A STUDY ON VOLATILITY DYNAMICS AND INTER-SECTORAL SPILLOVERS ORIGINATING FROM BANKING SECTOR: THE CASE OF KARACHI STOCK EXCHANGE

By

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Abstract

The study was conducted to investigate the spillover effects originating from the banking sector and directionality of these effects on various sectors of Pakistan. The sectors under study were 21 Banks, 12 oïl and gas companies, 23 construction companies, 25 chemical companies, 46 Food Producer, 4 Fixed line telecommuincation companies, 13 companies in Electricity sector and 107 in Personal Goods sector. The total companies into consideration were 251and the time period studied was from 2008 to 2011. We investigated not only the spillover effects originating from banking sector and whether they differ across different sector but also examined whether correlation of banking sector with other sector varies over time. We used two Softawares to run our data set which included SAS and Eviwes 6.We used BEKK parameterization as used by (Engle & Kroner, 1995)to detect volatiltity transmission among banking andOil and Gas, Food Producers, Chemicals, Personal Goods, Construction and Materials, Electricity and Fixed Line Telecommunication. We also conducted Granger Causality test on weekly and monthly returns, volatility and conditional standard deviation to have a better understanding. The results of daily data showed returns of banking sector significantly impacted returns in oil and gas sector. Returns in construction sector did impact return in banking sector negatively. Returns in chemical sector impacted returns in banking sector significantly and also returns in banking sector impacted the chemical sector significantly. The returns in banking sector impacted returns in electricity sector.

Next we carried out test on the weekly and monthly data, weekly average correlation depicted positive relationship of returns in banking with all other sector, the strongest correlation existed between chemical, oil and gas and construction sector. We then tested Granger Causality, on weekly portfolio returns, volatility and conditional standard deviation and then ran the

GARCH model on weekly and monthly data set. We concluded that banking sector did play a crucial role in impacting various sectors of the economy but it was also evident from the results that few sectors did impact the banking sector too.

Key words:Volatility, Garch Model, Portfolio returns, Banking Sector

Chapter 1

1. Introduction

For economic growth of any country a sound financial sector is important. Banking sector of Pakistan has played a pivotal role in the growth of country's economy. The study is confined to investigate on spillover effects originating from the banking sector and directionality of these effects. We were interested in understanding whether banking sector was leading other sectors or it was other sectors leading the banking sector. To test these relationship GARCH model has been used widely in finance literature.

It was witnessed that down fall in housing sector of United States greatly affected the financial sector. Closure of construction companies in turn affected steel, cement and various other sectors leading to recession.

Through this study we investigated the volatility transmission from the banking sector of Pakistan to other sectors of the Karachi Stock Exchange (KSE) and also the volatility transmission from other sectors to the banking sector. Karachi Stock Exchange being largest and most liquid stock market of Pakistan played an important role in economic development by encouraging investments. The information cost has decreased; accessibility along with speed of diffusion of information has increased leading to greater capital mobility. Financial markets participants are interested in knowing how volatility transmission mechanism works across markets over time. According to (Bauwens, Laurent, & Rombouts, 2006) financial volatilities move together over time across assets and markets which meant that volatilitity of one asset or market could lead to volatility of other asset and market.

We empirically tested the volatility spillover effect of the banking sector on the following sector Oil and Gas, Food Producers, Chemicals, Personal Goods, Construction and Materials, Electricity and Fixed Line Telecommunication and vice versa. In short we investigated not only the spillover effects originating from banking sector and whether they differ across different sector but also examined whether correlation of banking sector with other sector varies over time. This helped us determine to what extent the different sectors in the KSE market are integrated. We were interested in determining the integration at sectoral level and

how this has changed over a period of time by studying different sectors of Pakistan's stock markets using daily frequencies from Karachi Stock Exchange (KSE).

The most popular method to measure volatility was by ARCH model developed by(Engle, 1982) which was then generalised by (Bollerslev, 1986) to Generalised Autoregressive Conditional Heteroscedasticity GARCH model measuring volatility of high frequency data. To study the volatility spillover among different markets and sector the most widely used model has been Multivariant Generalised Autoregressive Conditional Heteroscedasticity (MGARCH).

With reference to GARCH models, it has been widely accepted that Vector GARCH (VEC) specifications suggested by (Bollerslev, Engle, & Wooldridge, 1988) are extremely difficult to handle while working with more than two variables due to the large number of parameters required.

Keeping in view these constraints we decided to use BEKK specification (acronym for Baba, Engle, Kraft and Kroner) proposed by (Engle & Kroner, 1995) to calculate dynamic conditional correlations between individual sector's stock returns and banking sector's returns.

We used BEKK parameterization (acronym for Baba, Engle, Kraft and Kroner) as used by (Engle & Kroner, 1995) to detect volatiltity transmission among banking and Oil and Gas, Food Producers, Chemicals, Personal Goods, Construction and Materials, Electricity and Fixed Line Telecommunication as well as the persistence of volatility with in each series.

The basic objective to use multivariate GARCH was to extract the time varying conditional covariance and correlation between different sectoral returns and banking sector return in Karachi stock exchange.

We concluded, In our daily analysis we found out that return in banking sector were significantly impacting the returns of oil and gas sector,electricity sector and chemical sector whereas Returns in construction sector,chemical sector and personal goods sector impacted banking sector. We ran GARCH model on our weekly data and found impact and directionality of the impact. Return in banking sector positive and significantly impacted oil and gas sector, chemical and personal goods and negatively impacted construction sector and fixed line

telecommunication. Food producer, fixed line telecommunication and electricity impacted banking sector positively and significantly whereas oil and gas impacted the banking sector negatively. Lastly the monthly data GARCH model results depicted return in banking sector significantly and positively impacted construction, chemical, food producer and electricity sector. Whereas oil and gas and fixed line telecommunication impacted the banking sector.

The remaining thesis is as follows: Section II will present a detailed literature review on the Volatility Spillover and GARCH models; Section III will explain the data used, methodology of the research followed by Section IV providing policy implications.

1.1 Research Rationale

Considerable research on volatility spillover has been conducted in developed countries. In Pakistan there has been no such study conducted so far which examines whether banking sector originates volatility in other sectors or vice versa. So this left us with ample room to carry out this research.

This would assist in deriving important implications for economic policies. Furthermore, in case where some non-financial sectors are more sensitive to contagion from financial sector, policy makers gain information on where to allocate scarce resources. The study would add to the growing literature on volatility spillover for developing countries. After this study we will be able to comment on the extent to which banking sector originates volatility spillover in other sectors and whether the banking sector functioned as engine of growth.

The study can be of interest for financial markets participants who are more and more interested in knowing how shocks and volatility transmission mechanism works across markets over time. It can also grab interest of the policy maker in making economic policies helping them understanding how to allocate their limited resources once the transmission mechanism of volatility spillover of banking sector with that of other sector is known.

Chapter II

2. Literature Review

There has been wide literature how different sectors and markets interact over time for developed countries. There are various reasons that explained the significance of transmission mechanisms between the returns and volatilities of different stocks. These explicit and implicit reasons were discussed by (Harris & Pisedtasalasai, 2006)

Firstly, transmission mechanisms helped explaining market efficiency. Presence of Spillover effecting returns depicted evidence against efficient market hypothesis which meant exploitable trading strategy may exist to benefit from profits. In addition, the knowledge of spillover effects may be valuable in asset allocation and help in portfolio management. Lastly, volatility spillover effects understanding was of significant importance in financial applications that rely on conditional volatility, such as portfolio optimization ,value at risk (VaR) ,option pricing , and hedging.

The study conducted by (Guarda & Rouabah, 2011) investigated the sectoral outgrowth in Luxembourg and its correlation with other sectors. It measured volatility of macroeconomic portfolio and decomposed it into effects of changes in sectoral shares, changes in sector specific volatilities and changes in correlations between sectors. The main focus of the study was to investigate the relation between growth in financial services and other sectors in the economy.

It found empirical evidence whether correlation of financial service sector and other sector vary over time. (Engle, 2002) model of Dynamic conditional correlation (DDC) was used in order to find correlation patterns differing across business cycle. The data used quarterly frequency over the sample 1995Q1-2010Q3 of real value added by sector of production which included Agriculture, hunting, forestry and fishing, Industry(including energy), Construction, Wholesale and retail trade, financial and business services, other services(including health and education) along with two aggregate series. These series included Gross value added summed across the six sectors and Gross value added excluding financial and business services.

The results were tested on Granger causality test but due to lack of robustness two stage approach was used. The first stage included calculation of uni-variate autoregressive integrated

moving average (ARIMA) model for each series with GARCH innovations and then correlation of standardized residuals of Financial and business services sector with all of the remaining sectors. In the second stage, (Cheung & K.Ng, 1996) two phase tests for causality in mean and variance were applied. Due to lack of empirical evidence in causality in mean or causality in variance could reflect violation of the assumption of constant correlations over the whole sample. For this reason time varying correlations were estimated by DCC.

To conclude, the empirical findings suggested that financial service sectors functioned as engine of growth and led the other sectors in Luxembourg. Correlations tend to rise during recessions and fall during boom across the sectors. There was a strong correlation of growth innovation in financial and business services sector which was the largest sector of production with wholesale and retail trade second largest sector in the economy.

In its study by (Ewing, 2002)argued that it is important that investors comprehend the interrelationships among different indexes. Whether or not to include in a portfoliodepends on a number of reasons including how, and to what extent, are various sectors related. This study examined five major sector of S&P stock market which comprises of capital goods, financials, industrial, transportation and utilities using monthly data from 1988 to 1997. It used generalized forecast error variance decomposition technique and found that unanticipated news in one sector did have a significant impact on another sector returns.

Another study by (A.Al-Fayoumi, Khamees, & A.Al-Thuneibat, 2009) used Vector Error Correction (VECM) model to examine the interdependences of Jordan stock markets indices. Dynamic interactions among the daily returns of Amman Stock Exchange(ASE) indices from September 2000 to August 2007 were studied for general, financial, industrial and service sectors. The results depicted that sectors showed co movement among each other which meant price fluctuation in one sector could be determined to an extent using information provided by other sector. Variance decomposition results showed that financial sector returns was the most integrated sector in ASE market and service was the least integrated sector.

In the study of (Kaltenhaeuser, 2003) they tried to understand the reason behind stock price movements, this paper studied how price innovations in equity markets affect other major global stock markets and whether the medium of this affect has changed over the course of time. The

link amongst different equity markets can be studied through three types of spillover effects; first being the cross country relation, second, cross sector linkage within a country and lastly intra-sectoral association (linkage of similar sector across countries). It kept its focus on the latter two studying a sample consisting of Euro area, US and Japan.

The author was interested in determining the level of integration at the industry level and how this changed over a period of time by studying ten economic sectors (basic industries, cyclical consumer goods, cyclical service, financials, general industries, information technology, Non-cyclical consumer goods, non-cyclical services, resources and utilities) from January 1986 to 31st October 2002 computing all the data in dollars using daily frequencies. GARCH model was used in two step firstly it determined the country specific shocks on Euro area, US and Japan equity returns, another GARCH model was estimated to identify sector specific shocks on the European, US and Japan market returns.

The model for daily return spillover effects was used to calculate the effect of country and sector specific shocks on different sectors in different currency areas. It was concluded that in the late 1990s European equity markets gained importance. In this time period price changes in the European equities doubled or tripled their impact on other stock markets. In the meanwhile it was concluded that sectors have become more heterogeneous in each of these currency areas.

The empirical evidence also showed that country specific spillover effects between the Euro and the US zone were more powerful then the sector specific spillover effect. However, the Japanese equity market was less affected by price changes in foreign equity markets and also had lower impact of those markets.

The study by (Alfranseder, 2009) investigated spillover effects and possible contagion originating from financial sector and whether they differ across different economic sector. The research empirically tested U.S and European stock market for two different market crises to find whether financial sector was the main reason for the market decline after the "dot-com bubble" in 2002 -2003 and during mid of 2007 to early 2009.

It used (Forbes & Rigobon, 2002) definition of contagion; that is an increase in cross market link after a shock.

Daily sector returns of European and U.S equity market were used for the two time periods using (Baun, 2003) methodology with some modification. Each time period was sub-divided into non-crises and crises. The sectors that were studied were basic materials, consumer goods, consumer services, health care, industrial, oil and gas, technology, utilities, telecommunication and financials. To account for conditional variance, a parameter to capture leverage effect along with EGARCH approach was used.

Results depicted that financial sector did play an crucial role during the 2007-2009 crisis as compared to 2000-2003 dot-com induced decline. Mean contagion was positive for European market during both the time period whereas it was negative for U.S financial market. No convincing evidence could empirically support contagion hypothesis. Financial sector played crucial role during the crises period which was seen in form of positive volatility contagion in non financial sectors. These sector included technology, Industrial and health care for European and U.S markets.

In the study by (Xia & Dhesi, 2010) examines the volatility spillover and dynamic conditional correlations between US and European equity market. Since the last two decades financial crisis has extended its effect from one economic unit to another generating contagion phenomenon. Development of trading technology innovations and integration of markets because of globalization seems to cause co-movement in the financial markets. The understanding and knowledge of this volatility transmission and interrelation between the international markets and assets could be beneficial in making investment decisions. The paper explores the volatility spillover effect between the two markets, whether there is symmetric or asymmetric volatility mechanism among the world stock markets, the main transmitter of volatility during the past five years, how time varying conditional correlations differ from unconditional correlation in terms of direction and magnitude and lastly, time varying conditional correlation between stock index return series was mean reverting. The paper not only focuses on the volatility spillover effects but also conditional correlations to study the dynamic linkages between the two markets.

BEKK model was used for volatility spillover effect and DCC model to estimate the dynamic conditional correlations. These models were run on daily returns of the following stock markets FTSE100, CAC, DAX and S&P500 from January 2004 to October 2009. The empirical findings

supported that significant volatility spillover effect exhibited in the international stock market and this spillover mechanism was asymmetric. It was also found that US equity market S&P500 was the main transmitter for the time period of 2004 till 2009 between European and US stock market whereas UK was the main transmitter with the European market. In case of European market mean reverting behavior in time varying conditional correlation was found. Lastly, both the unconditional and conditional correlation depicted that European markets were more dependent on each other.

A study conducted in Pakistan by (Qayyum & Kemal, 2006) investigated the volatility spill over between stock and foreign exchange market. The main aim was to examine and scrutinize the relationship between the stock market and the foreign exchange market. To study this relation it used time series approach.

The methodology used for this research was (Engle & Granger,1987) two steps approach to test for the co-integration relation between stock market prices and exchange rates using weekly data from 1998 to 2006 from Karachi Stock Exchange (KSE-100) and exchange rate data from State Bank of Pakistan. It also tested on EGARCH model which was developed by (Bollerslev, 1986) and (Nelson, 1991) amongst other to keep in view the leverage effect in the stock assets returns. It was extended into bi-variate version by (Braun, Nelson, & Sunier, 1995), (Kroner & Ng, 1998)and (Henry & Sharma, 1999) which was applied by the author in this research to study the volatility spillover between the two markets. The hypotheses were also tested through skewness, Kurtosis and Jarque -Bera test of normality. Lastly stationarity of data was tested by the Augmented Dickey Fuller (ADF) unit roots test.

The results depicted that there is no long run relationship between the two markets in case of co-integration analysis whereas the volatility result showed the both the stock market and foreign exchange markets were inter connected. Returns of stock exchange were sensitive to return as well as volatility of foreign exchange market. Similarly, foreign exchange returns were affected by the volatility of stock market returns. In short volatility spillover existed between the two markets in Pakistan.

(Dash & Mallic, 2009)The study examines the contagion impact of the recent crisis affected US equity market on India's stock market. Various definitions of contagions have been

used in literature. It uses the very restrictive definition by (Forbes & Rigobon, 2002) which infers it as the changing transmission mechanism during a crisis. Contagion effect can be depicted with a significant increase in cross market relationship after a shock to a country. To measure the co-movement time varying correlation coefficient, Dynamic Conditional Correlation under Bivariate GARCH model (DCC) is estimated (Engle, 2002). Result s for pre crisis and crisis are compared using stock prices from US and India stock market from January 2002 till June 2009. The Bai-Perron structural break test is used to determine the break point in the sample for pre-crisis and crisis period (Bai & Perron, 2003) and (Bai & Perron, 1998). Bombay stock exchange and NASDAQ 100 are considered to be representative of the respective countries. The result were estimated for uni-variate GARCH model and DCC Model and compared. Empirical evidence showed positive conditional correlation coefficients of stock returns and co movement between the two equity markets. Contagion effect was evident through the significant increase in conditional correlation coefficient mean during the crisis period also in line with other similar studies (Wang & Thi, 2006),(Kenourgios, Samitas, & Paltalidis, 2011).

The study by (Billio, Gobbo, & Caporin, 2006) introduced Flexible Dynamic Correlation (FDCC) multi-variant GARCH model which generalizes DCC model. For past two decades, significant literature has been done on the exploration of covariance of assets, primary focus being the uni-variate volatilities not correlations. (Bollerslev, 1990) Constant conditional Correlation model was generalized by (Engle, 2002) in DCC. Dynamics was considered to equal for all correlations in case of DCC which was an unnecessary restriction. The DCC is further generalized in Flexible Dynamic Correlation (FDCC) which assumes dynamics is equal only among group of variables. This model provides flexibility in parameterization of correlation dynamics by keeping the number of parameter at a feasible point. There are two step procedures for FDCC, first step being the univariate estimation where second step estimates the correlation.

FDDC model was run on more than 3000 daily observation of Italian Stock market from January 1991 to September 2003 for three major sectors. These sectors included Industrial, Services and Finance which was further subdivided in sub sector. The results are computed for CCC, DCC and FDCC showed empirical evidence for the existence of dynamics in correlations and depict the dissimilarities in these dynamics among different sectors. The three correlation models were also combined with empirical evidence of Markovitz approach where mean

variance portfolio with CCC, DCC and FDCC time varying correlation structures were estimated. It was a simulated portfolio allocation exercise supported FDCC model provided lowest optimal portfolio variance and highest portfolio returns.

The study by (Felipe & Diranzo, 2005) discussed literature on volatility transmission in a broad manner and the different methodologies that have been applied. The significance of understanding volatility transmission mechanism comes from determinant consequences on monetary policy, optimal resource allocation, risk measurement, capital requirement and asset valuation. In literature, there has been six methodologies that has been used to analyze interrelations between different financial markets, it focuses on three methodologies; General Autoregressive Conditional heteroscedasticity (GARCH) model, Regime Switching and Stochastic Volatility.

Ever Since (Engle R. F., 1982) put forth the concept of conditional heteroscedascity various studies have extended this methodology. (Bollerslev,1986) while analyzing relation between financial markets specified the phenomena described by (Engle, 1990)as heat waves and meteor showers. The concept of heat waves suggests that majority of the volatility sources are country specific whereas meteor shower proposes that volatility travels between different markets, countries and region. The multi-variant GARCH model is used to calculate the significance of existence or absence of such effects.

It was proposed by (Diebold, 1986),(Lamoureux & Lastrapes, 1990), (Diebold & Inoue, 2001) and (Edwards & Susmel, 2003) that joint behavior of volatility could be due to structural changes .In order to account for regime switching, the model was modified by various authors like (Cai, 1994),(Gray, 1996),(Dueker, 1997).It has been documented that the introduction of Regime changes lessens the effects of volatility.(Ewing & Malik, 2005) concluded that accounting for volatility shifts reduced volatility and also eliminates spillover effects.

The survey has analyzed several financial markets where different methodologies were applied and tries to point out and comment on the over lapping problem, efficiency and asymmetries. The results that have been pulled out from the empirical findings from volatility transmission models which have been focused mainly on the developed countries stock markets. There has been no clear relation between the methodology being applied and the data frequency but

empirical evidence showed that using lower frequencies, lowers the volatility transmission. Volatility could be introduced in the model in different ways, there is no standard way to measure or introduce volatility. (Hamao, et al., 1990), (Susmel & Engle, 1994) and (Lee, et al., 2004) for influential market volatility used squared residuals. While (Kim & Kon, 1994) and (Hamao, et al., 1990) introduced volatility as regressor the conditional variance.

While analyzing information transmission and it effects between different financial markets the differences in trading hours and trading calendar need to be looked at. (Granger, 1986) and (Fama, 1970) argue that if two financial markets are efficient then there cannot be co integration between them, as co integration would lead to predictability. However, (Sephton & Larsen, 1991) believed that the presence of co integration doesn't necessarily mean the absence of efficiency.(Dwyer & Wallace, 1992)and(Engel, 1996) linked efficiency to arbitrage opportunity. They pointed out that even though co-integration can lead to prediction, the presence of transaction cost among other things could remove any arbitrage opportunities present.

It has been argued that mean analysis of returns efficiency should be measured through existence of arbitrage opportunity while in variance analysis of return efficiency should be linked to spillover with short life span.

According to various authors (Susmel & Engle, 1994) and (Bae & Karolyi, 1994) asymmetries need to incorporate in the model to prevent any erroneous conclusion from volatility transmission models. GARCH model has been the most popular to integrate asymmetries, other methodologies also have the asymmetric version.(Harvey & Shephard, 1996) used the asymmetric version of Stochastic Volatility models.

Chapter III

3. Methodology

3.1 Data and Sample Criteria

In this study, we used time series data for the firms under consideration to study the spillover effect of banking sector on other sector and vice versa with the help of daily price data obtained from KSE index. We required the average returns of selected sectors which were not available due to the absence of sectoral indices, therefore, we constructed , by using portfolio returns methodology, returns for each selected sector. The data set consists of daily sectoral price indices of Karachi stock market from Janurary1, 2008 through December 31, 2011.The daily data enabled to capture all possible interactions which can be ignored by using weekly or monthly data. In our view that stock markets reacts promptly to news and thus low frequency would fail to capture such dynamics Eight sectors were selected based on market capitalisation and turnover shown in Table 1.In Banking sector we considered 21 banks, 12 oil and gas companies, 23 construction companies, 25 chemical companies, 46 food producer, 4 fixed line telecommuincation companies, 13 companies in electricity sector and 107 in personal goods sector. The total companies into consideration were 251 (See Appendix 1).

Table 1 Sectors Studied

Serial No.	Sectors with High Market Capitalization and Turnover
1	Oil and Gas
2	Commercial Banks
3	Food Producers
4	Chemicals
5	Personal Goods (Textile)
6	Construction and Materials (Cement)
7	Electricity
8	Fixed Line Telecommunication

3.2 Background of the Models

(Engle, 1982) Introduced the concept of heteroscadasticity and was the first ones to develop the ARCH model. This model was generalised by (Bollerslev, 1986) to Generalised Autoregressive Conditional Heteroscedasticity GARCH model which have been widely used in studies analysing relation between financial markets, modelling volatility of high frequency time series data[1]. This model helped to distinguish between heat waves and meteor showers as described by (Engle, Ito, & Lin, 1990). The heat waves stated that shock transmission were conutry specific whereas meteor showers were consistent with the idea that this transmission between different market,region or countries. Multivariant Generalised Autoregressive Conditional Heteroscedasticity were mainly used to study spillover mechanism among different markets.

The first study investigating the relation between international markets using uni-variate GARCH methodology was of (Hamao, Masulis, & Ng, 1990). The model used two stage approach. In the first stage MA(1)-GARCH(1,1) is estimated for every market individually, in the second step squared residual of the previous stage is used as a regressors in the variance equation of other markets. This will enable to determine relation between domestic market variance and the volatility surprise of international market. It concluded significant volatility spillover from New York to London and Tokyo and also from London to Tokyo. Various authors[2]used uni-variate GARCH model to study volatility transmission between financial markets.

The studies using Uni variate models introduce an estimation of conditional variance of series X as explanatory variable in the conditional variance of series of Y, or vice versa. This model ignores the possibility having causality between volatilities in both directions and doesnot bring into consideration the covariance between both series. A better way of calculating interaction among volatilities of different time series was to estimate multi variate GARCH

[1] see Engle(2002) for detailed survey

[2](Engle, Ito, & Lin, 1990), (Peña, 1992), (Wang, Rui, & Firth, 2002)

model. This model helped to estimate variance and covariance of different time series simultaneously using Maximum Likelihood ML. The first study using this methodology was of (Engle & Granger, 1984) after which various authors have used this model to study volatility transmission among different markets.In our research on banking and other sectors and their volatility transmission mechanism we will be using BEKK multi variate GARCH model[3] which does not impose the restriction of constant correlation among variables over time. It estimates mean and conditional variance of banking and sector index return inorder to avoid the regressor problem linked with two step estimation process found in earlier studies (Pagan, 1984).

Lastly The GARCH revolution brought in light the use of number of multivariate GARCH models that provided a better tool to study volatility spillover. The Dynamic Conditional Correlation multivariate GARCH model DCC introduced by (Engle R. F., 2002) combine flexibility of uni-variate GARCH model with time varying correlation. The model was estimated in two steps. First being the calculation of variance using uni-variate GARCH specification and then parameters of dynamic correlations were estimated.

3.2.1 Our Model

We will then use BEKK parameterization as used by (Engle & Kroner, 1995)to detect volatiltity transmission among banking andOil and Gas, Food Producers, Chemicals, Personal Goods, Construction and Materials, Electricity and Fixed Line Telecommunication as well as the persistence of volatility with in each series.

For the calculation of conditional correlation, however, we also relied on the calculations provided by Eviews which uses Diagonal VECH specifications to estimate variance equations particularly for weekly and monthly data. It has also been recognized that correlation does not ensure the presence of causation in any meaningful sense and there could still be a possibility of spuriously identified relationship between two sectors on the basis of strong correlation coefficient. To minimize the possibility of any such spurious relationship we also ran granger

[3] The acronym BEKK is used in literature, it was an unpublished work by Baba, Engle, Kraft and Kroner (1990)

causality tests extensively to ensure the robustness of any possible relationship as well as direction between banking sector and other sectors of KSE.

The basic objective to use multivariate GARCH was to extract the time varying conditional covariance and correlation between different sectoral returns and banking sector return in Karachi stock exchange. With reference to GARCH models, it has been widely accepted that VEC specifications suggested by (Bollerslev, Engle, & Wooldridge, 1988) are extremely difficult to handle while working with more than two variables due to the large number of parameters required $\left[\frac{N(N+1)(N(N+1)+1)}{2} = 78\ for\ N = 3\right]$. (Bollerslev, Engle, & Wooldridge, 1988) proposed Diagonal VEC (DVEC) model which allows conditional variance depending only on its own lag and on the lagged values of cross product of errors ($\boldsymbol{\epsilon_{it}\epsilon_{jt}}$) thus restricting the number of parameters up to $\left[\frac{N(N+5)}{2} = 12\ for\ N = 3\right]$. Nonetheless even in diagonal VEC representation it is extremely difficult to ensure the positivity of conditional variance covariance matrix (H_t)unless we impose strong restrictions on the parameters (Bauwens, Laurent, & Rombouts, 2006). Keeping in view these constraints we decide to use BEKK specification (acronym for Baba, Engle, Kraft and Kroner) proposed by (Engle & Kroner, 1995) to calculate dynamic conditional correlations between individual sector's stock returns and banking sector's returns. We assume that $\psi(t-1)$ is the information field generated by the past values of ϵ_t and that H_t is the conditional variance-covariance matrix of the k-dimensional random vector ϵ_t. We also assume that H_t is measurable with respect to past information set $\psi(t-1)$; in that case the structure of multivariate GARCH would be as

$$\left(\epsilon_t \middle| \psi(t-1) \sim N(0, H_t)\right)$$

$$H_t = C + \sum_{i=1}^{q} A_i' \epsilon_{t-i} \epsilon_{t-i}' A_i + \sum_{i=1}^{p} G_i' H_{t-i} G_i$$

Equation 0.1

Where C,A_i and G_i are $k \times k$ parameter matrices.

