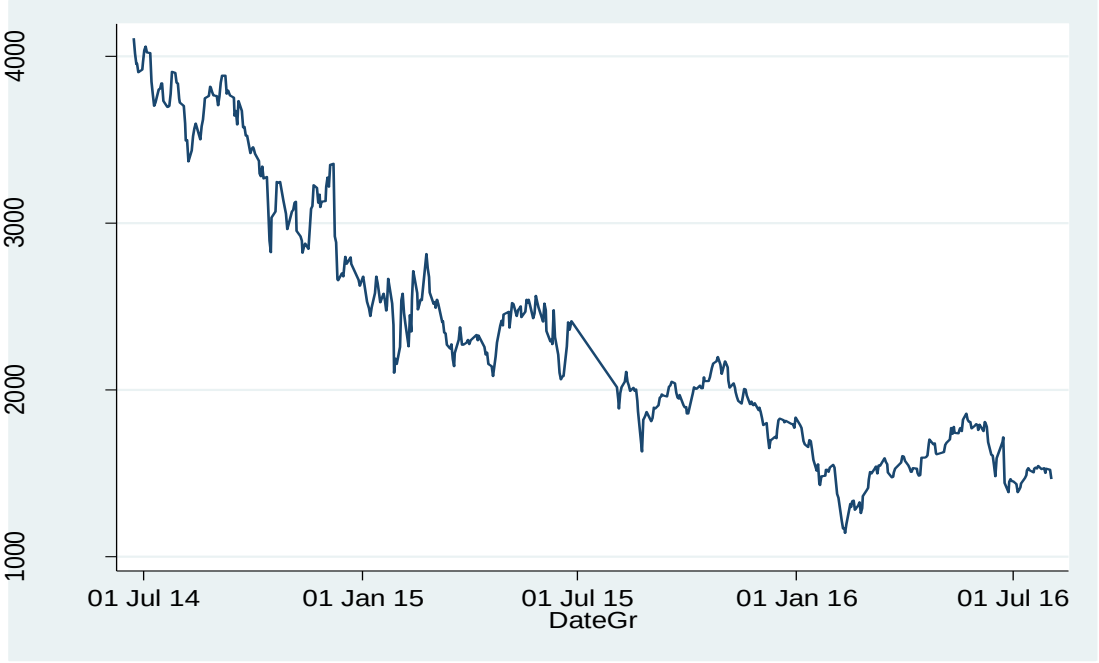
3.1 Greece

According to Figure 1 there is an intense negative trend for the market price of the ASE index from July 2014 until the end of 2015. In July 2015, we can observe that the announcement of the capital controls implementation and the occurring banking crisis did not affect in a profound way the downwarding trend of the index till early 2016 when the index starts to rise and seems to stabilize.

Figure 1. ASE Index

According to Figure 2 there is an intense negative trend for the FTSE index from July 2014 until the end of 2015. In 2016 the index is almost steady. The FTSE index seems to follow the ASE index for the entire period.

Figure 2. FTSE Index



According to Figure 3 the return of the ASE index does not present any trend and the volatility is almost constant. Only exception a negative spike in July 2015 when the capital controls implemented.

Figure 3. Return of ASE Index

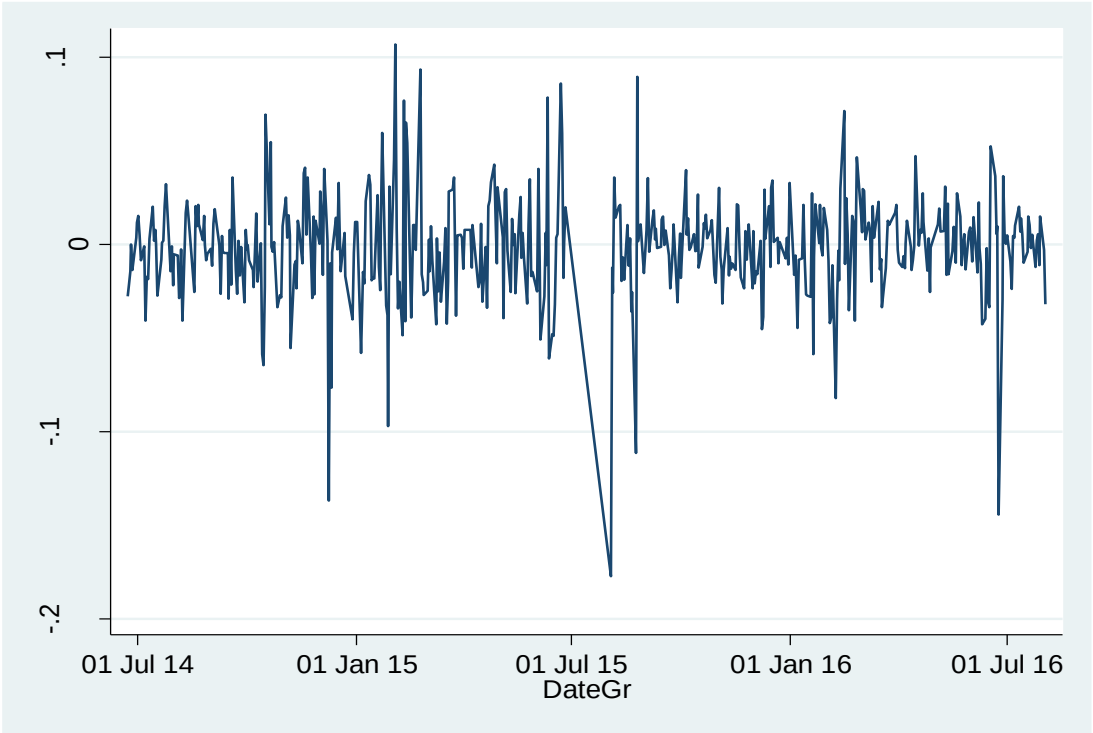


Table 1: Augmented Dickey-Fuller test, R_ASE

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -20,035	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 1 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-20,035<-2.570).

According to Figure 4, the volatility of the ASE index is more intense in 2015. In the first and last quarter of 2015 there are 2 spikes, the first one is due to the implementation of the capitals controls.

Figure 4. Volume of ASE index

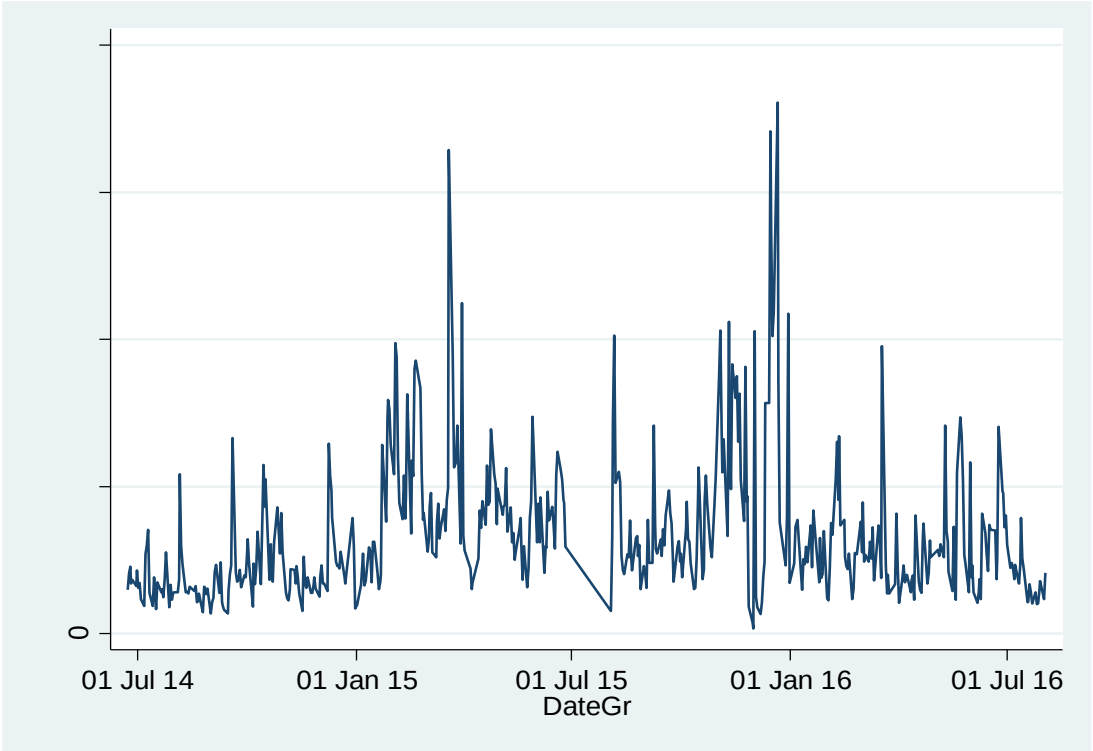


Table 2. Augmented Dickey-Fuller test, V_ASE

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -9,755	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 2 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-9,755<-2.570).

According to Figure 5 the return of the FTSE index does not present any trend and the volatility is almost constant. Only exception a negative spike in July 2015 after the implementation of the capital controls. Also, we have to mention that the FTSE index follows almost the same pattern of the ASE index.

Figure 5. Return of FTSE index

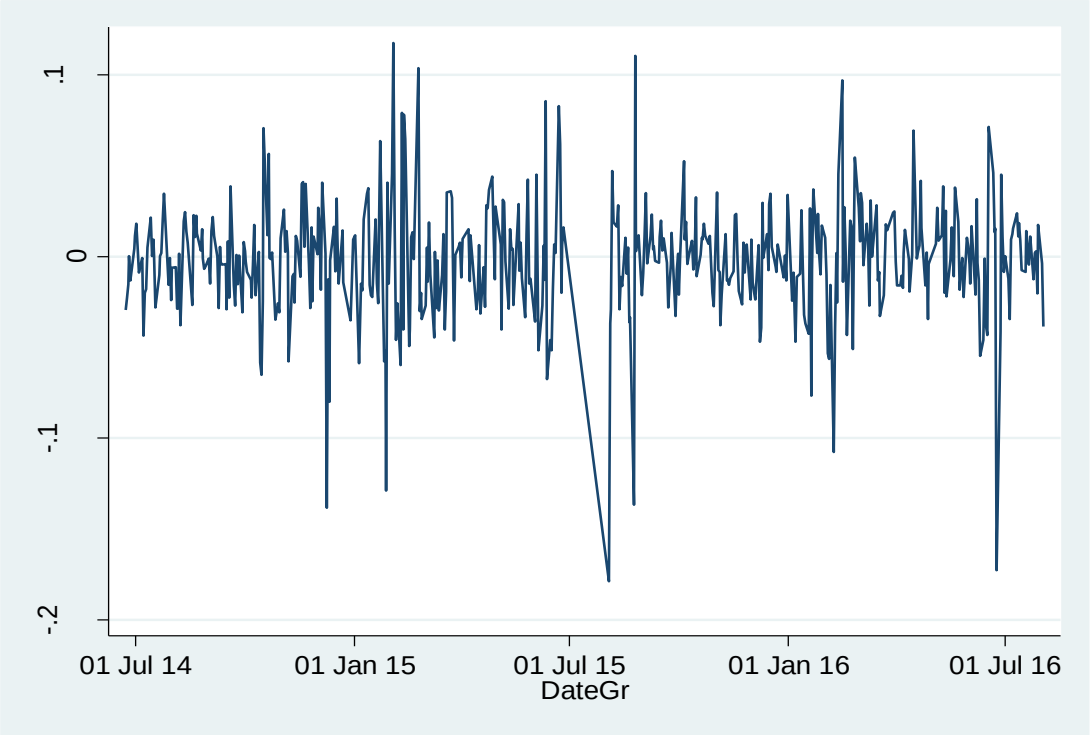


Table 3. Augmented Dickey-Fuller test, R_FTSE

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -19,833	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 3 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-19,833<-2.570).

According to Figure 6 the volatility of the FTSE index is more intense in 2015. Also, there is a spike in the end of 2015, it is similar with the spike of the volatility of ASE index.

