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ECONOMIC ACTIVITY AND STOCK RETURNS IN MATURE AND EMERGING COUNTRIES

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Abstract

This paper empirically investigates the potential existence and strength of uni-directional or bi-directional relations stemming from the aspects of economic activity to stock returns and those that are produced from the opposite direction both in mature and emerging countries. We applied a multivariate VAR model and we performed Granger causality tests. Both quarterly and monthly (availability concerning) data were used, covering the period January 1980-December 2012. The economic activity was presented through a variety of variables such as GDP growth, industrial production growth, government consumption, private consumption, market value growth and inflation. The existence of an empirical relationship with forecasting extensions is confirmed in some economic activity presenting variables, but the magnitude of the results is differentiated between mature and emerging countries.

Keywords: Mature and emerging countries; stock returns-economic activity; VAR; Granger causality

Contents

1 Introduction

1.1 Relationship between economic activity and stock returns

The issue of the relationship between economic activity and stock returns in mature and emerging countries has risen again due to the recent economic crisis and to the steps forward in the field of economic structure and development that many emerging countries have experienced and as a result has changed their dependence with the global economy. Jeremy C.Goh, Fuwei Jiang, Jun Tu, Vuchen Wang (2012) give us an example of this alteration by testing the effectiveness of US economic variables in the prediction of Chinese stock market. The results show that before 2001(the year that China joined the World Trade Organization) there were no statistic relationship between US economic activity and Chinese stock market returns , but after this incorporation the state changed and now US economic activity(which is a large portion of the global) is a good leading indicator for the Chinese stock market. The decoding of the causal effects of stock prices to the future economic activity is of great importance as it will allow the policy makers to take measures in stock market's operations in order to stabilize the economic activity when that is needed, it will also help in the creation of more proper and well-deserved asset pricing models and it will ameliorate the cost of capital calculation, contributing to the normalization and the amelioration of the whole economic activity.

In the existing literature there are two theories on how stock prices affect and in a level anticipate the future economic activity. The first one focuses on the fact that stock price is the present value of future dividends and an increase or a decrease in the expectations that we have about the economic activity in the future is been reflected in the current stock price pushing it to higher or lower levels. Binswanger(2004) uses the theme of the creation of bubbles in order to refute this theory supporting that misleading factors may be the cause of the stock price fluctuations .The second theory is based on the lifecycle hypothesis of saving, which states that people consume a fraction of the present value of their total future income (Ando and Modigliani 1963). So if stock prices raise people's level of consumption will also reach higher levels creating better economic conditions. The correlation between stock returns and economic activity is positive and of great importance as several studies for a number of countries has shown in the past. Fama (1990), Barro (1990), Fisher and Merton (1984) for USA, Barro(1990) for Canada, Schwer (1990) for Japan and Germany, Choi(1999) for G-7 and Asperm,Wassefallen(1989) for other seven European countries. However, we are far from categorizing this relationship as perfect and as Paul Samuelson (1960) has said in order to walk with this point of view “The stock market has predicted nine out of the last five recessions. Paulo Mauro in his paper at 2002 about stock returns and output growth in emerging and advanced economies finds that the empirical association between stock returns and output growth although is not perfect , is significant in several emerging and advanced countries and the association is even stronger in countries with market characteristics such as high market capitalization, many domestic companies and initial public offerings as well as English regulations ruling the stock market processes. In order to come to this conclusion he used real stock returns (obtained as the difference between nominal stock returns and consumer price inflation), real GDP growth and in a number of cases (in a few emerging countries where the GDP growth data did not exist or existed in a time basis which is not the desired one) industrial production growth. This method gave him the possibility to increase his sample of seven countries (Colombia, India, Jordan, Greece, Malaysia, Pakistan and Zimbabwe) creating his final sample which consisted of 18 advanced and 13 emerging countries. A question that arises is if there is a bi-directional relationship between economic activity and stock returns in mature and emerging countries or one of these two factors leads the relationship. An answer to this question is given by Katerina Tsouma in her paper about stock returns and economic activity in mature and emerging markets. She used monthly data (of real stock returns and growth rates of industrial production that resulted from selected nominal stock price indices, seasonally adjusted industrial production indices and consumption price indices for each country) of a sample of 22 MMs and 19 EMs countries covering the period January 1991-December 2006, she applied a bivariate VAR (12) model and she performed Granger causality tests. The results confirmed the empirical relationship between stock returns and economic activity but didn’t reveal the existence of a bi-directional direction between these two factors. A strong positive one-directional relationship from stock returns to future economic activity is proved but only a very weak relationship stems from the opposite direction. The results are not exactly the same for the two kinds of countries that took part in the analysis. The forecasting ability of stock returns to economic activity holds more for the MMs countries than the EMs, while the same kind ability coming this time from economic activity to stock returns holds for more than the half EMs but only for a very small number of MMs countries. The absence of bi-directional relationship between economic activity and stock returns that Tsouma supports with her findings does not hold if we examine a similar kind of relationship as it is that of economic activity and stock market development that Jose Alberto Fuinhas , Luis Miguel Marques and Antonio Cardoso Marques (2013) did in their paper at 2013.Their research was not consisted of a large number of countries but was solely based on Portugal .The authors used quarterly data on a number of variables such as real GDP, stock market capitalization, domestic credit ratio, investment ratio and consumer price index stemming from the period 1993-2011(76 observations) .They used a Vector Autoregressive Model and performed Granger causality analysis (in the same way that Caporate (2004) and Tsouma at 2009 did) and came to the conclusion that a bi-directional positive causal relationship between stock returns and economic activity exists indeed. Granger causality analysis was also used as a tool by Christophe Croux and Peter Reusens in their article (2012) where they tried to find evidence about the predictive power of stock returns in addition to economic activity. For that purpose the authors used quarterly data from the period 1991-2010 for the G-7 countries .Their contribution to the current literature was the decomposition of the Granger causality in the frequency domain so as to find where the predictive power is more concentrated at the quickly or at the slowly fluctuating components of the stock prices. For the fulfilment of that cause they applied the Geweke (1982) test procedure both in a single-country and in a multi-country setting. The results show that the slowly fluctuating components of the stock prices are the ones that concentrate an important amount of forecasting ability for the future GDP both in a single-country and in a multi-country setting, something that no one can contends for the quickly fluctuating components according to the presented evidence . The country that the relationship between stock returns and economic activity has been more analyzed in the existing literature is by far USA. Fama (1990), Barno (1990), Lee (1992), Chen (1991) and Schert(1990) with their research were in favour of the hypothesis that stock returns seem to lead real activity in the USA. Estrella and Mishkin (1996) also contributed in that hypothesis as they found stock prices to be a very powerful tool in the prediction of recessions mostly one to three quarters ahead. On the other side Binswanger(1999) states that the previous findings of Fama and the others hold for the period 1953-1997 but the things look very differently if we run regressions over a subsample covering the boom on the time that the article was released on the stock market since the early

1980s. Binswanger in his article identifies a fall in the ‘power’ of the relationship between stock returns and economic activity in the USA. This occurrence holds both for monthly or annual stock returns and the presentation of economic activity by GDP growth rate or production growth rates does not affect it. A possible answer to this phenomenon is the creation of speculative bubbles since the early 1980s. Another important contribution to the understanding of the relationship between stock returns and economic activity in the USA comes from Marco Gallegati (2007). Gallegati used wavelet analysis (a technique that has similar points with Fourier analysis) to the DJIA stock price index and to the industrial production index for the USA over the period 1961-2006 in order to identify the scaling properties of the series and their lead/lag relationship among them at different time scales. The results manifest that according to wavelet variance analysis production growth rate exhibits stationary long memory dynamics while stock returns have exact the opposite behavior(they show short memory dynamics).What comes as a result of the authors research is that we can use stock returns in order to make provisions about the future economic activity but only for examined periods of 16 months or longer, something that is not weird because investors who have long term horizons incorporate the macroeconomic fundamentals in their investment choice so the relation gets stronger at higher scales (lower frequencies).

One of the first and most thorough attempts to exactify if the relationship between stock returns and economic activity that Fama suggested holds also for other countries was made by Fabio Canova and Gianni de Nicolo(1995). These two analysts examined the relationship among stock returns and output growth for five different countries US, UK, Germany, France and Italy. In order to achieve their goal they used a generally equilibrium model with two sources of disturbance, three mechanisms of transmission (domestic and international) across countries and they took as granted that agents are rational and that markets are complete. The results show that the source of disturbance that drives the cycle is responsible for the strength of the association among the two examined factors. For example when the expenditure shocks which are driven by the government are “in charge’ of the international cycle the bond between GNP growth and stock returns comes as a result of the positive effects that these disturbances have on dividend payments something that does not occur when technology shocks drive the cycle, where we have a weaker form of connection due to the lower point of correlation between dividend yields and GNP.