For bivariate GARCH (1,1) the structure can be represented as follows.

$$H_t = \begin{bmatrix} c_{11} & c_{12} \\ c_{12} & c_{22} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}' \begin{bmatrix} \epsilon_{1,t-1}^2 & \epsilon_{1,t-1}\epsilon_{2,t-1} \\ \epsilon_{2,t-1}\epsilon_{1,t-1} & \epsilon_{2,t-1}^2 \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$
$$+ \begin{bmatrix} g_{11} & g_{12} \\ g_{21} & g_{22} \end{bmatrix}' H_{t-1} \begin{bmatrix} g_{11} & g_{12} \\ g_{21} & g_{22} \end{bmatrix}$$

We maximize the following log-likelihood function for multivariate GARCH model, written without a constant term;

$$\ell = -\frac{1}{2}\sum_{t=1}^{T}[log|H_t| + \epsilon_t' H_t^{-1}\epsilon_t]$$

Equation 0.2

To calculate sectoral returns we will first calculate continuously compounded returns of each individual firm by using following equation

$$CCR_{j,t} = \left(lnP_{j,t} - lnP_{j,t-1}\right) \times 100 \qquad \textbf{Equation 3.3}$$

After segregating each firm according to the sector, we will calculate the weight of each firm by dividing its base date market capitalization with the total market capitalization of the sector to which a firm belongs on the same date.

$W_{j,t} = Market\ Cap_{j\ Firm}/Market\ Cap_{i\ Sector}$ **Equation 3.4**

This weight would not be constant for the whole sample period rather it will be updated after each six months period which is the usual frequency to update market indices. Sum of weights belongs to all firm in each sector must be 1 and individual weights will be applied to the previously calculated returns of all firms in a sector to obtain weighted average sectoral return.

$$r_{i,t} = \sum_{j=1}^{n} W_{j,t}.CCR_{j,t}$$

Equation 3.5

Where j is the number of firms identified in i sector and the process will be repeated for all selected sectors. For banking sector we will calculate the sectoral returns exactly in the manner described above which will be denoted as

$$r_{BNK,t} = \sum_{j=1}^{n} W_{j,t}.CCR_{j,t}$$

Equation 3.6

We decide to model mean equations as Vector Autoregression (VAR) and their structure would be like following;

$$\boldsymbol{r_{i,t} = \beta_{10} + \beta_{11} r_{i,t-1} + \beta_{12} r_{BNK,t-1} + \epsilon_{i,t}}$$

Equation 0.7

$$\boldsymbol{r_{BNK,t} = \beta_{20} + \beta_{21} r_{i,t-1} + \beta_{22} r_{BNK,t-1} + \epsilon_{BNK,t}}$$

Equation 0.8

Where $r_{i,t}$ is the sector i's index return which depends on its own lagged value as well as the lagged value of Banking sector return .$R_{BNK,t}$ is the banking sector index return which depends on its own lagged value as well as the lagged value of sector i's index return.

By incorporating the setting of mean equations mentioned above, the final model becomes the VAR(1)-GARCH(1,1) with the structure of Variance-Covariance equations given below;

$$\boldsymbol{H_{(i.i),t} = c_{11} + a_{11}^2 \epsilon_{i,t-1}^2 + 2a_{11}a_{21}\epsilon_{i,t-1}\epsilon_{BNK,t-1} + a_{21}^2 \epsilon_{BNK,t-1}^2 + g_{11}^2 H_{(i.i),t-1}} \\ \boldsymbol{+ 2g_{11}g_{21}H_{(i.BNK),t-1} + g_{21}^2 H_{(BNK.BNK),t-1}}$$

Equation 0.9

$$\boldsymbol{H_{(i.BNK),t} = c_{12} + a_{11}a_{21}\epsilon_{i,t-1}^2 + (a_{21}a_{12} + a_{11}a_{22})\epsilon_{i,t-1}\epsilon_{BNK,t-1} + a_{21}a_{22}\epsilon_{BNK,t-1}^2} \\ \boldsymbol{+ g_{11}g_{12}H_{(i.i),t-1} + (g_{21}g_{12} + g_{11}g_{22})H_{(i.BNK),t-1} + g_{21}g_{22}H_{(BNK.BNK),t-1}}$$

Equation 0.10

$$H_{(BNK.BNK),t} = c_{22} + a_{12}^2 \epsilon_{i,t-1}^2 + 2a_{12}a_{22}\epsilon_{i,t-1}\epsilon_{BNK,t-1} + a_{22}^2 \epsilon_{BNK,t-1}^2 + g_{12}^2 H_{(i.i),t-1} + 2g_{12}g_{22}H_{(i.BNK),t-1} + g_{22}^2 H_{(BNK.BNK),t-1}$$

Equation 0.11

We obtain the values of dynamic conditional correlations (DCORR) as follows;

$$DCC_{(i.BNK),t} = \frac{H_{(i.BNK),t}}{\sqrt{H_{(i.i),t}} \times \sqrt{H_{(BNK,BNK),t}}}$$

Equation 0.12

H_t is the conditional variance-covariance equation of banking sector and sector i error terms ϵ_t.Equation 3.9 depicts the impact of Banking sector on sector i. a_{11}^2 is the coefficient of past squared residuals $\epsilon_{i,t-1}^2$ and capture the news impact within sector on the volatility. Sector i volatility is also caused by the news impact in the banking sector in time period (t-1) $\epsilon_{BNK,t-1}^2$ can be identified by looking at co-efficient a_{21}^2. Lastly the most important term is the spillover term from the banking sector$g_{21}^2 H_{(BNK.BNK),t-1}$, which shows how much strongly banks are transmitting their volatility towards i sector.

Equation 3.11 depicts the impact of sector i on Banking sector. $a_{12}^2 \epsilon_{i,t-1}^2$shows that variance in the error term is caused by news impact in sector i.$a_{22}^2 \epsilon_{BNK,t-1}^2$shows the volatility in banking sector is also cause by banking sector error term in the time period (t-1). The spillover of sector i is depicted by$g_{12}^2 H_{(i.i),t-1}$.

Finally with the help of these equation 3.9, 3.10 and 3.11 we will estimate Dynamic Conditional Correlation equation 3.12 which identifies the correlation between section i and banking sector.

We also tested for Granger Causality on weekly and monthly data in order to test whether one time series helped in forecasting another time series.The basic definition leans relies on the idea that the cause occurs before the effect which was first time used in 1960's. If one series did forecast the second series it meant that past values of *first series* contained information that

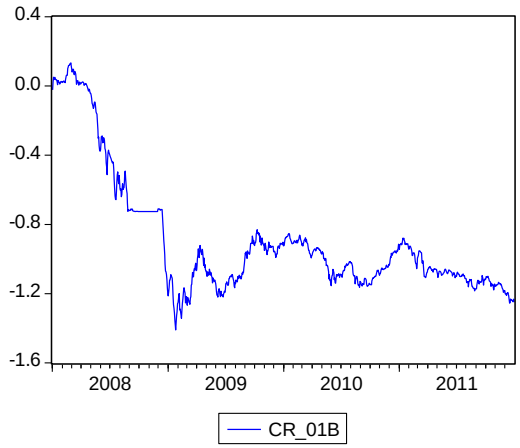
helped to predict the second series above and beyond the information contained in past values of *second series* alone.

3.3 Stock Market Trend

There has been fluctuating trends in returns from 2008 to 2011attributed by the macro-economic environment of the country. Beginning of 2008 was depicted by bullish trend in Karachi stock market, by a setting a record of 15,000 in April 2008 and became one of the best performer among the developing markets. But soon after in May 2008 the market fell sharply because of high inflation which led to an unexpected increase in interest rates by the State Bank of Pakistan. As pressure grew on a weak Pakistani government to tackle Taliban militancy worries about the economy's frailty grew resulting in one third drop in KSE-100 index from its all-time high in April 2008. The resignation of President of Pakistan Pervez Musharraf uplifted the stock market by 4 percent but this increase was short lived due to rising inflation and fiscal deficit. In order to stop the drop in stock prices which resulted in the stock market losing $36.9 billion in market value since April the KSE set a floor for stock prices in August 2008 which continued for 3months and was finally removed in December 2008

3.3.1 Cumulative Portfolio Returns of Banks

Figure 1- Cumulative Portfolio Returns of Banking Sector 2008-2011



Volatility seen in 2009 in the market was attributed by international economic crisis along with political turmoil prevailing in the country with numerous terrorist attacks. The market gradually revived by mid of the year with foreign investor interest in banking, oil and gas and cement

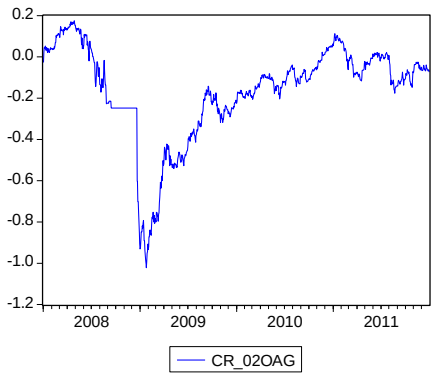
sector which helped these sector returns to gear up. Foreign investment in Banking, Oil & Gas Sectors during month of August 2009 was $23.80 million. Decrement in discount rate as announced by State Bank of Pakistan in its monetary policy, 2009 helped to improve the stock market returns. According to experts in this policy there were expectations of a significant cut in discount rate.Beside these good news there were some bad news during the year. Rain and electricity problems, Load Shedding and Water shortages throughout the country, Swat operation and terrorist activities, strikes during 2009 which had its impact on the stock market of Pakistan.State Bank declared that NPL (Non-Performing Loans) of Banks and DFI's have surged to a new peak level of Rs.435 Billion in December 2009 which weakened the local investor confidence in the banking sector.

2010 began with a positive interest of foreign investor in Banking, Telecommunication and Chemical sector with IMF satisfactory review about Pakistan's economy. The commencement of funds from IMF, World Bank and Saudi Arabia led to increased confidence of investors. The market was volatile during 2010 because of Political turmoil in the country, terrorist attacks and power and shortages. The stock market also witnessed Faysal Bank acquisition of Royal Bank of Scotland in mid of 2010. Devastation caused by the floods in the country adversely impacted various sectors of stock market. The end of the year showed under performance of banking sector.

Karachi stock market also faced ups and down throughout the year of 2011.Political uncertainty, turmoil and instability was observed. Especially after the assassination of Governor of Punjab Salman Taseer. The banking sector remained under pressure during the beginning of the year as data released by the State Bank revealed non-performing loans (NPLs) of all banks rising most in two years. The mid of the year showed the banking sector performed well.50 basis point cut in Monetary Policy announced by SBP in July 2011 created a positive wave in the kse. Stock market has remained very volatile during this period. Value of Rupee against dollar continued to decline, and inflation at around 12 percent causing the foreign portfolio investors to exit in 2011.

3.3.2Cumulative Portfolio Returns of Oil and Gas

Figure 2 Cumulative Portfolio Returns of Oil and Gas 2008-2011



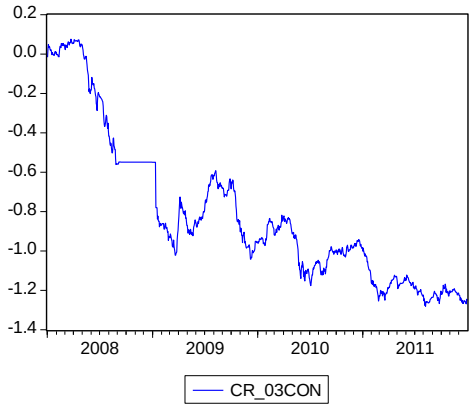
This sector's earnings are led largely due to inventory gains resulting from increasing international oil prices and hence, the sector registered strong profits earlier on. Fuel and energy sector continued to be one of the major market players along with engineering, chemicals and pharmaceuticals.

In late 2011 Pakistan State Oil (PSO) requested the government to disburse upwards of Rs. 80 billion on several occasions so that it could repay/retire dues to International fuel suppliers and avoid defaults on oil import. PSO has been facing a severe setback for quite a long time due to non-payment of dues from Independent Power Plants (IPPs) as their total dues have crossed over Rs. 200 billion.

In other news PPL in collaboration with ENI is set to start for the first time drilling of exploratory well in Sindh's deep sea, 200 nautical miles from Arabia. PPL has acquired exploration rights in a block located 100km from Baghdad, Iraq for oil exploration and hoped that it will be a potential block, which will result in oil discovery.

3.3.3 Cumulative Portfolio Returns of Construction

Figure 3 Cumulative Portfolio Returns of Construction 2008-11

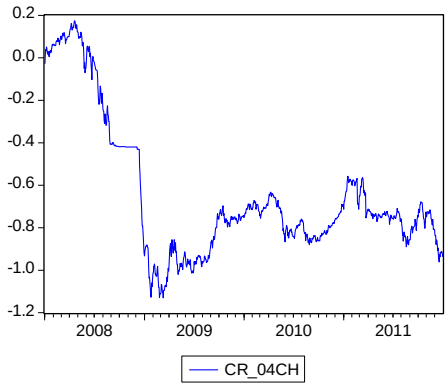


This sector registered strong profits as during mid of 2009 cement prices went up by Rs.50. the overall performance of cement sector was satisfactory despite the volatile economic condition of Pakistan as discussed earlier. The investor maintained their confidence in this sector which also created a positive impact in the market. The sector got impacted when the cement prices were declined during august 2009 but it was during this year the approval of 24 projects including the Bhasha Dam project by the Executive Committee of the National Economic Council came in as good news especially for the Cement sector along with increase in export of Cement from Pakistan. But it was during 2010 that UAE demand for local cement declined as china came forward as a strong competitor.

Government announced Inland freight subsidy (up to 35%) on exports of cement, which attracted local investors in Cement sector in 2010 which also attracted foreign investment in this sector. The cement sector in 2010 to 2011 did got impacted by gas and electricity shortages along with terrorist attack and political instability but it managed to perform better relative to the other sectors of the stock market.

3.3.4Cumulative Portfolio Returns of Chemicals

Figure 4 Cumulative Portfolio Returns of Chemical 2008-11

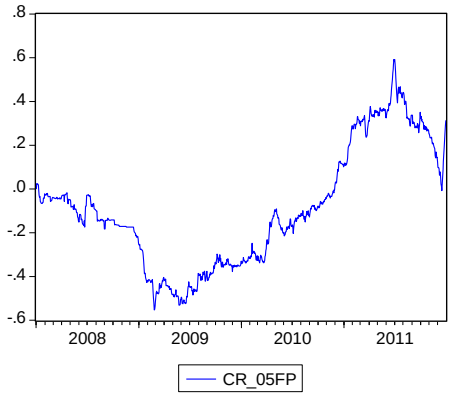


In 2011 the government announced doubling the price of gas supplied to fertilizer companies. This created widespread rumors concerning increases in prices by the major fertilizer companies, due to increased costs of productions. Due to tight-demand supply situation and rising fertilizer prices, boosting up margins for the fertilizer companies, the government decided that the gap between the demand and supply of urea should be managed by announcing 15 day closure of gas supplied to fertilizer companies in addition to the normal gas load shedding. This curtailment was greater on the Sui Network as compared to the Mari Network, thus companies based on the Sui Network faced greater impacts than those companies that got their gas supply from the Mari Network.

The government of Khyber Pakhtun Khawa later announced a ban on the mining of raw phosphates. This ban resulted in closure of 28 factories manufacturing Single Super Phosphate (SSP). The decrease in supply of these phosphates resulted in further increases in the prices of urea fertilizers. A sub-committee of ECC turned down a plan to spend USD400mn from Gas Infrastructure Development Cess (GIDC) on gas supply to the struggling fertilizer firms, thus the fertilizer companies continued to face severe gas curtailment.

3.3.5Cumulative Portfolio Returns of Food Producer

Figure 5 Cumulative Portfolio Returns of Food Producer



The sector remained volatile throughout the period of analysis. The sector failed to attract enough foreign investment. In June 2009 the news of tax on stock market (shares) on upcoming budget released as Mr. Shaukat Tareen claimed "There will be no tax on agriculture and stock market trading", helped to recover the market.

Lack of electricity, water and gas adversely and continuously affected country's economy and various industries of Pakistan especially Textile, Agriculture etc. Floods also impacted this sector greatly.

The high fluctuations witnessed in this sector are due to the seasonal nature of the portfolio as well as the influence of regulatory interventions in the market. Being an agro based industry the return on sugar, vegetable and fruit processing units is entirely dependent on supply (crop production) and market demands during each year.

Sugar is the 2nd largest agricultural based industry after textile, over the past five decades, the consumption patterns of sugar have seen exponential growth & have risen from less than 5Kg per capita per annum(1955-1960) to 26Kg (2008-11)presently. When compared to similar income group countries, our consumption remains higher than the rest.

The general economic downturn witnessed in the financial year FY09 had an impact on all industries in the country including edible oil industry.

The profitability of the edible oil and ghee was likewise affected. During the year an increase in interest rates, substantial rise in fuel prices and in the cost of utilities, tin plate and other

packaging materials, all contributed to substantial increase in production costs and putting margins under pressure.
Additionally the increase in discount rate by the State Bank of Pakistan also had an impact on cost of borrowing both for short-term and long-term loans.

These rises caused the financial costs to increase drastically to almost two-fold in FY08 for Wazir Ali industries only to reduce by 15% in FY09.

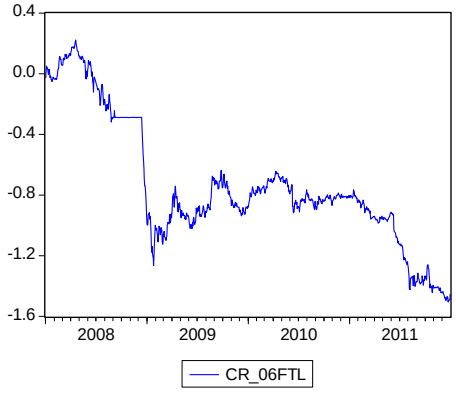
Sugarcane cultivation area decreased in 2008-09 in Pakistan. This behavior depicted crop substitution by farmers, as they shifted to other crops, such as rice in Pakistan. This was due to shortage of irrigation water and scanty payments by mills due to declining margins to sugarcane growers.

According to State Bank of Pakistan (SBP) analysis, the cumulative price of wheat rose after 2008, far higher than the 40 per cent between 2003 and 2007. Similarily sugar prices also surged 184 per cent higher since 2008, compared with 46 per cent increase during 2003-07.

The transfer of additional Rs. 300 billion to Pakistan's agriculture sector during fiscal year 2010-2011 by higher prices of agriculture produce and direct flood compensation further gave boost to economic confidence.

3.3.6 Cumulative Portfolio Returns of Fixed Line Telecommunication

Figure 6 Cumulative Portfolio Returns of Telecomunication 2008-11



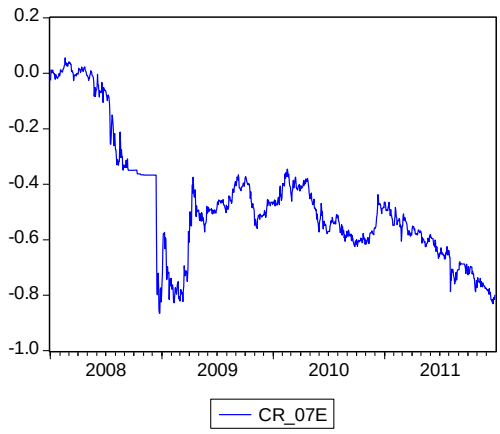
This sector also faced mixed trend over the time period of analysis. The main reason was the economic state of the country. It included instable government, terrorist attacks, and strikes along

with shortages of gas, electricity and water. Fixed Line communication sector was not seen as major player of the stock market.

In September 2009 it attracted investment of local investor but foreign investor was not seen active as far as this sector was concerned.2010started with a positive beginning for the Telecom sector because of the news of reduction of mobile termination rates. Through 2010 to 2011 the sector remained volatile.

3.3.7Cumulative Portfolio Returns of Electricity

Figure 7 Cumulative Portfolio Returns of Electricity 2008-11



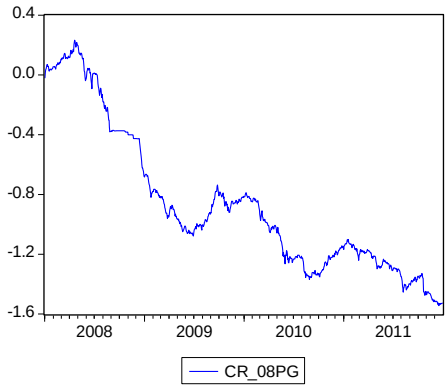
The stock market returns in the electricity sector of Pakistan have constantly shown a downward trend between the period of 2009 to 2011. This instability and uncertainty can be attributed to a number of macro-economic factors which will be discussed in detail, in order of occurrence. First and foremost during the year 2009, returns in the electricity sector were primarily low due to the political chaos in the country; as the Chief Justice of Pakistan was suspended, followed by the Swat operation and the very famous Lal Masjid tragedy occurred, along with this religious controversies and terrorist activities were rampant. Moreover, since 2009 Pakistan has been experiencing massive load-shedding and water supply issues, along with substantial inflation in the country causing rise in prices of petrol, diesel, electricity and other common food items. Finally, the international economic crisis and the implementation of certain unfair taxes by the government were some other reasons for diminutive returns during the year.

The year 2010 also followed the same bearish trend. During the beginning of the year, although the government managed to increase the supply of electricity and gas by 13.6 percent

and 18 percent respectively, experts stated that the water supply from the river Ravi will fall by 20 percent, resulting in increased load shedding in the country. However, in March 2010 there was a positive development in the power sector of the country as after a strategic dialogue between Pakistan and the US, the US announced to give $125 million for the power sector of Pakistan and also assured a disbursement of CSF worth $2 Billion. Finally, coming towards the end of the year subsidies in the power sector were reduced as per IMF directives and power tariffs in the country were unfortunately increased by a further two percent, with the expectations of further increase in the near future. During the year 2011, certain constructive steps were taken to resolve the energy crisis in the country, these however as discussed further, did not positively impact the stock market returns in the sector. In April, 2011 China announced an investment of $15 billion, in Thar Coal as well, has shown keen interest in increasing overall trade with Pakistan. Moreover, in May 2011 China's three Gorges project corporation also proposed a hydro power scheme (Indus dam scheme) to Pakistan with the aim to control floods and address electricity shortages in the country. Also in September 2011 the US announced to construct six power plants in Pakistan. With all these steps in progress, gravely enough the power supply reached a shortfall of approx. 8,000 MW by May 2011, which WAPDA planned to overcome by establishing up-gradation plans of the Mangla Dam. In view of the rising circular debt and the unresolved matters of the power sector in Pakistan, speculators have continued to be doubtful regarding investing in this rather volatile and insecure market.

3.3.8Cumulative Portfolio Returns of Personal Goods

Figure 8 Cumulative Portfolio Returns of Personal Goods 2008-11



Much like the other areas of the production economy, textile sector also faced production issues due to unavailability or intermittent supply of electricity, water and gas to the production units.

During much of 2010 the cotton prices rose continuously in the international markets thus giving a boost to the profitability of the textile sector, a sector that was facing continuous concerns due to the energy crisis.

During the third quarter of 2010 the European Union (EU) allowed around 75 products of Pakistan, the right to export duty free. This step would result in increasing Pakistan's exports by around € 100 million, mainly benefiting the textile sector. In mid-2011 the textile sector faced further bad news, when it was revealed that more than 200 major textile investors shifted their focus for investment worth nearly Rs. 100 billion from Pakistan to Bangladesh and Sri Lanka over the previous six months. This was again due to the issues faced by the textile sector due to energy crisis.

Lately the textile sector experienced a much needed boost when it was announced that Pakistan was trying to gain duty-free access to the US markets specifically for its textile products, which could open the gates to one of the largest markets in the world for the local textile producers.

3.4 Descriptive Statistics of Portfolio Returns

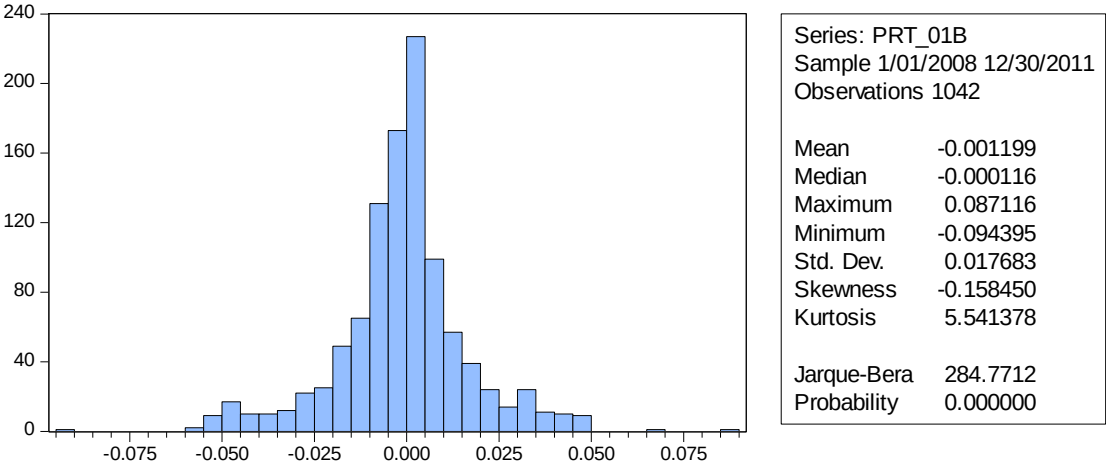
Table 2- Descriptive Statistics of Portfolio Returns from 2008-2011

Sector	Banks	Oil and Gas	Construction	Chemical	Food Produce	Electric	Fixed Line Telecommunication	Personal Goods
Mean	-0.00119	-7.08E-05	-0.00119	-0.00090	0.000301	-0.00070	-0.001391	-0.001407
Median	-0.00011	0	0	0	0	0	-6.73E-06	-4.45E-05
Max	0.08711	0.093245	0.061575	0.082158	0.04931	0.131134	0.094585	0.065464
Mini	-0.09439	-0.35429	-0.230045	-0.11883	-0.04691	-0.23262	-0.137822	-0.091175
Std. Dev.	0.01768	0.019816	0.015683	0.016929	0.01280	0.021087	0.021856	0.013035
Skewness	-0.15845	-5.50431	-2.97392	-0.75315	-0.01597	-1.54296	-0.214770	-0.414789
Kurtosis	5.54137	101.2751	47.16129	8.127098	4.689354	25.23725	6.406400	6.357868
Jarque-Bera	284.771	425240.6	86373.45	1235.052	124.8061	21882.79	512.7810	517.9190
Probability	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00

The table 2 summarizes the descriptive statistics of all the sectors i.e Banks, Oil and Gas, Construction, Chemicals, Food Producers, Electricity, Fixed Line Telecommunication and Personal goods. The sector that outperformed all other sector was Food Producer (Mean=0.000301) during 2008 to 2011. And highest volatility was seen is Fixed Lined Telecommunication (S.D=0.021856) followed by Electricity (S.D=0.021087).As seen in the above table data was not normally distributed. Normal distribution is characterized by 0 skewness and kurtosis of 3 which was absent in the entire eight sector under our study. The kurtosis test indicated that sectoral return series were leptokurtic which meant it was thick tailed. Leptokurtosis can be explained by Volatility clustering – period of high and low volatility followed by another large high or low volatility period. It is modeled as Auto regressive conditional heteroscedasticity. Jarque-Bera null hypothesis is rejected by combining the evidence of excess kurtosis and skewness at the significance level of 1%.

3.4.1 Banking sector

Figure 9 Descriptive Statistics of Portfolio Returns of Bank 2008-11

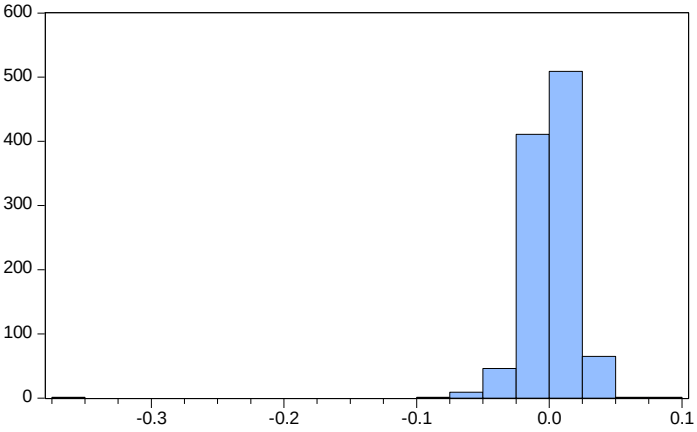


Banking sector mean portfolio returns were negative (-0.001199) during the time period of 2008-2011. Banking sector was impacted because of the international crisis during 2009. Furthermore the negative portfolio returns were attributed by political turmoil in the economy, devaluation of the local currency increased inflation and exiting foreign investment.