Figure 6. Volume of FTSE index

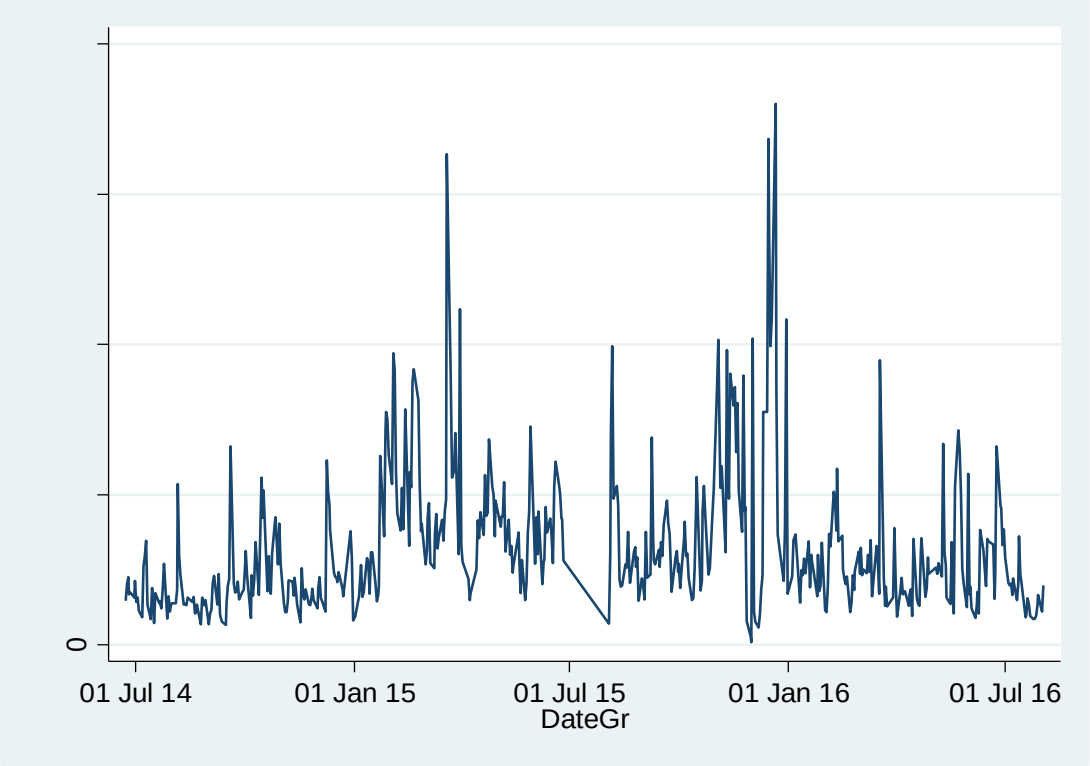


Table 4. Augmented Dickey-Fuller test, V_FTSE

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -9,712	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 4 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-9,712<-2.570).

In order to identify the number of the lags of the R_ASE and R_FTSE we have calculated the autocorrelations (Table 1 & Table 2, Appendix). There is no indication of autocorrelation for both series. In the following two graphs (Figures 7 & 8), the autocorrelations are too low.

Figure 7. Correlogram, R_ASE

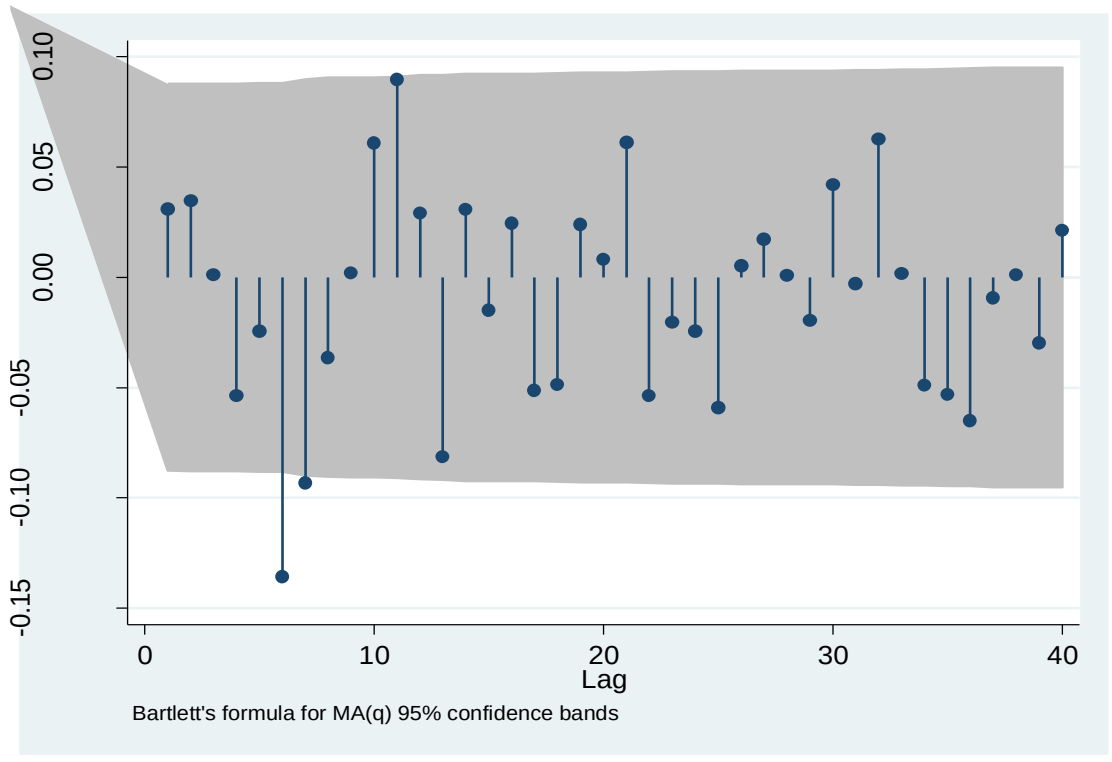
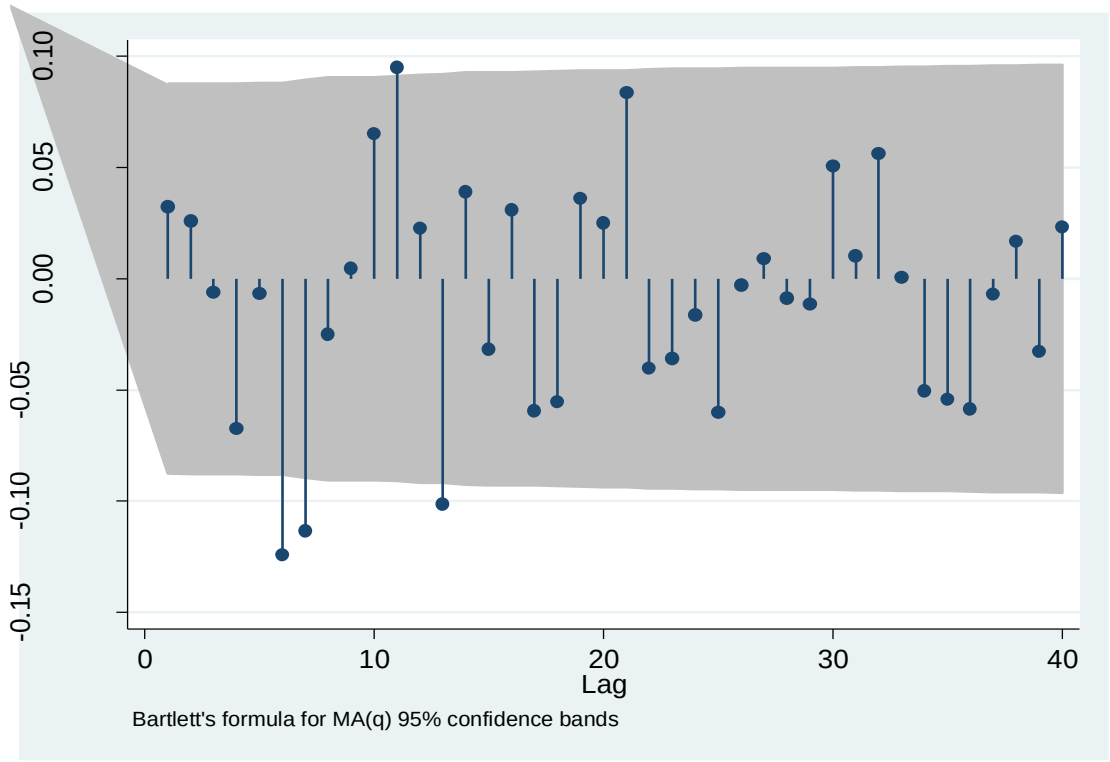


Figure 8. Correlogram, R_FTSE



Finally, table 5 presents the descriptive statistics of the under-analysis indices of Greece.

Table 5. Descriptive statistics before and after the crisis

Before	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*	*CV*
R_ASE	250	-.0019727	.0294531	-.1366886	.1068063	1493,03%
V_ASE	250	1.27e+08	8.50e+07	2.75e+07	6.58e+08	66,92%
R_FTSE	250	-.0022483	.0318232	-.1384395	.117394	1415,43%
V_FTSE	250	1.24e+08	8.36e+07	2.67e+07	6.54e+08	64,41%
After	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*	*CV*
R_ASE	250	-.0014744	.0260726	-.1771289	.0896675	1768,35%
V_ASE	250	1.41e+08	1.04e+08	6325918	7.23e+08	73,75%
R_FTSE	250	-.0019961	.0312737	-.1787792	.110564	1566,74%
V_FTSE	250	1.34e+08	1.03e+08	3466047	7.21e+08	76,86%

According to table 5 it can be seen that the average values of the returns and the volume are almost the same before and after the capital controls. However, this is not true for the volatility, since the standard deviation after the capital controls has higher values compared with the time period before the capitals controls. The increased volatility can be easily seen if we notice the coefficient of variation. The values of the CV are higher after the capitals controls not only for the returns but also for the volume.

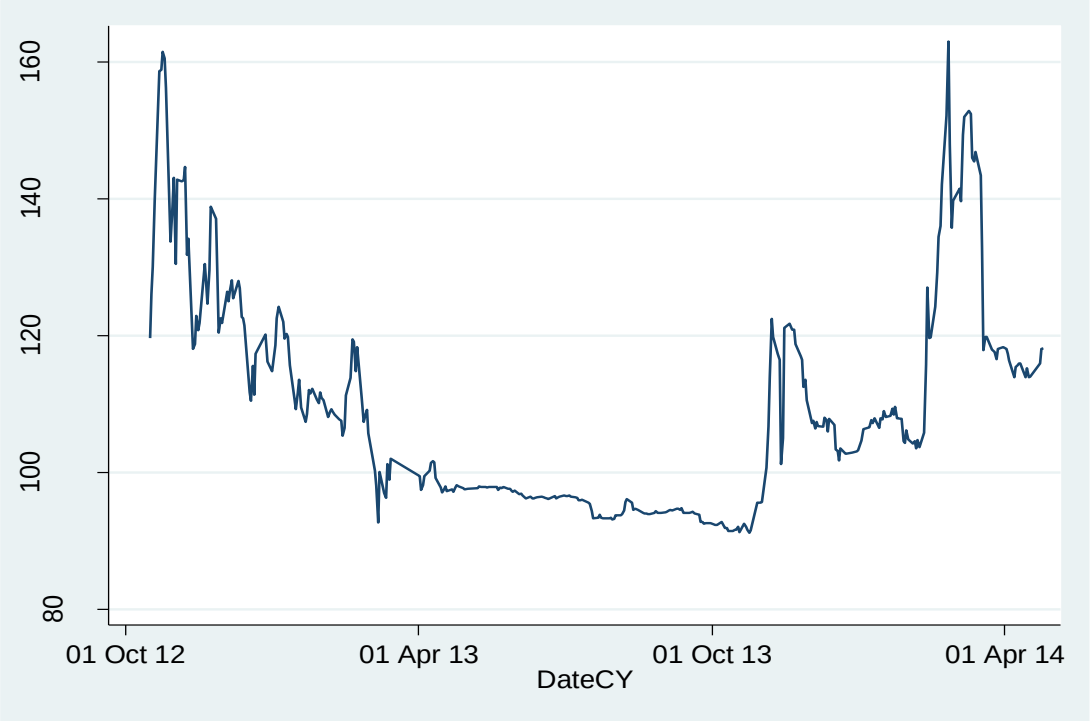
In addition, we have conducted a t-test comparison before and after the capital controls for all the above indexes. The results were the following: R_ASE ($t(490.77)= -0.20$, $p= 0.84$), R_FTSE ($t(497.84)= -0.08$, $p= 0.92$), V_FTSE ($t(477.55)= -1.22$, $p= 0.22$), V_ASE ($t(478.86)= -1.68$, $p= 0.09$). The t-test confirmed that the average values of the returns and the volume are almost the same before and after the capital controls.