1.2 Relationship between liquidity and stock returns

An aspect of economic activity that deserves to be discussed and analyzed in comparison to stock returns so as our study does not have black holes is the relationship between liquidity and stock returns. The last years a growing interest is being noticed about the decoding of that relationship. This phenomenon of course has his answer and stems from the fact that if a causal relation is beyond question verified among these two parts then from the investors' point of view the pricing of the liquidity risk is obligatory. One of the most influential works in this regard is that of Pastor and Stambaugh(2003) who found that the stocks that exhibit the higher expected returns are those which display the greater sensitivity to aggregate liquidity. To take things from the beginning we must mention that liquidity emerged as a possible determinant of stock returns in the middle of the 80s when the first studies focused on this subject were published producing unfortunately mixed results. Some of the researchers were led to results that supported the existence of a strong positive return-illiquidity relationship, others found no relation at all, while others claimed that the relationship exists but only during January. The two pioneers who provided the first theoretical motivation for all the others to follow by establishing the relationship among assets with low liquidity (or high transaction costs) and return premium were Amihud and Mendelson (1986). The two scientists used as tools for their study OLS and GLS regressions to 1961-1980 NYSE data and came to the conclusion that risk-adjusted stock returns do increase with spread (liquidity). Their findings did not remain unchallenged. Chen and Kan(1989) presented their view that the results of Amihud and Mendelson were unique to the methodology they used and as a result there were no reliable sign of a return-spread relationship. Furthermore one more juxtaposition came from the part of Eleswarapu and Reinganium(1993) who presented their theory that there is indeed a statistically significant relationship between stock returns and liquidity spread but that holds only for January months. However, later Eleswarapu(1997) in the study that he conducted alone found that although the spread effect was more intense during January months, there was still a statistically important(at the 5%) level effect over all months. In the 28 years which have now passed since the first publication dealing with the relationship issue among stock returns and liquidity(Amihud and Mendelson (1986)) many researchers have followed their example and tried to shed light in that intriguing issue. Through all these years the vast number of researchers dealt with the unravelling of the relationship in question mainly if not solely for the advanced countries (easiness on finding data) and support the presence of a negative relationship between return and liquidity, confirming the existence of a positive liquidity premium as it is clearly proposed by theoretical papers. The place that the empirical relationship is without doubt more thoroughly documented is the large hybrid quote driven markets of the USA (NYSE, AMEX , NASDAQ). One of the most important and complete attempts that talks about how our examined relationship holds in USA is that of Vinar T. Datar, Narayan Y.Naik and Robert Radcliff at 1998. Their paper provides a different kind of test of Amihud and Mendelson's model and the difference is laid on their using the turnover rate as a proxy for liquidity. The used all the non-financial firms on the NYSE during the period of 31 July 1962 to 3 December of 1991 as data for their research. The data was used at a monthly basis. The monthly data on returns was collected from the Centre of Research in Security Prices (CRSP), while the book value was extracted from the COMPUSAT tapes. Their result is a confirmation of the Amihud and Mendelson model. To be more specific they found a strongly negative relationship between the stock returns and their turnover rates supporting in that way the notion that illiquid stocks provide relatively higher average returns. Speaking via numbers it turned up an association of 1% drop in the turnover rate with a higher return of about 4.5 basis points per month, on average. The relation among liquidity and stock returns does not lose its strength even after the control of the book to market ratio, the size of the firm, the beta and the January effect that Eleswarapu and Reinganium support(January seasonality did not occur) . The existence of a liquidity spread in hybrid quote-driven markets was thoroughly analyzed and proved by many researchers but the question remained if that premium exists also in pure order-driven system. The paper of Ben R. Marshall and Martin Young (2003) uses the example of the Australian stock market which is a pure order-driven system as a means of help in order to find out the truth. The authors used turnover rate, bid-ask spread and amortized spread as liquidity proxies, while they also took into consideration factors such as size and beta that seem to influence stock returns. The research was conducted in a monthly basis and the data used on that study was gathered for all companies (for which the necessary data was available) listed on the Australian Stock Exchange for the period 1994-1998 inclusive. They obtained the data from the Securities Industry Research Centre of Asia-Pacific and 1100 companies per year (on average) were included. The methodology used was SUR and CSCTA models. The results that came out were of great importance and analysis. The relationship between turnover rate and stock returns is negative in a statistically significant level during the whole year indicating the presence of a positive liquidity premium. This result is not odd if we make a quick analysis of the perspective of investors. Investors want to be compensated with better returns for the risk of not being able to sell a stock in a specific time horizon without loss that they undertake. The existence of that phenomenon in the order-driven market of Australia implies that although order-driven markets may be more liquid than the quote-driven markets, many stocks still face liquidity issues in an important level so as to warrant a liquidity premium. Secondly, no relation between stock returns and amortized spread was revealed reinforcing the common belief. Finally a statistically significant negative relationship among stock returns and size in the Australian market was detected, a finding that is in the same route with previous researches. Marshal continue dealing with the stock returns-liquidity issue in the Australian market and at 2005 he published his paper which tried to analyze the examined relationship with a different way and by using different "tools" than those used in his collaboration with Young a few years earlier. He used as data the firms listed on the Australian Stock Exchange (ASX) during the period 1991-2002.He used the standard Fama and MacBeth methodology and the point where he differentiated his study is the use of a new proxy for liquidity.the Weighted Order Value(WOV). WOV is a combination of bid and ask depth and weight orders. Marshal was led to the same results with previous researches and for one more time the existence of a positive liquidity premium was revealed. One of the studies that does not deal with the unravelling of the relationship between stock returns and liquidity in developed countries but focus his attention in the same issue but for the emerging countries is that of Sang-Gyung Jun, Achla Marathe and Hany A. Shawky published at 2002.The authors used monthly data for stock returns and liquidity for 27 emerging equity markets for the period January 1992-December 1999.The monthly returns were taken from CRSP. Morgan Stanley World Index was also used as a proxy for the stock returns on the world market index. Of course the basic source of data was the Emerging Market Database maintained in the beginning by the World Bank and later by Standard and Poor's. In order to make the comparison among countries possible all the return data used are in terms of US dollars. The liquidity was measured by three variables: the turnover ratio, the trading value and the turnover-volatility multiple. The results confirm the positive correlation among stock returns and aggregate market liquidity. The results are of the same direction both for cross sectional and time-series analyses and do not lose their impact even after controlling for market capitalization, world market beta and price to book ratio. The positive correlation among stock returns and liquidity in a time-series analysis is in the same line with previous findings in developed markets. On the other side the positive correlation in a cross-sectional analysis does not comply with market microstructure theory that has been empirically supported by many researchers on the developed markets area. The authors took their research a step forward by examining the existence of a causal relationship among the two variables. In order this to happen they conducted Granger causality tests using a multivariate VAR model. The outcome was that neither of the two examined variables was proved to significantly Granger cause the other one in any consistent way across all the including in the study markets. We mentioned in the beginning that not all the studies that dealt with the issue of the relationship among stock returns and liquidity produced the same results but instead we had mixed and not the same results even for countries that are placed in the same geographical territory and have a few things in common. An example of that phenomenon is the markets of Japan and China. In Japan the result as it is presented by Yuk Ying Chang, Robert Faff and Chuan-Yang Hwang in their study about liquidity and stock returns in Japan at 2009 is that the expected stock returns are negatively(positively) related to the existing level of liquidity(illiquidity), a result that is not opposite with the existing literature. In order the researchers to come to this conclusion they used monthly data stemming from the First Section, the Second Section and the Mothers Section of the Tokyo Stock Exchange (TSE). Stocks listed on the First Section are the most successful and of the biggest size in Japan. In the Second Section we find companies that have a lower level of trading activity, while Mothers Section is the newest part of the Tokyo Stock Exchange with a clear and very important role, to give help and support newer and more innovative companies. The sample period of the study is from 1975 to 2004. On the other side in the case of China we don't find the perfect example of compliance with the existing literature in the examined field. The paper of Paresh Kumar Narayan and Xinwei Zheng helps us to clarify our view about if and how stock returns and liquidity relate with each other. The dataset that the authors used in their survey comes from the China Stock Market and Accounting Research (CSMAR) database. They used individual daily and monthly returns for all the stocks traded on the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) for the period 1994-2005.They presented liquidity via three different liquidity measures: trading volume (TV), trading probability and turnover rate (TR).The results that occurred are at least mixed. A greater evidence of a negative effect driving from liquidity to stock returns is obvious on the SHSE compared to the SZSE. This occurrence does not give conclusive evidence on whether or not liquidity risk needs to be priced on the Chinese Stock Market. A possible answer for not having the expected results is that asymmetric information and government control that dominate the Chinese Stock Market may be the cause for nullifying liquidity crises(an example of that reality is the relatively small impact that the 1997/1998 Asian financial crisis had on the Chinese Stock Market).