The banking portfolio returns were negatively skewed (-0.158) and had excess kurtosis (5.54) leading to rejection of Jarque Bera null hypothesis of returns being normally distributed.

3.4.2 Oil and Gas Sector

Figure 10 Descriptive Statistics of Portfolio Returns of Oil and Gas 2008-11



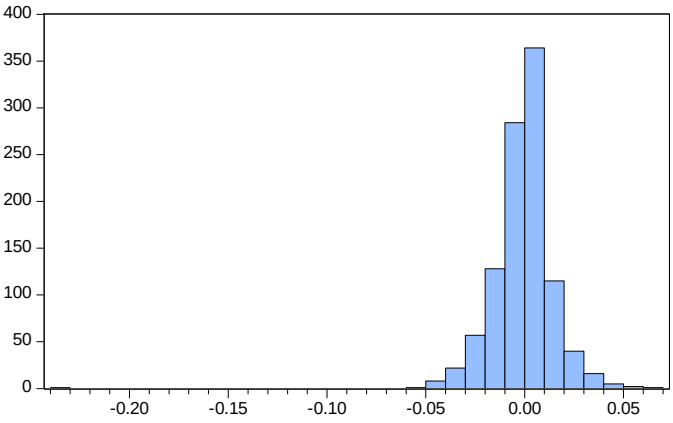
Series: PRT_02OAG	
Sample 1/01/2008 12/30/2011	
Observations 1044	
Mean	-7.08e-05
Median	0.000000
Maximum	0.093245
Minimum	-0.354298
Std. Dev.	0.019816
Skewness	-5.504317
Kurtosis	101.2571
Jarque-Bera	425240.6
Probability	0.000000

Oil and Gas mean portfolio returns were also negative. The volatility of this sector was high (S.D =0.019) as the sector remained exposed to various price changes the period of 2008-2011. This sector faced the non-payment of dues from Independent Power Plants (IPPs).

Return series were not normally distributed due to combined effect of negative skewness (-5.504) and Kurtosis greater than 3 (101.257).

3.4.3 Construction sector

Figure 11- Descriptive Statistics of Portfolio Returns of Construction 2008-11



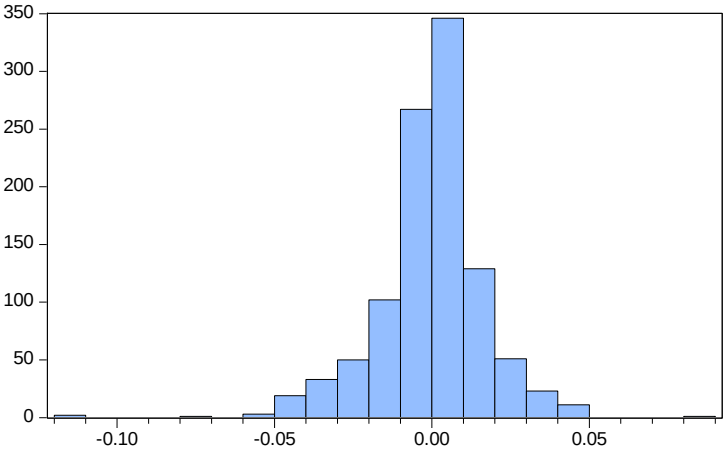
Series: PRT_03CON	
Sample 1/01/2008 12/30/2011	
Observations 1044	
Mean	-0.001198
Median	0.000000
Maximum	0.061575
Minimum	-0.230045
Std. Dev.	0.015638
Skewness	-2.973925
Kurtosis	47.16129
Jarque-Bera	86373.45
Probability	0.000000

This sector also faced mean negative portfolio returns (-0.001198). One of the core reasons of this sector negative returns were the shortage of gas and electricity along with political instability during 2008-2011.Construction portfolio returns were negatively skewed (-2.973) and had excess

kurtosis (47.16) leading to rejection of Jarque Bera null hypothesis of returns being normally distributed.

3.4.4 Chemical Sector

Figure 12 Descriptive Statistics of Portfolio Returns of Chemical Sector 2008-11



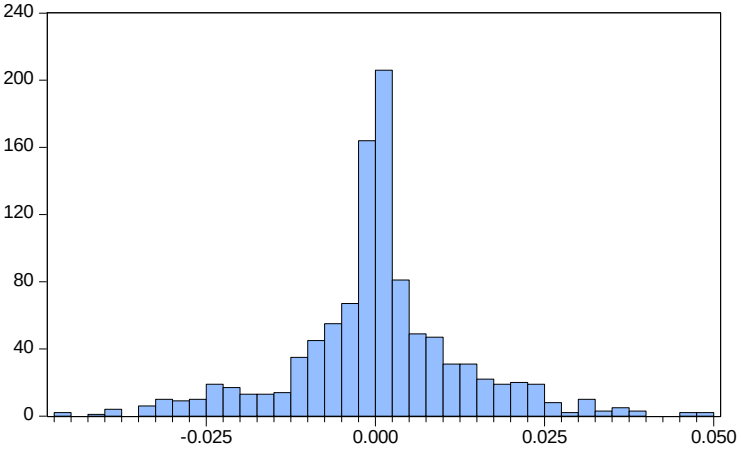
Series: PRT_04CH	
Sample 1/01/2008 12/30/2011	
Observations 1038	
Mean	-0.000903
Median	0.000000
Maximum	0.082158
Minimum	-0.118833
Std. Dev.	0.016929
Skewness	-0.753158
Kurtosis	8.127098
Jarque-Bera	1235.052
Probability	0.000000

Mean portfolio returns of chemical sector were negative (-0.0009) which was attributed by high cost of production due to doubling of gas prices for this sector. Furthermore the negative portfolio returns were attributed by shortages of electricity and gas.

Skewness for this sector was (-0.7526) and kurtosis was greater than 3 (8.127) leading to return series not being normally distributed.

3.4.5 Food Producer Sector

Figure 13 Descriptive Statistics of Portfolio Returns of Food Producer 2008-11

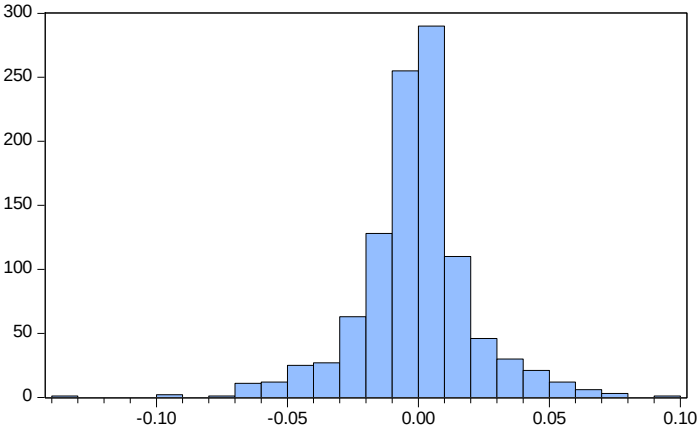


Series: PRT_05FP	
Sample 1/01/2008 12/30/2011	
Observations 1044	
Mean	0.000301
Median	0.000000
Maximum	0.049314
Minimum	-0.046915
Std. Dev.	0.012801
Skewness	-0.015979
Kurtosis	4.693542
Jarque-Bera	124.8061
Probability	0.000000

Food Producer was the only sector with mean positive portfolio returns (0.0003). The Food Producer portfolio returns were negatively skewed (-0.0159) and had excess kurtosis (4.69) leading to rejection of Jarque Bera null hypothesis of returns being normally distributed. Normal distribution is characterized by 0 skewness and kurtosis of 3.

3.4.6 Fixed Line Telecommunication Sector

Figure 14 Descriptive Statistics of Portfolio Returns of Fixed Line Telecommuication 2008-11



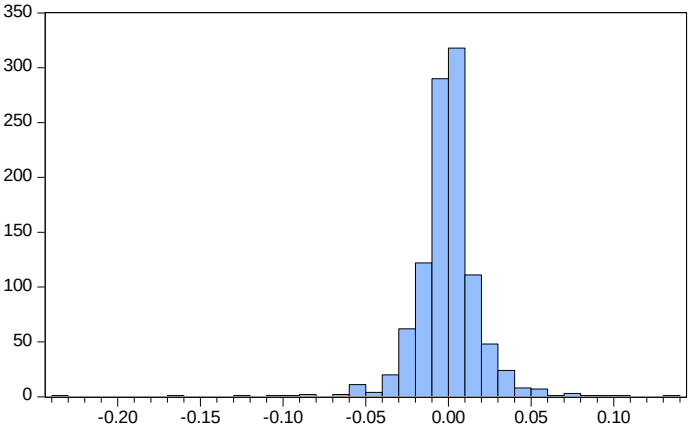
Series: PRT_06FTL	
Sample 1/01/2008 12/30/2011	
Observations 1044	
Mean	-0.001391
Median	-6.73e-06
Maximum	0.094585
Minimum	-0.137822
Std. Dev.	0.021851
Skewness	-0.214770
Kurtosis	6.406400
Jarque-Bera	512.7810
Probability	0.000000

Fixed line telecommunication also had negative mean portfolio return (-0.0013). The sector was impacted by the political instability and terrorist attack during 2008 to 2011.

Skewness was this sector was (-0.2147) and kurtosis of (6.406) which depicted that portfolio returns were not normally distributed.

3.4.7 Electricity Sector

Figure 15 Descriptive Statistics of Portfolio Returns of Electricity 2008-11



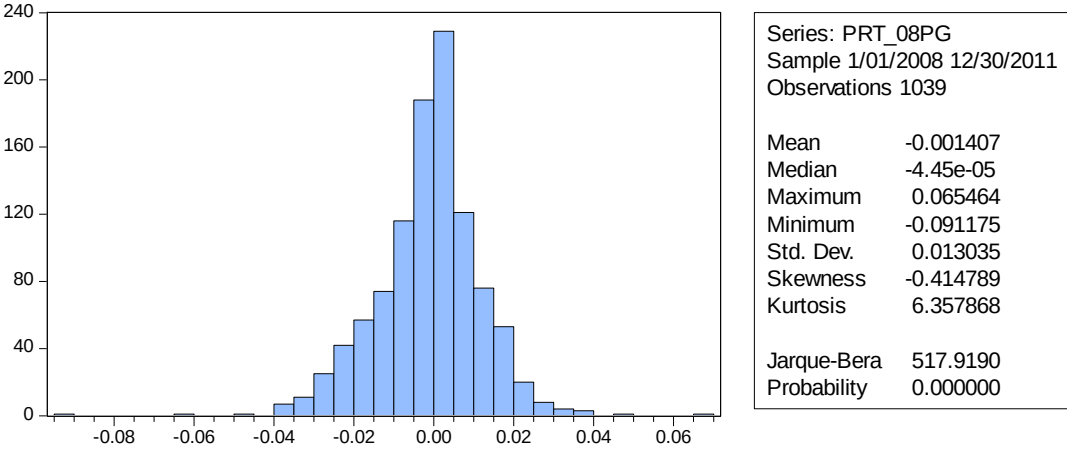
Series: PRT_07E	
Sample 1/01/2008 12/30/2011	
Observations 1042	
Mean	-0.000704
Median	0.000000
Maximum	0.131134
Minimum	-0.232620
Std. Dev.	0.021087
Skewness	-1.542968
Kurtosis	25.23725
Jarque-Bera	21882.79
Probability	0.000000

The electricity mean portfolio returns were negative (-0.00070) this sector was seen as the most volatile sector (S.D=0.0210). The high electricity shortages were faced during 2008 to 2011.

Skewness was this sector was (-1.542) and kurtosis of (25.237) which depicted that portfolio returns were not normally distributed.

3.4.8 Personal Goods Sector

Figure 16 Descriptive Statistics of Portfolio Returns of Personal Goods 2008-11



Personal goods sector also had negative mean portfolio returns (-0.001407). Textile sector also faced production issues due to unavailability or intermittent supply of electricity, water and gas to the production units.

Skewness was (-0.414) and kurtosis was (6.35). Combining the evidence of skewness and kurtosis, Jarque-Bera null hypothesis is rejected.

Chapter IV

4. Results

4.1 Daily Data Analysis

We ran the daily data on SAS to check the relationship of returns of banking sector with that of other sector and also relationship of volatility of banking sector with other sectors.

4.1.1 Test on Daily Returns of all sectors with Banking Sector

Table 3- Test on Daily Returns of all sectors with Banking Sector

Sectors	Parameter	Estimate	Pr > |t|
PRT_02OAG	$\beta_{12} r_{BNK,t-1}$	0.11917	0.0001
	$\beta_{21} r_{i,t-1}$	0.04517	0.9741
PRT_03CON	$\beta_{12} r_{BNK,t-1}$	-0.03275	0.3568
	$\beta_{21} r_{i,t-1}$	-0.09997	0.0102
PRT_04CH	$\beta_{12} r_{BNK,t-1}$	0.08406	0.0445
	$\beta_{21} r_{i,t-1}$	0.07861	0.0828
PRT_05FP	$\beta_{12} r_{BNK,t-1}$	-0.00815	0.7198
	$\beta_{21} r_{i,t-1}$	-0.01244	0.7723
PRT_06FTL	$\beta_{12} r_{BNK,t-1}$	-0.00213	0.9488
	$\beta_{21} r_{i,t-1}$	0.00508	0.9741
PRT_07E	$\beta_{12} r_{BNK,t-1}$	0.06509	0.0082
	$\beta_{21} r_{i,t-1}$	-0.0846	0.3226
PRT_08PG	$\beta_{12} r_{BNK,t-1}$	0.04509	0.1182
	$\beta_{21} r_{i,t-1}$	-0.06469	0.2226

The table 3 depicts the relationship of returns of banking sector and other sector and vice versa. $\beta_{12} r_{BNK,t-1}$ shows the impact of returns in banking sector on the returns of respective sector and $\beta_{21} r_{i,t-1}$ shows the impact of returns of the same sector on the returns of banking sector. The results of oil and gas sector showed that banking sector was significantly (p-value=0.0001) impacting the returns of oil and gas sector. Whereas oil and gas sector did not impact returns of banking sector (p-value=0.9741).

The results of construction sector showed that banking sector was not impacting the construction sector (p-value=0.3568) whereas construction did impact the banking sector negatively (p-value=0.102).

As far as the chemical sector was concerned both returns in banking sector significantly impacted returns in chemical sector (p-value=0.0445) and also chemical sector impacted banking sector (p-value=0.0825).

Neither returns in banking sector impact returns in food producer sector (p-value=0.7198) nor returns in food producer impacted the banking sector (p-value=0.7723).

It was also seen in Fixed Line Telecommunication that neither returns in banking sector impact returns in Fixed Line Telecommunication sector (p-value=0.9488) nor returns in Fixed Line Telecommunication impacted the banking sector (p-value=0.9741).

In case of electricity sector, returns in banking sector impact returns in electricity sector (p-value=0.0008) but electricity sector did not impact returns in banking sector (p-value=0.322).

In case of personal goods sector, returns in banking sector did not impact returns in personal goods sector (p-value=0.1182) and also personal goods sector did not impact returns in banking sector (p-value=0.2226).

Table 4 ARCH Terms

Sectors	Parameter	Estimate	Pr > |t|
Oil and Gas	a_{21}^2	-0.01254	0.0002
Construction	a_{21}^2	-0.07404	0.5669
Chemicals	a_{21}^2	0.0003	0.001
Food Producer	a_{21}^2	0.00101	0.9992
Fixed Line Telecommunication	a_{21}^2	-0.00846	0.789
Electricity	a_{21}^2	0.04254	0.0002
Personal Goods	a_{21}^2	0.003	0.004

In table 4 ARCH terms depicted the news impact of banking sector on oil and gas, construction, chemical, food producer, fixed line telecommunication, electricity and personal goods. Banking sector was significantly impacting oil and gas (p-value=0.0002), chemicals (p-value=0.001), electricity (p-value=0.0002) and personal good (p-value=0.004).

Table 5 GARCH Terms

Sectors	Parameter	Estimate	Pr > |t|
Oil and Gas	g_{21}^2	-0.02766	0.0357
Construction	g_{21}^2	-0.14827	0.6659
Chemicals	g_{21}^2	0.41408	0.678
Food Producer	g_{21}^2	0.00030	0.8895
Fixed Line Telecommunication	g_{21}^2	-0.36462	0.9986
Electricity	g_{21}^2	0.02766	0.0357
Personal Goods	g_{21}^2	0.0432	0.0086

Table 5 depicted the GARCH terms of banking sector impacting all other sector. The volatility of banking sector was transmitted in oil and gas sector(p-value=0.0357), electricity sector (p-value=0.0357) and personal goods (p-value=0.0086)

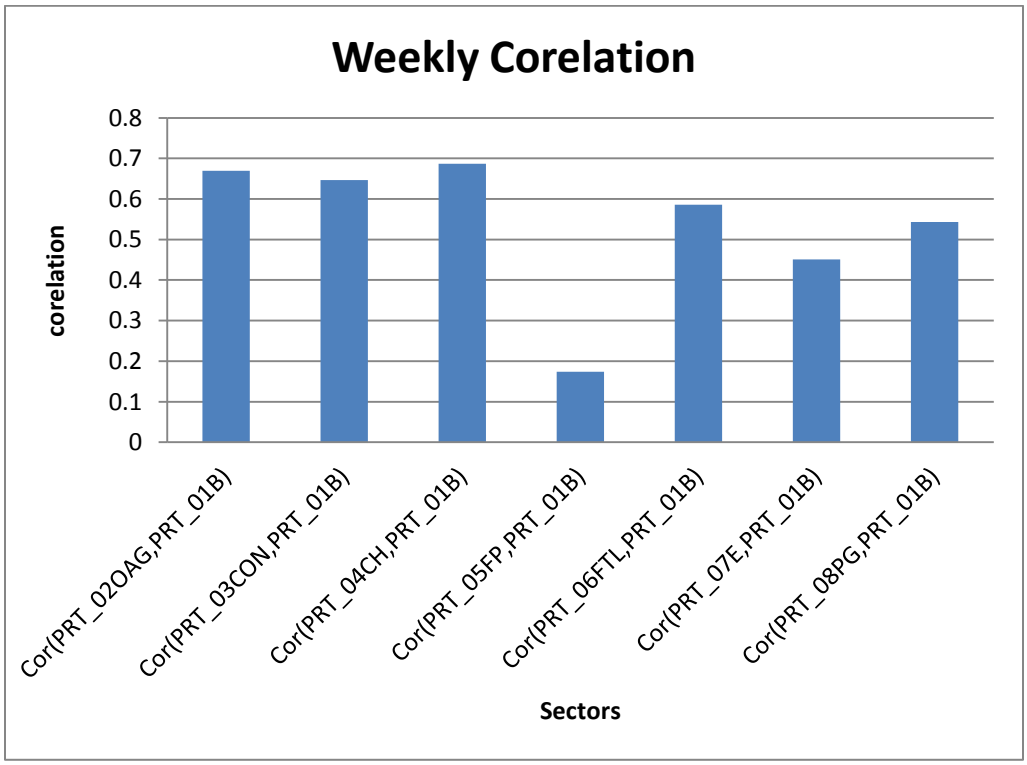
4.2Weekly Data Analysis

Daily data results were not so significant, so we ran our test on weekly and monthly data on Eviews 6 to understand the relationship of banking sector and various sectors.

4.2.1 Weekly Correlation

We calculated the average weekly correlation of each sector with the banking sector to have a better understanding of the directionality of returns of each sector with the banking sector.

Figure 17 Average Weekly Correlation of Banking Sector with other Sectors



Weekly correlation in figure 17 bar chart depicted mean correlation between banks and other sectors. The strongest correlation was seen in the returns of chemical and banking sector, and then it was returns of oil and gas sector and construction sector where strong correlation was seen with the banking sector. Fixed line telecommunication also had a strong correlation with the banking sector. It was then the personal goods sector that showed a positive correlation with the banking sector. Food producer had the minimum correlation with the banking sector.

4.2.2 Ganger Causality Test on Weekly Portfolio Returns

Table 6- Ganger Causality Test on Weekly Portfolio Returns

	B ↛ OAG	OAG ↛ B	B ↛ Con	Con ↛ B	B ↛ Ch	Ch ↛ B	B ↛ FP	FP ↛ B	B ↛ FTL	FTL ↛ B	B ↛ E	E ↛ B	B ↛ PG	PG ↛ B
Lags	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
1	5.65892	0.63681	10.7594***	2.75567*	0.01104	7.81458***	1.23881	0.32458	7.04032***	24.6434***	7.1963***	40.9102***	15.8053***	1.48326
2	5.15666***	1.73851	11.0150***	4.21122**	1.56454	4.32217**	0.96170	1.03914	1.13941	10.2092***	2.19339	16.6819***	17.3739***	1.27861
3	2.64570**	1.73441	6.38545***	1.85796	1.01898	2.98893**	0.49998	0.46821	0.19623	12.1435***	3.03889**	9.24881***	10.3080***	0.54210
4	1.89524	2.47208**	4.68667***	0.98800	0.20784	4.21003***	0.37721	0.64763	0.16687	11.2757***	1.59160	6.55378***	7.71425***	1.71863
5	1.37141	3.22821***	4.05264***	0.79617	0.29879	6.21295***	0.47189	0.44178	1.88097*	8.92832***	0.86537	5.40565***	5.95508***	2.3559**
6	3.67604***	0.91221	5.48192***	1.72335	2.70359**	3.68033***	0.34237	1.07813	2.76466**	4.26261***	3.3319***	6.41379***	11.0980***	2.04229*
7	3.28481***	2.42337**	4.99275***	0.88970	2.15697**	3.24986***	0.20854	1.42306	2.25571**	3.39823***	1.76130*	5.25250***	10.0398***	1.55244
8	2.86001***	2.25264**	4.59213***	0.90879	2.39712**	2.93415***	0.25783	1.41605	2.88403***	2.99250***	1.74475*	4.60013***	8.78510***	1.31024
9	2.58598***	2.01007**	4.16263***	2.39467**	2.44317***	2.69012***	0.24913	1.26150	2.55675***	2.67734***	2.11800**	4.34086***	8.08652***	1.15899
10	2.58571***	1.97079**	3.84896***	2.17847**	2.17218**	2.51294***	0.29234	1.17618	2.60242***	2.46245***	2.14234**	4.45841***	7.53942***	1.07763

Notes: *, **, and *** indicate statistical significance at 90%, 95% and 99% level of significance, respectively.

Ganger Causality Test on Weekly Portfolio Returns

We ran Ganger Causality test in order to check the impact of weekly portfolio returns of banking sector on other sectors weekly portfolio returns and vice versa on EVIEWS 6. To have a better understanding we ran test from 1 to 10 lag. There were three significance level that were considered 99%, 95% and 90%. The table 6 summarizes the granger test ran on weekly portfolio returns of each sector with banking sector.

According to the first hypothesis we tested that banking sector weekly portfolio returns did not impact weekly portfolio returns of Oil and Gas sector. At lag=1 there was no impact on portfolio returns of oil and gas sector, at lag=2 and 3 banking sector impacted oil and gas sector at 1% and 5% significance level respectively. Then at lag= 4 and 5 no impact was seen and it was at lag= 6 till 10 weekly portfolio returns of oil and gas sector got impacted at a significance of 1%. The next hypothesis tested was weekly portfolio returns of oil and gas sector did not impact weekly portfolio returns of banking sector. It was found that weekly portfolio return failed to impact banking sector till lag 3. It was at lag=4 and 5 banking sector returns got impacted at 5% and 1% significance level respectively. Then again at lag= 6 banking returns had no impact and it was from lag 7 to 10 banking sector weekly portfolio returns were impacted at 1% significance level.

Then we tested for weekly portfolio returns of banking sector did not affect weekly portfolio returns of Construction Sector. It was found that null hypothesis was rejected and from lag=1 till 10 were highly significant bringing us to the conclusion that weekly portfolio returns of Banking sector did impact weekly portfolio returns of construction sector. Furthermore we tested that weekly portfolio returns of construction sector did not impact banking sector. The results showed that at lag 1 and 2 weekly returns of banking sector did get affected by the weekly portfolio returns of construction sector but it was after lag 2 no impact was seen on weekly portfolio returns of the banking sector till lag=8. It was at lag=9 and 10 the impact was seen on weekly portfolio returns of the banking sector at significance level 5%.

Granger test on weekly portfolio returns of banking sector impacting chemical sector showed that weekly portfolio returns of banking sector didn't impact weekly portfolio returns of chemical sector till lag 5.It was from lag=6 till 10 that weekly portfolio returns of chemical

sector got impacted. Whereas when we tested the hypothesis that weekly portfolio returns of chemical sector did not impact weekly portfolio returns of banking sector. We had to reject the null hypothesismeaning chemical sector returns did impact banking sector from lag=1 to 10 mainly at 1% significance level.

As far as the food producer sector weekly portfolio returns were concerned the results showed that neither banking sector weekly portfolio returns affect food producers nor food producer weekly portfolio returns impacted banking sector. In short in both the cases we failed to reject the null hypothesis.

Banking sector weekly portfolio returns when tested to find the impact on weekly portfolio returns of fixed line telecommunication the results came out to be interesting. Banking sector impact the returns significantly at lag 1 and then the impact was seen from lag 5 till 10. Whereas when fixed line telecommunication weekly returns impact was tested on banking sector weekly portfolio returns the result showed that from lag=1 to 10 the impact was significant at 1%. This meant that returns of fixed line communication could impact returns of banking sector.

Next hypothesis we test was banking sector weekly portfolio returns did not impact electricity sector weekly portfolio returns. And we found banking sector returns impacted electricity returns at lag=1,3 and from lag 6 till 10. Whereas hypothesis tested electricity sector weekly portfolio returns impacting banking sector was highly significant from lag 1 till 10. Returns in electricity sector were impacting returns of banking sector.

Lastly we tested the hypothesis that weekly returns of banking sector did not impact weekly portfolio returns of personal goods sector. We rejected the null hypothesis as returns of banking sector were significantly impacting returns of personal goods. We then tested for impact of returns of personal goods on banking sector returns. We didn't not find significant impact on banking sector expect at lag =5 and 6 at 5% and 10% significance level respectively.