Also, we have tested whether the pair of variables R_ASE /V_ASE and R_FTSE /V_FTSE cointegrate or not. The analysis resulted that both pairs cointegrate (Appendix).

3.2 Cyprus

According to Figure 9 there is a downwarding trend till April 2013, when capital controls were implemented in Cyprus, for the general stock market index CYSM. After the capital controls were implemented, there is an imminent freezing period in the market, almost stable, until the October of the same year when the market seems to ‘’wake up’’. After October 2013 it follows an upward trend.

Figure 9. CYSM index



According to Figure 10 there is a declined trend before the October of 2013 for the stock market index FTSE_CY, after the October of the same year it follows an upward trend. The pattern of the FTSE_CY is almost identical to the CYSM.

Figure 10. FTSE_CY index

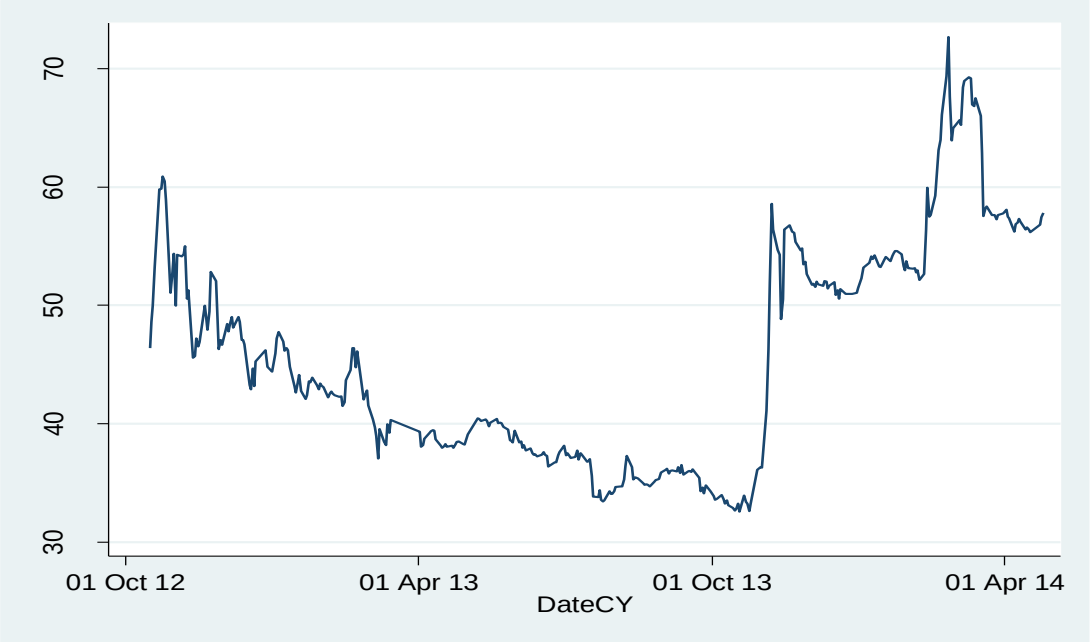
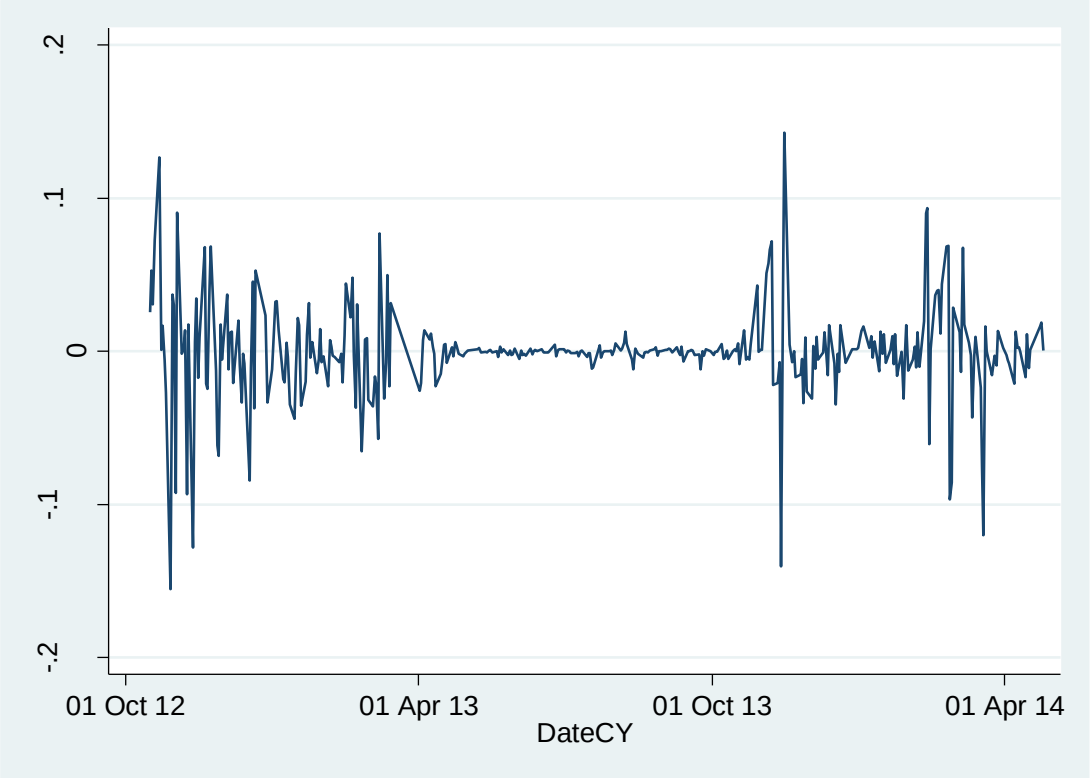


Figure 11. Return of CYSM index



According to Figure 11 the returns of CYSM are stable without any trend. However, after the April of 2013 with the implementation of the capital controls and

until October of the same year the volatility is very limited. The time series looks stationary.

Table 6. Augmented Dickey-Fuller test, R_CYSM

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -16,654	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 6 it is concluded that we have to reject the null hypothesis; the variable does not contain a unit root meaning that the time variable is stationary process (-16,654<-2.570).

According to Figure 12 the volatility of the CYSM after the April of 2013 is very limited since the capital controls have been implemented.

Figure 12. Volume of CYSM index

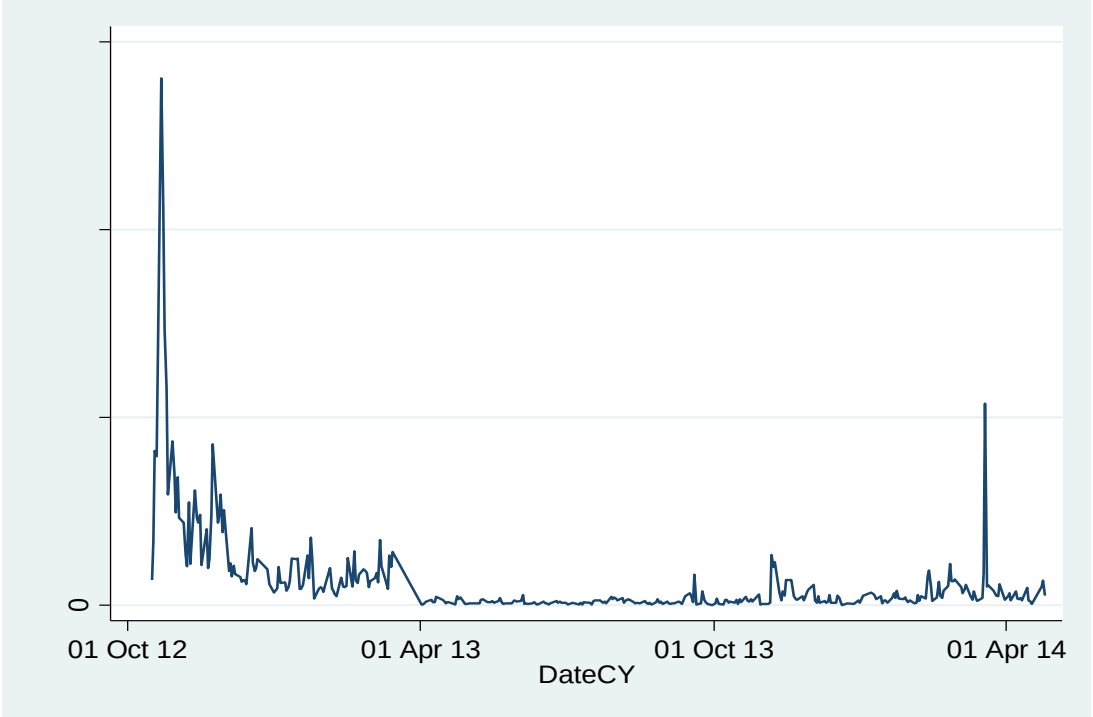


Table 7. Augmented Dickey-Fuller test, V_CYSM

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -11,833	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 7 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-11,833<-2.570).

According to Figure 13 the returns of FTSE_CY are stable without any trend. The FTSE_CY follows the same the pattern with the CYSM_CY.

Figure 13. Return of FTSE_CY index

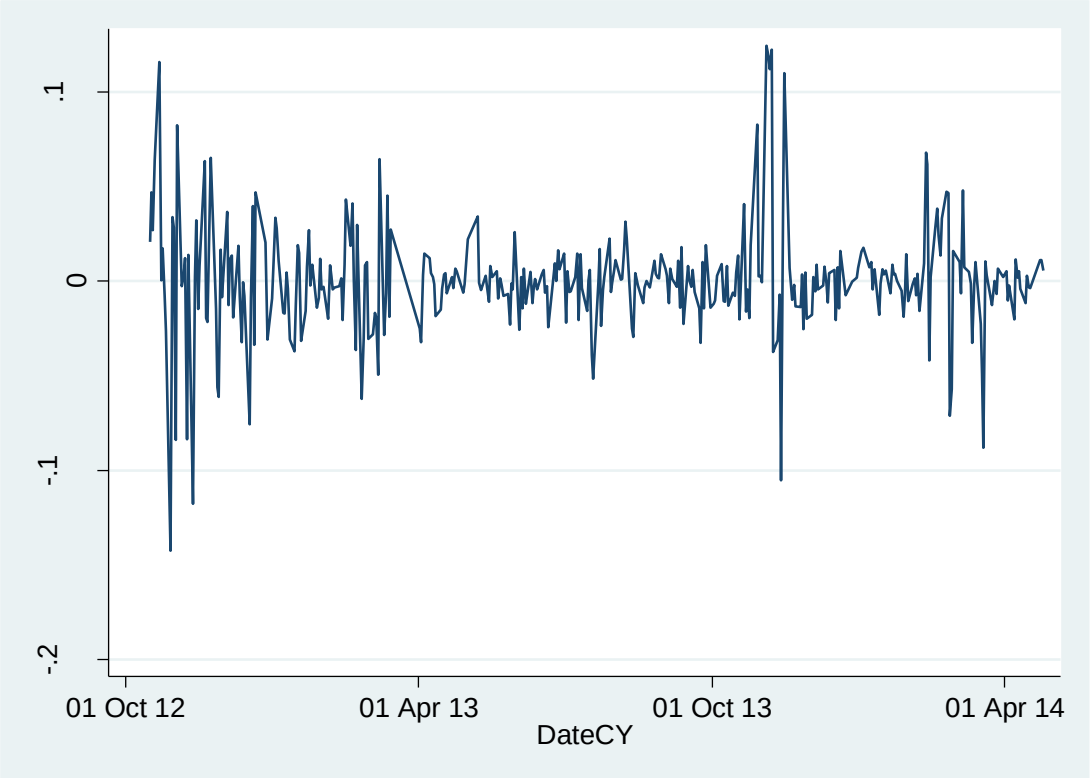


Table 8. Augmented Dickey-Fuller test, R_FTSE_CY

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -16,035	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 8 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-16,035<-2.570).

According to Figure 13 the volatility of the FTSE_CY after the April of 2013 is very limited. The volatility of the FTSE_CY index is almost identical to the volatility of the CYSM index.