1.3 Relationship between inflation and stock returns

Our attempt to make an analytical and thorough presentation of all the aspects of economy that are related to one way or another with stock returns would remain incomplete if we did not make mention about a controversy issue that has kept the economists busy for a really long time .All that introduction refers to the relation between stock returns and inflation. Anyone who wants to do things properly and start from the beginning hasn't other way but to start the unravelling of that relationship from Fisher. The classic Fisher model (Fisher 1930) supports that the rate of inflation and nominal asset returns move one-for one so that there will be an independence between real stock returns and inflation and the direction that real stock returns take to be determined solely by real factors. Furthermore, the root of that idea is also based on the belief that equities are hedges against inflation because they represent claims on real assets. However, evidence of that theory is not easily to be found. With the exception of Solnic and Solnic(1997),Engsted and Tanggaard(2002), Luintel and Paudyal (2006) and a few others, the vast majority of the researchers stands on the opposite side finding evidence (by using post-war data for the USA and many others industrialized countries) that support the existence of a negative correlation between real stock returns and inflation (Bodie 1976, Nelson 1976, Fama and Schwert 1977, Jaffe and Mandelker 1978, Gultekin 1983 et. al.) The presence of a negative relation between the two examined factors implies that investors, who face losses due to inflation, can expect this effect to be compounded by a less than average return on the stock market (Chouldhry 2001). The negative correlation that is found and comes in contrast with the conventional theory is often called as "the stock return-inflation puzzle". Many hypotheses have been proposed in order to explain the observed negative relation. The most popular of them are those of Modigliani and Cohn (1979), Feldstein (1980) and Fama (1981, 1983). The inflation illusion hypothesis of Modigliani and Cohn maintains the belief that investors are subject to inflation illusion, so when a rise on inflation is been detected, they have the tendency to do a bigger discount to expected future earnings by using higher nominal interest rates. What comes as a result of that movement is the undervaluation of stock prices when inflation is at high levels and the overvaluation when inflation falls, leading to the negative noticed relationship among the two variables. The tax hypothesis of Feldstein argues that basic features of US tax laws, especially historic cost depreciation and taxation of nominal capital gains are the reasons behind the creation of an adverse effect of increased inflation on stock price. It also states that the invocation of a theory based on systematic error as that developed by Modigliani and Cohn is of no necessity. The proxy hypothesis of Fama maintains that the combination of a positive association between stock returns and real activity with a negative association between real activity and inflation based on a money demand model, leads to forged negative relations between stock returns and inflation. The impact and the magnitude that those hypotheses had on the scientific environment is obvious by the fact that they gave rise to many new studies that tried to see whether those studies have real scientific basis. A research named "The stock return-inflation puzzle revisited" conducted by Liam A. Gallagher and Mark P. Taylor is an example of that spirit. The hypothesis tested in that paper is that of Fama (proxy hypothesis). The authors used quarterly and annual data (stock returns and consumer price index), that found from the IMF's International Financial Statistics data base for the period 1957Q1-1997Q4. They tried to formalize and derive testable implication of Fama's hypothesis by developing a theoretical model, leaving the empirical investigation on a VAR model. The results verified Fama's and Marshall's results for the post-war period(US real stock returns have a significantly negative relation with inflation) and they also gave credit to proxy hypothesis as they strongly confirm the proxy hypothesis explanation of the puzzle in the US over the last forty years. One more study that deals with the verification or rejection of a proposed explanation for the puzzle is that of Bong Soo Lee (2009). The hypothesis in question is the illusion hypothesis (Modigliani and Cohn). The authors used USA and international data (stock returns and dividend yields) taken from S&P 500 Composite Index, Robert Shiller's website and CRSP value-weighted returns. The methodology used was structural VAR identification method. What came as a result of that study was that the illusion hypothesis can be used to explain the post-war negative relation between stock returns and inflation, but not the pre-war positive relation of the same variables. The majority of studies about the relation between stock returns and inflation, is conducted on short horizons(less than a year).However, the examination of that relation in the long run is very important and that importance is based on at least two reasons. First of all, practically speaking many investors hold the stocks that have acquired for long time periods, so the unravelling of the manner in which stock prices move with inflation is of great importance. Secondly, the true relation between stock returns and inflation in the short run can be easily obscured by short-term noise which can derive through many sources such as unexpected immediate consumption need reasons. Those that examined the relation over long horizons and found that Fisher hypotheses stands as the horizon increases are Boudookh and Richardson (1993), Solnik and Solnik (1997) and Schotman and Schweitzer (2003). A research that focus on the relation between stock returns and inflation both in short- term and medium-term period is that of Lifang Li, Paresh Kumar Narayan and Xinwei Zhang (2010).The authors preferred to deal with a country that only a small number of studies were based on it (Goodhart and Smith 1985, Paul and Pope 1988 and Joyce and Read 2002) and it had up to then produced mixed and confusing results. To fulfil their goal they used daily and monthly FTSE all shares Index (FTA), ten industry indices (namely oil and gases(OI), basic materials (BM) , industrials (ID), consumer goods (CG), healthcare (HL), consumer services(CS), telecoms (TM), financials (FN), information technologies (IT) and utilities (UT)) and RPI(retail price index, is a measure of inflation in UK, which is published monthly by the office for National Statistics and measures the changes in the cost of a basket of retail goods and services.) data from June 1948-December 2007.The short-term sample period was 1962-2007 ,while the medium term one contained data covering the period 1955-2007). All the data were obtained through Datastream except from FTA. The results for UK were for one more time not in a stable pattern. It was found that UK stock market fails to hedge against inflation in short-term, while in the medium-term period we had mixed results. The expected inflation is positively related with stock returns, but on the other side the unexpected one has the exactly opposite results. One more attempt to analyze the relationship between stock returns and inflation in separate time horizons were made by Sangbae Kim and Francis In (2004) this time by using USA data. They used monthly nominal and real stock returns and inflation rate for the USA covering the period 1926-2000. They collected the data used from Stocks, Bonds, Bills and Inflation (SBBI) sourced from Ibbotson Associates (2001).The methodology used was based on a wavelet multiscaling method which decomposes a given time series on a scale-by-scale basis. The outcome reveals the existence of a positive relationship among stock return and inflation both for the shortest and the longest scale, while a negative relationship is been found for the intermediate scales.A notably interest study especially for the method used as a means of result producing is that of Paul Alagidede and Theodore Panagiotidis (2009). The two scientists examined the relation between stock returns and inflation for the G7 countries (USA, UK, GERMANY, ITALY, JAPAN, CANADA, FRANCE) using quantile regressions that were presented by Koenker and Bassett (1978) and their importance lies on the fact that they provide estimation of the linear relationship among the regressors and a specified quantile of the dependent variable. The data consisted of monthly consumer and stock price data for the period 1970-2008 for all G7 countries and were obtained by Datastream. A positive relationship was one more time found especially as we move to higher quantiles with the exception of Canada. The results produced comply with the existing literature. We couldn't close the historical flashback of the inflation-stock return relationship without referring to the paper of George Hondrogiannis and Evangelia Papapetrou who shed light to that relationship for Greece. The two Greeks used quarterly data for Greece covering the period 1984-2002. They used real GDP as output variable, they took price level as the CPI and the stock value comes from the Athens general stock market index (STOCK).The methodology used was based on a Markov switching vector autoregressive model (MS-VAR) which has the advantage of being able to capture the dependence structure of the examined series both in terms of mean and variance. What the two researchers found was that real stock market returns are not significantly influenced by actual inflation. They continued their study with the decomposition of inflation into 2 components, one due to demand shocks (temporary inflation) and the other due to supply shocks (permanent inflation) and by employing 3 different estimation techniques (BQ decomposition, Kalman filter and HP filter). The final results show that the performance of the Greek stock market has no relation with any inflation source in the economy and that outcome is of no dependence with the method employed in order to separate inflation into 2 components.

1.4 Relationship between financial development or liberalization and stock returns

One other aspect of the relationship between stock returns and economic activity that is of great interest is in what degree financial development or liberalization affects stock return and as a result the general economic activity .The motives for the research of this relationship are given by the fact that the way stock returns behave is strongly related with some financial market properties in two different ways. Firstly the stock returns performance depend in a direct way on how well some of the functions of the financial system such as liquidity provision, diversification of risk or manager's monitoring are held. Secondly the asset prices and in particularly stock prices are affected by financial markets structure through the macroeconomic fundamentals. The last decades many emerging countries have liberalized their capital markets .They remove the restrictions on cross-border transactions and as a result of that movement we had an increase in the participation of international investors. The investors wanted to make use of the higher returns in these markets along with the advantage of international diversification that this choice contains for their portfolio. However, the financial liberalization had also positive results for the emerging countries as it modernize the stock market and lower the cost of capital for the domestic companies leading to investment booms (Henry 2000) and creating economic expansion. There is a large number of articles in the existing literature that have dealt with this intriguing issue. Our analysis will be based on three very interesting articles. The first article is that of Harris Dellas and Martin Hess (2005). The authors committed a quarterly examination of stock returns in comparison to the most important factors that consolidate financial liberalization such as the size and the quality of the banking system and the liquidity of the stock market in a cross section of 49 emerging and mature countries over the period 1980-1999. What comes as a result of the findings that are presented in that paper is the significant relation of stock returns to the degree of a market's financial development. The variance and the covariance of domestic stock returns have strong relation to the country's modernization of the banking sector and has nothing to do with the currency that the stock returns are measured. Stock market development (liquidity) is related to the covariance of the domestic with world returns. The second article is that of Mehmet Umutlu, Levent Akdeniz and Ashihan Altay-Salih which addresses the degree that stock returns are affected by financial liberization in emerging countries. The authors deviate from the existing literature as they did not examine the stock return volatility of the market portfolio but the aggregated return volatility of individual stocks. The results revealed a negative relation between the aggregated total volatility and to the degree of financial liberalization, especially for small or medium-sized emerging markets, something that concords with the view that an increase of the investor's base due to the financial liberalization enhances the accuracy of public information mentioned and causes the reduction of volatility. On the other hand a positive relationship among global volatility and financial liberalization has also occurred. The third article is that of Daniel Cajuiro, Periclis Gogas and Benjamin Tabac which investigates if financial market liberalization increases the stock market efficiency by using as example the Athens stock exchange. The methodology that the authors use in order to identify the changes in the structure of the Athens stock market and the degree of its development was based in that of Barabasi & Vicsek (1991) and Di Matteo,Aste & Dacorogna (2005). They also used a "rolling sample" approach rather than analyzing different periods and with that crucial movement they avoid the problem of setting a "liberalization date" which troubled many similar studies. Finally they managed to find the association between changes in the structure of stock market and its liberalization. The outcome of the research that took place was the demonstration of low evidence of predictability and multifractality that characterized the Athens stock exchange, characteristics that we find in developed markets. These facts may lead to a reduction to the cost of capital for domestic companies and to the reduction to the cost of equity for the country through the diversification of risk among domestic and foreign agents. The evidence that are presented in that article come to an agreement with Henry's paper(2000b) where we see that the mean growth rate of private investment in the three years after the liberalization of the stock market exceeds by 22% the sample mean.