Table 7 Categarised Results of Granger Causality Test between weekly returns of Bank and other sectors

	Bank impacting the Sector	Sector impacting the bank
Oil & Gas	Highly Significant	Moderately Significant
Construction	Highly Significant	Insignificant
Chemical	Moderately Significant	Highly Significant
Food Producer	Insignificant	Insignificant
Fixed Line Telecommunication	Highly Significant	Highly Significant
Electricity	Highly Significant	Highly Significant
Personal Goods	Highly Significant	Insignificant

Note: These results are based on the frequency of occurrence of significant wald statistics at less than 10 percent level, reported in Table 6. We categorize the results according to the following criteria:

Highly Significant= More than 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Moderate Significant= 50 percent to 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Insignificant= Less than 50 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

4.2.3 Ganger Causality Test on Weekly Volatilities

Table 8 - Ganger Causality Test on Weekly Volatilities

	B ⇏ OAG	OAG ⇏ B	B ⇏ Con	Con ⇏ B	B → Ch	Ch ⇏ B	B → FP	FP ⇏ B	B → FTL	FTL ⇏ B	B → E	E ⇏ B	B → PG	PG ⇏ B
Lags	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
1	13.3616***	1.20196	0.97948	6.718***	1.78043	1.44756	4.8189**	3.9325**	0.01235	8.15797***	6.66959**	36.4579***	0.33673	0.07329
2	14.2493***	3.05785**	6.90656***	5.6627***	7.35756***	1.90513	1.90763	0.77642	4.42839**	12.1069***	6.73334**	26.4264***	9.44031***	1.57577
3	9.71093***	1.87950	6.03870***	3.00513**	5.71728***	1.15915	1.26752	0.73427	3.69607**	7.76982***	2.69920**	12.5043***	13.1867***	0.51506
4	5.87370***	1.87667	3.96690***	3.7957***	4.10243***	1.33949	0.94785	0.76848	1.80933	7.73758***	2.02524*	9.28520***	9.90727***	1.39906
5	4.63027***	1.89601*	3.33720***	2.75126**	2.77380**	1.20566	1.06163	0.81679	1.59701	6.71728***	1.61727	7.76357***	7.81026***	1.30140
6	3.40997***	2.42377**	4.74356***	2.37200**	2.20234**	0.99623	1.18462	0.66696	1.86868*	5.54488***	1.67160	6.31476***	6.52182***	1.00814
7	3.05119***	2.19677**	4.63498***	2.07813**	2.90524***	0.92745	1.14205	0.61312	1.70982	4.76153***	1.52582	5.46690***	5.94622***	1.01481
8	2.68839***	1.83695*	4.48638***	2.04292**	2.59438***	0.80927	1.02491	0.79740	1.51585	4.25497***	1.31004	5.20487***	5.39612***	0.87010
9	3.04124***	1.78556*	4.19838***	1.66319*	2.37809**	0.76156	0.91562	0.75797	1.58170	4.04209***	1.29394	4.43106***	5.23869***	0.93994
10	3.23698***	2.40142***	3.91192***	2.10970**	2.25697**	0.97722	1.04161	0.72438	1.56086	3.73511***	1.68277*	4.18275***	4.76545***	0.89447

Notes: *, **, and *** indicate statistical significance at 90%, 95% and 99% level of significance, respectively.

Ganger Causality Test on Weekly Volatilities

We then ran the granger Causality test on weekly volatility on all the sectors the table 8 summarizes the results. The first hypothesis stated that volatility in banking sector does not lead to volatility in oil and gas. We ran the test on lag= 1 to 10 and found that banking sector significantly impacted the volatility in oil and gas sector at 1% significance level. The next hypothesis we tested was whether volatility in oil and gas sector impacted volatility in banking sector. At lag=1 we failed to reject the null hypothesis meaning volatility in oil and gas did not impact volatility in banking sector. The impact of volatility was seen in lag=2 where volatilities in oil and gas sector affected the volatilities in banking sector. Furthermore no impact was seen at lag= 3 to 4 and then it became evident at lag=4 till 10.

We then tested for our next sector construction sector. First we wanted to test the impact of volatility of banking sector on volatility of construction sector. At lag=1 volatility in banking sector did not impact volatility in construction sector. Whereas from lag=2 till 10 volatility in banking sector significantly impacted volatility in construction sector. Whereas when we tested the impact of volatility in construction sector on volatility in banking sector we found that construction sector did have a significant impact on banking sector from lag=1 till lag=10.

When we tested the hypothesis volatility in banking sector did not impact volatility in chemical sector. Volatility in banking sector significantly impacted volatility in chemical sector from lag=2 till lag= 10. Whereas in volatility in chemical sector failed to impact volatility in banking sector at any lag.

The next Granger Causality test was ran on volatilities of Food Producer sector and Banking sector. In case on volatility in banking sector impact on volatility in Food producer and also impact of volatility in Food Producer on volatility in Banking sector, in both the scenario the impact was significant at lag=1 which meant both the sectors were impacted each other at lag=1. No significant impact was found from lag=2 to 10.

Banking sector weekly volatility when tested to find the impact on weekly volatility of fixed line telecommunication the results came out to be interesting. Volatility in banking sector impacted volatility of fixed line telecommunication significantly at lag 2, 3 and 6. Whereas when fixed line telecommunication weekly volatility impact was tested on banking sector weekly

volatility the result showed that from lag=1 to 10 the impact was significant at 1%. This meant that volatility in fixed line communication could impact volatility in banking sector.

Next hypothesis we tested was volatility in banking sector did not impact volatility in electricity sector. And we found volatility in banking sector impacted volatility in electricity returns at lag=1, 2, 3, 4 and 10 mainly at 5% significance level. Whereas hypothesis tested volatility in electricity sector impacting volatility in banking sector was highly significant from lag 1 till 10 at 1% significance level. Volatility in electricity sector was impacting volatility in banking sector.

Lastly we tested for volatility in banking sector and personal goods. The results clearly showed that volatility in banking sector was impacting volatility in personal goods sector at all the lags at a significance of 1% except for lag=1. Whereas when tested for the impact of volatility in personal goods on volatility in banking sector. We failed to reject the null hypothesis which meant that volatility in personal goods sector did not impact volatility in banking sector.

Table 9 Categarised Results of Granger Causality Test between weekly volatilities of Bank and other sectors

	Bank impacting the Sector	**Sector impacting the bank**
Oil & Gas	Highly Significant	Moderately Significant
Construction	Highly Significant	Highly Significant
Chemical	Highly Significant	Insignificant
Food Producer	Insignificant	Insignificant
Fixed Line Telecommunication	Insignificant	Highly Significant
Electricity	Moderately Significant	Highly Significant
Personal Goods	Highly Significant	Insignificant

Note: These results are based on the frequency of occurrence of significant wald statistics at less than 10 percent level, reported in Table 8. We categorize the results according to the following criteria:
Highly Significant= More than 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.
Moderate Significant= 50 percent to 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.
Insignificant= Less than 50 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

4.2.4 Ganger Causality Test on Weekly Conditional Standard Deviation

Table 10- Ganger Causality Test on Weekly Conditional Standard Deviation

	B ↛ OAG	OAG ↛ B	B ↛ Con	Con ↛ B	B ↛ Ch	Ch ↛ B	B ↛ FP	FP ↛ B	B ↛ FTL	FTL ↛ B	B ↛ E	E ↛ B	B ↛ PG	PG ↛ B
Lags	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
1	11.6676***	0.73826	13.6887***	2.37728	6.75528**	2.07817	0.64502	0.82468	11.9304***	0.81703	0.18622	8.28945	1.59509	0.02652
2	5.83782***	0.35995	6.73587***	3.65280**	3.27846**	1.17344	1.38478	0.78427	6.13865***	0.89752	0.81352	7.99601	1.06587	0.38025
3	4.84651***	0.36858	4.69973***	2.47650*	2.20944*	1.58947	1.02021	0.57200	4.80421***	7.37737***	0.35259	5.96716	1.45392	1.57863
4	4.07417***	0.32279	3.18759**	1.98766*	1.65233	4.54665***	1.06924	1.15770	4.81030***	5.59011***	0.38636	5.07565	1.03992	2.04593*
5	4.51162***	0.68110	2.83231**	1.53703	1.51968	3.93900***	1.08513	1.63615	3.98080***	4.79669***	0.21969	4.53660	1.30187	1.97657*
6	6.33306***	1.10069	4.27424***	1.49091	1.91088*	2.91776***	0.88882	1.30509	3.68239***	3.32721***	0.58409	3.58339	2.15919**	1.82113*
7	5.30894***	1.08026	4.61800***	1.58612	2.83898***	2.93658***	1.09214	1.32193	2.94875***	2.60089**	0.56021	3.21248	2.21604**	1.56100
8	4.38332***	0.89407	5.33586***	1.45885	2.20886**	2.47598**	1.09404	1.22200	2.82618***	2.27384**	0.51714	2.90686	1.88044*	1.34523
9	4.02318***	0.88176	4.80820***	1.66570*	2.08359**	2.35282**	0.98957	1.11505	2.57674***	2.08835**	0.47205	3.15032	1.90780**	1.32785
10	3.52846***	1.06157	4.24884***	1.91954**	1.83753*	3.14271***	0.90100	1.00541	2.67712***	2.20932**	0.61280	3.01551	1.71122*	1.41177

Notes: *, **, and *** indicate statistical significance at 90%, 95% and 99% level of significance, respectively.

Ganger Causality Test on Weekly Conditional Standard Deviation

Lastly we ran granger causality test on weekly conditional standard deviation. The results are summarized in the table 10. The test was run in similar way as for returns and volatility data. The results came out to be interesting.

According to the first hypothesis we tested that banking sector weekly conditional standard deviation did not impact weekly conditional standard deviation of Oil and Gas sector. The results clearly showed that conditional standard deviation of banking sector was impacting conditional standard deviation of oil and gas sector at all the lags at a significance of 1%. The next hypothesis tested was weekly conditional standard deviation of oil and gas sector did not impact weekly conditional standard deviation of banking sector. It was found that weekly conditional standard deviation of oil and gas failed to impact banking sector. We failed to reject the null hypothesis.

We also tested the hypothesis that banking sector weekly conditional standard deviation did not impact weekly conditional standard deviation of construction sector. The results depicted that banking sector significantly impacted construction sector at the significance level of 1% from lag=1 to 10. Whereas when we tested the impact of construction sector on banking sector we found the impact on lag=2, 3, 4 and 9 and 10 at significance level between 5% to 10%. No impact of construction sector was seen on banking sector at lag=1, 5, 6, 7 and 8.

When we tested the hypothesis weekly conditional standard deviation in banking sector did not impact weekly conditional standard deviation in chemical sector. We found that banking sector was impacting chemical sector at lag=1,2 at significance level of 5% and at lag=3 it impacted at the significance level of 10%. No impact was seen at lag=4 and 5. The impact became evident again from lag=6 till 10. We then tested weekly conditional standard deviation in chemical sector did not impact weekly conditional standard deviation in banking sector. The results showed chemical sector had no impact on banking sector from lag=1 till 4 and it was from lag=5 till 10 chemical sector significantly impacted banking sector at the significance level of 1%.

As far as the food producer sector weekly conditional standard deviation were concerned the results showed that neither banking sector weekly conditional standard deviation affect food

producers nor food producer weekly conditional standard deviation impacted banking sector. In short in both the cases we failed to reject the null hypothesis.

Banking sector weekly conditional standard deviation when tested to find the impact on weekly conditional standard deviation of fixed line telecommunication the results depicted that banking sector significantly impacted the fixed line telecommunication from lag=1 to 10 at 1% significance level. When tested for weekly conditional standard deviation of telecommunication sector impact on weekly conditional standard deviation of banking sector we found no significant impact from lag=1 and 2 but then the impact became significant from lag=3 till 10.

As far as the electricity sector weekly conditional standard deviation were concerned the results showed that neither banking sector weekly conditional standard deviation affect electricity nor electricity weekly conditional standard deviation impacted banking sector. In short in both the cases we failed to reject the null hypothesis.

Lastly we tested for weekly conditional standard deviation in banking sector and personal goods. The results showed that weekly conditional standard deviation in banking sector was impacting weekly conditional standard deviation in personal goods sector from lag=6 till 10 significantly. Whereas when tested for the impact of weekly conditional standard deviation in personal goods on weekly conditional standard deviation in banking sector. Personal goods sector impacted banking sector at lag= 4,5 and 6 at significance level of 10%. Remaining lags had insignificant impact.

Table 11 Categarised Results of Granger Causality Test between weekly Conditional Standard Deviation of Bank and other sectors

	Bank impacting the Sector	Sector impacting the bank
Oil & Gas	Highly Significant	Insignificant
Construction	Highly Significant	Moderately Significant
Chemical	Highly Significant	Highly Significant
Food Producer	Insignificant	Insignificant
Fixed Line Telecommunication	Highly Significant	Highly Significant
Electricity	Insignificant	Insignificant
Personal Goods	Moderately Significant	Insignificant

Note: These results are based on the frequency of occurrence of significant wald statistics at less than 10 percent level, reported in Table 10. We categorize the results according to the following criteria:

Highly Significant= More than 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Moderate Significant= 50 percent to 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Insignificant= Less than 50 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags

4.2.5 GARCH Model on Weekly Data

Table 12 GARCH Model on weekly returns

Sectors		Co-efficients	Prob
Oil & Gas	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.192183	0
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	-0.083467	0
Construction	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	-0.149809	0
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.029201	0.135
Chemical	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.055566	0.002
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.019299	0.279
Food Producer	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.007901	0.23
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.027361	0.032
Fixed Line Telecommunication	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	-0.055317	0.006
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.024789	0.081
Electricity	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.031004	0.103
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.088196	0
Personal Goods	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.041096	4E-04
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	-0.006704	0.641

We ran GARCH model on our weekly data set of 2008-2011 in order to find the relationship of different sectors with banking sector as seen in table 12. $\boldsymbol{\beta_{12} r_{BNK,t-1}}$ denoted the impact of banking sector on the respective sector whereas $\boldsymbol{\beta_{21} r_{i,t-1}}$ denoted the impact of respective sector on banking sector.

When we ran the data to find the impact of oil and gas sector with banking sector we found banking sector was significantly impacting oil and gas sector (p-value=0). Similarly, oil and gas sector also impacted banking sector significantly but negatively (p-value=0).

When we ran to check the impact of banking sector on construction sector we found a significant but negative impact on construction sector (p-value=0). Whereas construction sector did not have a significant impact on banking sector (p-value=0.135).

For chemical sector, banking sector was significantly impacting the chemical sector (p=0.002) but chemical sector impact on banking sector was not so significant (p-value= 0.279).

We then ran the GARCH model on Food producer sector to understand whether it's the banking sector impacting the food producers or is it food producers impacting the banking sector. The results showed banking sector was not impacting the food producers (p-value=0.279) but it was food producer sector which was impacting banking sector (p-value=0.032).

We also tested for fixed line telecommunication and banking sector. The results showed that banking sector was significantly but negatively impacting fixed line telecommunication (p-value=0.006) and also fixed line telecommunication was impacting banking (p-value=0.081).

Banking sector was not impacting electricity sector significantly (p-value=0.103) but it was electricity sector that was impacting banking sector significantly (p-value=0).

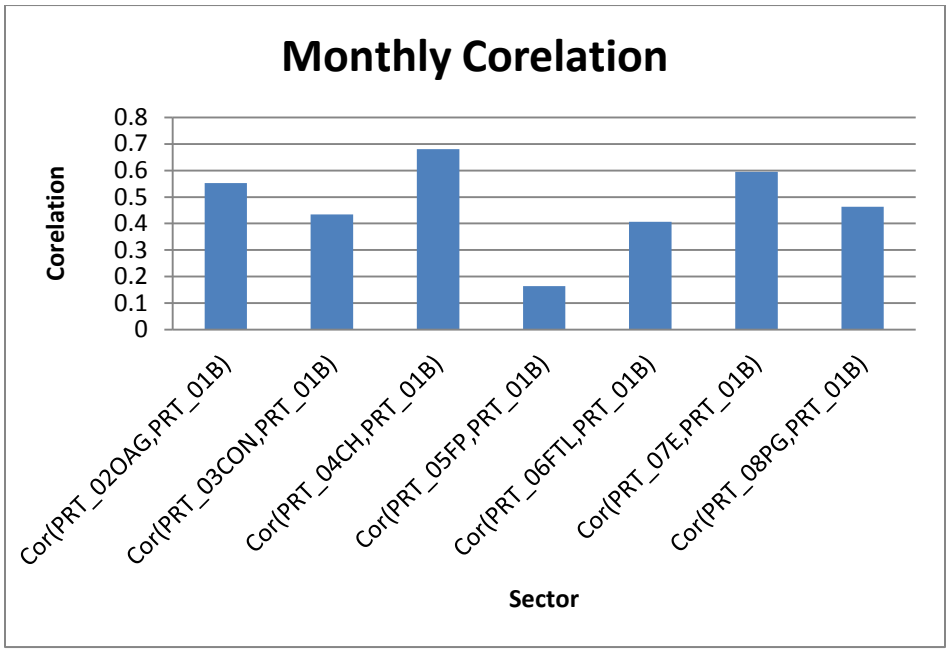
Lastly we tested for personal goods and banking sector. Banking sector was significantly impacting personal goods sector (p-value= 4.E-04). But personal goods sector did not significantly impact banking sector (p-value= 0.641).

4.3 Monthly Data Analysis

Monthly data was also ran on Eviews 6 to understand the whether the impact of banking sector persist on other sectors or other sectors impact banking sector.

4.3.1 Monthly Correlation

Figure 18 Average Monthly Correlation of Banking Sector with other Sectors



Monthly average correlation of returns of banking and other sectors showed a positive relation as seen in figure 18. Chemical Sector had the strongest correlation with the banking sector followed by electricity sector and oil and gas sector. Other sector also had a positive correlation personal goods, construction and fixed line telecommunication. Out of all the sectors food producers had the least correlation with the banking sector.

4.3.2 Ganger Causality Test on Monthly Portfolio Returns

Table 13 - Ganger Causality Test on Monthly Portfolio Returns

	B ↛ OAG	OAG ↛ B	B ↛ Con	Con ↛ B	B ↛ Ch	Ch ↛ B	B ↛ FP	FP ↛ B	B ↛ FTL	FTL ↛ B	B ↛ E	E ↛ B	B ↛ PG	PG ↛ B
Lags	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
1	0.04630	7.17405***	2.36840	0.80719	3.70491**	2.92381*	1.21450	0.01794	0.00059	15.4201***	0.84296	7.92942***	14.6385***	0.51917
2	8.87670***	4.49905**	9.07567***	0.27414	11.3459***	7.57733***	0.68106	0.38945	0.00418	4.58943**	0.45042	6.00687***	19.5661***	0.59401
3	4.45157***	3.40350**	5.96592***	0.43556	8.30940***	5.77736***	0.64022	0.34836	0.13517	3.05406**	0.15248	6.86259***	17.7307***	0.41577
4	3.43427***	2.79088**	4.71773***	0.53606	6.08143***	5.04559***	0.67304	0.28111	0.23329	2.30825*	0.32816	5.45646***	13.7323***	0.31847
5	4.35384***	2.26228**	7.02435***	0.43701	4.89644***	4.07651***	0.67493	0.27029	0.22411	1.89509*	0.58420	4.49385***	10.5974***	0.33300
6	3.40716***	2.65083**	9.30977***	0.33250	5.04067***	3.33538***	0.65321	0.50089	0.39350	2.15123**	2.57781**	6.02099***	8.86156***	0.65207
7	3.68323***	3.59652***	8.80000***	0.28763	5.23322***	2.85833***	0.58041	0.48744	0.72883	2.19506**	2.23378**	5.17895***	7.58377***	1.08026
8	3.64191***	3.23676***	8.11860***	0.26387	5.28131***	3.84828***	0.50739	0.43549	1.54334	1.89896*	1.86064*	5.27011***	6.58815***	1.07432
9	2.97242***	2.95296***	7.31739***	0.51618	4.83047***	3.51222***	0.56074	0.45846	1.68097*	1.64382*	1.77327*	4.55996***	6.14069***	1.06161
10	2.86503***	2.77284***	6.62178***	0.60299	4.15417***	3.76481***	0.61627	0.52685	1.92282**	1.56674	2.05067**	4.27272***	5.66416***	1.07475

Notes: *, **, and *** indicate statistical significance at 90%, 95% and 99% level of significance, respectively.

Ganger Causality Test on Monthly Portfolio Returns

We also ran Ganger Causality test in order to check the impact of monthly portfolio returns of banking sector on other sectors monthly portfolio returns and vice versa. To have a better understanding we ran test from 1 to 10 lag. There were three significance level that were considered 1%, 5%, and 10%. The table 13 summarizes the granger test ran on monthly portfolio returns of each sector with banking sector.

The first hypothesis we tested was banking sector's monthly portfolio returns on different sectors' monthly portfolio returns. When it came to Oil and Gas we observed that at lag=1, there was no impact on portfolio returns of oil and gas sector. However at lag=2 to lag=10 the banking sector impacted oil and gas sector at 1% significance. When testing the opposite we observed that at lag=1 oil and gas impacted the banking sector at 1% significance, from lag=2 to lag=6 oil and gas impacted banking sector's monthly portfolio returns at 5% significance and from lag=7 to lag=10 oil and gas impacted banking sector at 1% significance.

When we tested the impact of banking sector's monthly portfolio returns on construction sector we observed that banking sector did not impact construction sector at lag=1, however from lag=2 to lag=10 banking sector return impacted construction returns at 1% significance. When testing construction sector's monthly portfolio returns on banking sector's monthly portfolio returns we observed no significant impact at any lag level from lag=1 to lag=10.

Testing the impact of banking sector on chemical sector we saw that at lag=1 banking sector impacted chemical sector at 5% significance level. From lag=2 to lag=10 the impact was found to be significant at 1% significance level. When we tested the impact of chemical sector's monthly portfolio returns on banking sector's monthly portfolio return we observed that the impact was significant at 10% significant level at lag=1, from lag=2 to lag=10 the impact was significant at 1% significance level.

Next we tested the impact banking sector's monthly portfolio returns on monthly portfolio returns on food producer sector's monthly portfolio returns we failed to see any significant impact at any lag level between lag=1 and lag=10. It was a similar story when we tested food producer's impact on banking sector as no lag from lag=1 to lag=10 managed to show significant impact.

Testing the impact of banking sector on fixed line telecommunication we observed that from lag=1 to lag=8 there was no significant impact, lag=9 tested significant at 10% significant level, lag=10 tested significant at 5% significance level. When testing fixed line telecommunication's impact on banking sector we observed that at lag=1 the impact was significant at 1%, lag=2 and lag=3 the impact was significant at 5% level. Lag=4 and lag=5 were significant at 10% level, while lag=6 and lag=7 were significant at 5% level. Lag=8 and lag=9 were significant at 10% level while lag=10 showed insignificant impact.

When we tested the impact of banking sector's monthly portfolio return on electricity sector we observed that from lag=1 to lag=5 there was no significant impact, however lag=6 and lag=7 were found to be significant at 5% level, lag=8 and lag=9 were significant at 10% level while lag=10 was significant at 5% level. When testing electricity sector's impact on banking sector's monthly portfolio returns we observed that electricity sector impacted returns of banking sector at 1% significance from lag=1 to lag=10.

When testing banking sector's return's impact on personal good we observe that lag=1 to lag=10 the impact is significant at 1%. However when we check the opposite and test the impact of personal good on banking sector we observe that all lags from lag=1 to lag=10 return insignificant impact.

Table 14 Categarised Results of Granger Causality Test between monthly returns of Bank and other sectors

	Bank impacting the Sector	Sector impacting the bank
Oil & Gas	Highly Significant	Highly Significant
Construction	Highly Significant	Insignificant
Chemical	Highly Significant	Highly Significant
Food Producer	Insignificant	Insignificant
Fixed Line Telecommunication	Insignificant	Highly Significant
Electricity	Moderately Significant	Highly Significant
Personal Goods	Highly Significant	Insignificant

Note: These results are based on the frequency of occurrence of significant wald statistics at less than 10 percent level, reported in Table 13. We categorize the results according to the following criteria:

Highly Significant= More than 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Moderate Significant= 50 percent to 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Insignificant= Less than 50 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags

4.3.3 Ganger Causality Test on Monthly Volatilities

Table 15 - Ganger Causality Test on Monthly Volatilities

	B ↛ OAG	OAG ↛ B	B ↛ Con	Con ↛ B	B ↛ Ch	Ch ↛ B	B ↛ FP	FP ↛ B	B ↛ FTL	FTL ↛ B	B ↛ E	E ↛ B	B ↛ PG	PG ↛ B
Lags	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
1	0.00036	7.16077***	1.63007	1.36083	3.37121*	20.2392***	0.07369	0.67177	3.11263*	29.3053***	1.40794	20.1618***	3.07480*	0.14174
2	6.84116***	7.52889***	3.19969**	2.38030*	1.42427	12.1125***	0.04086	0.07662	2.35175*	12.7469***	3.71854**	15.5287***	8.64113***	3.6665**
3	9.08239***	4.80935***	6.95074***	1.07494	3.14971**	6.97074***	0.12597	0.07747	1.13902	7.01344***	3.03640**	10.1316***	8.52428***	3.914***
4	6.5404***	4.12375***	6.26737***	0.73529	2.04174	5.23445***	0.24586	0.13664	1.02644	6.71141***	1.79171	7.50009***	6.76997***	2.9420**
5	5.53476***	3.51664***	6.20188***	1.25235	1.95815*	4.45433***	0.23714	0.13156	0.89723	5.83036***	1.77693	6.00771***	5.29568***	3.313***
6	5.65862***	3.37463***	4.62388***	2.13296	1.90102	3.67403***	0.19437	0.12846	1.05879	4.65515***	1.39794	6.39781***	4.27390***	2.7368**
7	4.54886***	3.32135***	5.04510***	2.8993***	1.64941	3.64182***	0.21510	0.17198	0.70748	3.95761***	1.25922	6.01179***	3.70285***	2.5024**
8	3.86678***	3.05243***	4.23037***	2.6443***	1.85527*	3.65746***	0.63343	0.68110	0.34305	4.36987***	1.30699	5.29913***	3.21232***	2.4731**
9	3.65433***	2.76778***	3.77409***	2.4501***	1.67199*	3.53217***	0.69161	0.62192	0.36388	4.24648***	1.10300	4.66400***	2.85976***	2.2661**
10	3.76481***	2.49210***	3.24354***	2.3684***	1.64966*	3.50272***	0.96022	0.70974	1.19402	4.28749***	2.3607***	4.43047***	2.84655***	1.9514**

Notes: *, **, and *** indicate statistical significance at 90%, 95% and 99% level of significance, respectively

Ganger Causality Test on Monthly Volatilities

The next hypothesis we tested was whether monthly volatility in banking sector affected other sectors at different lag levels and vice versa as shown in table 15. When testing the impact of monthly volatilities of banking sector on oil and gas sector we observed that at lag=1 the impact was insignificant, however from lag=2 to lag=10 the impact was significant at 1% level. The impact of oil and gas volatility on banking sector returned results that were significant at 1% for all levels of lag, that is from lag=1 to lag=10.

When testing the impact of volatility of banking sector on construction sector we observed that at lag=1 there was again insignificant impact. From lag=2 to lag=10 the impact was significant at 1% significance level. The volatility in construction sector had an insignificant on the banking sector at lag=1, at lag=2 the impact was significant at 10% significance level. Lag=3 to lag=6 again returned insignificant results. From lag=7 to lag=10 the impact was significant at 1% significance level.

The impact of volatility of banking sector on chemical sector was found to be significant at 10% significance level at lag=1, lag=2 and lag=4 and lag=6 and lag=7 returned insignificant impact results. Lag=3 was found to be significant at 5% level. Lag=5 was found to be significant at 10% level. While lag=8 to lag=10 was significant at 10% level. However when we tested the impact of the volatility of chemical sector on banking sector we observed that from lag=1 to lag=10 all tested lag levels were found to be significant at 1% significance level.

When we tested the impact of banking sector's volatility on food producers we found that no lag from lag=1 to lag=10 returned significant results. When testing the impact of food producers on banking sector we observed the same, that is, all lags from lag=1 to lag=10 returned insignificant result.

When testing banking sector impact on fixed line telecommunication we observed that lag=1 and lag=2 returned results significant at 10% significance level. However lag=3 to lag=10 returned insignificant results. When testing impact of fixed line telecommunication on banking sector we observed that all lags from lag=1 to lag=10 was significant at 1% significance level.

The impact of banking sector's volatility on electricity sector was tested next. It was observed that at lag=1 the impact was insignificant. However at lag=2 and lag=3 the impact was significant at 5% significance level. Lag=4 to lag=9 were insignificant while lag=10 was significant at 1% significance level. The impact of volatility in electricity sector on banking sector was found to be significant at 1% level at all lags from lag=1 to lag=10.

It was observed that the impact of banking sector on personal goods at lag=1 was significant at 10% level, while lag=2 to lag=10 all resulted in significant results at 1% level. The impact of personal goods on banking sector was found to be insignificant at lag=1, lag=2 was found to be significant at 5% level and lag=3 was found to be significant at 1% significance level. Lag=4 was again found to be significant at 5% level and lag=5 was found to be significant at 1% level. Lag=6 to lag=10 were found to be significant at 5% significance level.