Figure 14. Volume of FTSE_CY index

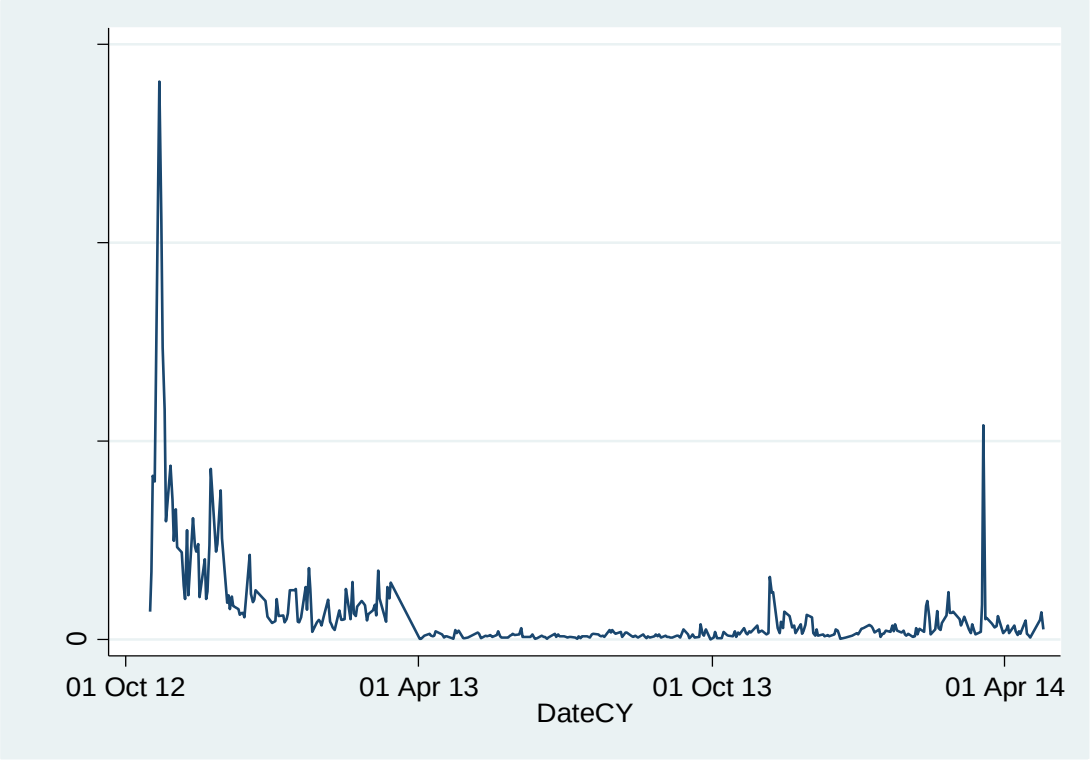


Table 9. Augmented Dickey-Fuller test, V_FTSE_CY

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -10,781	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 9 we observe that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-10,781<-2.570).

In order to identify the number of the lags of the R_CYSM and R_FTSE_CY we have calculated the autocorrelations (Table 3 & Table 4, Appendix). After lag 3 there is a statistical significant correlation for R_CYSM. For R_FTSE_CY only lag 2 is not statistical significant. However, all autocorrelations are very low according to the following two graphs (Figure 15 & 16).

Figure 15. Correlogram, R_CYSM

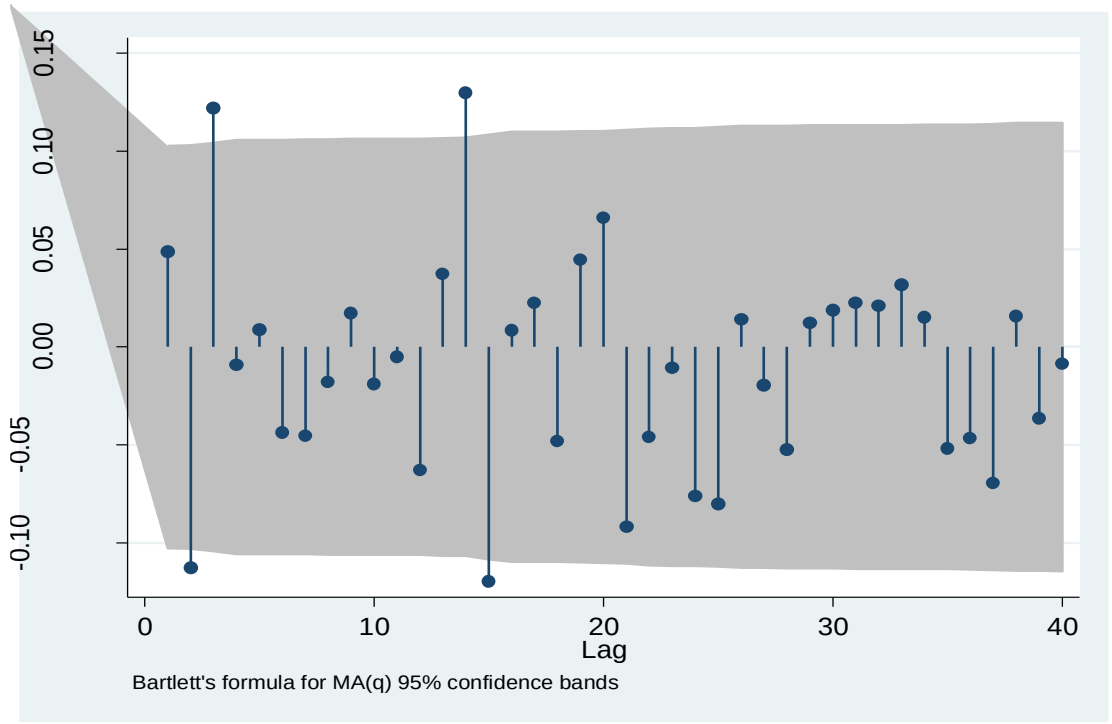
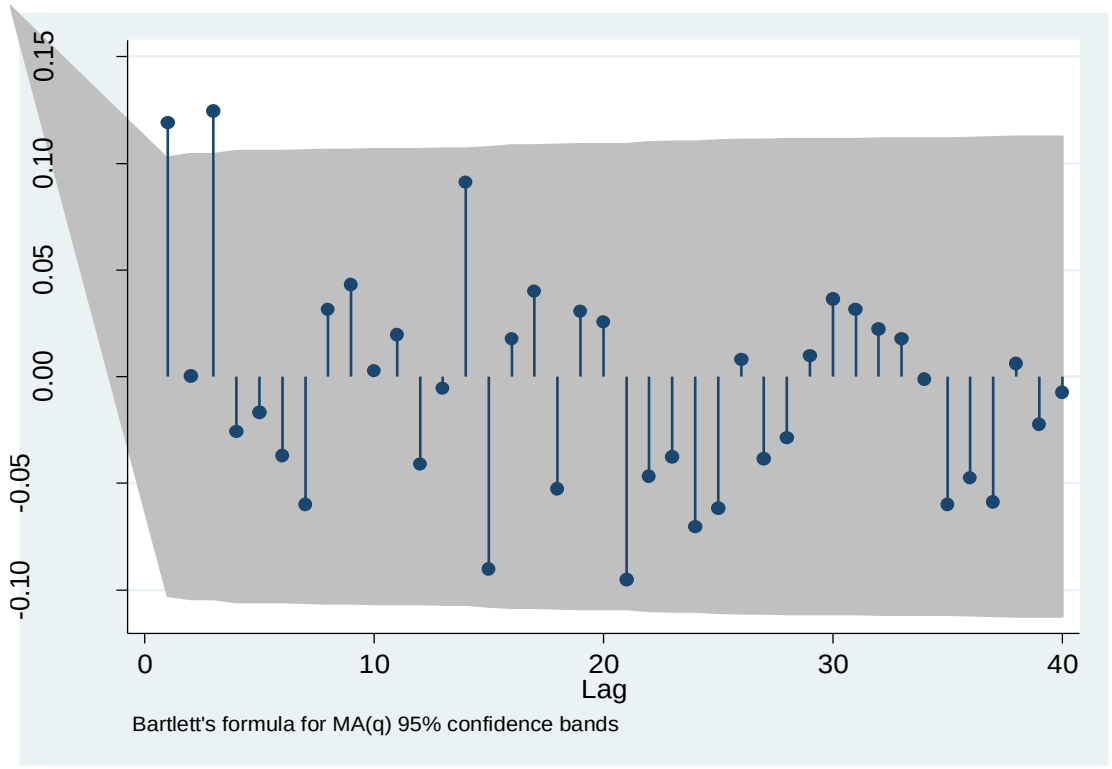


Figure 16. Correlogram, R_FTSE_CY



Finally, we present the descriptive statistics of the under-analysis indices of Cyprus.

Table 10: Descriptive statistics before and after the crisis - Cyprus

Before	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*	*CV*
R_CYSM	114	-.0014164	.0399709	-.1552499	.1267687	2822,01%
V_CYSM	114	5849566	7610764	35810	5.61e+07	130,10%
R_FTSE_CY	114	-.0014064	.0363786	-.1423042	.1159667	2586,65%
V_FTSE_CY	114	5945353	7665747	39610	5.62e+07	128,93%
After	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*	*CV*
R_CYSM	250	.000699	.0250719	-.1403973	.142993	3586,82%
V_CYSM	250	824210.4	1554808	18920	2.15e+07	188,64%
R_FTSE_CY	250	.0016039	.0257207	-.1051968	.1244337	1603,30%
V_FTSE_CY	250	908577.2	1581413	29629	2.16e+07	174,05%

According to table 10, it can be seen that the average values of the returns and the volume are not the same before and after the capital controls. The mean of the returns slightly increased while we observe a sharp decrease in volume, for both indices. Regarding the volatility, the standard deviation after the capital controls has higher values compared with the time period before the capitals controls. The increased volatility can be easily seen if we notice the coefficient of variation. The values of the CV are higher after the capitals controls not only for the returns but also for the volume (only exception the R_FTSE_CY).

In the analysis of Cyprus, we had to limit our sample before the ‘’crisis’’, that is the capital controls, from 250 to 112 observations due to lack of data.

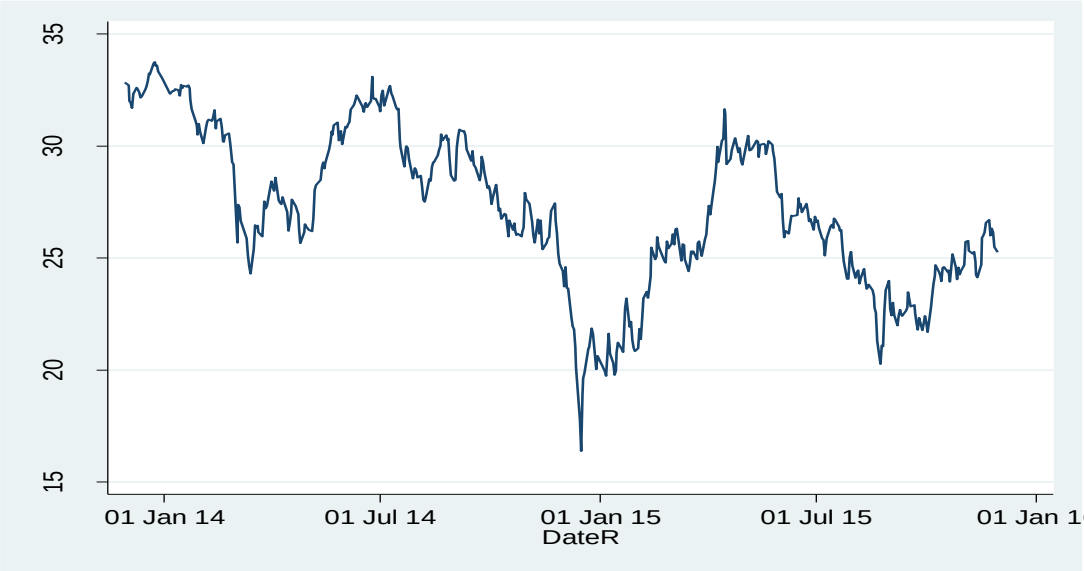
In addition, we have conducted a t-test comparison before and after the capital controls for all the above indexes. The results were the following: R_CYSM (t(154.92)= -0.52, p= 0.60), R_FTSE_CY (t(166.46)= -0.79, p= 0.42), V_CYSM (t(117.32)= 6.98, p= 0.00), V_FTSE_CY (t(117.40)=6 .94, p= 0.00). The t-test confirmed that the average values of the returns are almost the same before and after the capital controls. This is not true for the volume of the indices.