1.5 Relationship between monetary policy and stock returns

Financial liberalization and development is one of the "driving forces" that indirectly affect the real economy through modifications in the stock market operations and through the economic potentials that these alterations create. Monetary policy statements is one more way of indirectly affecting the general economic activity and the analysis of the ways through this affection is accomplished among with the impact that they have in the economy during the existence of different macroeconomic cycles is of great interest for the policy makers and for all the participants of the economic environment as a whole. All the market participants are aware of the importance and influence that monetary policy has on the direction that real economy will follow, as it affects her primarily through financial markets in general and stock markets in particular. As it is obvious they pay attention to every word that Fed official utters in order to find clues of possible changes in the monetary policy, which will affect stock prices upwards or downwards. An example of this reality is given by the reaction that market participants had after an interview that Ben Bernanke, the Fed Chairman, gave to CNBC reporter Maria Bartiromo during a media dinner. Ben Bernanke told that investors did not estimate in the way they should, and Fed expected his willingness to use monetary policy as a 'weapon" in the fight against inflation. Just after these words made known to the people through Ms Bartiromo's TV program we had some very important implications in the economic environment. S&P 500 index dropped by 0,8% and the Treasury bond yields reached four-year highs. All these implications took place because investors believed that behind Bernanke's remark was a sign that Fed will continue its interest-rate boosting campaign for a longer period than it was estimated before. New York Times in their headline the next day used a very clever note that depicted the reaction of the stock market, 'Bernanke Speaks and Shares Tumble". Two more findings that reflect the significance and affection of monetary statements to several economic factors are given by Fleming and Remolona (1997) and by Fair (2002).The first two economists show that big price changes in the US Treasury Market are caused by Federal Funds target rate announcements while Fair argues that more than 30% of the events that cause serious price changes in the stock market and can be identified are monetary announcements. Bernanke and Kuttner (2005) proved that an unexpected 25-basis point cut in the federal funds target rate drives to 1% average increase in the stock price level. Bernanke and Kuttner also estimated changes in the current federal funds target rate in order to measure monetary policy shocks. Gurkaynak, Sack and Swanson (2005) in their study presented two factors that determine the reaction of asset prices and therefore stock prices to monetary news. They interpreted the first as changes that we do not expect in the current target rate. The second, which is called the path factor makes a relation to the route that monetary policy will follow to the policy statements of the Federal Open Market Committee that incorporate this kind of information. Gurkaynak(2005) also show that FOMC statements affect long-term Treasury yields but he did not find association with the US stocks movements. Gurkaynak's paper comes in conflict with the findings of Alexander Kurov (2012). Kurov found a state dependence between stock markets and monetary policy statements. In his study he also dealt with answering the question whether the state of the economy (recession or prosperity) is crucial when we examine the effects of monetary policy statements to stock market. He proved that stocks respond positively to the path factor in recessions and negatively during good economic times. With his findings Kurov supported the theory that since corporate cash flows and expected returns do not remain steady during a business cycle, Federal Reserve has in her possession information about the economy that investors are unaware of. Finally he contributed to the existing literature by proving that stock returns volatility depends on the monetary statements and the impact of that dependence varies through different economic periods. Kurov has dealt again in the past with the issue of macroeconomic cycles and the stock market's reaction to monetary policy with the collaboration of Arabinda Basistha at the title-paper which was published at 2008. With the use of proper ways of measuring the monetary news, a right sample period and multiple proxies for macroeconomic state, the authors found evidence of state dependence between monetary news and stock market, in addition to Andersen (2007) who came to the opposite conclusion in his study. Furthermore they proved that the state of the economy and the credit market conditions are responsible for the size of the impact that unexpected changes in the fed funds target rate have on stock returns. To be exact stocks response to monetary news in times of recession and tight credit conditions is more than twice as in times of economic prosperity. Moreover firms that face economic difficulties and have credit issues respond in a much more intense way in monetary shocks during bad economic moments than firms whose economic condition and credit position are in a better "shape". Monetary policy is a tool of economic intervention and stability transmission that is used both for emerged and advanced economies. However, the emerged economies are more liable to internal and external uncertainty that prevails the last years in the global economy, so they use more the flexibility of monetary policy in order to stabilize the route of their economy. The monetary means that such countries use aiming at the fulfillment of their goal are modifications in fields such as money supply, interest rate, exchange rate and required reserve rate. The exploration of the impact of monetary shocks is studied by economic researchers through inflation, employment and output, finding evidence that support the existence of asymmetry during their presence. Every researcher emphasizes in different factors embodied in the monetary shocks that affect the stock market. Christos and Alexandros (2008) found that stock's pricing is affected by the expected discount rate which is influenced by monetary shocks. Fransesco and Stefano (2007) underlined the importance of money supply and unity labor cost, whose changes through monetary policy shocks affect the stock market. The existing literature confirms the association between stock markets and monetary shocks especially for the emerged countries. One of the more well-functioned papers that analyze the assymetric effects of monetary shocks in an emerging stock market is that of Feng Guo, Jinyan Hu and Mingming Jiang (2013) who used the case of China, who owns the biggest stock market in comparison to the other emerged economies. The authors studied the effect of monetary shocks on the Chinese stock market during the period 2005-2011 with the 'help' of a MSVAR-EGARCH model. Furthermore they used a Markov switch model in order to explore the endogenous market cycles. The results which are of extensive discussion and great importance are the followings. First, money supply and exchange rate shocks are the two factors that have the most prominent effects on the stock market. A significant positive relationship among fluctuations in those two factors and stock market's return rate has been identified. Second, it is clear that the effects of interest rate shocks in stock market are not stationary. In the bear market interest rate policy stabilizes stock market, while in the bull market we can't assert the same thing as the effects are not very illustrating. Finally, reserve rate shocks also play a double-role part in the stock market. In the bear market a frequent change in the reserve rate is in favor of expectation release, while in the bear market those changes are for the benefit of signaling.

1.6 Relationship between crisis shocks and stock returns

We talked about the implications that monetary shocks have on stock markets and consequently on economic activity but we did not make reference to the side effects that crisis shocks have on stock returns. Several studies have been published that tried to shed light to this phenomenon. One study that dererves to be mentioned is that of

Charles Calomiris, Inessa Love and Maria Soledad Martinez Peria (2012).The authors focused on the financial crisis of 2007-2008 which started in the US mortgage market. To conduct their study they used data that they collected through a sample of over 16000 firms in 44 countries(emerging or developed) and they compared the performance of stock returns that those firms had during the 2007-2008 crisis period and during several other placebo periods(non-crisis periods). In order to achieve their goal they created a vector consisting of six variables that used to measure the effects that the three types of shocks (collapse of global trade, credit supply contraction and selling pressure in stock markets) which characterized the global crisis of 2007-2008 had. The analogy that they used was: four variables that measure how vulnerable is a firm to credit supply shocks, one to measure the size of the exposure to global trade demand shocks and one to measure the consequences that selling pressure had to stock markets. The results show that while the six mentioned variables were of great statistical importance during the crisis period, through a number of placebo periods the degree of importance that those variables had was not in the same high level. By making separate estimations for emerging and developed countries the authors found that emerging markets respond in a more intense way to global trade conditions during crisis or placebo periods but not as much as developed countries do to selling pressures. Furthermore, a finding of great magnitude arose when “crisis-shock exposed” and “crisis-shock robust” firms were separated and their mean returns during crisis or placebo periods were compared. As it was expected the mean returns of “crisis-shock exposed” firms were lower than those of “crisis-shock robust” firms through the crisis period, but an opposite direction relationship among these two kind of firms during the placebo periods was not detected, giving us evidence to support the theory that investors were not compensated to the level they should to for the risks that their investment choices embodied at before crisis periods. With the globalization of economic system, crises that start in a country (like the 2007-2008 crisis which was examined before and started in the US mortgage market) do not remain restricted in one area but spread to other markets through channels and mechanisms that the globalization of the economy has created. A paper that deals with that issue is that of Wasim Ahmad, Sanjay Sehgal and N.R Bhanumurthy (2013) which examines the financial contagion effects that GIPSI countries (Greece,Ireland,Portugal,Spain,Italy) transmitted on BRIICKS(Brazil,Russia,India,Indonesia,China,South Korea,South Africa) stock markets because of the Eurozone crisis(19 October 2009 to 31 January

2012).The authors used the GIPSI countries as the contagion cause and also used three of the biggest economies UK,USA,JAPAN as a global factor. For the quantitative part of their study they employed DDC-GARCH model which was developed by Engle (2002) and used it to test the short-run interdependence and find out which are the channels that spread the contagion effects between GIPSI, JAPAN, USA,UK and BRIICKS markets. The results illustrated Greece as the less contagious market among the BRIICKS. After the examination of all BRIICKS markets only Indonesia and South Korea instead of confirming the existence of contagion supporting a form of interdependence. Finally it is obvious that South Africa, Russia and Brazil stock markets are seriously affected by the occurrence of Eurozone crisis.

2 Data

Our dataset includes 8 MMs (France, Italy, Germany, Spain, Norway, Portugal, UK, US) and 12 EMs (Brazil, China, India, Indonesia, Korea, Peru, Philippines, Poland, Romania, Turkey, Russia, Malaysia). We investigated the relationship between economic activity and stock returns via monthly (availability issue) and quarterly data. We used selected nominal stock price indices, as well as data concerning to all the variables that represent economic activity in that paper for the selected MMs and EMs. The data were obtained from DATASREAM.

3 Empirical Methodology

3.1 Stationarity

The first issue that we dealt with, was the confirmation that all the variables used in our study are stationary. The importance of that ascertainment lies on the fact that stationarity or not of a series can strongly affect its behavior and properties in many ways. To make a brief account of some of the implications that non-stationarity provokes we should start from the fact that the persistence of shocks will be infinite for non-stationary series. Secondly, spurious regressions might arise, because if we try a regression between two variables which are trending over time, a high R^2 result can be produced even in the case of total relation absence among the 2 variables. Furthermore, our standard assumption for asymptotic analysis faces the danger of not being in valid if we run our regression model with non-stationary variables. To avoid all these implications and to verify the stationarity of all the variables used in that paper we employed the Augmented Dickey Fuller (ADF) test. Augmented Dickey Fuller (ADF) test is a test for a unit root in a time series sample. It is an augmented version of the Dickey-Fuller for a larger and more complicated set of time series models. The augmented Dickey–Fuller (ADF) statistic, used in the test, is a negative number. The more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence becomes. The testing procedure for the ADF test is the same as the Dickey-Fuller test but it is applied to the model

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t,$$

where α is a constant, β is the coefficient on a time trend and p the lag order of the autoregressive process. Imposing the constraints $\alpha = 0$ and $\beta = 0$corresponds to modelling a random walk and using the constraint $\beta = 0$corresponds to modelling a random walk with a drift. Consequently, there are three main versions of the test, analogous to the Dickey-Fuller test ones.