Table 16 Categarised Results of Granger Causality Test between monthly Volatilities of Bank and other sectors

	Bank impacting the Sector	**Sector impacting the bank**
Oil & Gas	Highly Significant	Highly Significant
Construction	Highly Significant	Moderately Significant
Chemical	Moderately Significant	Highly Significant
Food Producer	Insignificant	Insignificant
Fixed Line Telecommunication	Insignificant	Highly Significant
Electricity	Insignificant	Highly Significant
Personal Goods	Highly Significant	Highly Significant

Note: These results are based on the frequency of occurrence of significant wald statistics at less than 10 percent level, reported in Table 15. We categorize the results according to the following criteria:
Highly Significant= More than 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.
Moderate Significant= 50 percent to 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.
Insignificant= Less than 50 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

4.3.4 Ganger Causality Test on Monthly Conditional Standard Deviation

Table 17 - Ganger Causality Test on Monthly Conditional Standard Deviation

	B ↛ OAG	OAG ↛ B	B ↛ Con	Con ↛ B	B ↛ Ch	Ch ↛ B	B ↛ FP	FP ↛ B	B ↛ FTL	FTL ↛ B	B ↛ E	E ↛ B	B ↛ PG	PG ↛ B
Lags	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
1	20.2377***	8.40214***	6.36323**	0.15260	4.31199**	4.01858**	0.44511	0.23871	1.15998	4.25215**	5.90460**	3.03976*	5.57383**	1.56420
2	7.99756***	3.27738**	5.10712***	1.61356	3.32859**	5.31948***	0.36326	0.32548	6.67781**	2.90998*	7.6405***	3.65236**	4.53228**	3.1000**
3	4.74951***	2.15825*	2.21875*	1.07868	3.22485**	3.77800**	0.68006	1.28085	4.85738***	1.93184	5.0473***	4.22606***	2.77485**	2.25073*
4	3.19573***	2.12258*	4.27079***	1.89753	2.45444**	3.06342**	1.19172	1.20339	4.07695***	1.69233	3.7460***	3.25000**	2.59527**	1.70922
5	2.78565**	2.18783*	5.50166***	1.76962	2.65822**	2.82707**	1.22297	1.43414	3.24778***	2.19110*	3.03351**	2.61238**	2.59837**	1.46924
6	2.27637**	2.14527**	4.34903***	1.77867	2.93435***	2.40171**	1.51127	1.55627	2.89217***	1.94982*	2.63858**	2.57006**	2.02200*	1.25432
7	2.03300**	1.94431*	4.34570***	1.47942	2.57720**	2.10198**	1.30456	1.40473	2.92831***	1.69566	2.46308**	2.38294**	2.03145**	1.58877
8	2.29775**	2.44042**	4.09472***	1.32576	2.30035**	2.60511***	1.61151	1.24724	2.53473***	1.66091	2.35260**	2.06648**	1.96723**	1.53219
9	2.27446**	2.26930**	3.96135***	1.24390	2.18570**	2.56168***	1.49326	1.20392	2.33271**	1.61395	2.09748**	1.93977**	1.91984**	1.43426
10	2.32376**	2.00870**	3.67340***	1.01659	3.04414***	2.41886***	1.34606	0.97425	2.05251**	1.40215	1.95086**	1.74812*	1.84303**	1.41068

Notes: *, **, and *** indicate statistical significance at 90%, 95% and 99% level of significance, respectively.

Ganger Causality Test on Monthly Conditional Standard Deviation

Lastly we ran granger causality test on monthly conditional standard deviation. The results are summarized in the table 17. The test was run in similar way as for returns and volatility data. The results came out as below.

We tested the impact of banking sector's monthly conditional standard deviation on oil and gas sector, lag=1 to lag=4 were significant at 1% significance level, while lag=5 to lag=10 were significant at 5% significance level. When testing oil and gas impact on banking sector we observed that lag=1 was significant at 1% significance level, lag=2 was significant at 5% significance level, lag=3 to lag=5 was significant at 10% significance level. Lag=6 was significant at 5% significance level, while lag=7 was significant at 10% significance level and lag=8 to lag=10 were significant at 5% significance level.

When testing banking sector's impact on construction sector we observed that lag=1 was significant at 5% significance level, while lag=2 was significant at 1% significance level. Lag=3 was significant at 10% significance level while lag=4 to lag=10 were significant at 1% significance level. When observing construction sector's monthly conditional standard deviation's impact on banking sector we observed that none of the lags tested between lag=1 to lag=10 were significant at any level.

Next we tested banking sector's impact on chemical sector and observed that lag=1 to lag=5 were significant at 5% significance level, while lag=6 was significant at 1% significance level. Lag=7 to lag=9 were significant at 5% significance level and lag=10 was significance at 1% significance level. When testing chemical sector's impact on banking sector we observed that lag=1 was significant at 5% significance level while lag=2 was significant at 1% significance level. Lag=3 to lag=7 was significance at 5% significance level, and lag=8 to lag=10 were significant at 1% significance level.

We tested the impact of banking sector on food producers sector and observed that all lags tested between lag=1 to lag=10 returned insignificant results. It was a similar case when looking at food producers impact on banking sector with all lags tested between lag=1 to lag=10 returning insignificant results.

Testing the impact of banking sector's monthly conditional standard deviation on fixed line telecommunication we observed that lag=1 returned insignificant results, lag=2 was significant at 5% significance level, while lag=3 to lag=8 were significant at 1% level. Lag=9 and lag=10 were significant at 5% significance level. Testing fixed line telecommunication's impact on banking sector we observed that lag=1 was significant at 5% significance while lag=2, lag=5 and lag=6 were significant at 10% significance level. All other lags tested returned insignificant results.

Testing banking sector's impact on electricity sector we observe that lag=1 was significant at 5% significance level, lag=2 to lag=4 were significant at 1% significance level. Lag=5 to lag=10 were significant at 5% significance level. When testing electricity sector's impact on banking sector we observed that lag=1 was significant at 10% significance level, lag=2 was significant at 5% significance level, lag=3 was significant at 1% significance while lag=4 to lag=9 were significant at 5% significance level. Lag=10 was significant at 10% significance level.

When measuring the impact of banking sector's monthly conditional standard deviation on personal goods sector we observed that lag=1 to lag=5 were significant at 5% significance level, while lag=6 was significant at 10% significance level, lag=7 to lag=10 were significant at 5% significance level. On the flip side we observed that lag=1 was insignificant while lag=2 was significant at 5% significance level, lag=3 was significant at 10% significance level, while lag=4 to lag=10 were all insignificant.

Table 18 Categarised Results of Granger Causality Test between monthly conditional standard deviation of Bank and other sectors

	Bank impacting the Sector	Sector impacting the bank
Oil & Gas	Highly Significant	Highly Significant
Construction	Highly Significant	Insignificant
Chemical	Highly Significant	Highly Significant
Food Producer	Insignificant	Insignificant
Fixed Line Telecommunication	Highly Significant	Insignificant
Electricity	Highly Significant	Highly Significant
Personal Goods	Highly Significant	Insignificant

Note: These results are based on the frequency of occurrence of significant wald statistics at less than 10 percent level, reported in Table 17. We categorize the results according to the following criteria:

Highly Significant= More than 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Moderate Significant= 50 percent to 70 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags.

Insignificant= Less than 50 percent times wald statistic is significant at less than 1 percent, from 1 to 10 lags

4.3.5 GARCH Model on Monthly Data

Table 19 GARCH Model on monthly data

Sectors		Co-efficients	Prob
Oil & Gas	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.011108	0.238
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.022116	0.01
Construction	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.014467	0.025
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	-0.00592	0.493
Chemical	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.01807	0.032
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.008192	0.402
Food Producer	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.011581	0.002
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.006898	0.308
Fixed Line Telecommunication	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.000375	0.969
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.053587	0
Electricity	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	-0.01566	0.099
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.006116	0.351
Personal Goods	$\boldsymbol{\beta_{12} r_{BNK,t-1}}$	0.060696	12.92
	$\boldsymbol{\beta_{21} r_{i,t-1}}$	0.006876	0.871

We then ran GARCH model on our monthly data set of 2008-2011 in order to find the relationship of different sectors with banking sector shown in table 19. $\boldsymbol{\beta_{12} r_{BNK,t-1}}$ denoted the impact of banking sector on the respective sector whereas $\boldsymbol{\beta_{21} r_{i,t-1}}$ denoted the impact of respective sector on banking sector.

As we ran the model on weekly data in a similar way we ran it on monthly data. The result on oil and gas and banking sector results depicted that banking sector did not impact oil and gas sector (p-value= 0.238) but oil and gas sector did impact banking sector significantly (p-value=0.01).

For construction sector, the results showed that banking sector was significantly impacting construction sector (p-value= 0.025) but construction sector did not have significant impact on banking sector (p-value= 0.493).

For chemical sector, banking sector was significantly impacting the chemical sector (p=0.032) but chemical sector impact on banking sector was not so significant (p-value= 0.402).

We then ran the GARCH model on Food producer sector to understand whether it's the banking sector impacting the food producers or is it food producers impacting the banking sector. The results showed banking sector was significantly impacting the food producers (p-value=0.002) but food producer sector was not impacting banking sector (p-value=0.308).

We also tested for fixed line telecommunication and banking sector. The results showed that banking sector was not impacting fixed line telecommunication (p-value=0.969) whereas fixed line telecommunication did impact banking sector (p-value=0).

For electricity sector, banking sector impacted electricity sector (p-value=0.099) but electricity sector did not impact banking sector (p-value=0.351).

Also in case of personal goods sector, neither banking sector impacted personal goods sector (p-value=12.92) nor personal goods sector impacted banking sector (p-value=0.871).

Chapter 5

5. Conclusion

The study could be of vital importance for monetary, financial and regulatory authorities as it explored the volatility spillover that a banking sector in Pakistan is capable to transmit towards other sectors while market is in operation. We did an extensive research on oil and gas, construction,chemical, food producer,fixed line telecommunication, electricity and personal goods sector inorder to find out the effect of banking sector on these sector and vice versa. To have a better understanding we divided the research into three parts daily, weekly and monthly analysis.

In our daily analysis we found out that return in banking sector were significantly impacting the returns of oil and gas sector, electricity sector and chemical sector whereas Returns in construction sector, chemical sector and personal goods sector impacted banking sector.

In weekly data analysis when we ran granger causality test on portfolio returns, volatility and conditional standard deviation from lag 1 to 10 we found some interesting results. In case of portfolio returns of banking sector impacted oil and gas, construction, fixed line telecommunication, electricity portfolio returns and personal goods. Whereas oil and gas, chemical, fixed line telecommunication and electricity portfolio returns impacted portfolio returns of banking sector. Weekly volatility results depicted that volatilities in banking sector impacted volatilities in oil and gas, construction, chemical, electricity and personal good sector. On the other hand, volatilities in oil and gas, construction, fixed line telecommunication and electricity significantly impacted volatilities in banking sector. Lastly the results of weekly conditional standard deviation showed banking sector was impacting oil and gas, construction, chemical and fixed line telecommunication and personal goods whereas conditional standard deviation in construction, chemical and fixed line telecommunication impacted conditional standard deviation of banking sector in almost all lags. Finally, we ran GARCH model on our weekly data and found impact and directionality of the impact. Return in banking sector positive and significantly impacted oil and gas sector, chemical and personal goods and negatively impacted construction sector and fixed line telecommunication. Food producer, fixed line

telecommunication and electricity impacted banking sector positively and significantly whereas oil and gas impacted the banking sector negatively.

Lastly we repeated all tests for our monthly data set. In Ganger Causality portfolio return test, banking sector significantly impacted oil and gas, construction, chemical, electricity and personal good portfolio returns. Portfolio return of oil and gas, chemicals, fixed line telecommunication and electricity significantly impacted portfolio returns of banking sector. For volatility, volatility in banking sector impacted volatilities in oil and gas, construction, chemical and personal goods. Volatility in oil and gas, construction, chemical, fixed line telecommunication, electricity and personal goods impacted banking sector volatility. In case of conditional standard deviation, banking sector impacted oil and gas, construction; chemical, fixed line telecommunication, electricity and personal goods whereas oil and gas, chemical and electricity impacted the banking sector. Lastly the GARCH model results depicted return in banking sector significantly and positively impacted construction, chemical, food producer and electricity sector. Whereas oil and gas and fixed line telecommunication impacted the banking sector.

we found significant spillover effect whose direction is from banking sector to other(s) sector, financial and monetary authorites will be in a better position to formulate policies and strategies not only to protect crisis originiated from banking sector but also to utilize the same spillover by injecting growth in other sectors through a banking channel. It will also help understanding authorities whether the influence of banking sector over other sectors has changed over time or not and what are the dynamics of that change. Banks can also utilize this study in understanding what are the sectors that can hurt the performance of banking sector due to their idiosyncratic and indiginous problems and to what extent banks should expose themselves to those sectors.

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Appendix

Appendix 1 Companies Included in the sample

Sector:001	Banks-B	Company's Ticker	CLOSING PRICE-CP	Returns-Rt	Weights-Wt	Weighted Return-WtR
1	Allied Bank Limited	ABL	CP_01B_01ABL	Rt_01B_01ABL	Wt_01B_01ABL	WtR_01B_01ABL
2	Askari Bank	AKBL	CP_01B_02AKBL	Rt_01B_02AKBL	Wt_01B_02AKBL	WtR_01B_02AKBL
3	Bank Al-Falah	BAFL	CP_01B_03BAFL	Rt_01B_03BAFL	Wt_01B_03BAFL	WtR_01B_03BAFL
4	Bank Al-Habib	BAHL	CP_01B_04BAHL	Rt_01B_04BAHL	Wt_01B_04BAHL	WtR_01B_04BAHL
5	Bank Islamic Pakistan	BIPL	CP_01B_05BIPL	Rt_01B_05BIPL	Wt_01B_05BIPL	WtR_01B_05BIPL
6	Bank of Khyber	BOK	CP_01B_06BOK	Rt_01B_06BOK	Wt_01B_06BOK	WtR_01B_06BOK
7	Bank of Punjab	BOP	CP_01B_07BOP	Rt_01B_07BOP	Wt_01B_07BOP	WtR_01B_07BOP
8	JS Bank Limited	JSBL	CP_01B_08JSBL	Rt_01B_08JSBL	Wt_01B_08JSBL	WtR_01B_08JSBL
9	Habib Bank Limited	HBL	CP_01B_09HBL	Rt_01B_09HBL	Wt_01B_09HBL	WtR_01B_09HBL
10	Habib Metropolitan Bank	HMB	CP_01B_10HMB	Rt_01B_10HMB	Wt_01B_10HMB	WtR_01B_10HMB
11	Fasyal Bank	FABL	CP_01B_11FABL	Rt_01B_11FABL	Wt_01B_11FABL	WtR_01B_11FABL
12	Muslim Commerical Bank	MCB	CP_01B_12MCB	Rt_01B_12MCB	Wt_01B_12MCB	WtR_01B_12MCB
13	KASB Bank	KASB	CP_01B_13KASB	Rt_01B_13KASB	Wt_01B_13KASB	WtR_01B_13KASB
14	Meezan Bank Limited	MEBL	CP_01B_14MEBL	Rt_01B_14MEBL	Wt_01B_14MEBL	WtR_01B_14MEBL
15	National Bank of Pakistan	NBP	CP_01B_15NBP	Rt_01B_15NBP	Wt_01B_15NBP	WtR_01B_15NBP
16	NIB Bank Limited	NIB	CP_01B_16NIB	Rt_01B_16NIB	Wt_01B_16NIB	WtR_01B_16NIB
17	Standard Chartered Bank	SCB	CP_01B_17SCB	Rt_01B_17SCB	Wt_01B_17SCB	WtR_01B_17SCB
18	Samba Bank Limited	SBL	CP_01B_18SBL	Rt_01B_18SBL	Wt_01B_18SBL	WtR_01B_18SBL
19	Soneri Bank Limited	SNBL	CP_01B_19SNBL	Rt_01B_19NBL	Wt_01B_19NBL	WtR_01B_19NBL
20	United Bank Limited	UBL	CP_01B_20UBL	Rt_01B_20UBL	Wt_01B_20UBL	WtR_01B_20UBL
21	Summit Bank	SMBL	CP_01B_21SMBL	Rt_01B_21SMBL	Wt_01B_21SMBL	WtR_01B_21SMBL

Sector:002	Oil & Gas-OAG	Company's Ticker	CLOSING PRICE-CP	Returns-Rt	Weights-Wt	Weighted Return-WtR
1	Attock Petroleum XD	APL	CP_02OAG_01APL	Rt_02OAG_01APL	Wt_02OAG_01APL	WtR_02OAG_01APL
2	Attock Refinery	ATRL	CP_02OAG_02ATRL	Rt_02OAG_02ATRL	Wt_02OAG_02ATRL	WtR_02OAG_02ATRL
3	Burshane LPG	BPL	CP_02OAG_03BPL	Rt_02OAG_03BPL	Wt_02OAG_03BPL	WtR_02OAG_03BPL
4	Byco Petroleum	BYCO	CP_02OAG_04BYCO	Rt_02OAG_04BYCO	Wt_02OAG_04BYCO	WtR_02OAG_04BYCO
5	Mari Gas Company Ltd.	MARI	CP_02OAG_05MARI	Rt_02OAG_05MARI	Wt_02OAG_05MARI	WtR_02OAG_05MARI
6	National Refinery Ltd.	NRL	CP_02OAG_06NRL	Rt_02OAG_06NRL	Wt_02OAG_06NRL	WtR_02OAG_06NRL
7	Oil & Gas Development	ODGC	CP_02OAG_07ODGC	Rt_02OAG_07ODGC	Wt_02OAG_07ODGC	WtR_02OAG_07ODGC
8	Pak Oil Fields Ltd	POL	CP_02OAG_08POL	Rt_02OAG_08POL	Wt_02OAG_08POL	WtR_02OAG_08POL
9	Pak PetroleumXD	PPL	CP_02OAG_09PPL	Rt_02OAG_09PPL	Wt_02OAG_09PPL	WtR_02OAG_09PPL
10	Pak Refinery	PRL	CP_02OAG_10PRL	Rt_02OAG_10PRL	Wt_02OAG_10PRL	WtR_02OAG_10PRL
11	Pakistan State Oil	PSO	CP_02OAG_11PSO	Rt_02OAG_11PSO	Wt_02OAG_11PSO	WtR_02OAG_11PSO
12	Shell	SHEL	CP_02OAG_12SHEL	Rt_02OAG_12SHEL	Wt_02OAG_12SHEL	WtR_02OAG_12SHEL

Sector:003	Construction-CON	Company's Ticker	CLOSING PRICE-CP	Returns-Rt	Weights-Wt	Weighted Return-WtR
1	Attock Cement Pakistan Limited	ACPL	CP_03CON_01ACPL	Rt_03CON_01ACPL	Wt_03CON_01ACPL	WtR_03CON_01ACPL
2	Berger Paints	BERG	CP_03CON_02BERG	Rt_03CON_02BERG	Wt_03CON_02BERG	WtR_03CON_02BERG
3	Buxly Paints	BUXL	CP_03CON_03BUXL	Rt_03CON_03BUXL	Wt_03CON_03BUXL	WtR_03CON_03BUXL
4	Bestway cements	BWCL	CP_03CON_04BWCL	Rt_03CON_04BWCL	Wt_03CON_04BWCL	WtR_03CON_04BWCL
5	D.G.Khan Cement	DGKC	CP_03CON_05DGKC	Rt_03CON_05DGKC	Wt_03CON_05DGKC	WtR_03CON_05DGKC
6	Dandot Cement	DNCC	CP_03CON_06DNCC	Rt_03CON_06DNCC	Wt_03CON_06DNCC	WtR_03CON_06DNCC
7	EMCO Industries	EMCO	CP_03CON_07EMCO	Rt_03CON_07EMCO	Wt_03CON_07EMCO	WtR_03CON_07EMCO
8	Fauji Cement	FCCL	CP_03CON_08FCCL	Rt_03CON_08FCCL	Wt_03CON_08FCCL	WtR_03CON_08FCCL
9	Frontier Ceramics	FRCL	CP_03CON_09FRCL	Rt_03CON_09FRCL	Wt_03CON_09FRCL	WtR_03CON_09FRCL
10	Gammon Pak	GAMON	CP_03CON_10GAMON	Rt_03CON_10GAMON	Wt_03CON_10GAMON	WtR_03CON_10GAMON
11	Gharibwal Cement	GWLC	CP_03CON_11GWLC	Rt_03CON_11GWLC	Wt_03CON_11GWLC	WtR_03CON_11GWLC
12	Haydery Constructions	HADC	CP_03CON_12HADC	Rt_03CON_12HADC	Wt_03CON_12HADC	WtR_03CON_12HADC
13	Javedan	JVDC	CP_03CON_13JVDC	Rt_03CON_13JVDC	Wt_03CON_13JVDC	WtR_03CON_13JVDC
14	Karam Cremics Limited	KCL	CP_03CON_14KCL	Rt_03CON_14KCL	Wt_03CON_14KCL	WtR_03CON_14KCL
15	Kohat cement	KOHC	CP_03CON_15KOHC	Rt_03CON_15KOHC	Wt_03CON_15KOHC	WtR_03CON_15KOHC
16	Lafarge	LPCL	CP_03CON_16LPCL	Rt_03CON_16LPCL	Wt_03CON_16LPCL	WtR_03CON_16LPCL
17	Lucky cement	LUCK	CP_03CON_17LUCK	Rt_03CON_17LUCK	Wt_03CON_17LUCK	WtR_03CON_17LUCK
18	Maple Leaf Cement Factory Ltd (Pref)	MLCFPS	CP_03CON_18MLCFPS	Rt_03CON_18MLCFPS	Wt_03CON_18MLCFPS	WtR_03CON_18MLCFPS
19	Maple Leaf cement	MLCF	CP_03CON_19MLCF	Rt_03CON_19MLCF	Wt_03CON_19MLCF	WtR_03CON_19MLCF
20	Mustehkam cement	MUCL	CP_03CON_20MUCL	Rt_03CON_20MUCL	Wt_03CON_20MUCL	WtR_03CON_20MUCL
21	Pioneer Cement Limited	PIOC	CP_03CON_21PIOC	Rt_03CON_21PIOC	Wt_03CON_21PIOC	WtR_03CON_21PIOC
22	Shabbir Tiles and Ceramics Ltd.	STCL	CP_03CON_22STCL	Rt_03CON_22STCL	Wt_03CON_22STCL	WtR_03CON_22STCL
23	Zeal Construction	ZELP	CP_03CON_23ZELP	Rt_03CON_23ZELP	Wt_03CON_23ZELP	WtR_03CON_23ZELP

Sector:004	Chemicals-CH	Company's Ticker	CLOSING PRICE-CP	Returns-Rt	Weights-Wt	Weighted Return-WtR
1	Arif Habib Co SD	AHCL	CP_04CH_01AHCL	Rt_04CH_01AHCL	Wt_04CH_01AHCL	WtR_04CH_01AHCL
2	Bawanay Air Products	BAPL	CP_04CH_02BAPL	Rt_04CH_02BAPL	Wt_04CH_02BAPL	WtR_04CH_02BAPL
3	Biafo Ind.	BIFO	CP_04CH_03BIFO	Rt_04CH_03BIFO	Wt_04CH_03BIFO	WtR_04CH_03BIFO
4	Clariant Pakistan	CPL	CP_04CH_04CPL	Rt_04CH_04CPL	Wt_04CH_04CPL	WtR_04CH_04CPL
5	Dawood Hercules	DAWH	CP_04CH_05DAWH	Rt_04CH_05DAWH	Wt_04CH_05DAWH	WtR_04CH_05DAWH
6	Descon Chemicals	DCH	CP_04CH_06DCH	Rt_04CH_06DCH	Wt_04CH_06DCH	WtR_04CH_06DCH
7	Dewan Salman	DSF	CP_04CH_07DSF	Rt_04CH_07DSF	Wt_04CH_07DSF	WtR_04CH_07DSF
8	Dynae Pakistan	DYNO	CP_04CH_08DYNO	Rt_04CH_08DYNO	Wt_04CH_08DYNO	WtR_04CH_08DYNO
9	Engro Corporation	ENGRO	CP_04CH_09ENGRO	Rt_04CH_09ENGRO	Wt_04CH_09ENGRO	WtR_04CH_09ENGRO
10	Fauji Fertilizer Bin Qasim	FFBL	CP_04CH_10FFBL	Rt_04CH_10FFBL	Wt_04CH_10FFBL	WtR_04CH_10FFBL
11	Fauji Fertilizer XDXB	FFC	CP_04CH_11FFC	Rt_04CH_11FFC	Wt_04CH_11FFC	WtR_04CH_11FFC
12	Gatron Industries	GATI	CP_04CH_12GATI	Rt_04CH_12GATI	Wt_04CH_12GATI	WtR_04CH_12GATI
13	ICI Pakistan	ICI	CP_04CH_13ICI	Rt_04CH_13ICI	Wt_04CH_13ICI	WtR_04CH_13ICI
14	Ittehad Chemical Ltd	ICL	CP_04CH_14ICL	Rt_04CH_14ICL	Wt_04CH_14ICL	WtR_04CH_14ICL
15	Linde Pakistan	LINDE	CP_04CH_15LINDE	Rt_04CH_15LINDE	Wt_04CH_15LINDE	WtR_04CH_15LINDE
16	Leiner Pak Gelatine Ltd.	LPGL	CP_04CH_16LPGL	Rt_04CH_16LPGL	Wt_04CH_16LPGL	WtR_04CH_16LPGL
17	Mandviwala	MWMP	CP_04CH_17MWMP	Rt_04CH_17MWMP	Wt_04CH_17MWMP	WtR_04CH_17MWMP
18	NIMIR IND. CHEMICALS	NICL	CP_04CH_18NICL	Rt_04CH_18NICL	Wt_04CH_18NICL	WtR_04CH_18NICL
19	PAK GUM AND CHEMICALS	PGCL	CP_04CH_19PGCL	Rt_04CH_19PGCL	Wt_04CH_19PGCL	WtR_04CH_19PGCL
20	PAK PVC	PPVC	CP_04CH_20PPVC	Rt_04CH_20PPVC	Wt_04CH_20PPVC	WtR_04CH_20PPVC
21	SARDAR Chemicals	SARD	CP_04CH_21SARD	Rt_04CH_21SARD	Wt_04CH_21SARD	WtR_04CH_21SARD
22	Sitara Chemical	SITC	CP_04CH_22SITC	Rt_04CH_22SITC	Wt_04CH_22SITC	WtR_04CH_22SITC
23	Sitara Peroxide	SPL	CP_04CH_23SPL	Rt_04CH_23SPL	Wt_04CH_23SPL	WtR_04CH_23SPL
24	Wah-Noble	WAHN	CP_04CH_24WAHN	Rt_04CH_24WAHN	Wt_04CH_24WAHN	WtR_04CH_24WAHN
25	United Distributors	UDPL	CP_04CH_25UDPL	Rt_04CH_25UDPL	Wt_04CH_25UDPL	WtR_04CH_25UDPL