Also, we have tested whether the pair of variables R_CYSM /V_CYSM and R_FTSE_CY /V_FTSE_CY cointegrate or not. The analysis resulted that both pairs cointegrate (Appendix).

3.3 Russia

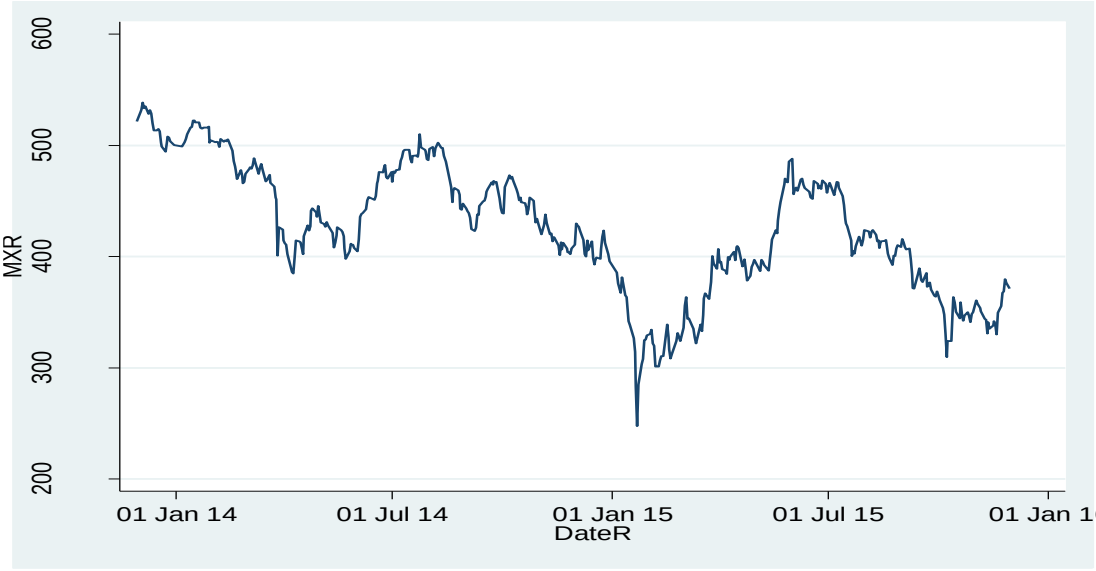
According to figure 17 the stock index exhibits a downward trend over the time period with a spike on January 2015 after the informal capital controls.

Figure 17. INDEXCF index



According to figure 18 the MXR index exhibits a downward trend over the time period with a spike on January 2015 after the capital controls. This index has the same pattern with the previous one.

Figure 18. MXR index



According to figure 19, the R_INDEXCF seems stationary with only one spike on January 2015.

Figure 19. Return of INDEXCF index

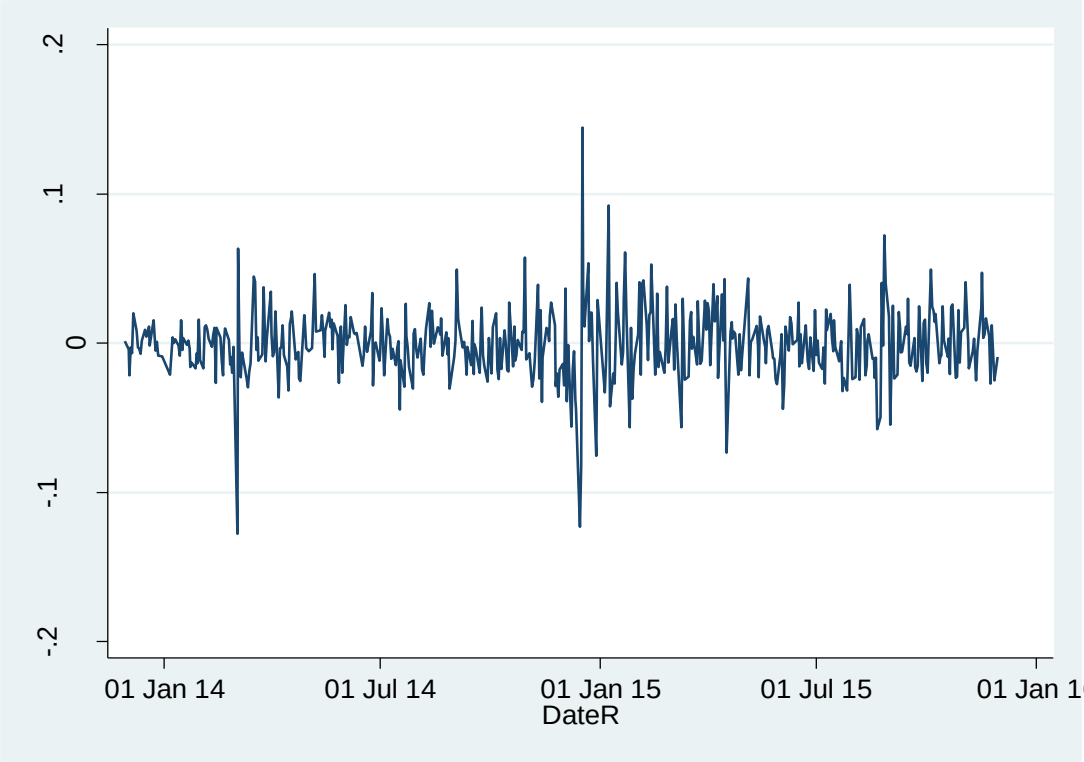


Table 11. Augmented Dickey-Fuller test, R_INDEXCF

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic *Z(t) -21,760*	Value	Value	Value
	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 11 it is observed that we must reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-21,760<-2.570).

According to figure 20 the V_INDEX exhibits a downward trend during the whole-time period with two spikes on January and June 2015.

Figure 20. Volume of INDEXCF index

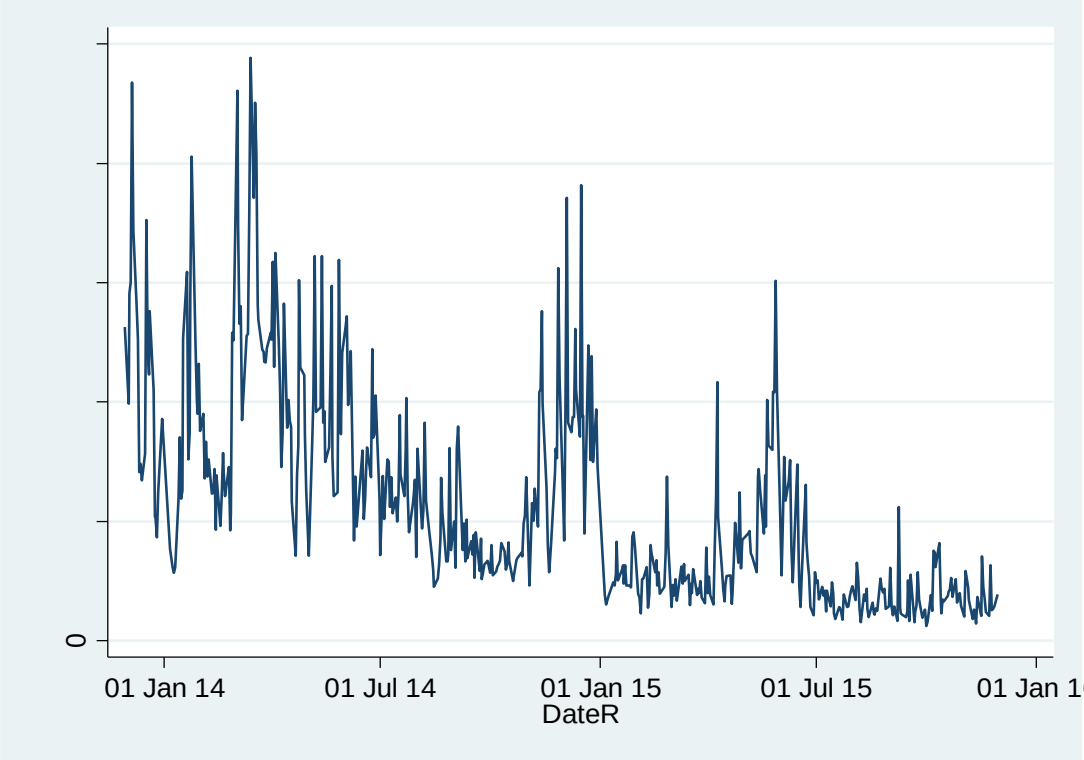


Table 12. Augmented Dickey-Fuller test, V_INDEX

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -5,637	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 12 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-5,637<-2.570).

According to figure 21 the R_MXR index seems stationary with only one spike on January 2015.

Figure 21. Return of MXR index

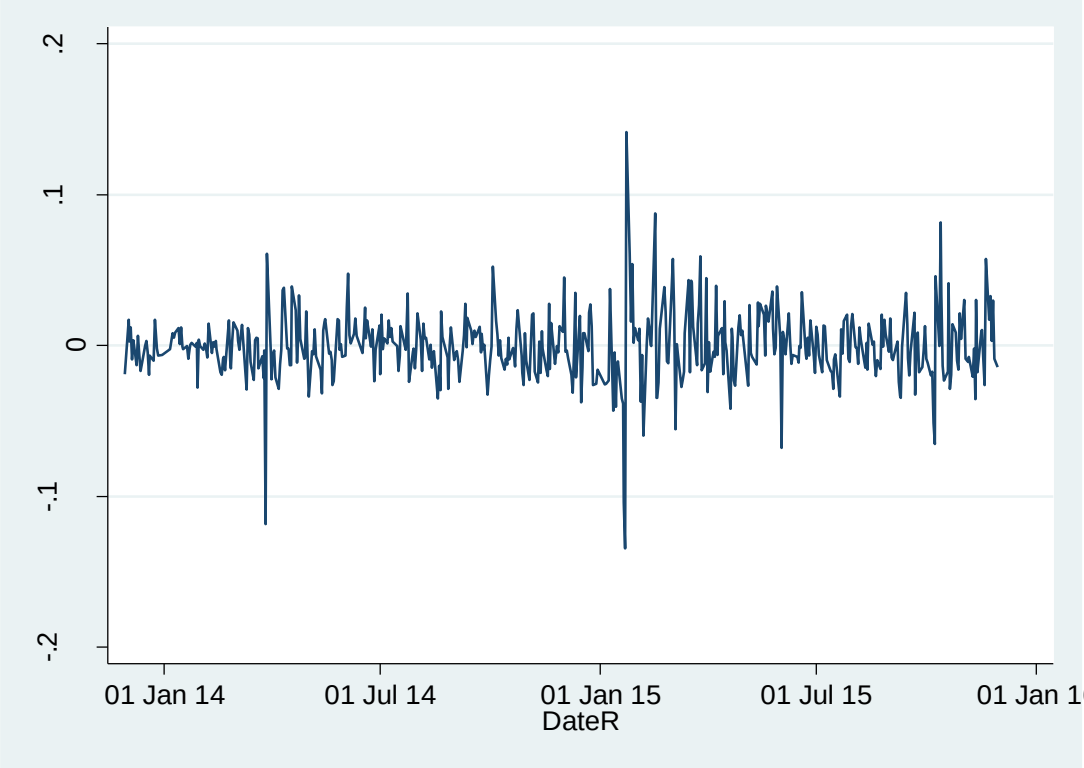


Table 13. Augmented Dickey-Fuller test, R_MXR

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -18,260	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 13 it can be observed that we have to reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-18,260<-2.570).

According to figure 22, the volatility of the MXR index exhibits a lot of volatility during whole period, this volatility is more intense on January and June 2015.