1) $\Delta y_t = \rho y_{t-1} + \Sigma^{\kappa}_{j=1} \alpha_j \Delta y_{t-j} + u_t$
2) $\Delta y_t = \alpha_0 + \rho y_{t-1} + \Sigma^{\kappa}_{j=1} \alpha_j \Delta y_{t-j} + u_t$
3) $\Delta y_t = \alpha_0 + \delta_t + \rho y_{t-1} + \Sigma^{\kappa}_{j=1} \alpha_j \Delta y_{t-j} + u_t$

By including lags of the order *p* the ADF formulation allows for higher-order autoregressive processes. This means that the lag length *p* has to be determined when applying the test. One possible approach is to test down from high orders and examine the t-values on coefficients. An alternative approach is to examine information criteria such as the Akaike information criterion, Bayesian information criterion or the Hannan-Quinn information criterion. Then we conduct a unit root test with the null hypothesis $\gamma=0$ against the alternative hypothesis of $\gamma<0$ Once a value for the test statistic

$$DF_\tau = \frac{\hat{\gamma}}{SE(\hat{\gamma})}$$

is calculated it, we compare it with the relevant critical value for the Dickey–Fuller test. If the test statistic is less (this test is non symmetrical so we do not consider an absolute value) than the (larger negative) critical value, then the null hypothesis of $\gamma=0$ is rejected and no unit root is present.

In this paper we apply the VAR methodology to investigate the relation between stock returns and economic activity, which is approximated by GDP growth, industrial production, market value, inflation, government consumption and private consumption for MMs and EMs .We test for Granger causality in order to assess the usefulness of the information contained in one variable in predicting the other variable. Our methodology enables an analysis of dynamic interdependencies among the two examined variables and consideration of the causality issue.

3.2 Vector autoregression (VAR)

Vector autoregression is an econometric model used to capture the linear interdependencies among multiple time series. VAR models generalize the univariate autoregression (AR) models by allowing for more than one evolving variable. All variables in a VAR are treated symmetrically in a structural sense (although the estimated quantitative response coefficients will not in general be the same); each variable has an equation explaining its evolution based on its own lags and the lags of the other model variables. The VAR technique treats the variables as potentially endogenous, evaluating the relationships without the prior need to distinguish endogenous from exogenous variables, as required by the simultaneous equations model. In the analysis of the relationship between developed stock markets and economic growth, this technique was used, for example by Caporale (2004) and Tsouma(2009).

Vector autoregressive definition

A VAR model describes the evolution of a set of k variables (called *endogenous variables*) over the same sample period (t = 1, ..., T) as a linear function of only their past values. The variables are collected in a $k \times 1$ vector y_t, which has as the i^{th} element, $y_{i,t}$, the time t observation of the i^{th} variable. For example, if the i^{th} variable is GDP, then $y_{i,t}$ is the value of GDP at time t.

A *p-th order VAR*, denoted **VAR(*p*)**, is

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + e_t,$$

where the l-periods back observation y_{t-l} is called the l-th ***lag*** of y, c is a $k \times 1$ vector of constants (intercepts), A_i is a time-invariant $k \times k$ matrix and e_t is a $k \times 1$ vector of error terms satisfying

1. $\mathrm{E}(e_t) = 0$ — every error term has mean zero;
2. $\mathrm{E}(e_t e_t') = \Omega$ — the contemporaneous covariance matrix of error terms is Ω (a $k \times k$ positive-semi-definite matrix);
3. $\mathrm{E}(e_t e_{t-k}') = 0$ for any non-zero k — there is no correlation across time; in particular, no serial correlation in individual error terms. See Hatemi-J (2004) for multivariate tests for autocorrelation in the VAR models.

A pth-order VAR is also called a **VAR with *p* lags**. The process of choosing the maximum lag p in the VAR model requires special attention because inference is dependent on correctness of the selected lag order.

3.3 Granger causality

The best way to start talking about Granger causality is to present a few words from Granger himself talking about the causality issue and for the analysis that he created. ”The topic of how to define causality has kept philosophers busy for over two thousand years and has yet to be resolved. It is a deep convoluted question with many possible answers which do not satisfy everyone, and yet it remains of some importance. Investigators would like to think that they have found a "cause", which is a deep fundamental relationship and possibly potentially useful. In the early 1960's I was considering a pair of related stochastic processes which were clearly inter-related and I wanted to know if this relationship could be broken down into a pair of one way relationships. It was suggested to me to look at a definition of causality proposed by a very famous mathematician, Norbert Weiner, so I adapted this definition (Wiener 1956) into a practical form and discussed it. Applied economists found the definition understandable and useable and applications of it started to appear. However, several writers stated that "of course, this is not real causality, it is only Granger causality." Thus, from the beginning, applications used this term to distinguish it from other possible definitions.

Granger causality definition

Granger causality is a statistical concept of causality that is based on prediction. According to Granger causality, if a signal X_1 "Granger-causes" (or "G-causes") a signal X_2, then past values of X_1 should contain information that helps predict X_2 above and beyond the information contained in past values of X_2 alone. Its mathematical formulation is based on linear regression modeling of stochastic processes (Granger 1969). More complex extensions to nonlinear cases exist, however these extensions are often more difficult to apply in practice.

Mathematical statement

Let *y* and *x* be stationary time series. To test the null hypothesis that *x* does not Granger-cause *y*, one first finds the proper lagged values of *y* to include in a univariate autoregression of *y*:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \dots + a_m y_{t-m} + \text{residual}_t$$

Next, the autoregression is augmented by including lagged values of *x*:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \dots + a_m y_{t-m} + bp x_{t-p} + \dots + b_q x_{t-q} + \text{residual}_t$$

One retains in this regression all lagged values of *x* that are individually significant according to their t-statistics, provided that collectively they add explanatory power to the regression according to an F-test (whose null hypothesis is no explanatory power jointly added by the *x*'s). In the notation of the above augmented regression, *p* is the shortest, and *q* is the longest, lag length for which the lagged value of *x* is significant.The null hypothesis that *x* does not Granger-cause *y* is not rejected if and only if no lagged values of *x* are retained in the regression.

Granger causality uses

Granger causality (or "G-causality") was developed in 1960s and has been widely used in economics since the 1960s. Granger causality has been applied to a wide range of research questions. Gronwald (2009) with the use of it studied the causal relationship between the oil price and several other macroeconomic and financial market variables. The causal effects of money, output and the output gap on the inflation rate have been analyzed by Assenmacher-Wesche and Gerlach(2008 a,b). Lemmens and others (2008) have studied the predictive value of production expectation surveys in the frequency domain. The causal relationship between tax and government expenditures has been analyzed by Koren and Stiassny(1998). Finally Granger causality techniques have been extensively used to study the causal interaction in neural data (Ding et. al. 2006).

4 Empirical results

4.1 Results based on monthly basis

First of all in Tables 1-4 we present evidence of stationarity for all the variables used in the study based on the Dickey-Fuller Augmented test, along with some basic descriptive statistics for every variable (mean, standard deviation). Secondly the estimates presented in Tables 5-7 give us all the information required in order to find out which economic variables are useful in predicting the stock returns and vice versa. The results presented in Table 5 indicate that the hypothesis that industrial production growth does not Granger cause stock returns is rejected only in 2 cases both in mature and emerging countries (Spain, USA, Brazil, Romania). Granger causality test indicates that the two endogenous variables do not appear to be related through a one-directional "causal" relationship running from industrial production growth to stock returns. Hence, industrial production growth is not useful in predicting stock returns.

On the other hand the hypothesis that stock returns do not Granger cause industrial production growth is rejected in 6 out of 8 mature countries (France, Italy, Germany, Portugal, Spain, US) and in 5 out of 9 countries that data are available for the emerging countries (Brazil, Turkey, Malaysia, Romania, Korea). Hence, for a significant number of markets in both groups, the results suggest that stock returns are useful in predicting industrial production growth. These results comply perfectly with the results presented in Maria's Tsouma study which is mentioned several times in the introduction.

In table 6 where the results of the relationship among inflation and stock returns are presented we see that no significant sign of inflation being useful in predicting stock returns is found as the hypothesis that inflation does not Granger cause stock returns is rejected only in 5 cases all of them from the emerging area (Brazil, Malaysia, Peru, Poland, Romania).

The opposite direction relationship holds in a much greater level as the hypothesis that stock returns do not Granger cause inflation is rejected in half of the examined countries (France, Norway, Portugal ,US, UK, Brazil, China, Indonesia, Peru, Russia) verifying the mixed results that we see in the existing literature about the relationship between inflation and stock returns.

In table 7 where the relationship analyzed is that of market value growth and stock returns the results talk for themselves as it is obvious that stock returns are useful in predicting market value growth and not the opposite.