Sector:005	Food Produce-FP	Company's Ticker	CLOSING PRICE-CP	Returns-Rt	Weights-Wt	Weighted Return-WtR
1	Al abas sugar	AABS	CP_05FP_01AABS	Rt_05FP_01AABS	Wt_05FP_01AABS	WtR_05FP_01AABS
2	Adam sugar mills	ADAMS	CP_05FP_02ADAMS	Rt_05FP_02ADAMS	Wt_05FP_02ADAMS	WtR_05FP_02ADAMS
3	AbduAllah shah	AGSML	CP_05FP_03AGSML	Rt_05FP_03AGSML	Wt_05FP_03AGSML	WtR_05FP_03AGSML
4	Al-Noor Sugar Mills Ltd	ALNRS	CP_05FP_04ALNRS	Rt_05FP_04ALNRS	Wt_05FP_04ALNRS	WtR_05FP_04ALNRS
5	Baba Farid Sugar Mills	BAFS	CP_05FP_05BAFS	Rt_05FP_05BAFS	Wt_05FP_05BAFS	WtR_05FP_05BAFS
6	Bawany Sugar Mills Ltd	BAWS	CP_05FP_06BAWS	Rt_05FP_06BAWS	Wt_05FP_06BAWS	WtR_05FP_06BAWS
7	Chashma Sugar Mills Ltd	CHAS	CP_05FP_07CHAS	Rt_05FP_07CHAS	Wt_05FP_07CHAS	WtR_05FP_07CHAS
8	Clover Pakistan Limited	CLOV	CP_05FP_08CLOV	Rt_05FP_08CLOV	Wt_05FP_08CLOV	WtR_05FP_08CLOV
9	Crescent sugar miils	CSMD	CP_05FP_09CSMD	Rt_05FP_09CSMD	Wt_05FP_09CSMD	WtR_05FP_09CSMD
10	Data agro sugar miils	DAAG	CP_05FP_10DAAG	Rt_05FP_10DAAG	Wt_05FP_10DAAG	WtR_05FP_10DAAG
11	Dewaan sugar mills	DWSM	CP_05FP_11DWSM	Rt_05FP_11DWSM	Wt_05FP_11DWSM	WtR_05FP_11DWSM
12	Faran Sugar Mills Ltd.	FRSM	CP_05FP_12FRSM	Rt_05FP_12FRSM	Wt_05FP_12FRSM	WtR_05FP_12FRSM
13	Fazal Vegetable Ghee	FAZAL	CP_05FP_13FAZAL	Rt_05FP_13FAZAL	Wt_05FP_13FAZAL	WtR_05FP_13FAZAL
14	Hussein Sugar Mills ltd.	HUSS	CP_05FP_14HUSS	Rt_05FP_14HUSS	Wt_05FP_14HUSS	WtR_05FP_14HUSS
15	Habib Sugar Mill	HABSM	CP_05FP_15HABSM	Rt_05FP_15HABSM	Wt_05FP_15HABSM	WtR_05FP_15HABSM
16	Habib-ADM	HAL	CP_05FP_16HAL	Rt_05FP_16HAL	Wt_05FP_16HAL	WtR_05FP_16HAL
17	Good Luck Industries	GLIN	CP_05FP_17GLIN	Rt_05FP_17GLIN	Wt_05FP_17GLIN	WtR_05FP_17GLIN
18	Haseeb waqas sugar mills	HWQS	CP_05FP_18HWQS	Rt_05FP_18HWQS	Wt_05FP_18HWQS	WtR_05FP_18HWQS
19	Ismail industries	ISIL	CP_05FP_19ISIL	Rt_05FP_19ISIL	Wt_05FP_19ISIL	WtR_05FP_19ISIL
20	J.D.W sugar mills	JDWS	CP_05FP_20JDWS	Rt_05FP_20JWDS	Wt_05FP_20JWDS	WtR_05FP_20JWDS
21	Mitchell's Fruits Farms Ltd	MFFL	CP_05FP_21MFFL	Rt_05FP_21MFFL	Wt_05FP_21MFFL	WtR_05FP_21MFFL
22	Khairpur Sugar Mills Ltd	KPUS	CP_05FP_22KPUS	Rt_05FP_22KPUS	Wt_05FP_22KPUS	WtR_05FP_22KPUS
23	Kohinoor Sugar Mills Ltd	KNRS	CP_05FP_23KNRS	Rt_05FP_23KNRS	Wt_05FP_23KNRS	WtR_05FP_23KNRS
24	Morafco Industries Ltd	MOIL	CP_05FP_24MOIL	Rt_05FP_24MOIL	Wt_05FP_24MOIL	WtR_05FP_24MOIL
25	MirpurKhas Sugar Mills	MIRKS	CP_05FP_25MIRKS	Rt_05FP_25MIRKS	Wt_05FP_25MIRKS	WtR_05FP_25MIRKS
26	Mirza Sugar Mills Limited	MZSM	CP_05FP_26MZSM	Rt_05FP_26MZSM	Wt_05FP_26MZSM	WtR_05FP_26MZSM
27	Nestle Pakistan Ltd.	NESTLE	CP_05FP_27NESTLE	Rt_05FP_27NESTLE	Wt_05FP_27NESTLE	WtR_05FP_27NESTLE
28	National Foods Limited	NATF	CP_05FP_28NATF	Rt_05FP_28NATF	Wt_05FP_28NATF	WtR_05FP_28NATF

29	Quice Food (Ltd.)	QUICE	CP_05FP_29QUICE	Rt_05FP_29QUICE	Wt_05FP_29QUICE	WtR_05FP_29QUICE
30	Rafhan Maize	RMPL	CP_05FP_30RMPL	Rt_05FP_30RMPL	Wt_05FP_30RMPL	WtR_05FP_30RMPL
31	Punjab Oil Mills	POML	CP_05FP_31POML	Rt_05FP_31POML	Wt_05FP_31POML	WtR_05FP_31POML
32	Sanghar Sugar Mills Ltd	SANSM	CP_05FP_32SANSM	Rt_05FP_32SANSM	Wt_05FP_32SANSM	WtR_05FP_32SANSM
33	Sind Abadgars Sugar Mills Ltd	SASML	CP_05FP_33SASML	Rt_05FP_33SASML	Wt_05FP_33SASML	WtR_05FP_33SASML
34	Shahmurad Sugar Mills Ltd.	SHSML	CP_05FP_34SHSML	Rt_05FP_34SHSML	Wt_05FP_34SHSML	WtR_05FP_34SHSML
35	Saleem Sugar Mills Limited (O)	SLSO	CP_05FP_35SLSO	Rt_05FP_35SLSO	Wt_05FP_35SLSO	WtR_05FP_35SLSO
36	Shakerganj Mills Ltd.	SGML	CP_05FP_36SGML	Rt_05FP_36SGML	Wt_05FP_36SGML	WtR_05FP_36SGML
37	Shakarganj (R.C.Pr)	SGMLPS	CP_05FP_37SGMLPS	Rt_05FP_37SGMLPS	Wt_05FP_37SGMLPS	WtR_05FP_37SGMLPS
38	Shahtaj Sugar Mills	SHJS	CP_05FP_38SHJS	Rt_05FP_38SHJS	Wt_05FP_38SHJS	WtR_05FP_38SHJS
39	Saleem Sugar Mill PP	SLSOPP	CP_05FP_39SLSOPP	Rt_05FP_39SLSOPP	Wt_05FP_39SLSOPP	WtR_05FP_39SLSOPP
40	Saleem Sugar Mill 6% (P)	SLSOPVI	CP_05FP_40SLSOPVI	Rt_05FP_40SLSOPVI	Wt_05FP_40SLSOPVI	WtR_05FP_40SLSOPVI
41	S.S OIL MILL LTD	SSOM	CP_05FP_41SSOM	Rt_05FP_41SSOM	Wt_05FP_41SSOM	WtR_05FP_41SSOM
42	Suraj ghee	SURAJ	CP_05FP_42SURAJ	Rt_05FP_42SURAJ	Wt_05FP_42SURAJ	WtR_05FP_42SURAJ
43	Thal	TICL	CP_05FP_43TICL	Rt_05FP_43TICL	Wt_05FP_43TICL	WtR_05FP_43TICL
44	UNILIVER PAKISTAN LIMITED	ULEVER	CP_05FP_44ULEVER	Rt_05FP_44ULEVER	Wt_05FP_44ULEVER	WtR_05FP_44ULEVER
45	UNILIVER PAK FOOD	UPFL	CP_05FP_45UPFL	Rt_05FP_45UPFL	Wt_05FP_45UPFL	WtR_05FP_45UPFL
46	Wazir Ali Industries Ltd.	WAZIR	CP_05FP_46WAZIR	Rt_05FP_46WAZIR	Wt_05FP_46WAZIR	WtR_05FP_46WAZIR

Sector:006	**Fixed Line Telecommunication**	**Company's Ticker**	**CLOSING PRICE-CP**	**Returns-Rt**	**Weights-Wt**	**Weighted Return-WtR**
1	P.T.C.L.A Price	PTC	CP_06FLT_01PTC	Rt_06FLT_01PTC	Wt_06FLT_01PTC	WtR_06FLT_01PTC
2	Pak Datacom Price	PAKD	CP_06FLT_02PAKD	Rt_06FLT_02PAKD	Wt_06FLT_02PAKD	WtR_06FLT_02PAKD
3	Telecard Ltd Price	Tele	CP_06FLT_03Tele	Rt_06FLT_03Tele	Wt_06FLT_03Tele	WtR_06FLT_03Tele
4	Worldcall Telecom Ltd	WTL	CP_06FLT_04WTL	Rt_06FLT_04WTL	Wt_06FLT_04WTL	WtR_06FLT_04WTL

Sector:007	**Electricity**	**Company's Ticker**	**CLOSING PRICE-CP**	**Returns-Rt**	**Weights-Wt**	**Weighted Return-WtR**
1	ALTERN ENERGY	ALTN	CP_07E_01ALTN	Rt_07E_01ALTN	Wt_07E_01ALTN	WtR_07E_01ALTN
2	Genertech	GENP	CP_07E_02GENP	Rt_07E_02GENP	Wt_07E_02GENP	WtR_07E_02GENP
3	Hub Power Co	HUBC	CP_07E_03HUBC	Rt_07E_03HUBC	Wt_07E_03HUBC	WtR_07E_03HUBC
4	Japan power generation	JPGL	CP_07E_04JPGL	Rt_07E_04JPGL	Wt_07E_04JPGL	WtR_07E_04JPGL
5	K.E.S.C	K.E.S.C	CP_07E_05K.E.S.C	Rt_07E_05K.E.S.C	Wt_07E_05K.E.S.C	WtR_07E_05K.E.S.C
6	Kohinoor Power	KOHP	CP_07E_06KOHP	Rt_07E_06KOHP	Wt_07E_06KOHP	WtR_07E_06KOHP
7	Sitara energy ltd	SEL	CP_07E_07SEL	Rt_07E_07SEL	Wt_07E_07SEL	WtR_07E_07SEL
8	Southern Electric	SEPCO	CP_07E_08SEPCO	Rt_07E_08SEPCO	Wt_07E_08SEPCO	WtR_07E_08SEPCO
9	Tri-star Power Ltd.	TSPL	CP_07E_09TSPL	Rt_07E_09TSPL	Wt_07E_09TSPL	WtR_07E_09TSPL
10	Kohinoor Energy	K.O.H.E	CP_07E_10K.O.H.E	Rt_07E_10K.O.H.E	Wt_07E_10K.O.H.E	WtR_07E_10K.O.H.E
11	Kot Addu power spot	K.A.P.C.O	CP_07E_11K.A.P.C.O	Rt_07E_11K.A.P.C.O	Wt_07E_11K.A.P.C.O	WtR_07E_11K.A.P.C.O
12	Ideal power ltd	IDEN	CP_07E_12IDEN	Rt_07E_12IDEN	Wt_07E_12IDEN	WtR_07E_12IDEN
13	S.G. Power Ltd	SGPL	CP_07E_13SGPL	Rt_07E_13SGPL	Wt_07E_13SGPL	WtR_07E_13SGPL

Sector:008	**Personl Goods**	**Company's Ticker**	**CLOSING PRICE-CP**	**Returns-Rt**	**Weights-Wt**	**Weighted Return-WtR**
1	Ali Asghar Textile PRICE	AATM	CP_08PG_01AATM	Rt_08PG_01AATM	Wt_08PG_01AATM	WtR_08PG_01AATM
2	Artistic Denim Mills	ADMM	CP_08PG_02ADMM	Rt_08PG_02ADMM	Wt_08PG_02ADMM	WtR_08PG_02ADMM
3	Ahmad Hassan Texile Mill Ltd	AHTM	CP_08PG_03AHTM	Rt_08PG_03AHTM	Wt_08PG_03AHTM	WtR_08PG_03AHTM
4	Adil Textile Mills	ADTM	CP_08PG_04ADTM	Rt_08PG_4ADTM	Wt_08PG_4ADTM	WtR_08PG_4ADTM
5	AL-Qadir Textile	ALQT	CP_08PG_05ALQT	Rt_08PG_05ALQT	Wt_08PG_05ALQT	WtR_08PG_05ALQT
6	Apollo textile price	APOT	CP_08PG_06APOT	Rt_08PG_06APOT	Wt_08PG_06APOT	WtR_08PG_06APOT
7	Aruj Garments Closing Price	ARUJ	CP_08PG_07ARUJ	Rt_08PG_07ARUJ	Wt_08PG_07ARUJ	WtR_08PG_07ARUJ
8	Ashfaq Textiles closing price	ASHT	CP_08PG_08ASHT	Rt_08PG_08ASHT	Wt_08PG_08ASHT	WtR_08PG_08ASHT
9	Annoor textile price	ANNT	CP_08PG_09ANNT	Rt_08PG_09ANNT	Wt_08PG_09ANNT	WtR_08PG_09ANNT
10	asim textile	ASTM	CP_08PG_10ASTM	Rt_08PG_10ASTM	Wt_08PG_10ASTM	WtR_08PG_10ASTM
11	amin spinning mill(ral)	ASMLRAL	CP_08PG_11ASMLRAL	Rt_08PG_11ASMLRAL	Wt_08PG_11ASMLRAL	WtR_08PG_11ASMLRAL
12	bahawalpur textile	BAHT	CP_08PG_12BAHT	Rt_08PG_12BAHT	Wt_08PG_12BAHT	WtR_08PG_12BAHT
13	Azgard Nine Ltd.	ANL	CP_08PG_13ANL	Rt_08PG_13ANL	Wt_08PG_13ANL	WtR_08PG_13ANL
14	Allahawasaya Textile	AWTX	CP_08PG_14AWTX	Rt_08PG_14AWTX	Wt_08PG_14AWTX	WtR_08PG_14AWTX
15	Ayesha Textile	AYTM	CP_08PG_15AYTM	Rt_08PG_15AYTM	Wt_08PG_15AYTM	WtR_08PG_15AYTM
16	Azmat Textile	AZMT	CP_08PG_16AZMT	Rt_08PG_16AZMT	Wt_08PG_16AZMT	WtR_08PG_16AZMT
17	Al-Azhar Textile	AZTM	CP_08PG_17AZTM	Rt_08PG_17AZTM	Wt_08PG_17AZTM	WtR_08PG_17AZTM
18	Al-Qaim Textile Closing Price	AQTM	CP_08PG_18AQTM	Rt_08PG_18AQTM	Wt_08PG_18AQTM	WtR_08PG_18AQTM
19	Bilal Fibres Price	BILF	CP_08PG_19BILF	Rt_08PG_19BILF	Wt_08PG_19BILF	WtR_08PG_19BILF
20	Bata Price	bata	CP_08PG_20bata	Rt_08PG_20bata	Wt_08PG_20bata	WtR_08PG_20bata
21	Bhanero T Prices	bhat	CP_08PG_21bhat	Rt_08PG_21bhat	Wt_08PG_21bhat	WtR_08PG_21bhat
22	Crescent Jute price	CJPL	CP_08PG_22CJPL	Rt_08PG_22CJPL	Wt_08PG_22CJPL	WtR_08PG_22CJPL
23	Brothers Textile Price	BROT	CP_08PG_23BROT	Rt_08PG_23BROT	Wt_08PG_23BROT	WtR_08PG_23BROT
24	Crescent Fibre Price	CFL	CP_08PG_24CFL	Rt_08PG_24CFL	Wt_08PG_24CFL	WtR_08PG_24CFL
25	Chenab limited price	CHBL	CP_08PG_25CHBL	Rt_08PG_25CHBL	Wt_08PG_25CHBL	WtR_08PG_25CHBL
26	Blesses Text Closing	BTL	CP_08PG_26BTL	Rt_08PG_26BTL	Wt_08PG_26BTL	WtR_08PG_26BTL
27	Bannu Woolen	BNWM	CP_08PG_27BNWM	Rt_08PG_27BNWM	Wt_08PG_27BNWM	WtR_08PG_27BNWM

28	Caravan Fibre price	CARF	CP_08PG_28CARF	Rt_08PG_28CARF	Wt_08PG_28CARF	WtR_08PG_28CARF
29	Chenab Limited pref.sh	CLCPS	CP_08PG_29CLCPS	Rt_08PG_29CLCPS	Wt_08PG_29CLCPS	WtR_08PG_29CLCPS
30	Colony Thal Textile Mills LTD	COTT	CP_08PG_30COTT	Rt_08PG_30COTT	Wt_08PG_30COTT	WtR_08PG_30COTT
31	Sarhad Colony Textile LTD	COST	CP_08PG_31COST	Rt_08PG_31COST	Wt_08PG_31COST	WtR_08PG_31COST
32	Dawood Lawencepur	DLL	CP_08PG_32DLL	Rt_08PG_32DLL	Wt_08PG_32DLL	WtR_08PG_32DLL
33	Dewan khalid.	DKTM	CP_08PG_33DKTM	Rt_08PG_33DKTM	Wt_08PG_33DKTM	WtR_08PG_33DKTM
34	Dewan Mustaq	DMTM	CP_08PG_34DMTM	Rt_08PG_34DMTM	Wt_08PG_34DMTM	WtR_08PG_34DMTM
35	D.m Textiles	DMTX	CP_08PG_35DMTX	Rt_08PG_35DMTX	Wt_08PG_35DMTX	WtR_08PG_35DMTX
36	D.s Ind Ltd	DSIL	CP_08PG_36DSIL	Rt_08PG_36DSIL	Wt_08PG_36DSIL	WtR_08PG_36DSIL
37	Dar-es-salaam	DSML	CP_08PG_37DSML	Rt_08PG_37DSML	Wt_08PG_37DSML	WtR_08PG_37DSML
38	Dewan Textiles	DWTM	CP_08PG_38DWTM	Rt_08PG_38DWTM	Wt_08PG_38DWTM	WtR_08PG_38DWTM
39	Gadoon textile Mills	GADT	CP_08PG_39GADT	Rt_08PG_39GADT	Wt_08PG_39GADT	WtR_08PG_39GADT
40	Fazal textile Mills	FZTM	CP_08PG_40FZTM	Rt_08PG_40FZTM	Wt_08PG_40FZTM	WtR_08PG_40FZTM
41	Gulahmad Textile Mills	GATM	CP_08PG_41GATM	Rt_08PG_41GATM	Wt_08PG_41GATM	WtR_08PG_41GATM
42	Ghazi fabric international Ltd	GFIL	CP_08PG_42GFIL	Rt_08PG_42GFIL	Wt_08PG_42GFIL	WtR_08PG_42GFIL
43	Glamour textile	GLAT	CP_08PG_43GLAT	Rt_08PG_43GLAT	Wt_08PG_43GLAT	WtR_08PG_43GLAT
44	Gillette pak	GLPL	CP_08PG_44GLPL	Rt_08PG_44GLPL	Wt_08PG_44GLPL	WtR_08PG_44GLPL
45	Globe textile O.E	GOEM	CP_08PG_45GOEM	Rt_08PG_45GOEM	Wt_08PG_45GOEM	WtR_08PG_45GOEM
46	Gulshan spinning	GSPM	CP_08PG_46GSPM	Rt_08PG_46GSPM	Wt_08PG_46GSPM	WtR_08PG_46GSPM
47	Gulistan sp (GUSM)	GUSM	CP_08PG_47GUSM	Rt_08PG_47GUSM	Wt_08PG_47GUSM	WtR_08PG_47GUSM
48	Gulistan textile (GUTM)	GUTM	CP_08PG_48GUTM	Rt_08PG_48GUTM	Wt_08PG_48GUTM	WtR_08PG_48GUTM
49	Hajra textile	HAJT	CP_08PG_49HAJT	Rt_08PG_49HAJT	Wt_08PG_49HAJT	WtR_08PG_49HAJT
50	Mukhtar Textile	MUKT	CP_08PG_50MUKT	Rt_08PG_50MUKT	Wt_08PG_50MUKT	WtR_08PG_50MUKT
51	H.M Ismail Mills	HMIM	CP_08PG_51HMIM	Rt_08PG_51HMIM	Wt_08PG_51HMIM	WtR_08PG_51HMIM
52	Idrees textile.Closing rates	IDRT	CP_08PG_52IDRT	Rt_08PG_52IDRT	Wt_08PG_52IDRT	WtR_08PG_52IDRT
53	Ideal spinning	IDSM	CP_08PG_53IDSM	Rt_08PG_53IDSM	Wt_08PG_53IDSM	WtR_08PG_53IDSM
54	Ishtiaque Tex	ISHT	CP_08PG_54ISHT	Rt_08PG_54ISHT	Wt_08PG_54ISHT	WtR_08PG_54ISHT
55	Ishaque Tex	ISTM	CP_08PG_55ISTM	Rt_08PG_55ISTM	Wt_08PG_55ISTM	WtR_08PG_55ISTM

56	Janana D M Textile	JDMT	CP_08PG_56JDMT	Rt_08PG_56JDMT	Wt_08PG_56JDMT	WtR_08PG_56JDMT
57	JA Tex	JATM	CP_08PG_57JATM	Rt_08PG_JATM	Wt_08PG_57JATM	WtR_08PG_57JATM
58	JK Spin	JKSM	CP_08PG_58JKSM	Rt_08PG_58JKSM	Wt_08PG_58JKSM	WtR_08PG_58JKSM
59	Khurshid Spinning	KHSM	CP_08PG_59KHSM	Rt_08PG_59KHSM	Wt_08PG_59KHSM	WtR_08PG_59KHSM
60	Karim Cotton	KACM	CP_08PG_60KACM	Rt_08PG_60KACM	Wt_08PG_60KACM	WtR_08PG_60KACM
61	Kohinoor Industries	KOIL	CP_08PG_61KOIL	Rt_08PG_61KOIL	Wt_08PG_61KOIL	WtR_08PG_61KOIL
62	Kohinoor Spinning	KOSM	CP_08PG_62KOSM	Rt_08PG_62KOSM	Wt_08PG_62KOSM	WtR_08PG_62KOSM
63	Kohat Textiles	KOHTM	CP_08PG_63KOHTM	Rt_08PG_63KOHTM	Wt_08PG_63KOHTM	WtR_08PG_63KOHTM
64	Kohinoor Tex Mills	KML	CP_08PG_64KML	Rt_08PG_64KML	Wt_08PG_64KML	WtR_08PG_64KML
65	Khyber Textile	KHYT	CP_08PG_65KHYT	Rt_08PG_65KHYT	Wt_08PG_65KHYT	WtR_08PG_65KHYT
66	Land Mark Spinning	LMSM	CP_08PG_66LMSM	Rt_08PG_66LMSM	Wt_08PG_66LMSM	WtR_08PG_66LMSM
67	Libaas Textile	LIBT	CP_08PG_67LIBT	Rt_08PG_67LIBT	Wt_08PG_67LIBT	WtR_08PG_67LIBT
68	Mehmood Textile	MEHT	CP_08PG_68MEHT	Rt_08PG_68MEHT	Wt_08PG_68MEHT	WtR_08PG_68MEHT
69	Mehr Dastgir	MDTM	CP_08PG_69MDTM	Rt_08PG_69MDTM	Wt_08PG_69MDTM	WtR_08PG_69MDTM
70	Mohd Farooq	MFTM	CP_08PG_70MFTM	Rt_08PG_70MFTM	Wt_08PG_70MFTM	WtR_08PG_70MFTM
71	Mian textile	MTIL	CP_08PG_71MTIL	Rt_08PG_71MTIL	Wt_08PG_71MTIL	WtR_08PG_71MTIL
72	Mubarak textile	MUBT	CP_08PG_72MUBT	Rt_08PG_72MUBT	Wt_08PG_72MUBT	WtR_08PG_72MUBT
73	Masood textile	MSOT	CP_08PG_73MSOT	Rt_08PG_73MSOT	Wt_08PG_73MSOT	WtR_08PG_73MSOT
74	Maqbool textile	MOTM	CP_08PG_74MOTM	Rt_08PG_74MOTM	Wt_08PG_74MOTM	WtR_08PG_74MOTM
75	Moon lite (Pak)	MOON	CP_08PG_75MOON	Rt_08PG_75MOON	Wt_08PG_75MOON	WtR_08PG_75MOON
76	NP spinning Price	NPSM	CP_08PG_76NPSM	Rt_08PG_76NPSM	Wt_08PG_76NPSM	WtR_08PG_76NPSM
77	nishat mills	NML	CP_08PG_77NML	Rt_08PG_77NML	Wt_08PG_77NML	WtR_08PG_77NML
78	olympia spinning	OLSM	CP_08PG_78OLSM	Rt_08PG_78OLSM	Wt_08PG_78OLSM	WtR_08PG_78OLSM
79	Paramount Spinning	PASM	CP_08PG_79PASM	Rt_08PG_79PASM	Wt_08PG_79PASM	WtR_08PG_79PASM
80	Premium Textile	PRET	CP_08PG_80PRET	Rt_08PG_80PRET	Wt_08PG_80PRET	WtR_08PG_80PRET
81	Prosperity Weaving	PRWM	CP_08PG_81PRWM	Rt_08PG_81PRWM	Wt_08PG_81PRWM	WtR_08PG_81PRWM
82	Sadoon Textile	SDOT	CP_08PG_82SDOT	Rt_08PG_82SDOT	Wt_08PG_82SDOT	WtR_08PG_82SDOT
83	Saleem Denim	SDIL	CP_08PG_83SDIL	Rt_08PG_83SDIL	Wt_08PG_83SDIL	WtR_08PG_83SDIL

84	Service Fabrics	SERT	CP_08PG_84SERT	Rt_08PG_84SERT	Wt_08PG_84SERT	WtR_08PG_84SERT
85	Safa Textiles	SFAT	CP_08PG_85SFAT	Rt_08PG_85SFAT	Wt_08PG_85SFAT	WtR_08PG_85SFAT
86	Sapphire fibers	SFL	CP_08PG_86SFL	Rt_08PG_86SFL	Wt_08PG_86SFL	WtR_08PG_86SFL
87	Service Textile	SERT	CP_08PG_87SERT	Rt_08PG_87SERT	Wt_08PG_87SERT	WtR_08PG_87SERT
88	Sargodha spinning	SRSM	CP_08PG_88SRSM	Rt_08PG_88SRSM	Wt_08PG_88SRSM	WtR_08PG_88SRSM
89	Sally textiles	SLYT	CP_08PG_89SLYT	Rt_08PG_89SLYT	Wt_08PG_89SLYT	WtR_08PG_89SLYT
90	samin textiles	SMTM	CP_08PG_90SMTM	Rt_08PG_90SMTM	Wt_08PG_90SMTM	WtR_08PG_90SMTM
91	Sana industries	SNAI	CP_08PG_91SNAI	Rt_08PG_91SNAI	Wt_08PG_91SNAI	WtR_08PG_91SNAI
92	Services textiles industries	SRVI	CP_08PG_92SRVI	Rt_08PG_92SRVI	Wt_08PG_92SRVI	WtR_08PG_92SRVI
93	saritow SPINNING	SSML	CP_08PG_93SSML	Rt_08PG_93SSML	Wt_08PG_93SSML	WtR_08PG_93SSML
94	SHAHTAJ TEXTILE Price	STJT	CP_08PG_94STJT	Rt_08PG_94STJT	Wt_08PG_94STJT	WtR_08PG_94STJT
95	SHAMS TEXTILE PRICE	STML	CP_08PG_95STML	Rt_08PG_95STML	Wt_08PG_95STML	WtR_08PG_95STML
96	SUNSHINE COTTON	SUCM	CP_08PG_96SUCM	Rt_08PG_96SUCM	Wt_08PG_96SUCM	WtR_08PG_96SUCM
97	SUHAIL JUTE	SUHJ	CP_08PG_97SUHJ	Rt_08PG_97SUHJ	Wt_08PG_97SUHJ	WtR_08PG_97SUHJ
98	SURAJ COTTON	SURC	CP_08PG_98SURC	Rt_08PG_98SURC	Wt_08PG_98SURC	WtR_08PG_98SURC
99	Sunray textile	SUTM	CP_08PG_99SUTM	Rt_08PG_99SUTM	Wt_08PG_99SUTM	WtR_08PG_99SUTM
100	ShAhzad Textile	SZTM	CP_08PG_100SZTM	Rt_08PG_100SZTM	Wt_08PG_100SZTM	WtR_08PG_100SZTM
101	Taj Textile	TAJT	CP_08PG_101TAJT	Rt_08PG_101TAJT	Wt_08PG_101TAJT	WtR_08PG_101TAJT
102	TATA TEXTILE	TATM	CP_08PG_102TATM	Rt_08PG_102TATM	Wt_08PG_102TATM	WtR_08PG_102TATM
103	Tri-star Polyster	TRPOL	CP_08PG_103TRPOL	Rt_08PG_103TRPOL	Wt_08PG_103TRPOL	WtR_08PG_103TRPOL
104	Usman Textile	USMT	CP_08PG_104USMT	Rt_08PG_104USMT	Wt_08PG_104USMT	WtR_08PG_104USMT
105	Yousaf Weaving Mills	YOUW	CP_08PG_105YOUW	Rt_08PG_105YOUW	Wt_08PG_105YOUW	WtR_08PG_105YOUW
106	United Brands Limited	UBDL	CP_08PG_106UBDL	Rt_08PG_106UBDL	Wt_08PG_106UBDL	WtR_08PG_106UBDL
107	Treet Corporation Ltd	TREET	CP_08PG_107TREET	Rt_08PG_107TREET	Wt_08PG_107TREET	WtR_08PG_107TREET