Figure 22. Volatility of MXR index

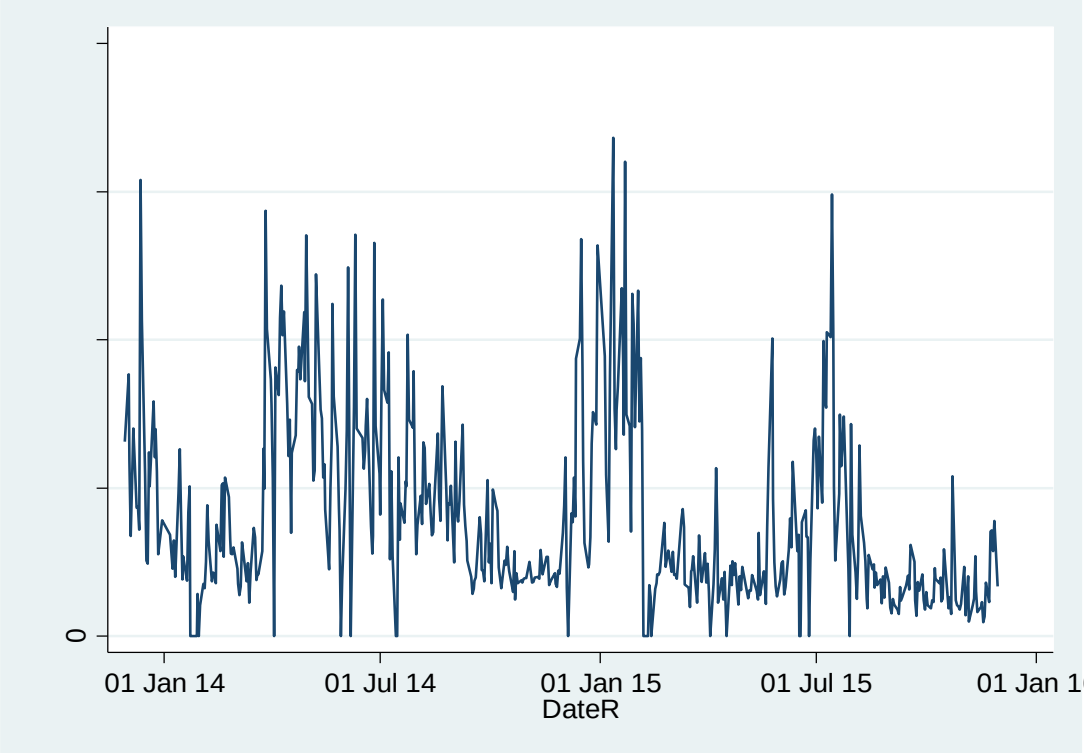


Table 14. Augmented Dickey-Fuller test, V_MXR

	1% Critical	***5% Critical***	***10% Critical***
Test Statistic	Value	Value	Value
Z(t) -8,485	-3.449	-2.874	-2.570
MacKinnon approximate p-value for Z(t) = 0.7054			

From table 14 it can be observed that we must reject the null hypothesis; the variable does not contain a unit root which means that the time variable is stationary process (-8,485<-2.570).

In order to identify the number of the lags of the R_INDEX and R_MXR we have calculated the autocorrelations (Table 5 & Table 6, Appendix). There is no indication of autocorrelation as it can be seen from the two correlograms below (figures 23 & 24):

Figure 23. Correlogram, R_INDEXCF

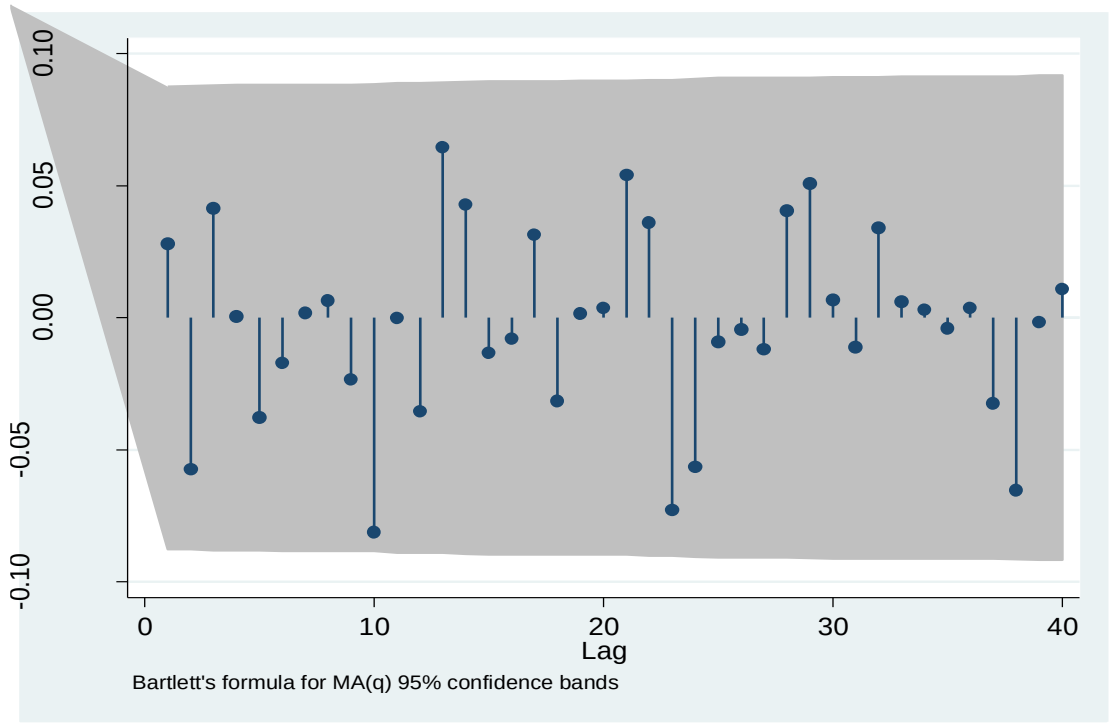
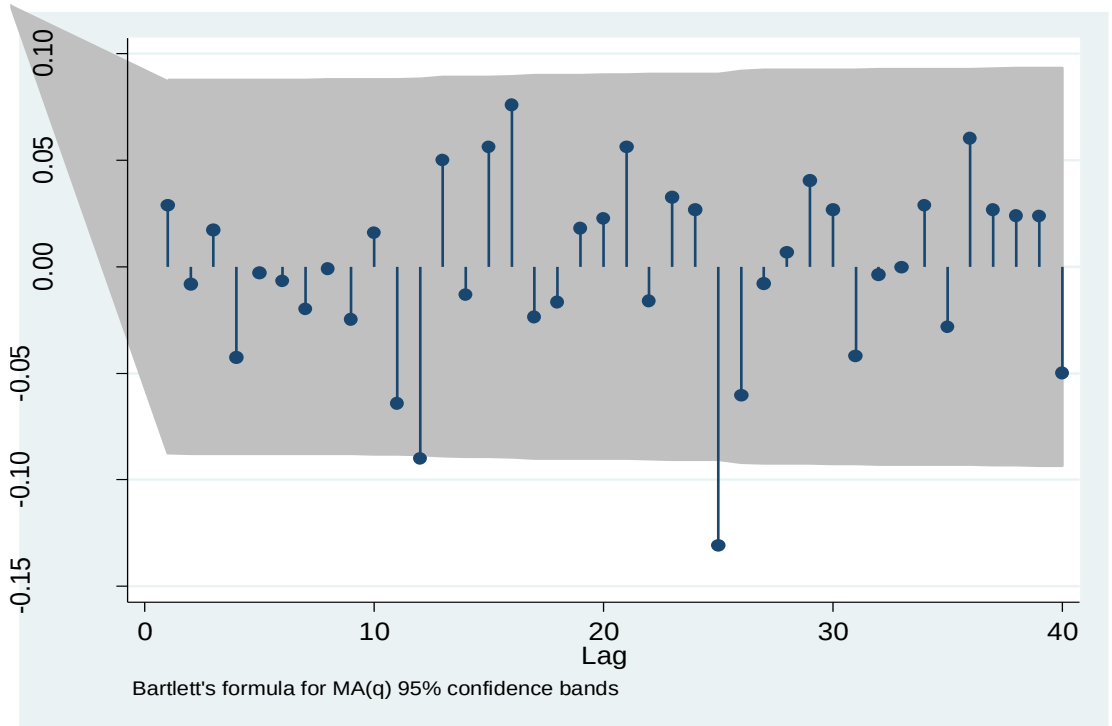


Figure 24. Correlogram, R_MXR



Finally, we present the descriptive statistics of the indices under-analysis.

Table 15. Descriptive statistics before and after the crisis - Russia

Before	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*	*CV*
R_INDEXCF	250	-.0011271	.0188	-.1278082	.0634182	1668,00%
V_INDEXCF	250	8.07e+10	4.48e+10	2.25e+10	2.44e+11	55,51%
R_MXR	250	-.0010678	.0168445	-.1186401	.0609819	1577,50%
V_MXR	249	4.59e+10	3.01e+10	858666	1.54e+11	65,57%
After	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*	*CV*
R_INDEXCF	250	.0000806	.027711	-.123341	.1444466	34380,8%
V_INDEXCF	250	3.43e+10	3.03e+10	6.15e+09	1.91e+11	88,33%
R_MXR	250	-.0003729	.0277979	-.1347687	.1413403	7454,52%
V_MXR	249	3.42e+10	3.10e+10	273628	1.68e+11	90,64%

According to table 15, the average values of the returns and the volume are not the same before and after the capital controls. As regards the returns, we notice a stability in the values, slightly a minor increase in the mean values, however, the mean of the volume drops significantly, for both indices. The standard deviation after the capital controls has higher values compared with the time period before the capital controls, for the returns and volume, for both indices. The increased volatility can be easily seen if we notice the coefficient of variation. The values of the CV are higher after the capitals controls not only for the returns but also for the volume.

In addition, we have conducted a t-test comparison before and after the capital controls for all the above indexes. The results were the following: R_INDEXCF (t(438.145)= -0.57, p= 0.56), R_MXR (t(410.13)= -0.33, p= 0.73), V_INDEXF (t(437.29)= 13.56, p= 0.00), V_MXR (t(495.57)= 4.26, p= 0.00). The t-test confirmed that the average values of the returns are almost the same before and after the capital controls. This is not true for the volume for both indexes.

Also, we have tested whether the pair of variables R_ASE /V_ASE and R_FTSE /V_FTSE cointegrates or not. The analysis resulted that both pairs cointegrate (Appendix).

Chapter 4: Empirical Findings and Discussion

The purpose of this research is to study the stock markets' pattern in Greece, Cyprus and Russia, following the announcement and imposition of capital controls. More specifically, prices, returns and the volume of transactions in general stock indices and high capitalization indices were studied, for about one year (except for Cyprus where the time was shorter, about five months) and one year after the implementation of the measures concerned, for each country individually.

For Greece, the ASE and FTSE performances, as well as their trading volume, present the same behavior before and after the crisis, i.e. they move in the same way. Volume, in fact, is positively related to the magnitude of the price changes (Jonathan M. Karpoff). Regarding Cyprus, the fact that the general index and the large cap index are almost identical, shows that the bulk of the transactions are carried out in relation to these companies, while the smaller companies do not play a significant role in the market, nor do they determine the developments significantly. Lastly, we observe a similarity in the patterns of the indices in Russia compared to Greece and Cyprus.

4.1 Returns of Greece, Cyprus and Russia

Even though the trends of the indices of the Greek, Cypriot and Russian stock market are not the same, we identify some common features regarding stock exchange returns. We notice that for the period immediately after the imposition of the capital controls, in all three countries the stock market returns have fallen significantly, showing once again that investors' imminent response to adverse and restrictive measures is strongly negative. In the following period though, the results did not show any significant deviations from returns in the prior period, for all countries under analysis.

Specifically, in Greece, there is a small decline in the average of negative returns, for both indices, that is to say, a small improvement has been observed in marginal terms, after capital controls. As regards the volatility of the returns, we observe that the standard deviation after the capital controls is decreased. If we take, however, into consideration the coefficient of variation, which is a more accurate and

reliable measure for volatility, we conclude that volatility has slightly increased compared with the prior period. Of course, the small improvement in stock market returns is in line with the case of Malaysia, where the impact of the capital controls on the country's most liquid stocks was examined, and it was found that after their imposition there was a rise in the stock market returns (Johnson & Mitton, 2003).

In the case of Cyprus, we detect a minor increase in the markets' returns; the market had negative returns before, while after the capital controls the mean values are positive. As regards the volatility of the returns, we observe that the standard deviation after the capital controls is also decreased, as in Greece. Taking into consideration however, the coefficient of variation, we conclude that volatility increased for the general market index CYSM and decreased for the large capitalization index FTSE_CY, compared with the prior period before the capital controls.