4.1.1 Descriptive statistics and stationarity tables

Table 1

Stock returns sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0.000147	0.002512	-14.23558*
Germany	0.000371	0.002573	-15.14268*
Italy	-0.000116	0.003043	-12.62177*
Norway	0.000420	0.003033	-15.58632*
Portugal	0.000035	0.002453	-8.008489*
Spain	0.000202	0.003117	-15.99204*
US	0.000281	0.002097	-18.56062*
UK	0.000284	0.002140	-19.21977*
Emerging Market			
Brazil	0.002560	0.008203	-4.637086*
China	0.000275	0.004182	-5.946987*
India	0.000542	0.004030	-16.18277*
Indonesia	0.000451	0.004019	-15.63903*
Turkey	0.001449	0.006807	-16.35940*
Korea	0.000308	0.003599	-18.19668*
Malaysia	0.000281	0.003915	-11.47935*
Peru	0.001180	0.004937	-9.084385*
Philippines	0.000487	0.004146	-14.78393*
Poland	0.000633	0.005152	-15.22974*
Romania	0.000440	0.005018	-11.01236*
Russia	0.000647	0.006925	-11.59798*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 2
Market value growth sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0.011222	0.059505	-17.50514*
Germany	0.007513	0.056372	-17.50192*
Italy	0.012752	0.073581	-17.00673*
Norway	0.012283	0.076642	-17.92550*
Portugal	0.008573	0.064960	-14.23853*
Spain	0.008258	0.065296	-15.95010*
US	0.008479	0.046719	-18.25790*
UK	0.009812	0.049160	-19.12083*
Emerging Market			
Brazil	0.016916	0.084039	-15.32766*
China	0.026903	0.116794	-13.03224*
India	0.018649	0.105615	-15.41313*
Indonesia	0.019883	0.097022	-15.18032*
Turkey	0.041186	0.149857	-17.41058*
Korea	0.014548	0.094375	-15.48545*
Malaysia	0.013045	0.081829	-16.59634*
Peru	0.015092	0.084530	-15.14523*
Philippines	0.019071	0.089134	-15.93893*
Poland	0.015935	0,103832	-16.17053*
Romania	0.043147	0.199368	-13.24556*
Russia	0.030128	0.138220	-11.47997*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 3
Industrial production growth sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	-0.000004	0.013104	-9.776674*
Germany	0.000916	0.015704	-6.985903*
Italy	-0.000028	0.017507	-26.78972*
Norway	0.000927	0.016775	-17.25830*
Portugal	-0.001869	0.117361	-3.372674*
Spain	0.000988	0.016221	-7.078317*
US	0.001899	0.007981	-6.797459*
UK	0.000193	0.011003	-24.74414*
Emerging Market			
Brazil	0.001798	0.021070	-15.78459*
China	()	()	()
India	0.007237	0.062034	-2.083209*
Indonesia	()	()	()
Turkey	0.005251	0.092921	-2.602032*
Korea	0.006733	0.024557	-18.30247*
Malaysia	0.003427	0.072817	-23.61070*
Peru	()	()	()
Philippines	0.006833	0.062823	-6.117070*
Poland	0.002358	0.016766	-5.304978*
Romania	0.004185	0.018883	-10.64485*
Russia	0.000171	0.139393	-12.22253*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 4
Inflation sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0.001448	0.001700	-14.15693*
Germany	0.001779	0.003381	-3.422784*
Italy	0.004159	0.004160	-3.268823*
Norway	0.003180	0.005184	-3.126529*
Portugal	0.006126	0.007961	-1.337324*
Spain	0.004239	0.005375	-2.562877*
US	0.002750	0.002972	-10.87134*
UK	0.002349	0.004268	-1.836203*
Emerging Market			
Brazil	0.046526	0.099085	-7.061040*
China	-0.000136	0.008706	-7.186262*
India	0.006593	0.008557	-3.862332*
Indonesia	0.008292	0.015146	-6.668232*
Turkey	0.006814	0.007838	-8.201329*
Korea	0.004079	0.006306	-11.91056*
Malaysia	0.002430	0.004218	-15.35676*
Peru	0.032419	0.122299	-4.442737*
Philippines	0.007023	0.010352	-4.697641*
Poland	0.018824	0.070790	-5.972137*
Romania	-0.000771	0.032854	-24.57949*
Russia	0.032852	0.070818	-5.085227*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

4.1.2 Granger causality tables

Table 5

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Industrial production growth	Industrial production growth $\overset{GC}{\nrightarrow}$ stock returns
France	8.931725* (0.0302)	4.043999 (0.2568)
Germany	24.48360* (0.0002)	10.51118 (0.0620)
Italy	20.77510* (0.0001)	3.231608 (0.3573)
Norway	9.588167 (0.0878)	6.345047 (0.2741)
Portugal	23.91207* (0.0012)	3.486194 (0.8367)
Spain	13.22201* (0.0214)	12.09656* (0.0335)
US	40.62698* (0.0000)	12.35614* (0.0149)
UK	0.368177 (0.5440)	0.052239 (0.8192)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Industrial production growth	Industrial production growth $\overset{GC}{\nrightarrow}$ stock returns
Brazil	16.18814* (0.0128)	17.02185* (0.0092)
China	()	()
India	9.243041 (0.0998)	5.530189 (0.3546)
Indonesia	()	()
Turkey	20.99688* (0.0008)	4.044595 (0.5430)
Korea	14.13555* (0.0027)	7.666068 (0.0534)
Malaysia	29.00265* (0.0000)	1.849426 (0.6042)
Peru	()	()
Philippines	2.212723 (0.3308)	1.559325 (0.4586)
Poland	0.105948 (0.7448)	0.509097 (0.4755)
Romania	12.21258* (0.0158)	17.42892* (0.0016)
Russia	5.881091 (0.3180)	2.339301 (0.8005)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

Monthly data

Table 6

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Inflation	Inflation $\overset{GC}{\nrightarrow}$ stock returns
France	4.212885* (0.0401)	0.006521 (0.9356)
Germany	0.682961 (0.4086)	0.054398 (0.8156)
Italy	2.812662 (0.4214)	4.099129 (0.2510)
Norway	8.199234* (0.0166)	1.026494 (0.5985)
Portugal	12.71954* (0.0477)	5.608100 (0,4685)
Spain	3.895809 (0.6908)	4.98413 (0.5458)
US	7.257409* (0.0266)	2.267309 (0.3219)
UK	14.60375* (0.0414)	6.501981 (0.4825)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Inflation	Inflation $\overset{GC}{\nrightarrow}$ stock returns
Brazil	48.76633* (0.0000)	67.07194* (0.0000)
China	9.846147* (0.0431)	7.197561 (0.1258)
India	0.018095 (0.8930)	0.025387 (0.8734)
Indonesia	11.28711* (0.0035)	5.382411 (0.0678)
Turkey	4.700241 (0.3195)	5.501271 (0.2396)
Korea	0.310873 (0.5771)	0.523026 (0.4696)
Malaysia	12.41293 (0.0534)	15.22216* (0.0186)
Peru	15.59414* (0.0014)	18.25015* (0.0004)
Philippines	2.131347 (0.1443)	0.000231 (0.9879)
Poland	0.615920 (0.4326)	4.029809* (0.0447)
Romania	5.426209 (0.3661)	21.22202* (0.0007)
Russia	61.38820* (0.0000)	17.73078 (0.0014)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

Monthly data

Table 7

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Market Value Growth	Market Value Growth $\overset{GC}{\nrightarrow}$ stock returns
France	1422.172* (0.0000)	1.776594 (0.4114)
Germany	439.7384* (0.0000)	1.322840 (0.5161)
Italy	995.4110* (0.0000)	7.458339 (0.0586)
Norway	1266.854 * (0.0000)	2.606819 (0.4563)
Portugal	606.4677* (0.0000)	14.14450* (0.0027)
Spain	1240.596 * (0.0000)	0.444279 (0.8008)
US	2529.962* (0.0000)	2.406153 (0.3003)
UK	2845.898 * (0.0000)	0.539745 (0.7635)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Market Value Growth	Market Value Growth $\overset{GC}{\nrightarrow}$ Stock returns
Brazil	565.5609* (0.0000)	0.050733 (0.8218)
China	41.32342 * (0.0000)	3.604232 (0.0576)
India	1120.446 * (0.0000)	0.141180 (0.7071)
Indonesia	660.0183* (0,0000)	0.320648 (0.8519)
Turkey	1236.073* (0.0000)	7.502772 (0.1859)
Korea	1242.064* (0.0000)	1.248478 (0.5357)
Malaysia	1273.370* (0.0000)	4.491117 (0.1059)
Peru	190.4319 * (0.0000)	3.616672 (0.0572)
Philippines	327,7108 * (0.0000)	2.250197 (0.1336)
Poland	513.8653* (0.0000)	20.56046* (0.0084)
Romania	235.2469* (0.0000)	0.001619 (0.9679)
Russia	420.7319 * (0.0000)	16.96916* (0.0020)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level M

Monthly data

4.2 Results based on quarterly basis

As it is done previously for the monthly data we first present evidence of stationarity for all the variables used in the study based on the Dickey-Fuller Augmented test, along with some basic descriptive statistics for every variable such as mean and standard deviation (Table 8-14). After that in the following tables(15-20) all the data needed in order to discover which economic variables are useful in predicting the stock returns and vice versa. In table 15 where the relationship between GDP growth and stock returns is presented the hypothesis that stock returns do not Granger cause GDP growth is rejected in very few cases indicating that stock returns is not useful in predicting GDP growth . On the other hand we see that in the majority of mature counties (France, Germany, Italy, US, UK) the hypothesis that GDP growth does not Granger cause stock returns is rejected providing evidence that GDP growth is useful in predicting stock returns as the existing literature supports. The same result was not found for the emerging countries.

In table 16 where the relationship between industrial production growth and stock returns is presented the hypothesis that stock returns do not Granger cause industrial production growth is not rejected with the magnitude that happened for the monthly data and we do not have evidence to support that stock returns are a useful tool in the attempt to predict industrial production growth. The opposite direction causal relationship has the same outcome than that presented in the monthly analysis.

In the next table (17) where we explore the relationship among market value growth and stock returns the results do not comply with the monthly ones as we do not find evidence to support that stock returns are useful in predicting market value growth. The opposite direction causal relationship is also rejected.

In table 18 we find no sign of causal relationship running from stock returns to government consumption or from government consumption to stock returns at all.