DAILY DATA

Oil and Gas and Banking Sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_02OAG	CONST1	-0.00059	0.00865	-0.07	0.9459	1
	AR1_1_1	-0.01142	0.01086	-1.05	0.2932	PRT_02OAG(t-1)
C3	AR1_1_2	0.11917	0.00003	999	0.0001	PRT_01B(t-1)
PRT_01B	CONST2	-0.00475	0			1
C5	AR1_2_1	0.04517	0.15659	0.0300	0.9741	PRT_02OAG(t-1)
	AR1_2_2	0.19077	0.08936	2.64	0.0085	PRT_01B(t-1)

Construction and Banking Sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_03CON	CONST1	-0.00117	0.0005	-2.34	0.0197	1
	AR1_1_1	0.12763	0.04223	3.02	0.0026	PRT_03CON(t-1)
C3	AR1_1_2	-0.03275	0.03552	-0.92	0.3568	PRT_01B(t-1)
PRT_01B	CONST2	-0.00056	0.00043	-1.31	0.1896	1
C5	AR1_2_1	-0.09997	0.03885	-2.57	0.0102	PRT_03CON(t-1)
	AR1_2_2	0.18163	0.05056	3.56	0.0003	PRT_01B(t-1)

Chemical and banking sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_04CH	CONST1	-0.00071	0.00052	-1.37	0.1701	1
	AR1_1_1	0.10423	0.04373	2.38	0.0173	PRT_04CH(t-1)
C3	AR1_1_2	0.08406	0.04178	2.01	0.0445	PRT_01B(t-1)
PRT_01B	CONST2	-0.00093	0.00053	-1.74	0.082	1
C5	AR1_2_1	0.07861	0.04527	1.74	0.0828	PRT_04CH(t-1)
	AR1_2_2	0.16961	0.04326	3.92	0.0001	PRT_01B(t-1)

Food Producer and Banking Sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_05FP	CONST1	0.00024	0.0000			1
	AR1_1_1	0.19671	0.03137	6.27	0.0001	PRT_05FP(t-1)
C3	AR1_1_2	-0.00815	0.02270	-0.36	0.7198	PRT_01B(t-1)
PRT_01B	CONST2	-0.00093	0.0000			1
C5	AR1_2_1	-0.01244	0.04299	-0.29	0.7723	PRT_05FP(t-1)
	AR1_2_2	0.22568	0.03114	7.25	0.0001	PRT_01B(t-1)

Fixed Line Telecommunication and Banking Sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_06FTL	CONST1	-0.00127	0.00046	-2.76	0.0058	1
	AR1_1_1	0.05384	0.02661	2.02	0.0433	PRT_06FTL(t-1)
C3	AR1_1_2	-0.00213	0.03318	-0.06	0.9488	PRT_01B(t-1)
PRT_01B	CONST2	0.01003	0.00000			1
C5	AR1_2_1	0.00508	0.15659	0.0300	0.9741	PRT_06FTL(t-1)
	AR1_2_2	0.23558	0.08936	2.64	0.0085	PRT_01B(t-1)

Electricity and Banking Sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_07E	CONST1	-0.00112	0.0004	-2.83	0.0047	1
	AR1_1_1	0.16277	0.03918	4.16	0.0001	PRT_07E(t-1)
C3	AR1_1_2	0.06509	0.02883	1.56	0.0082	PRT_01B(t-1)
PRT_01B	CONST2	-0.00099	0.00054	-1.85	0.0651	1
C5	AR1_2_1	-0.08469	0.05302	-1.22	0.3226	PRT_07E(t-1)
	AR1_2_2	0.25372	0.03903	6.5	0.0001	PRT_01B(t-1)

Personal Goods and Banking Sector

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
PRT_08PG	CONST1	-0.00112	0.0004	-2.83	0.0047	1
	AR1_1_1	0.16277	0.03918	4.16	0.0001	PRT_08PG(t-1)
C3	AR1_1_2	0.04509	0.02883	1.56	0.1182	PRT_01B(t-1)
PRT_01B	CONST2	-0.00099	0.00054	-1.85	0.0651	1
C5	AR1_2_1	-0.06469	0.05302	-1.22	0.2226	PRT_08PG(t-1)
	AR1_2_2	0.25372	0.03903	6.5	0.0001	PRT_01B(t-1)

GARCH MODEL-Daily Data

Oil and Gas and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.00045	0.0000		
GCHC1_2	-0.20517	0.0151	-13.59	0.0001
GCHC2_2	0.00000	0.0000		
ACH1_1_1	0.02926	0.0000		
ACH1_2_1	-0.01254	0.01610		0.0002
ACH1_1_2	-0.00133	0.01282	-0.10	0.9176
ACH1_2_2	-0.00019	0.00000		
GCH1_1_1	-0.04804	0.01341	-3.58	0.0004
GCH1_2_1	-0.02766	0.01315	-2.10	0.0357
GCH1_1_2	0.00043	0.0000		
GCH1_2_2	0.00188	0.0000		

Construction and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.00023	0.00000		
GCHC1_2	0.00012	0.00002	7.03	0.0001
GCHC2_2	0.00019	0.00019		
ACH1_1_1	-0.19318	0.10368	-1.86	0.0627
ACH1_2_1	-0.07404	0.12927	-0.57	0.5669
ACH1_1_2	0.12134	0.04832	2.57	0.0122
ACH1_2_2	-0.66905	0.04211	-15.87	0.0001
GCH1_1_1	-0.00685	0.16036	-0.04	0.9659
GCH1_2_1	-0.14827	0.18036	-0.04	0.6659
GCH1_1_2	0.04727	0.11692	0.04	0.6861
GCH1_2_2	0.2978	0.00000		

Chemical and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.0003	0.0000		
GCHC1_2	0.0002	0.0000		
GCHC2_2	0.0003	0.0000		
ACH1_1_1	0.0010	0.0000		
ACH1_2_1	0.0003	0.0006		0.001
ACH1_1_2	0.0000	0.0000		
ACH1_2_2	0.0010	0.0000		
GCH1_1_1	0.0010	0.98777	0.0000	0.9992
GCH1_2_1	0.0000	0.41408	0.0000	0.678
GCH1_1_2	0.0000	2.58111	0.0000	1.0000
GCH1_2_2	0.0010	1.37678	0.0000	0.9994

Food Producer and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.00016	0.00000		
GCHC1_2	0.00005	0.00000		
GCHC2_2	0.00030	0.00000		
ACH1_1_1	0.00105	0.00000		
ACH1_2_1	0.00101	0.98777		0.9992
ACH1_1_2	0.00000	0.07933	0.00000	1
ACH1_2_2	0.00101	0.00000		
GCH1_1_1	0.00100	1.21153	0.00000	0.9993
GCH1_2_1	0.00030	3.14472	0.00000	0.8895
GCH1_1_2	0.00000	0.00000		
GCH1_2_2	0.00100	6.97101	0.00000	0.9999

Fixed Line Telecommunication and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.00021	0.00000		
GCHC1_2	-0.00007	0.00000		
GCHC2_2	0.00002	0.00000		
ACH1_1_1	0.04273	0.00000		
ACH1_2_1	-0.00846	0.1243	-0.004	0.789
ACH1_1_2	0.00156	0.00000		
ACH1_2_2	-0.01461	0.00000		
GCH1_1_1	0.08934	0.00000		
GCH1_2_1	-0.36462	0.02433	-0.063	0.9986
GCH1_1_2	0.00148	0.00000		
GCH1_2_2	-0.0009	0.1142	-0.01	0.9937

Electricity and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.00045	0.0000		
GCHC1_2	-0.20517	0.0151	-13.59	0.0001
GCHC2_2	0.00000	0.0000		
ACH1_1_1	0.02926	0.0000		
ACH1_2_1	0.04254	0.0000	-0.30	0.0002
ACH1_1_2	-0.00133	0.01282	-0.10	0.9176
ACH1_2_2	-0.00019	0.00000		
GCH1_1_1	-0.04804	0.01341	-3.58	0.0004
GCH1_2_1	0.02766	0.01315	2.10	0.0357
GCH1_1_2	0.00043	0.0000		
GCH1_2_2	0.00188	0.0000		

Personal Goods and Banking Sector

The VARMAX Procedure
GARCH Model Parameter Estimates

Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	0.00016	0.0000		
GCHC1_2	0.00014	0.0000		
GCHC2_2	0.0003	0.0000		
ACH1_1_1	0.001	0.06417	0.02	0.9876
ACH1_2_1	0.003	0.14589	0.00	0.004
ACH1_1_2	0.000	0.21167	0.00	1.0000
ACH1_2_2	0.001	0.10436	0.01	0.9924
GCH1_1_1	0.001	0.0000		
GCH1_2_1	0.0432	0.1046	0.007	0.0086
GCH1_1_2	0.000	0.85118	0.00	1.0000
GCH1_2_2	0.001	0.71738	0.00	0.9989

GARCH MODEL- on Weekly Data

Oil and Gas and Banking Sector

System: SYS_02OAG
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:39
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 37 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000133	0.000503	-0.263893	0.7919
C(2)	0.641686	0.019190	33.43776	0.0000
C(3)	0.192183	0.008835	21.75223	0.0000
C(4)	-0.000789	0.000470	-1.676942	0.0936
C(5)	-0.083467	0.017660	-4.726300	0.0000
C(6)	0.963355	0.016938	56.87678	0.0000
Variance Equation Coefficients				
C(7)	2.13E-05	3.42E-06	6.246034	0.0000
C(8)	1.50E-05	2.39E-06	6.266416	0.0000
C(9)	1.36E-05	2.81E-06	4.822507	0.0000
C(10)	0.228450	0.021988	10.38971	0.0000
C(11)	0.159343	0.011932	13.35415	0.0000
C(12)	0.187428	0.015384	12.18362	0.0000
C(13)	0.754745	0.016638	45.36285	0.0000
C(14)	0.796461	0.009931	80.20101	0.0000
C(15)	0.802796	0.013745	58.40603	0.0000

Log likelihood	5438.524	Schwarz criterion	-10.32867
Avg. log likelihood	2.607154	Hannan-Quinn criter.	-10.37285
Akaike info criterion	-10.39985		

Equation: PRT_02OAG = C(1) + C(2)*PRT_02OAG(-1) + C(3)*PRT_01B(-1)

R-squared	0.704695	Mean dependent var	-0.000378
Adjusted R-squared	0.704127	S.D. dependent var	0.049445
S.E. of regression	0.026895	Sum squared resid	0.752292
Durbin-Watson stat	1.637223		

Equation: PRT_01B = C(4) + C(5)*PRT_02OAG(-1) + C(6)*PRT_01B(-1)

R-squared	0.738367	Mean dependent var	-0.006151
Adjusted R-squared	0.737864	S.D. dependent var	0.049351
S.E. of regression	0.025267	Sum squared resid	0.663969
Durbin-Watson stat	1.549969		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	2.13E-05	3.42E-06	6.246034	0.0000
M(1,2)	1.50E-05	2.39E-06	6.266416	0.0000
M(2,2)	1.36E-05	2.81E-06	4.822507	0.0000
A1(1,1)	0.228450	0.021988	10.38971	0.0000
A1(1,2)	0.159343	0.011932	13.35415	0.0000
A1(2,2)	0.187428	0.015384	12.18362	0.0000
B1(1,1)	0.754745	0.016638	45.36285	0.0000
B1(1,2)	0.796461	0.009931	80.20101	0.0000
B1(2,2)	0.802796	0.013745	58.40603	0.0000

* Coefficient matrix is not PSD.

Construction and Banking Sector

System: SYS_03CON
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:47
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 54 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000147	0.000460	-0.319527	0.7493
C(2)	0.923045	0.018313	50.40411	0.0000
C(3)	-0.149809	0.004696	-31.90280	0.0000
C(4)	-0.000411	0.000563	-0.729761	0.4655
C(5)	0.029201	0.019540	1.494423	0.1351
C(6)	0.733706	0.017032	43.07924	0.0000
	Variance Equation Coefficients			
C(7)	7.83E-06	1.77E-06	4.423019	0.0000
C(8)	1.07E-05	1.81E-06	5.922996	0.0000
C(9)	1.88E-05	3.15E-06	5.970459	0.0000
C(10)	0.223247	0.024124	9.254231	0.0000
C(11)	0.168198	0.014125	11.90780	0.0000
C(12)	0.185266	0.015244	12.15361	0.0000
C(13)	0.807399	0.016719	48.29345	0.0000
C(14)	0.820175	0.010928	75.05349	0.0000
C(15)	0.801045	0.013390	59.82435	0.0000

Log likelihood	5563.235	Schwarz criterion	-10.56781
Avg. log likelihood	2.666939	Hannan-Quinn criter.	-10.61199
Akaike info criterion	-10.63899		

Equation: PRT_03CON = C(1) + C(2)*PRT_03CON(-1) + C(3)*PRT_01B(-1)

R-squared	0.700279	Mean dependent var	-0.006379
Adjusted R-squared	0.699703	S.D. dependent var	0.039973
S.E. of regression	0.021905	Sum squared resid	0.499016
Durbin-Watson stat	1.777281		

Equation: PRT_01B = C(4) + C(5)*PRT_03CON(-1) + C(6)*PRT_01B(-1)

R-squared	0.731050	Mean dependent var	-0.006151
Adjusted R-squared	0.730533	S.D. dependent var	0.049351
S.E. of regression	0.025618	Sum squared resid	0.682537
Durbin-Watson stat	1.300759		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	7.83E-06	1.77E-06	4.423019	0.0000
M(1,2)	1.07E-05	1.81E-06	5.922996	0.0000
M(2,2)	1.88E-05	3.15E-06	5.970459	0.0000
A1(1,1)	0.223247	0.024124	9.254231	0.0000
A1(1,2)	0.168198	0.014125	11.90780	0.0000
A1(2,2)	0.185266	0.015244	12.15361	0.0000
B1(1,1)	0.807399	0.016719	48.29345	0.0000
B1(1,2)	0.820175	0.010928	75.05349	0.0000
B1(2,2)	0.801045	0.013390	59.82435	0.0000

Chemical and Banking Sector

System: SYS_04CH
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:46
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 19 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000540	0.000397	-1.361838	0.1732
C(2)	0.776685	0.020512	37.86576	0.0000
C(3)	0.055566	0.017489	3.177226	0.0015
C(4)	-0.000621	0.000448	-1.386951	0.1655
C(5)	0.019299	0.017839	1.081856	0.2793
C(6)	0.836262	0.020571	40.65216	0.0000
	Variance Equation Coefficients			
C(7)	5.49E-06	5.43E-07	10.12439	0.0000
C(8)	5.68E-06	9.64E-07	5.886252	0.0000
C(9)	8.24E-06	1.75E-06	4.713947	0.0000
C(10)	0.215791	0.018582	11.61266	0.0000
C(11)	0.196113	0.018380	10.66998	0.0000
C(12)	0.222766	0.021353	10.43238	0.0000
C(13)	0.807656	0.011593	69.66651	0.0000
C(14)	0.809074	0.012495	64.75415	0.0000
C(15)	0.791596	0.014309	55.32242	0.0000

Log likelihood	5626.918	Schwarz criterion	-10.68992
Avg. log likelihood	2.697468	Hannan-Quinn criter.	-10.73411
Akaike info criterion	-10.76111		

Equation: PRT_04CH = C(1) + C(2)*PRT_04CH(-1) + C(3)*PRT_01B(-1)

R-squared	0.722647	Mean dependent var	-0.003764
Adjusted R-squared	0.722113	S.D. dependent var	0.044346
S.E. of regression	0.023377	Sum squared resid	0.568345
Durbin-Watson stat	1.536058		

Equation: PRT_01B = C(4) + C(5)*PRT_04CH(-1) + C(6)*PRT_01B(-1)

R-squared	0.745241	Mean dependent var	-0.006151
Adjusted R-squared	0.744751	S.D. dependent var	0.049351
S.E. of regression	0.024933	Sum squared resid	0.646525
Durbin-Watson stat	1.500745		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix

A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	5.49E-06	5.43E-07	10.12439	0.0000
M(1,2)	5.68E-06	9.64E-07	5.886252	0.0000
M(2,2)	8.24E-06	1.75E-06	4.713947	0.0000
A1(1,1)	0.215791	0.018582	11.61266	0.0000
A1(1,2)	0.196113	0.018380	10.66998	0.0000
A1(2,2)	0.222766	0.021353	10.43238	0.0000
B1(1,1)	0.807656	0.011593	69.66651	0.0000
B1(1,2)	0.809074	0.012495	64.75415	0.0000
B1(2,2)	0.791596	0.014309	55.32242	0.0000

* Coefficient matrix is not PSD.

Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:45
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 85 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000213	0.000382	-0.556896	0.5776
C(2)	0.837514	0.018109	46.24870	0.0000
C(3)	0.007901	0.006583	1.200159	0.2301
C(4)	-0.000364	0.000400	-0.911735	0.3619
C(5)	0.027361	0.012769	2.142750	0.0321
C(6)	0.839672	0.015797	53.15393	0.0000

Variance Equation Coefficients

C(7)	1.60E-06	5.10E-07	3.138245	0.0017
C(8)	1.67E-06	5.85E-07	2.857825	0.0043
C(9)	3.88E-06	9.63E-07	4.028401	0.0001
C(10)	0.152916	0.013009	11.75487	0.0000
C(11)	0.092850	0.021607	4.297282	0.0000
C(12)	0.230522	0.020045	11.50025	0.0000
C(13)	0.864574	0.008525	101.4191	0.0000
C(14)	0.835610	0.032120	26.01546	0.0000
C(15)	0.794815	0.013052	60.89591	0.0000

Log likelihood	5504.593	Schwarz criterion	-10.45536
Avg. log likelihood	2.638827	Hannan-Quinn criter.	-10.49954
Akaike info criterion	-10.52655		

Equation: PRT_05FP = C(1) + C(2)*PRT_05FP(-1) + C(3)*PRT_01B(-1)

R-squared	0.748130	Mean dependent var	0.001202
Adjusted R-squared	0.747646	S.D. dependent var	0.034921
S.E. of regression	0.017543	Sum squared resid	0.320054
Durbin-Watson stat	1.556584		

Equation: PRT_01B = C(4) + C(5)*PRT_05FP(-1) + C(6)*PRT_01B(-1)

R-squared	0.744132	Mean dependent var	-0.006151
Adjusted R-squared	0.743640	S.D. dependent var	0.049351
S.E. of regression	0.024987	Sum squared resid	0.649338
Durbin-Watson stat	1.491336		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	1.60E-06	5.10E-07	3.138245	0.0017
M(1,2)	1.67E-06	5.85E-07	2.857825	0.0043
M(2,2)	3.88E-06	9.63E-07	4.028401	0.0001
A1(1,1)	0.152916	0.013009	11.75487	0.0000
A1(1,2)	0.092850	0.021607	4.297282	0.0000
A1(2,2)	0.230522	0.020045	11.50025	0.0000
B1(1,1)	0.864574	0.008525	101.4191	0.0000
B1(1,2)	0.835610	0.032120	26.01546	0.0000
B1(2,2)	0.794815	0.013052	60.89591	0.0000

* Coefficient matrix is not PSD.

Fixed Line Telecommuication and Banking Sector

System: SYS_06FTL
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:43
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 66 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000736	0.000578	-1.273506	0.2028
C(2)	0.796221	0.022813	34.90254	0.0000
C(3)	-0.055317	0.019994	-2.766631	0.0057
C(4)	-0.000428	0.000422	-1.015246	0.3100
C(5)	0.024789	0.014216	1.743797	0.0812
C(6)	0.793390	0.018749	42.31540	0.0000
Variance Equation Coefficients				
C(7)	3.30E-05	3.83E-06	8.613179	0.0000
C(8)	1.52E-05	2.77E-06	5.496330	0.0000
C(9)	1.00E-05	2.16E-06	4.622752	0.0000
C(10)	0.223369	0.023192	9.631280	0.0000
C(11)	0.160797	0.018481	8.700764	0.0000
C(12)	0.195007	0.019291	10.10874	0.0000
C(13)	0.761755	0.019342	39.38264	0.0000
C(14)	0.801584	0.017964	44.62259	0.0000
C(15)	0.803397	0.014924	53.83395	0.0000

Log likelihood	5213.237	Schwarz criterion	-9.896669
Avg. log likelihood	2.499155	Hannan-Quinn criter.	-9.940855
Akaike info criterion	-9.967856		

Equation: PRT_06FTL = C(1) + C(2)*PRT_06FTL(-1) + C(3)*PRT_01B(-1)

R-squared	0.702691	Mean dependent var	-0.007196
Adjusted R-squared	0.702119	S.D. dependent var	0.054668
S.E. of regression	0.029837	Sum squared resid	0.925870
Durbin-Watson stat	1.473426		

Equation: PRT_01B = C(4) + C(5)*PRT_06FTL(-1) + C(6)*PRT_01B(-1)

R-squared	0.744573	Mean dependent var	-0.006151
Adjusted R-squared	0.744082	S.D. dependent var	0.049351
S.E. of regression	0.024966	Sum squared resid	0.648219
Durbin-Watson stat	1.446678		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	3.30E-05	3.83E-06	8.613179	0.0000
M(1,2)	1.52E-05	2.77E-06	5.496330	0.0000
M(2,2)	1.00E-05	2.16E-06	4.622752	0.0000
A1(1,1)	0.223369	0.023192	9.631280	0.0000
A1(1,2)	0.160797	0.018481	8.700764	0.0000
A1(2,2)	0.195007	0.019291	10.10874	0.0000
B1(1,1)	0.761755	0.019342	39.38264	0.0000
B1(1,2)	0.801584	0.017964	44.62259	0.0000
B1(2,2)	0.803397	0.014924	53.83395	0.0000

* Coefficient matrix is not PSD.

Electricity and Banking Sector

System: SYS_07E
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:41
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 7 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.000835	0.000716	1.166183	0.2435
C(2)	0.713374	0.026335	27.08850	0.0000
C(3)	0.031004	0.019037	1.628650	0.1034
C(4)	0.000184	0.000324	0.568395	0.5698
C(5)	0.088196	0.016166	5.455558	0.0000
C(6)	0.812133	0.016977	47.83802	0.0000
Variance Equation Coefficients				
C(7)	5.28E-05	5.65E-06	9.347729	0.0000
C(8)	6.67E-06	1.81E-06	3.688607	0.0002
C(9)	3.27E-06	9.29E-07	3.518338	0.0004
C(10)	0.137091	0.012823	10.69124	0.0000
C(11)	0.101769	0.009110	11.17058	0.0000
C(12)	0.226106	0.015099	14.97455	0.0000
C(13)	0.787898	0.019433	40.54458	0.0000
C(14)	0.865702	0.008011	108.0617	0.0000
C(15)	0.795861	0.008661	91.89308	0.0000

Log likelihood	5230.944	Schwarz criterion	-9.930623
Avg. log likelihood	2.507643	Hannan-Quinn criter.	-9.974809
Akaike info criterion	-10.00181		

Equation: PRT_07E = C(1) + C(2)*PRT_07E(-1) + C(3)*PRT_01B(-1)

R-squared	0.631640	Mean dependent var	-0.003225
Adjusted R-squared	0.630932	S.D. dependent var	0.046045
S.E. of regression	0.027973	Sum squared resid	0.813767
Durbin-Watson stat	1.666735		

Equation: PRT_01B = C(4) + C(5)*PRT_07E(-1) + C(6)*PRT_01B(-1)

R-squared	0.752955	Mean dependent var	-0.006151
Adjusted R-squared	0.752480	S.D. dependent var	0.049351
S.E. of regression	0.024553	Sum squared resid	0.626948
Durbin-Watson stat	1.563400		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	5.28E-05	5.65E-06	9.347729	0.0000
M(1,2)	6.67E-06	1.81E-06	3.688607	0.0002
M(2,2)	3.27E-06	9.29E-07	3.518338	0.0004
A1(1,1)	0.137091	0.012823	10.69124	0.0000
A1(1,2)	0.101769	0.009110	11.17058	0.0000
A1(2,2)	0.226106	0.015099	14.97455	0.0000
B1(1,1)	0.787898	0.019433	40.54458	0.0000
B1(1,2)	0.865702	0.008011	108.0617	0.0000
B1(2,2)	0.795861	0.008661	91.89308	0.0000

* Coefficient matrix is not PSD.

Personal Good and Banking Sector

System: SYS_08PG
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:42
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 8 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000536	0.000434	-1.234310	0.2171
C(2)	0.793206	0.017770	44.63839	0.0000
C(3)	0.041096	0.011618	3.537305	0.0004
C(4)	-0.000264	0.000334	-0.790533	0.4292
C(5)	-0.006704	0.014362	-0.466781	0.6407
C(6)	0.817950	0.016601	49.27240	0.0000
Variance Equation Coefficients				
C(7)	2.58E-05	2.63E-06	9.831832	0.0000
C(8)	6.41E-06	7.45E-07	8.601228	0.0000
C(9)	3.65E-06	4.67E-07	7.799356	0.0000
C(10)	0.192084	0.019114	10.04952	0.0000
C(11)	0.166286	0.013720	12.11952	0.0000
C(12)	0.238322	0.017571	13.56368	0.0000
C(13)	0.753568	0.014773	51.00995	0.0000
C(14)	0.813911	0.009090	89.54077	0.0000
C(15)	0.791130	0.010343	76.48637	0.0000

Log likelihood	5603.580	Schwarz criterion	-10.64517
Avg. log likelihood	2.686280	Hannan-Quinn criter.	-10.68936
Akaike info criterion	-10.71636		

Equation: PRT_08PG= C(1) + C(2)*PRT_08PG(-1) + C(3)*PRT_01B(-1)

R-squared	0.670404	Mean dependent var	-0.007136
Adjusted R-squared	0.669770	S.D. dependent var	0.034465
S.E. of regression	0.019806	Sum squared resid	0.407958
Durbin-Watson stat	1.851102		

Equation: PRT_01B = C(4) + C(5)*PRT_08PG(-1) + C(6)*PRT_01B(-1)

R-squared	0.742140	Mean dependent var	-0.006151
Adjusted R-squared	0.741644	S.D. dependent var	0.049351
S.E. of regression	0.025084	Sum squared resid	0.654393
Durbin-Watson stat	1.438115		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	2.58E-05	2.63E-06	9.831832	0.0000
M(1,2)	6.41E-06	7.45E-07	8.601228	0.0000
M(2,2)	3.65E-06	4.67E-07	7.799356	0.0000
A1(1,1)	0.192084	0.019114	10.04952	0.0000
A1(1,2)	0.166286	0.013720	12.11952	0.0000
A1(2,2)	0.238322	0.017571	13.56368	0.0000
B1(1,1)	0.753568	0.014773	51.00995	0.0000
B1(1,2)	0.813911	0.009090	89.54077	0.0000
B1(2,2)	0.791130	0.010343	76.48637	0.0000

* Coefficient matrix is not PSD.