In Russia, there is an improvement in the mean values of the returns, in marginal terms, for both indices, after the capital restrictions. Also, the volatility of the returns was higher for both indices, compared to the prior period. To be precise, we observe an enormous increase in Russia, which is correlated to the grave political crisis between Russia and Ukraine, the Russian military intervention in Crimea and the ominous international sanctions that were imposed to Russia afterwards. The panic and fear of the investors are reflected in the figures of volatility.

These findings, though, are incompatible with several previous research studies, due to the fact that there was an economic recession at the time and the values of the indices were on a downward trend because of the economic turmoil in the market, thus, the impact of the measures imposed were probably carried away by the preceding economic environment.

4.2 Volume of Greece, Cyprus and Russia

As for the volume of transactions, in Greece the results do not show large discrepancies in the period after the capital controls, although there is a minimal increase in the average volume of transactions. It was also found that, after the capital controls, that the standard deviation was lower. Nevertheless, looking at the

coefficient of variation we detect that the volatility increased. The fact of increased volatility is proportional to the results of previous research studies, which show that the imposition of capital controls implies increased volatility in the stock market (Edison & Reinhart, 2000; Johnson & Mitton, 2003). The paradox in the case of Greece is that after the imposition of the measures, the average volume of transactions in the stock exchange has increased in contrast with Cyprus and Russia, and, given the reduced liquidity of Greek investors (due to the measures), we can assume that the presence of foreign investors may be stronger.

In the case of Cyprus, due to the major haircut in deposits, several months the stock market movement had been frozen, and transactions were minimal, yielding zero returns to investors, in the period succeeding the capital controls. Thus, after the imposition of the measures, the volume of transactions had a steep drop and there was more volatility (taking into account the coefficient of variation) related to Greece. Knowing that the size of the stock market in Cyprus is much smaller can probably explain the strongest impact on the stock market transactions. Also, the imposition of measures, such as nominal transactions and accompanying documents for the transfer of capital, and the fact that the country's financial system relies heavily on foreign deposits, restrained investors' activity and decreased liquidity.

Almost the same results we see in Russia, where the volume of transactions fell dramatically after the capital restrictions. We observe the same pattern in Russia, where standard deviation also decreased, and the coefficient of variation increased, resulting in increased volatility for both indices. The decrease in the average values of volume and volatility are strongly related with the political instability, the international sanctions and the capital restrictions that took place in Russia at the time.

4.3 Returns' and volume' cointegration for the countries under analysis

Furthermore, a co-movement between the time series of returns and the volume of transactions was identified for all three stock markets. Stock returns are positively related to the contemporary change in trading volume (Chandrapala, Pathirawasam, 2011). Investors tend to be riskier when the market goes up, so they invest more and this result to an increase of the volume of shares. One the other hand

when the market goes down the investors tend to be more conservative, resulting to a decrease of the volume of shares. In Greece, we observe a downwarding trend before the capital controls, that continues till the end of 2015. The agreement between Greece and its creditors, the political and financial stability that followed, let the market stabilize, reassured investors' fears and suspicions about the economic environment and led to a minor increase in returns and volume.

In Cyprus, we detect at first a diminishing trend in the market till the capital controls, then a period of stability and several months later an upwarding trend. In April 2013, the agreement of the economic adjustment program for Cyprus was signed and we observe minimal movements in the market afterwards. This agreement led to a minor increase in returns and a major decline in volume of transactions, which is justified if we take into consideration the haircut of the deposits that took place that period.

Lastly, we observe a turmoil in the stock market in Russia. In 2014 we see a downfall, while in 2015 Russian market seems to recuperate and stabilizes. The reasoning is political: the Ukraine crisis and invasion in Crimea took place in 2014, when economic sanctions were forced that affected the stock market, naturally. We detect a downwarding trend in the stock market and the volume. Russia, in the end of 2014, imposed capital restrictions and the results are reflected in the market: we actually see a small increase in returns and the volume stabilizes in 2015. We conclude, therefore, that these restrictions helped the market to balance and Russia avoided another financial crisis.

Chapter 5: Conclusions

In the aftermath of our research, we can conclude that capital controls have indeed a negative impact on the stock markets, however not to the extent that someone could expect. Specifically, the analysis conducted above showed that, the average values of the returns for both indices in Greece, slightly increased, after the implementation of capital controls. An important result of the analysis was the increased volatility after the capital controls, for the returns and the volume for both indexes, ASE & FTSE, which verifies previous empirical research. This means that, the market was more unstable and less predictable after the capital controls compared before the capital controls even though the mean values were the same for the returns and the volume between the two periods.

As far as Cyprus and Russia are concerned, the analysis resulted in almost the same conclusions for the returns. In both countries the returns increased in marginal terms after the capital restrictions. Nevertheless, the volume of transactions decreased significantly in Cyprus and Russia, in contrast with Greece, where we detect a higher number of transactions after the capital controls compared to the period before the capital controls. Volatility in Cyprus and Russia was significantly higher for both returns and volume (except for the returns of the Cypriot index FTSE_CY) after the capital controls. A tremendous increase in the volatility of the returns for the two Russian indices is highlighted, indicating that, capital restrictions increase investors' uncertainty and exacerbate risk in the stock market, which depends to a large extent on the psychology of investors.

Furthermore, the findings confirm two interesting facts for the three countries under analysis, the co-movement between the returns and volume of transactions for both indices in each country and the lack of autocorrelation for the returns of the general stock indices and the high capitalization indices. The latter, indicates that the stock market does not incorporate previous stock market information, due to the capital restrictions implemented.

5.1 Limitations and Future Research

It should be mentioned that the subject of this research is very recent, complex and still ongoing. That is why the literature has not shed light yet in many aspects of the capital controls phenomenon. It appears, in our research, that the capital controls measures do not lead to negative returns on the stock markets as the average returns of the indices in all three markets are at similar levels before and after the imposition of capital restrictions. The fact that, the time period of the research was one year before and one year after the capital controls were imposed (in the case of Cyprus the time interval is even smaller; we had to limit our sample for the analysis before the capital controls from 250 to 112 observations due to lack of data) greatly diminishes the contrasts that occur in shorter terms - we mentioned that there is a negative impact on returns right after the announcement and implementation of the capital controls, but, overall, we do not observe significant differences in the stock market returns, in the time horizon of our research.

All in all, in order to allow for more detailed conclusions about the investors' response to capital controls; it would be useful in the future to study the long-term course of the stock market in a series of time periods with shorter time intervals. In this way, it will be possible to study both the direct and the overall impact of the different nature of the capital controls imposed. This will not only explain investor behaviors and market behavior in such events, but it will also be possible to formulate recommendations according to the nature and intensity of the measures, and the prevailing market conditions. Finally, in future research, in order to further determine the factors of co-movement in Greece, Cyprus and Russia, a Granger-causality test should be run for returns and volume. The findings of autocorrelations could be useful to analyze the market efficiency with a regression, suggesting how the capital controls affect the efficient market hypothesis.

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Appendix

Table 1

		-1 0 1	-1 0 1			
LAG	AC	PAC	Q	Prob<Q	[Autocorrelation]	[Partial Autocor]
1	0.0309	0.0404	.48117	0.4879		
2	0.0348	0.0522	1.0912	0.5795		
3	0.0012	-0.0931	1.0919	0.7790		
4	-0.0537	-0.0867	2.5506	0.6356		
5	-0.0244	.	2.8527	0.7227		
6	-0.1356	.	12.201	0.0576	-	
7	-0.0931	.	16.613	0.0201		
8	-0.0363	.	17.286	0.0273		
9	0.0019	.	17.288	0.0444		
10	0.0609	.	19.191	0.0379		
11	0.0898	.	23.334	0.0159		
12	0.0290	.	23.766	0.0219		
13	-0.0813	.	27.17	0.0118		
14	0.0308	.	27.658	0.0158		
15	-0.0148	.	27.772	0.0230		
16	0.0246	.	28.085	0.0309		
17	-0.0512	.	29.446	0.0306		
18	-0.0487	.	30.68	0.0313		
19	0.0239	.	30.98	0.0406		
20	0.0080	.	31.013	0.0550		
21	0.0613	.	32.984	0.0464		
22	-0.0538	.	34.502	0.0436		
23	-0.0206	.	34.725	0.0554		
24	-0.0243	.	35.036	0.0679		
25	-0.0590	.	36.877	0.0593		
26	0.0052	.	36.892	0.0764		
27	0.0172	.	37.049	0.0942		
28	0.0008	.	37.05	0.1178		
29	-0.0195	.	37.253	0.1399		
30	0.0419	.	38.192	0.1449		
31	-0.0028	.	38.196	0.1750		

32	0.0625	.	40.293	0.1491	
33	0.0016	.	40.294	0.1788	
34	-0.0489	.	41.58	0.1741	
35	-0.0532	.	43.106	0.1633	
36	-0.0648	.	45.379	0.1359	
37	-0.0092	.	45.425	0.1611	
38	0.0010	.	45.426	0.1902	
39	-0.0295	.	45.901	0.2078	
40	0.0212	.	46.145	0.2332	
.					

Table 2

		-1 0 1	-1 0 1			
LAG	AC	PAC	Q	Prob<Q	[Autocorrelation]	[Partial Autocor]
1	0.0324	0.0427	.52897	0.4670		
2	0.0260	0.0398	.87098	0.6469		
3	-0.0061	-0.1165	.8897	0.8279		
4	-0.0675	-0.1393	3.1933	0.5260	-	
5	-0.0068	.	3.2169	0.6666		
6	-0.1242	.	11.051	0.0868		
7	-0.1133	.	17.586	0.0140		
8	-0.0249	.	17.901	0.0220		
9	0.0048	.	17.913	0.0362		
10	0.0652	.	20.093	0.0284		
11	0.0951	.	24.733	0.0100		
12	0.0228	.	25	0.0148		
13	-0.1014	.	30.296	0.0043		
14	0.0391	.	31.086	0.0054		
15	-0.0316	.	31.604	0.0073		
16	0.0310	.	32.101	0.0097		
17	-0.0592	.	33.925	0.0086		
18	-0.0555	.	35.527	0.0081		
19	0.0361	.	36.206	0.0100		
20	0.0252	.	36.537	0.0133		
21	0.0836	.	40.197	0.0070		

22	-0.0404	.	41.056	0.0081	
23	-0.0359	.	41.734	0.0097	
24	-0.0161	.	41.87	0.0133	
25	-0.0601	.	43.778	0.0115	
26	-0.0029	.	43.783	0.0159	
27	0.0089	.	43.825	0.0216	
28	-0.0087	.	43.865	0.0286	
29	-0.0114	.	43.935	0.0372	
30	0.0505	.	45.299	0.0362	
31	0.0104	.	45.357	0.0463	
32	0.0561	.	47.043	0.0420	
33	0.0005	.	47.043	0.0537	
34	-0.0503	.	48.403	0.0520	
35	-0.0542	.	49.991	0.0482	
36	-0.0584	.	51.833	0.0425	
37	-0.0069	.	51.859	0.0533	
38	0.0166	.	52.009	0.0645	
39	-0.0326	.	52.588	0.0718	
40	0.0231	.	52.88	0.0835	
.					