In table 19 where inflation and stock returns data are presented we see that the mixed results that we referred to the monthly data analysis continue to exist make it difficult for us to speak with certainty for the relation between them.

Finally in table 20 where data from the relation between private consumption and stock returns are given we find that the only case where a predicting relationship might stems, but with not magnitude is in emerging countries where almost half of them reject the hypothesis that stock returns do not Granger cause private consumption.

4.2.1 Descriptive statistics and stationarity tables

Table 8
Stock returns sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0,011042	0,114552	-9,305345*
Germany	0,024339	0,114101	-8,851444*
Italy	-0,007666	0,134909	-7,726110*
Norway	0,029994	0,135360	-10,57522*
Portugal	-0,008034	0,110650	-4,467654*
Spain	0,011851	0,135331	-11,53950*
US	0,019801	0,084044	-10,61923*
UK	0,019709	0,086178	-11,42297*
Emerging Market			
Brazil	0,171430	0,359050	-4,521442*
China	0,016306	0,185362	-5,209959*
India	0,036298	0,173034	-10,64451*
Indonesia	0,032210	0,176070	-10,29939*
Turkey	0,094558	0,269896	-9,494850*
Korea	0,021528	0,153988	-11,39137*
Malaysia	0,015046	0,154382	-12,04020*
Peru	0,078198	0,212197	-7,158912*
Philippines	0,032520	0,180799	-9,606445*
Poland	0,046478	0,221403	-7,390996*
Romania	0,026857	0,206947	-6,531458*
Russia	0,042699	0,329888	-7,270102*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 9
GDP growth sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0,004268	0,004996	-4,281563*
Germany	-2,003143	0,008483	-6,819794*
Italy	0,001718	0,007193	-4,980216*
Norway	0,006074	0,012523	-14,54820*
Portugal	0,003159	0,009393	-5,562810*
Spain	0,005449	0,006732	-0,452983*
US	0,006683	0,007607	-5,559185*
UK	0,005868	0,007756	-6,226143*
Emerging Market			
Brazil	0,030188	0,055205	-3,157688*
China	0,071650	0,233478	-2,157189*
India	0,023334	0,073527	-1,788640*
Indonesia	0,013255	0,023461	-3,044791*
Turkey	0,018599	0,121470	-3,462484*
Korea	0,015682	0,016248	-9,032368*
Malaysia	0,011848	0,013730	-3,4106818
Peru	0,101259	0,087200	-3,510837*
Philippines	0,011164	0,100937	-6,899076*
Poland	0,027872	0,075423	-2,651122*
Romania	0,009020	0,016057	-4,397188*
Russia	0,010636	0,017022	-3,560061*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 10
Government Consumption sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0,004230	0,006723	-6,102276*
Germany	0,003919	0,009585	-8,169290*
Italy	0,001387	0,005838	-2,988179*
Norway	0,006580	0,014883	-18,95445*
Portugal	0,003770	0,014421	-1,539315*
Spain	0,007728	0,010827	-1,087234*
US	-0,002087	0,010478	-8,202340*
UK	0,003747	0,011196	-16,33487*
Emerging Market			
Brazil	0,029665	0,168959	-5,249490*
China			-8,782588*
India	0,026667	0,210413	-13,13546*
Indonesia	0,021915	0,241307	-3,696590*
Turkey	0,016596	0,240669	-43,78419*
Korea	0,011672	0,011838	-12,96901*
Malaysia	0,015454	0,038528	-3,591320*
Peru	0,008080	0,172481	-7,747206*
Philippines	0,005236	0,108151	-5,647532*
Poland	0,023718	0,071307	-3,109743*
Romania	-0,003839	0,138743	-12,97578*
Russia	0,002688	0,004485	-0,444533*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 11

Industrial production growth sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0,000448	0,014207	-7,326175*
Germany	0,002027	0,021430	-5,680400*
Italy	-0,000915	0,021162	-7,927765*
Norway	0,000724	0,025108	-13,12469*
Portugal	-0,002892	0,028458	-2,815971*
Spain	0,001159	0,016129	-4,890003*
US	0,004847	0,014095	-5,860719*
UK	0,000710	0,013279	-7,452853*
Emerging Market			
Brazil	0,004703	0,037727	-9,389979*
China	0,001882	0,024788	-8,421463*
India	0,017423	0,047927	-1,371061*
Indonesia	0,011394	0,051090	-9,859995*
Turkey	0,013438	0,074157	-2,751261*
Korea	0,020245	0,032429	-9,128241*
Malaysia	0,014837	0,037468	-8,911316*
Peru	0,007667	0,071680	-4,388024*
Philippines	0,020616	0,072310	-5,458228*
Poland	0,006685	0,014144	-2,047980*
Romania	0,012313	0,041855	-4,284940*
Russia	0,010080	0,049355	-3,700505*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 12
Market value growth sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0,033577	0,117723	-10,61655*
Germany	0,022399	0,114609	-11,31490*
Italy	0,038339	0,149439	-9,493519*
Norway	0,039961	0,138850	-11,36390*
Portugal	0,025746	0,028458	-8,384977*
Spain	0,026096	0,129437	-11,76985*
US	0,025713	0,087132	-10,35112*
UK	0,029486	0,088530	-10,95153*
Emerging Market			
Brazil	0,047880	0,148109	-8,426234*
China	0,076656	0,224045	-4,173672*
India	0,056102	0,204044	-11,00186*
Indonesia	0,059865	0,168115	-9,375222*
Turkey	0,117234	0,250309	-9,210419*
Korea	0,044170	0,183467	-10,06661*
Malaysia	0,040412	0,151878	-10,66046*
Peru	0,045816	0,147890	-7,982413*
Philippines	0,056924	0,175545	-8,691424*
Poland	0,053423	0,178931	-9,796150*
Romania	0,131327	0,360702	-7,068967*
Russia	0,092123	0,281833	-6,749279*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 13
Inflation sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0,004373	0,002802	-6,625334*
Germany	0,005277	0,005634	-8,809271*
Italy	0,012423	0,010863	-3,013639*
Norway	0,009451	0,009828	-3,469830*
Portugal	0,018353	0,019133	-1,703888*
Spain	0,012722	0,011175	-3,004198*
US	0,008197	0,006322	-7,355371*
UK	0,007026	0,007470	-1,891582*
Emerging Market			
Brazil	0,140520	0,265817	-2,157189*
China	-0,000447	0,019606	-4,173672*
India	0,019810	0,016536	-3,727615*
Indonesia	0,024965	0,036913	-3,795556*
Turkey	0,020266	0,013759	-1,231451*
Korea	0,011984	0,012209	-5,500231*
Malaysia	0,007290	0,007590	-8,365600*
Peru	0,097927	0,283501	-7,581113*
Philippines	0,020974	0,023758	-4,469731*
Poland	0,056750	0,141751	-6,152465*
Romania	-0,001004	0,026878	-9,301455*
Russia	0,099291	0,161483	-3,289583*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

Table 14

Private Consumption sample statistics for mature and emerging markets

Country	Mean	Standard Deviation	Stationarity[a]
Mature Markets			
France	0.004384	0.005546	-6.217258*
Germany	0.002637	0.009185	-14.15793*
Italy	0.001618	0.007001	-3.376771*
Norway	0.006965	0.012395	-12.65358*
Portugal	0.003204	0.011081	-6.203283*
Spain	0.004909	0.009400	-1.642997*
US	0.007381	0.006276	-3.224740*
UK			
Emerging Market			
Brazil	0.027895	0.032483	-11.46368*
China	()	()	()
India	0.021024	0.066487	-2.781278*
Indonesia	0.011011	0.008532	-2.594655*
Turkey	0.010396	0.066809	-3.209797*
Korea	0.013400	0.017925	-7.724975*
Malaysia	0.015625	0,016308	-5.353986*
Peru	0.008007	0.060976	-2.827728*
Philippines	0.011306	0.008948	-10.73116*
Poland	0.021487	0.055684	-2.801440*
Romania	0.014469	0.021270	-1.722967*
Russia	0.019202	0.019235	-3.529263*

[a] The reported statistics are the unit root test t-statistics. The asterisk (*) denotes hypothesis rejection based on the ADF Dickey–Fuller (augmented Dickey–Fuller) critical values at the 0.05 significance level.

4.2.2 Granger causality tables

Table 15

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ GDP growth	GDP growth $\overset{GC}{\nrightarrow}$ stock returns
France	1,183623(0,2766)	4,861112*(0,0275)
Germany	4,254000*(0,0392)	5,883670*(0,0153)
Italy	0,971000(0,3244)	4,245478*(0,0394)
Norway	2,949775(0,0859)	6,100153 (0,2966)
Portugal	2,372571(0,1235)	0,056543 (0,8120)
Spain	1,416802(0,2339)	1,845396 (0,7642)
US	9,825536*(0,0074)	6,109015*(0,0471)
UK	6,418783*(0,0113)	4,421494* (0,0489)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ GDP growth	GDP growth $\overset{GC}{\nrightarrow}$ stock returns
Brazil	8,324263(0,1392)	5,554430(0,3520)
China	68,19259*(0,000)	4,595948(0,3313)
India	28,25380*(0,000)	2,481848(0,4786)
Indonesia	6,007030 (0,1986)	3,342632(0,5022)
Turkey	18,19015*(0,0027)	7,609274(0,1791)
Korea	2,379497 (0,1229)	7,732968*(0,0054)
Malaysia	0,767572 (0,3810)	1,347722(0,2457)
Peru	6,822949 (0,1455)	3,864539(0,4246)
Philippines	5,623295 (0,0601)	2,407849(0,3000)
Poland	2,080117 (0,7210)	2,168458(0,7048)
Romania	1,650713 (0,1989)	0,005015(0,9435)
Russia	1,961252 (0,1614)	4,914833*(0,0266)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