Table 3

			-1 0 1	-1 0 1		
LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial Autocor]
1	0.0485	0.0618	.86491	0.3524		
2	-0.1127	-0.1792	5.5381	0.0627	-	
3	0.1221	0.2667	11.041	0.0115	--	
4	-0.0092	-0.2317	11.073	0.0258	-	
5	0.0088	.	11.101	0.0494		
6	-0.0436	.	11.81	0.0663		
7	-0.0454	.	12.579	0.0831		
8	-0.0181	.	12.701	0.1225		
9	0.0172	.	12.812	0.1713		
10	-0.0189	.	12.947	0.2267		
11	-0.0051	.	12.956	0.2962		

12	-0.0629	.	14.453	0.2727	
13	0.0372	.	14.979	0.3087	
14	0.1299	.	21.401	0.0918	-
15	-0.1198	.	26.88	0.0297	
16	0.0085	.	26.907	0.0425	
17	0.0224	.	27.1	0.0566	
18	-0.0483	.	27.998	0.0621	
19	0.0446	.	28.765	0.0698	
20	0.0660	.	30.454	0.0628	
21	-0.0919	.	33.737	0.0387	
22	-0.0461	.	34.566	0.0430	
23	-0.0109	.	34.613	0.0568	
24	-0.0762	.	36.889	0.0449	
25	-0.0801	.	39.409	0.0335	
26	0.0140	.	39.486	0.0438	
27	-0.0196	.	39.638	0.0554	
28	-0.0525	.	40.73	0.0568	
29	0.0122	.	40.789	0.0718	
30	0.0189	.	40.932	0.0880	
31	0.0226	.	41.136	0.1054	
32	0.0211	.	41.314	0.1253	
33	0.0317	.	41.719	0.1420	
34	0.0153	.	41.813	0.1678	
35	-0.0518	.	42.899	0.1686	
36	-0.0466	.	43.781	0.1748	
37	-0.0695	.	45.752	0.1532	
38	0.0157	.	45.852	0.1786	
39	-0.0363	.	46.394	0.1938	
40	-0.0086	.	46.424	0.2246	
.					

Table 4

LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial Autocor]
1	0.1189	0.1450	5.1887	0.0227	-	
2	0.0002	-0.0259	5.1887	0.0747		

3	0.1245	0.2596	10.91	0.0122	--
4	-0.0259	-0.1720	11.159	0.0248	-
5	-0.0166	.	11.261	0.0464	
6	-0.0369	.	11.768	0.0673	
7	-0.0599	.	13.106	0.0696	
8	0.0316	.	13.479	0.0964	
9	0.0432	.	14.179	0.1161	
10	0.0028	.	14.182	0.1648	
11	0.0196	.	14.327	0.2154	
12	-0.0410	.	14.964	0.2434	
13	-0.0055	.	14.976	0.3089	
14	0.0911	.	18.135	0.2007	
15	-0.0902	.	21.238	0.1294	
16	0.0175	.	21.356	0.1652	
17	0.0399	.	21.968	0.1860	
18	-0.0524	.	23.025	0.1896	
19	0.0306	.	23.386	0.2208	
20	0.0256	.	23.639	0.2585	
21	-0.0950	.	27.146	0.1661	
22	-0.0465	.	27.99	0.1760	
23	-0.0377	.	28.544	0.1959	
24	-0.0706	.	30.496	0.1689	
25	-0.0616	.	31.988	0.1584	
26	0.0079	.	32.012	0.1927	
27	-0.0385	.	32.598	0.2107	
28	-0.0286	.	32.923	0.2386	
29	0.0097	.	32.96	0.2793	
30	0.0365	.	33.492	0.3016	
31	0.0314	.	33.886	0.3300	
32	0.0225	.	34.088	0.3675	
33	0.0176	.	34.213	0.4093	
34	-0.0013	.	34.214	0.4575	
35	-0.0599	.	35.666	0.4369	
36	-0.0476	.	36.586	0.4415	
37	-0.0586	.	37.985	0.4243	
38	0.0062	.	38.001	0.4694	
39	-0.0224	.	38.207	0.5059	
40	-0.0074	.	38.229	0.5502	

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Table 5

LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial	Autocor]
1	0.0287	0.0384	.41467	0.5196			
2	-0.0082	-0.0190	.44831	0.7992			
3	0.0174	-0.0866	.60179	0.8960			
4	-0.0426	0.0406	1.5187	0.8233			
5	-0.0028	.	1.5228	0.9104			
6	-0.0067	.	1.5453	0.9564			
7	-0.0200	.	1.7487	0.9724			
8	-0.0008	.	1.749	0.9878			
9	-0.0246	.	2.0583	0.9905			
10	0.0159	.	2.1877	0.9947			
11	-0.0641	.	4.2976	0.9604			
12	-0.0900	.	8.4632	0.7480			
13	0.0501	.	9.7552	0.7138			
14	-0.0130	.	9.8431	0.7736			
15	0.0561	.	11.475	0.7183			
16	0.0760	.	14.472	0.5636			
17	-0.0236	.	14.763	0.6126			
18	-0.0165	.	14.905	0.6685			
19	0.0180	.	15.074	0.7179			
20	0.0227	.	15.344	0.7564			
21	0.0562	.	17	0.7111			
22	-0.0159	.	17.133	0.7560			
23	0.0327	.	17.696	0.7737			
24	0.0269	.	18.077	0.7993			
25	-0.1309	.	27.136	0.3491	-		
26	-0.0605	.	29.076	0.3076			
27	-0.0080	.	29.11	0.3556			
28	0.0068	.	29.134	0.4057			
29	0.0405	.	30.01	0.4135			
30	0.0269	.	30.397	0.4455			
31	-0.0420	.	31.342	0.4491			

32	-0.0037	.	31.349	0.4993	
33	-0.0002	.	31.349	0.5494	
34	0.0288	.	31.797	0.5761	
35	-0.0283	.	32.228	0.6026	
36	0.0603	.	34.194	0.5547	
37	0.0267	.	34.582	0.5830	
38	0.0241	.	34.897	0.6137	
39	0.0238	.	35.204	0.6437	
40	-0.0499	.	36.561	0.6259	
.					

Table 6

LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial	Autocor]
1	0.0281	0.0320	.39774	0.5283			
2	-0.0573	-0.0882	2.0544	0.3580			
3	0.0414	0.0872	2.9204	0.4041			
4	0.0005	-0.0276	2.9205	0.5712			
5	-0.0376	.	3.6389	0.6025			
6	-0.0171	.	3.7883	0.7053			
7	0.0018	.	3.7899	0.8036			
8	0.0065	.	3.8118	0.8737			
9	-0.0234	.	4.0925	0.9052			
10	-0.0811	.	7.4594	0.6815			
11	-0.0002	.	7.4595	0.7607			
12	-0.0355	.	8.1066	0.7767			
13	0.0644	.	10.244	0.6738			
14	0.0427	.	11.186	0.6714			
15	-0.0133	.	11.277	0.7327			
16	-0.0081	.	11.31	0.7899			
17	0.0315	.	11.825	0.8106			
18	-0.0316	.	12.343	0.8290			
19	0.0017	.	12.345	0.8704			
20	0.0037	.	12.352	0.9034			
21	0.0540	.	13.878	0.8748			
22	0.0361	.	14.562	0.8803			

23	-0.0728	.	17.352	0.7916	
24	-0.0566	.	19.038	0.7499	
25	-0.0091	.	19.082	0.7932	
26	-0.0044	.	19.093	0.8325	
27	-0.0120	.	19.168	0.8638	
28	0.0405	.	20.043	0.8629	
29	0.0508	.	21.416	0.8435	
30	0.0068	.	21.441	0.8736	
31	-0.0112	.	21.508	0.8979	
32	0.0341	.	22.132	0.9038	
33	0.0062	.	22.152	0.9241	
34	0.0031	.	22.157	0.9411	
35	-0.0040	.	22.166	0.9548	
36	0.0036	.	22.173	0.9657	
37	-0.0324	.	22.741	0.9683	
38	-0.0652	.	25.049	0.9473	
39	-0.0018	.	25.051	0.9593	
40	0.0108	.	25.115	0.9682	
.					

Cointegration

Greece

ASE

```
. regress R_ASE V_ASE
```

Source	SS	df	MS	Number of obs =	500
				F(1, 498) =	2.11
Model	.001627448	1	.001627448	Prob > F =	0.1467
Residual	.383673398	498	.000770429	R-squared =	0.0042
				Adj R-squared =	0.0022
Total	.385300846	499	.000772146	Root MSE =	.02776

R_ASE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
V_ASE	1.90e-11	1.31e-11	1.45	0.147	-6.68e-12	4.46e-11
_cons	-.0042707	.0021476	-1.99	0.047	-.0084902	-.0000512

```
. predict newvar, residuals

. dfuller newvar, lags(0)

Dickey-Fuller test for unit root                   Number of obs   =       388

                                 ---------- Interpolated Dickey-Fuller ----------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic         Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -19.975           -3.449            -2.874           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

FTSE

```
. regress R_FTSE V_FTSE
```

Source	SS	df	MS	Number of obs =	500
				F(1, 498) =	2.17
Model	.00215191	1	.00215191	Prob > F =	0.1412
Residual	.493555838	498	.000991076	R-squared =	0.0043
				Adj R-squared =	0.0023
Total	.495707748	499	.000993402	Root MSE =	.03148

R_FTSE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
V_FTSE	2.21e-11	1.50e-11	1.47	0.141	-7.37e-12	5.16e-11
_cons	-.0049686	.0023903	-2.08	0.038	-.0096649	-.0002722

```
. predict newvar, residuals

. dfuller newvar, lags(0)
```

Dickey-Fuller test for unit root — Number of obs = 388

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-19.783	-3.449	-2.874	-2.570

MacKinnon approximate p-value for Z(t) = 0.0000

Cyprus

CYSM

```
. regress R_CYSM V_CYSM
```

Source	SS	df	MS	Number of obs =	364
				F(1, 362) =	1.19
Model	.0011022	1	.0011022	Prob > F =	0.2768
Residual	.336305952	362	.000929022	R-squared =	0.0033
				Adj R-squared =	0.0005
Total	.337408152	363	.000929499	Root MSE =	.03048

R_CYSM	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
V_CYSM	3.48e-10	3.19e-10	1.09	0.277	-2.80e-10	9.75e-10
_cons	-.000797	.0017714	-0.45	0.653	-.0042804	.0026865

```
. predict newvar, residuals
(136 missing values generated)

. dfuller newvar, lags(0)

Dickey-Fuller test for unit root                   Number of obs   =       277
```

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-16.743	-3.458	-2.879	-2.570

```
MacKinnon approximate p-value for Z(t) = 0.0000
```

FTSE_CY

```
. regress R_FTSE_CY V_FTSE_CY
```

Source	SS	df	MS		
Model	.001457997	1	.001457997	Number of obs =	364
Residual	.313522961	362	.000866086	F(1, 362) =	1.68
				Prob > F =	0.1953
Total	.314980958	363	.000867716	R-squared =	0.0046
				Adj R-squared =	0.0019
				Root MSE =	.02943

R_FTSE_CY	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
V_FTSE_CY	3.97e-10	3.06e-10	1.30	0.195	-2.05e-10	9.99e-10
_cons	-.0003259	.0017199	-0.19	0.850	-.0037082	.0030563

```
. drop newvar

. predict newvar, residuals
(136 missing values generated)

. dfuller newvar, lags(0)

Dickey-Fuller test for unit root                   Number of obs   =       277
```

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-16.138	-3.458	-2.879	-2.570

```
MacKinnon approximate p-value for Z(t) = 0.0000

.
```

Russia

INDEXCF

```
. regress R_INDEXCF  V_INDEXCF
```

Source	SS	df	MS	Number of obs =	500
				F(1, 498) =	2.48
Model	.00138364	1	.00138364	Prob > F =	0.1160
Residual	.278012524	498	.000558258	R-squared =	0.0050
				Adj R-squared =	0.0030
Total	.279396164	499	.000559912	Root MSE =	.02363

R_INDEXCF	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
V_INDEXCF	-3.73e-14	2.37e-14	-1.57	0.116	-8.38e-14	9.24e-15
_cons	.0016188	.0017227	0.94	0.348	-.0017659	.0050035

```
. predict newvar, residuals

. dfuller newvar, lags(0)
```

Dickey-Fuller test for unit root Number of obs = 389

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-21.698	-3.449	-2.874	-2.570

MacKinnon approximate p-value for Z(t) = 0.0000

MXR

```
. regress R_MXR  V_MXR
```

Source	SS	df	MS	Number of obs =	498
				F(1, 496) =	3.82
Model	.002010781	1	.002010781	Prob > F =	0.0512
Residual	.261101056	496	.000526413	R-squared =	0.0076
				Adj R-squared =	0.0056
Total	.263111837	497	.0005294	Root MSE =	.02294

R_MXR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
V_MXR	-6.47e-14	3.31e-14	-1.95	0.051	-1.30e-13	3.42e-16
_cons	.0018657	.0016783	1.11	0.267	-.0014317	.0051631

```
.
```

```
. dfuller newvar, lags(0)
```

Dickey-Fuller test for unit root Number of obs = 387

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-18.156	-3.449	-2.875	-2.570

MacKinnon approximate p-value for Z(t) = 0.0000