[a] Quarterly data

Table 16

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Industrial production growth	Industrial production growth $\overset{GC}{\nrightarrow}$ stock returns
France	0,013313(0,9081)	6,012019*(0,0142)
Germany	1,270688(0,2596)	6,372281*(0,0116)
Italy	0,372300(0,5418)	6,257373*(0,0124)
Norway	1,213670(0,2706)	0,420419 (0,5167)
Portugal	6,426669*(0,0402)	1,886274 (0,3894)
Spain	4,098280(0,3929)	12,70870* (0,0128)
US	7,101825*(0,0077)	1,024899 (0,3114)
UK	7,594602*(0,0224)	3,886484 (0,1432)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Industrial production growth	Industrial production growth $\overset{GC}{\nrightarrow}$ stock returns
Brazil	3,883226 (0,4220)	10,71653*(0,0299)
China	0,219867 (0,6390)	0,011408(0,9140)
India	2,416657 (0,1201)	0,267723(0,6049)
Indonesia	6,517822 (0,1637)	2,334090(0,6746)
Turkey	3,818435 (0,1482)	4,579570(0,1013)
Korea	4,426247 (0,1094)	16,14620*(0,0003)
Malaysia	27,67843*(0,0000)	6,306855(0,1774)
Peru	7,326564 (0,0622)	2,704464(0,4395)
Philippines	7,750357 (0,0515)	1,640152(0,6503)
Poland	3,935454 (0,1398)	1,662524(0,4355)
Romania	0,443487 (0,5054)	0,142983(0,7053)
Russia	10,70343* (0,0301)	4,062355(0,3976)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

[a] Quarterly data

Table 17

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Market Value growth	Market Value growth $\overset{GC}{\nrightarrow}$ stock returns
France	0,128039(0,7205)	0,033606 (0,8545)
Germany	0,810459(0,6660)	0,423410 (0,8090)
Italy	0,289606(0,5905)	0,373538 (0,5411)
Norway	3,891885(0,1429)	3,878567 (0,1438)
Portugal	0,005662(0,9400)	0,201527 (0,6535)
Spain	0,135045(0,7133)	0,338592 (0,5606)
US	1,127591(0,2883)	1,308534 (0,2527)
UK	0,937074(0,3330)	0,804921 (0,3696)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Market Value growth	Market Value growth $\overset{GC}{\nrightarrow}$ stock returns
Brazil	0,320969 (0,5710)	0,188750(0,6640)
China	0,219867 (0,6390)	0,011408(0,9140)
India	2,416657 (0,1201)	0,267723(0,6049)
Indonesia	6,517822 (0,1637)	2,334090(0,6746)
Turkey	0,611072 (0,4344)	0,178007(0,6731)
Korea	0,123170 (0,7256)	0,005573(0,9405)
Malaysia	1,227797 (0,2678)	0,177193(0,6738)
Peru	1,641489 (0,2001)	0,151482(0,6971)
Philippines	0,006127 (0,9376)	0,118498(0,7307)
Poland	0,059635 (0,2678)	1,106715(0,2928)
Romania	0,194972 (0,6588)	0,041530(0,8385)
Russia	16,53135* (0,0003)	5,050742(0,0800)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

[a] Quarterly data

Table 18

Granger causality – mature and emerging countries

Country	Stock returns $\overset{GC}{\nrightarrow}$ Government Consumption	Government Consumption $\overset{GC}{\nrightarrow}$ stock returns
Mature countries — X^2 statistic (p-values in parentheses) — Null hypotheses		
France	0,982167(0,6120)	3,239361 (0,1980)
Germany	1,311952(0,5189)	6,152884 (0,0461)
Italy	0,180762(0,9136)	1,234960 (0,5393)
Norway	0,422939(0,5155)	0,634346 (0,4258)
Portugal	0,556662(0,4556)	0,409207 (0,5224)
Spain	4,732589(0,1925)	0,400786 (0,9401)
US	3,467931(0,0626)	2,373455 (0,1234)
UK	0,260923(0,6095)	0,002272 (0,9620)
Emerging countries — X^2 statistic (p-values in parentheses) — Null hypotheses		
Country	Stock returns $\overset{GC}{\nrightarrow}$ Government Consumption	Government Consumption $\overset{GC}{\nrightarrow}$ stock returns
Brazil	2,092790 (0,8362)	4,124034(0,5317)
China	()	()
India	1,688414 (0,6395)	9,082695*(0,0282)
Indonesia	6,114415 (0,1062)	0,391001(0,9421)
Turkey	3,519445 (0,3182)	3,287813(0,3493)
Korea	0,331288 (0,5649)	0,152110(0,6965)
Malaysia	0,145181 (0,9300)	2,006356(0,3667)
Peru	4,152143 (0,3858)	4,388839(0,3559)
Philippines	11,89901 (0,1558)	15,75761*(0,0460)
Poland	5,640220 (0,2277)	4,718464(0,3174)
Romania	0,504525 (0,4775)	0,061576(0,8040)
Russia	5,187299 (0,1586)	1,777666(0,6198)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

[a] Quarterly data

Table 19

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Inflation	Inflation $\overset{GC}{\nrightarrow}$ stock returns
France	1,657418(0,1980)	0,059045 (0,8080)
Germany	0,004946(0,9439)	0,184299 (0,6677)
Italy	0,261411(0,8775)	8,443919*(0,0144)
Norway	12,43426*(0,029)	6,100153 (0,2966)
Portugal	0,985587(0,3208)	0,056543 (0,8120)
Spain	7,637757(0,1058)	1,845396 (0,7642)
US	0,083606(0,7725)	0,518949 (0,4713)
UK	4,002600(0,4057)	3,421494 (0,4899)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Inflation	Inflation $\overset{GC}{\nrightarrow}$ stock returns
Brazil	6,407428 (0,2686)	98,30396*((0,0000)
China	20,26959*(0,0000)	5,338108 (0,2540)
India	2,709897 (0,7446)	7,344237 (0,1963)
Indonesia	2,505543 (0,6436)	27,65639*(0,0000)
Turkey	1,037580 (0,7922)	7,140592 (0,0675)
Korea	5,354551 (0,3742)	8,464541 (0,1324)
Malaysia	2,744939 (0,0976)	0,243040 (0,6220)
Peru	1,815399 (0,6116)	2,647725 (0,4492)
Philippines	16,34244*(0,0026)	12.10704*(0,0166)
Poland	29,59994*(0,0000)	17,46641*(0,0077)
Romania	14,72797*(0,0021)	14,85004*(0,0019)
Russia	7,914160*(0,0490)	1,113847 (0,2912)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

[a] Quarterly data

Table 20

Granger causality – mature and emerging countries

Mature countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Private Consumption	Private Consumption $\overset{GC}{\nrightarrow}$ stock returns
France	2.441899 (0.2950)	1.742185 (0.4185)
Germany	5.210343 (0.0739)	4.293415 (0.1169)
Italy	6.354221* (0.0117)	3.208383 (0.0733)
Norway	8.035246 (0.1543)	9.837750 (0.0800)
Portugal	1.752311 (0.1856)	0.188884(0.6638)
Spain	0.615298 (0.7352)	5.196968(0.0744)
US	5.658992 (0.1294)	7.875427(0.0487)
UK	0.163913 (0.9213)	3.104155(0.2118)

Emerging countries

X^2 statistic (p-values in parentheses)

Null hypotheses

Country	Stock returns $\overset{GC}{\nrightarrow}$ Private Consumption	Private Consumption $\overset{GC}{\nrightarrow}$ stock returns
Brazil	2.691154 (0.2604)	0.974398 (0.6143)
China	()	()
India	10.00506* (0.0185)	1.970284 (0.5786)
Indonesia	0.970091 (0.9143)	6.862435 (0.1433)
Turkey	13.51817* (0.0190)	11.07954* (0.0498)
Korea	0.000805 (0.9774)	1.511579 (0.2189)
Malaysia	2.738368 (0.0980)	0.616114 (0.4325)
Peru	46.70910* (0.0000)	14.74009* (0.0115)
Philippines	0.147953 (0.7005)	0.624267 (0.4295)
Poland	10.35142* (0.0349)	4.691948 (0.3204)
Romania	3.014154 (0.2216)	0.697530 (0.7056)
Russia	15.43923* (0.0004)	5.780499 (0.0556)

Note: Testing for Granger causality refers to the joint significance of the coefficients on the endogenous variables terms lagged *i* periods based on the individually selected final VAR(i) models. The asterisk (*) indicates rejection of the null hypothesis at the 5% significance level

[a] Quarterly data

5 Conclusion

In this paper, we have investigated the predictive power for the economic activity that is contained in the stock returns, as well as, the same kind of power for the stock returns that is contained in the economic activity. Consistent with the current literature on the topic, we have used the concept of Granger causality to evaluate this predictive power. The main contribution of our research lies on the fact that for a first time so many aspects of economic activity are used and also compared with stock returns in one study. We focused on monthly and quarterly data for 8 mature and 12 emerging countries. Granger causality stemming from stock returns to industrial production growth is demonstrated both for MMs and EMs using monthly data. In contrast, the Granger causality is much weaker using quarterly data. Existence of Granger causality is also demonstrated from GDP growth to stock returns for the majority of mature countries and to almost half of the emerging countries from stock returns to private consumption. Monthly and quarterly data agree that no Granger causality running from government consumption to stock returns or backwards exists. The inflation-stock returns results remained mixed both for the two different period analysis, while strong Granger causality from stock returns to market value growth is presented using monthly data but this relation vanishes when quarterly data are used. We see that different results are produced when the time-analysis of the survey changes, a phenomenon that deserves to be analyzed in future studies. A related area for future research is also the analysis of the relationship between economic activity presenting variables with stock returns during the economic crisis period and the comparison of these results with those that precede the economic crisis.

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