Granger Causality Test on weekly Portfolio Returns

Oil and Gas and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:14
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1043	5.65892	0.0175
PRT_02OAG does not Granger Cause PRT_01B		0.63681	0.4251

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:23
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1042	5.15666	0.0059
PRT_02OAG does not Granger Cause PRT_01B		1.73851	0.1763

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:25
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1041	2.64570	0.0479
PRT_02OAG does not Granger Cause PRT_01B		1.73441	0.1582

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1040	1.89524	0.1091
PRT_02OAG does not Granger Cause PRT_01B		2.47208	0.0430

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1039	1.37141	0.2325
PRT_02OAG does not Granger Cause PRT_01B		3.22821	0.0067

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:30
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1038	3.67604	0.0013
PRT_02OAG does not Granger Cause PRT_01B		0.91221	0.4852

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:32
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1037	3.28481	0.0019
PRT_02OAG does not Granger Cause PRT_01B		2.42337	0.0183

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:31
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1036	2.86001	0.0038
PRT_02OAG does not Granger Cause PRT_01B		2.25264	0.0219

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:36
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1035	2.58598	0.0060
PRT_02OAG does not Granger Cause PRT_01B		2.01007	0.0353

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:38
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1034	2.58571	0.0043
PRT_02OAG does not Granger Cause PRT_01B		1.97079	0.0333

Construction and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1043	10.7594	0.0011
PRT_03CON does not Granger Cause PRT_01B		2.75567	0.0972

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1042	11.0150	2.E-05
PRT_03CON does not Granger Cause PRT_01B		4.21122	0.0151

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1041	6.38545	0.0003
PRT_03CON does not Granger Cause PRT_01B		1.85796	0.1350

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1040	4.68667	0.0009
PRT_03CON does not Granger Cause PRT_01B		0.98800	0.4131

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1039	4.05264	0.0012
PRT_03CON does not Granger Cause PRT_01B		0.79617	0.5524

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1038	5.48192	1.E-05
PRT_03CON does not Granger Cause PRT_01B		1.72335	0.1123

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:01
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1037	4.99275	1.E-05
PRT_03CON does not Granger Cause PRT_01B		0.88970	0.5138

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:01
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1036	4.59213	2.E-05
PRT_03CON does not Granger Cause PRT_01B		0.90879	0.5082

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1035	4.16263	3.E-05
PRT_03CON does not Granger Cause PRT_01B		2.39467	0.0110

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1034	3.84896	4.E-05
PRT_03CON does not Granger Cause PRT_01B		2.17847	0.0171

Chemical and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1043	0.01104	0.9164
PRT_04CH does not Granger Cause PRT_01B		7.81458	0.0053

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1042	1.56454	0.2097
PRT_04CH does not Granger Cause PRT_01B		4.32217	0.0135

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1041	1.01898	0.3834
PRT_04CH does not Granger Cause PRT_01B		2.98893	0.0302

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:13
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1040	0.20784	0.9341
PRT_04CH does not Granger Cause PRT_01B		4.21003	0.0022

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:13
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1039	0.29879	0.9136
PRT_04CH does not Granger Cause PRT_01B		6.21295	1.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1038	2.70359	0.0131
PRT_04CH does not Granger Cause PRT_01B		3.68033	0.0013

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1037	2.15697	0.0357
PRT_04CH does not Granger Cause PRT_01B		3.24986	0.0020

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1036	2.39712	0.0146
PRT_04CH does not Granger Cause PRT_01B		2.93415	0.0030

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:16
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1035	2.44317	0.0094
PRT_04CH does not Granger Cause PRT_01B		2.69012	0.0043

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:16
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1034	2.17218	0.0174
PRT_04CH does not Granger Cause PRT_01B		2.51294	0.0055

Food Producer and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:23
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1043	1.23881	0.2660
PRT_05FP does not Granger Cause PRT_01B		0.32458	0.5690

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:25
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1042	0.96170	0.3826
PRT_05FP does not Granger Cause PRT_01B		1.03914	0.3541

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1041	0.49998	0.6824
PRT_05FP does not Granger Cause PRT_01B		0.46821	0.7045

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1040	0.37721	0.8250
PRT_05FP does not Granger Cause PRT_01B		0.64763	0.6286

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1039	0.47189	0.7974
PRT_05FP does not Granger Cause PRT_01B		0.44178	0.8194

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1038	0.34237	0.9145
PRT_05FP does not Granger Cause PRT_01B		1.07813	0.3736

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:29
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1037	0.20854	0.9836
PRT_05FP does not Granger Cause PRT_01B		1.42306	0.1921

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:29
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1036	0.25783	0.9789
PRT_05FP does not Granger Cause PRT_01B		1.41605	0.1853

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:30
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1035	0.24913	0.9869
PRT_05FP does not Granger Cause PRT_01B		1.26150	0.2538

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:31
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1034	0.29234	0.9830
PRT_05FP does not Granger Cause PRT_01B		1.17618	0.3028

Fixed Line Telecommunication and Banking Sector

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:41
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1043	7.04032	0.0081
PRT_06FTL does not Granger Cause PRT_01B		24.6434	8.E-07

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1042	1.13941	0.3204
PRT_06FTL does not Granger Cause PRT_01B		10.2092	4.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1041	0.19623	0.8990
PRT_06FTL does not Granger Cause PRT_01B		12.1435	8.E-08

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1040	0.16687	0.9552
PRT_06FTL does not Granger Cause PRT_01B		11.2757	6.E-09

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1039	1.88097	0.0950
PRT_06FTL does not Granger Cause PRT_01B		8.92832	3.E-08

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1038	2.76466	0.0114
PRT_06FTL does not Granger Cause PRT_01B		4.26261	0.0003

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1037	2.25571	0.0279
PRT_06FTL does not Granger Cause PRT_01B		3.39823	0.0014

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1036	2.88403	0.0035
PRT_06FTL does not Granger Cause PRT_01B		2.99250	0.0025

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1035	2.55675	0.0066
PRT_06FTL does not Granger Cause PRT_01B		2.67734	0.0045

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1034	2.60242	0.0040
PRT_06FTL does not Granger Cause PRT_01B		2.46245	0.0065

Electricity and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1043	7.19631	0.0074
PRT_07E does not Granger Cause PRT_01B		40.9102	2.E-10

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1042	2.19339	0.1121
PRT_07E does not Granger Cause PRT_01B		16.6819	7.E-08

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1041	3.03889	0.0282
PRT_07E does not Granger Cause PRT_01B		9.24881	5.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1040	1.59160	0.1743
PRT_07E does not Granger Cause PRT_01B		6.55378	3.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1039	0.86537	0.5038
PRT_07E does not Granger Cause PRT_01B		5.40565	6.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:54
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1038	3.33192	0.0030

PRT_07E does not Granger Cause PRT_01B		6.41379	1.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1037	1.76130	0.0916
PRT_07E does not Granger Cause PRT_01B		5.25250	7.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1036	1.74475	0.0843
PRT_07E does not Granger Cause PRT_01B		4.60013	2.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1035	2.11800	0.0256
PRT_07E does not Granger Cause PRT_01B		4.34086	1.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1034	2.14234	0.0192
PRT_07E does not Granger Cause PRT_01B		4.45841	4.E-06

Personal Goods and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1043	15.8053	8.E-05
PRT_08PG does not Granger Cause PRT_01B		1.48326	0.2235

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1042	17.3739	4.E-08
PRT_08PG does not Granger Cause PRT_01B		1.27861	0.2789

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1041	10.3080	1.E-06
PRT_08PG does not Granger Cause PRT_01B		0.54210	0.6536

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:00
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1040	7.71425	4.E-06
PRT_08PG does not Granger Cause PRT_01B		1.71863	0.1436

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:01
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1039	5.95508	2.E-05
PRT_08PG does not Granger Cause PRT_01B		2.35593	0.0387

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1038	11.0980	5.E-12

PRT_08PG does not Granger Cause PRT_01B		2.04229	0.0576

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1037	10.0398	4.E-12
PRT_08PG does not Granger Cause PRT_01B		1.55244	0.1459

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:04
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1036	8.78510	1.E-11
PRT_08PG does not Granger Cause PRT_01B		1.31024	0.2343

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1035	8.08652	1.E-11
PRT_08PG does not Granger Cause PRT_01B		1.15899	0.3181

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:05
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1034	7.53942	1.E-11
PRT_08PG does not Granger Cause PRT_01B		1.07763	0.3764

Granger Causality Test on Weekly Volatility

Oil and Gas and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1028	13.3616	0.0003
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		1.20196	0.2732

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1027	14.2493	8.E-07
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		3.05785	0.0474

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1026	9.71093	3.E-06
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		1.87950	0.1313

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1025	5.87370	0.0001
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		1.87667	0.1123

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1024	4.63027	0.0003
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		1.89601	0.0924

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1023	3.40997	0.0025
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		2.42377	0.0248

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1022	3.05119	0.0035
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		2.19677	0.0324

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1021	2.68839	0.0063
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		1.83695	0.0667

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1020	3.04124	0.0013
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		1.78556	0.0669

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:54
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_02OAG	1019	3.23698	0.0004
STDEV_W_02OAG does not Granger Cause STDEV_W_01B		2.40142	0.0081

Construction and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.

STDEV_W_01B does not Granger Cause STDEV_W_03CON	1028	0.97948	0.3226
STDEV_W_03CON does not Granger Cause STDEV_W_01B		6.71803	0.0097

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:01
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1027	6.90656	0.0010
STDEV_W_03CON does not Granger Cause STDEV_W_01B		5.66279	0.0036

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:01
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1026	6.03870	0.0004
STDEV_W_03CON does not Granger Cause STDEV_W_01B		3.00513	0.0296

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:01
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1025	3.96690	0.0034
STDEV_W_03CON does not Granger Cause STDEV_W_01B		3.79575	0.0045

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1024	3.33720	0.0054
STDEV_W_03CON does not Granger Cause STDEV_W_01B		2.75126	0.0177

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1023	4.74356	9.E-05
STDEV_W_03CON does not Granger Cause STDEV_W_01B		2.37200	0.0279

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1022	4.63498	4.E-05
STDEV_W_03CON does not Granger Cause STDEV_W_01B		2.07813	0.0433

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1021	4.48638	2.E-05
STDEV_W_03CON does not Granger Cause STDEV_W_01B		2.04292	0.0388

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1020	4.19838	2.E-05
STDEV_W_03CON does not Granger Cause STDEV_W_01B		1.66319	0.0934

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_03CON	1019	3.91192	3.E-05
STDEV_W_03CON does not Granger Cause STDEV_W_01B		2.10970	0.0214

Chemical and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:16
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1028	1.78043	0.1824

STDEV_W_04CH does not Granger Cause STDEV_W_01B	1.44756	0.2292

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:17
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1027	7.35756	0.0007
STDEV_W_04CH does not Granger Cause STDEV_W_01B		1.90513	0.1493

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1026	5.71728	0.0007
STDEV_W_04CH does not Granger Cause STDEV_W_01B		1.15915	0.3242

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1025	4.10243	0.0026
STDEV_W_04CH does not Granger Cause STDEV_W_01B		1.33949	0.2533

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1024	2.77380	0.0170
STDEV_W_04CH does not Granger Cause STDEV_W_01B		1.20566	0.3043

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1023	2.20234	0.0406
STDEV_W_04CH does not Granger Cause STDEV_W_01B		0.99623	0.4264

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19

Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1022	2.90524	0.0052
STDEV_W_04CH does not Granger Cause STDEV_W_01B		0.92745	0.4841

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1021	2.59438	0.0083
STDEV_W_04CH does not Granger Cause STDEV_W_01B		0.80927	0.5944

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1020	2.37809	0.0116
STDEV_W_04CH does not Granger Cause STDEV_W_01B		0.76156	0.6523

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:21
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_04CH	1019	2.25697	0.0132
STDEV_W_04CH does not Granger Cause STDEV_W_01B		0.97722	0.4615

Food Producer and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:25
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1028	4.81898	0.0284
STDEV_W_05FP does not Granger Cause STDEV_W_01B		3.93259	0.0476

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28

Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1027	1.90763	0.1490
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.77642	0.4603

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:29
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1026	1.26752	0.2842
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.73427	0.5316

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:33
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1025	0.94785	0.4354
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.76848	0.5458

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:33
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1024	1.06163	0.3801
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.81679	0.5377

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:34
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1023	1.18462	0.3120
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.66696	0.6764

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:35
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1022	1.14205	0.3341
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.61312	0.7454

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:36
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1021	1.02491	0.4151
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.79740	0.6050

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:37
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1020	0.91562	0.5106
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.75797	0.6556

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:38
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_05FP	1019	1.04161	0.4058
STDEV_W_05FP does not Granger Cause STDEV_W_01B		0.72438	0.7020

Fixed Line Telecommunication and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:40
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1028	0.01235	0.9115
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		8.15797	0.0044

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1027	4.42839	0.0122
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		12.1069	6.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1026	3.69607	0.0115
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		7.76982	4.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1025	1.80933	0.1248
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		7.73758	4.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1024	1.59701	0.1581
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		6.71728	4.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1023	1.86868	0.0832
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		5.54488	1.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1022	1.70982	0.1030

STDEV_W_06FTL does not Granger Cause STDEV_W_01B	4.76153	3.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1021	1.51585	0.1472
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		4.25497	5.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1020	1.58170	0.1159
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		4.04209	4.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_06FTL	1019	1.56086	0.1133
STDEV_W_06FTL does not Granger Cause STDEV_W_01B		3.73511	6.E-05

Electricity and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1028	6.66959	0.0099
STDEV_W_07E does not Granger Cause STDEV_W_01B		36.4579	2.E-09

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1027	6.73334	0.0012
STDEV_W_07E does not Granger Cause STDEV_W_01B		26.4264	6.E-12

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1026	2.69920	0.0446
STDEV_W_07E does not Granger Cause STDEV_W_01B		12.5043	5.E-08

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1025	2.02524	0.0888
STDEV_W_07E does not Granger Cause STDEV_W_01B		9.28520	2.E-07

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1024	1.61727	0.1526
STDEV_W_07E does not Granger Cause STDEV_W_01B		7.76357	4.E-07

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:16
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1023	1.67160	0.1247
STDEV_W_07E does not Granger Cause STDEV_W_01B		6.31476	2.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:17
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1022	1.52582	0.1546
STDEV_W_07E does not Granger Cause STDEV_W_01B		5.46690	4.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:17
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1021	1.31004	0.2344
STDEV_W_07E does not Granger Cause STDEV_W_01B		5.20487	2.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:17
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1020	1.29394	0.2357
STDEV_W_07E does not Granger Cause STDEV_W_01B		4.43106	1.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_07E	1019	1.68277	0.0800
STDEV_W_07E does not Granger Cause STDEV_W_01B		4.18275	1.E-05

Personal Goods and Banking sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:22
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1028	0.33673	0.5619
STDEV_W_08PG does not Granger Cause STDEV_W_01B		0.07329	0.7867

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:22
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1027	9.44031	9.E-05
STDEV_W_08PG does not Granger Cause STDEV_W_01B		1.57577	0.2074

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:22
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1026	13.1867	2.E-08
STDEV_W_08PG does not Granger Cause STDEV_W_01B		0.51506	0.6720

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:23
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1025	9.90727	7.E-08
STDEV_W_08PG does not Granger Cause STDEV_W_01B		1.39906	0.2322

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:23
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1024	7.81026	3.E-07
STDEV_W_08PG does not Granger Cause STDEV_W_01B		1.30140	0.2609

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:24
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1023	6.52182	9.E-07
STDEV_W_08PG does not Granger Cause STDEV_W_01B		1.00814	0.4184

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:24
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1022	5.94622	9.E-07
STDEV_W_08PG does not Granger Cause STDEV_W_01B		1.01481	0.4189

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:24
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1021	5.39612	1.E-06
STDEV_W_08PG does not Granger Cause STDEV_W_01B		0.87010	0.5412

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:25
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1020	5.23869	5.E-07
STDEV_W_08PG does not Granger Cause STDEV_W_01B		0.93994	0.4892

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_W_01B does not Granger Cause STDEV_W_08PG	1019	4.76545	1.E-06
STDEV_W_08PG does not Granger Cause STDEV_W_01B		0.89447	0.5378

Ganger Causality Test on Weekly Conditional standard Deviation

Oil and Gas and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1042	11.6676	0.0007
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		0.73826	0.3904

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1041	5.83782	0.0030

COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_	0.35995	0.6978

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1040	4.84651	0.0024
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		0.36858	0.7757

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1039	4.07417	0.0028
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		0.32279	0.8628

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1038	4.51162	0.0004
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		0.68110	0.6378

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1037	6.33306	1.E-06
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		1.10069	0.3598

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1036	5.30894	6.E-06
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		1.08026	0.3737

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1035	4.38332	3.E-05
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		0.89407	0.5207

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1034	4.02318	4.E-05
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		0.88176	0.5410

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:21
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_02OAG_ does not Granger Cause COSTD_PRT_02OAG_	1033	3.52846	0.0001
COSTD_PRT_02OAG_ does not Granger Cause COSTD_PRT_01B_02OAG_		1.06157	0.3893

Construction and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:36
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1042	13.6887	0.0002
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		2.37728	0.1234

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:36
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1041	6.73587	0.0012
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		3.65280	0.0263

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:37
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1040	4.69973	0.0029
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		2.47650	0.0600

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:38
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1039	3.18759	0.0129
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.98766	0.0943

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:39
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1038	2.83231	0.0151
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.53703	0.1755

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:39
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1037	4.27424	0.0003
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.49091	0.1779

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:40
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1036	4.61800	4.E-05
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.58612	0.1356

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:40
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1035	5.33586	1.E-06
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.45885	0.1681

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:41
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1034	4.80820	3.E-06
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.66570	0.0928

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:41
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_03CON_ does not Granger Cause COSTD_PRT_03CON_	1033	4.24884	8.E-06
COSTD_PRT_03CON_ does not Granger Cause COSTD_PRT_01B_03CON_		1.91954	0.0391

Chemical and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:44
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1042	6.75528	0.0095
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		2.07817	0.1497

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:44
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1041	3.27846	0.0381
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		1.17344	0.3097

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1040	2.20944	0.0854
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		1.58947	0.1903

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1039	1.65233	0.1589
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		4.54665	0.0012

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1038	1.51968	0.1809
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		3.93900	0.0015

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1037	1.91088	0.0761
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		2.91776	0.0079

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1036	2.83898	0.0062
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		2.93658	0.0048

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1035	2.20886	0.0247
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		2.47598	0.0116

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1034	2.08359	0.0284
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		2.35282	0.0125

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_04CH_ does not Granger Cause COSTD_PRT_04CH_	1033	1.83753	0.0504
COSTD_PRT_04CH_ does not Granger Cause COSTD_PRT_01B_04CH_		3.14271	0.0006

Food Producer and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1042	0.64502	0.4221
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		0.82468	0.3640

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1041	1.38478	0.2508
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		0.78427	0.4567

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1040	1.02021	0.3828
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		0.57200	0.6335

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:04
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1039	1.06924	0.3704
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.15770	0.3280

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:04
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1038	1.08513	0.3669
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.63615	0.1476

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:05
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1037	0.88882	0.5023
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.30509	0.2519

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1036	1.09214	0.3659
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.32193	0.2363

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011

Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1035	1.09404	0.3647
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.22200	0.2824

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1034	0.98957	0.4468
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.11505	0.3488

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_05FP_ does not Granger Cause COSTD_PRT_05FP_	1033	0.90100	0.5316
COSTD_PRT_05FP_ does not Granger Cause COSTD_PRT_01B_05FP_		1.00541	0.4366

Fixed Line Telecommunication and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:14
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1042	11.9304	0.0006
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		0.81703	0.3663

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1041	6.13865	0.0022
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		0.89752	0.4079

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:16

Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1040	4.80421	0.0025
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		7.37737	7.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:17
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1039	4.81030	0.0008
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		5.59011	0.0002

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:17
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1038	3.98080	0.0014
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		4.79669	0.0002

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1037	3.68239	0.0013
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		3.32721	0.0030

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1036	2.94875	0.0046
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		2.60089	0.0116

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:19
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.

COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1035	2.82618	0.0042
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		2.27384	0.0206

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:20
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1034	2.57674	0.0062
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		2.08835	0.0280

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:21
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_06FTL_ does not Granger Cause COSTD_PRT_06FTL_	1033	2.67712	0.0031
COSTD_PRT_06FTL_ does not Granger Cause COSTD_PRT_01B_06FTL_		2.20932	0.0154

Electricity and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1042	0.18622	0.6662
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		8.28945	0.0041

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1041	0.81352	0.4436
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		7.99601	0.0004

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1040	0.35259	0.7873
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		5.96716	0.0005

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1039	0.38636	0.8185
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		5.07565	0.0005

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:27
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1038	0.21969	0.9542
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		4.53660	0.0004

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1037	0.58409	0.7433
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		3.58339	0.0016

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1036	0.56021	0.7885
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		3.21248	0.0023

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28
Sample: 1/01/2008 12/30/2011

Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1035	0.51714	0.8442
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		2.90686	0.0033

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:28
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1034	0.47205	0.8939
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		3.15032	0.0009

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:29
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_07E_ does not Granger Cause COSTD_PRT_07E_	1033	0.61280	0.8039
COSTD_PRT_07E_ does not Granger Cause COSTD_PRT_01B_07E_		3.01551	0.0009

Personal Goods and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1042	1.59509	0.2069
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		0.02652	0.8707

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:45
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1041	1.06587	0.3448
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		0.38025	0.6838

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1040	1.45392	0.2256
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		1.57863	0.1929

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1039	1.03992	0.3854
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		2.04593	0.0859

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:46
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1038	1.30187	0.2607
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		1.97657	0.0796

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1037	2.15919	0.0447
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		1.82113	0.0918

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1036	2.21604	0.0308
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		1.56100	0.1432

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1035	1.88044	0.0596

COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_	1.34523	0.2171

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1034	1.90780	0.0474
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		1.32785	0.2178

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_01B_08PG_ does not Granger Cause COSTD_PRT_08PG_	1033	1.71122	0.0736
COSTD_PRT_08PG_ does not Granger Cause COSTD_PRT_01B_08PG_		1.41177	0.1696

GARCH MODEL- on Monthly Data

Oil and Gas and Banking Sector

System: SYS_02OAG
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:50
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 17 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-8.79E-05	0.000962	-0.091359	0.9272
C(2)	0.958902	0.006573	145.8858	0.0000
C(3)	0.011108	0.009413	1.180091	0.2380
C(4)	-0.000261	0.000345	-0.757945	0.4485
C(5)	0.022116	0.008604	2.570449	0.0102
C(6)	0.951474	0.007729	123.1058	0.0000
	Variance Equation Coefficients			
C(7)	0.000277	1.83E-05	15.15329	0.0000
C(8)	5.82E-05	3.81E-06	15.29139	0.0000
C(9)	1.26E-05	1.45E-06	8.669255	0.0000
C(10)	0.276139	0.034421	8.022506	0.0000

C(11)	0.212325	0.018014	11.78695	0.0000
C(12)	0.199127	0.014841	13.41711	0.0000
C(13)	0.370851	0.039504	9.387787	0.0000
C(14)	0.597446	0.017357	34.42161	0.0000
C(15)	0.803019	0.008255	97.27462	0.0000

Log likelihood	5146.895	Schwarz criterion	-9.769456
Avg. log likelihood	2.467351	Hannan-Quinn criter.	-9.813642
Akaike info criterion	-9.840642		

Equation: PRT_02OAG = C(1) + C(2)*PRT_02OAG(-1) + C(3)*PRT_01B(-1)

R-squared	0.942723	Mean dependent var	-0.001381
Adjusted R-squared	0.942613	S.D. dependent var	0.115470
S.E. of regression	0.027662	Sum squared resid	0.795768
Durbin-Watson stat	1.871131		

Equation: PRT_01B = C(4) + C(5)*PRT_02OAG(-1) + C(6)*PRT_01B(-1)

R-squared	0.945830	Mean dependent var	-0.026569
Adjusted R-squared	0.945725	S.D. dependent var	0.106578
S.E. of regression	0.024829	Sum squared resid	0.641156
Durbin-Watson stat	1.497820		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	0.000277	1.83E-05	15.15329	0.0000
M(1,2)	5.82E-05	3.81E-06	15.29139	0.0000
M(2,2)	1.26E-05	1.45E-06	8.669255	0.0000
A1(1,1)	0.276139	0.034421	8.022506	0.0000
A1(1,2)	0.212325	0.018014	11.78695	0.0000
A1(2,2)	0.199127	0.014841	13.41711	0.0000
B1(1,1)	0.370851	0.039504	9.387787	0.0000
B1(1,2)	0.597446	0.017357	34.42161	0.0000
B1(2,2)	0.803019	0.008255	97.27462	0.0000

* Coefficient matrix is not PSD.

Construction and Banking Sector

System: SYS_03CON
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:51
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 11 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000112	0.000906	-0.123789	0.9015
C(2)	0.948628	0.008592	110.4109	0.0000
C(3)	0.014467	0.006470	2.236090	0.0253
C(4)	-2.50E-05	0.000405	-0.061911	0.9506
C(5)	-0.005920	0.008631	-0.685877	0.4928
C(6)	0.976756	0.007564	129.1303	0.0000
Variance Equation Coefficients				
C(7)	0.000259	2.51E-05	10.31641	0.0000
C(8)	4.82E-05	2.94E-06	16.39981	0.0000
C(9)	8.68E-06	1.10E-06	7.891118	0.0000
C(10)	0.144787	0.027636	5.239138	0.0000
C(11)	0.163186	0.027064	6.029631	0.0000
C(12)	0.182726	0.014286	12.79095	0.0000
C(13)	0.441662	0.051713	8.540583	0.0000
C(14)	0.606724	0.030587	19.83626	0.0000
C(15)	0.826252	0.007598	108.7433	0.0000

Log likelihood	5122.378	Schwarz criterion	-9.722443
Avg. log likelihood	2.455598	Hannan-Quinn criter.	-9.766629
Akaike info criterion	-9.793630		

Equation: PRT_03CON = C(1) + C(2)*PRT_03CON(-1) + C(3)*PRT_01B(-1)

R-squared	0.921100	Mean dependent var	-0.026798
Adjusted R-squared	0.920949	S.D. dependent var	0.095312
S.E. of regression	0.026798	Sum squared resid	0.746854
Durbin-Watson stat	2.086023		

Equation: PRT_01B = C(4) + C(5)*PRT_03CON(-1) + C(6)*PRT_01B(-1)

R-squared	0.945571	Mean dependent var	-0.026569
Adjusted R-squared	0.945466	S.D. dependent var	0.106578
S.E. of regression	0.024889	Sum squared resid	0.644220
Durbin-Watson stat	1.503074		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix*
A1 is an indefinite matrix*
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	0.000259	2.51E-05	10.31641	0.0000
M(1,2)	4.82E-05	2.94E-06	16.39981	0.0000
M(2,2)	8.68E-06	1.10E-06	7.891118	0.0000
A1(1,1)	0.144787	0.027636	5.239138	0.0000
A1(1,2)	0.163186	0.027064	6.029631	0.0000
A1(2,2)	0.182726	0.014286	12.79095	0.0000
B1(1,1)	0.441662	0.051713	8.540583	0.0000
B1(1,2)	0.606724	0.030587	19.83626	0.0000
B1(2,2)	0.826252	0.007598	108.7433	0.0000

* Coefficient matrix is not PSD.

Chemical and Banking Sector

System: SYS_04CH
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:51
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 9 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.000142	0.000584	0.243603	0.8075
C(2)	0.949241	0.010082	94.14773	0.0000
C(3)	0.018070	0.008442	2.140525	0.0323
C(4)	9.00E-05	0.000452	0.199079	0.8422
C(5)	0.008192	0.009780	0.837633	0.4022
C(6)	0.962868	0.009639	99.89274	0.0000
	Variance Equation Coefficients			
C(7)	1.74E-05	1.48E-06	11.72554	0.0000
C(8)	8.96E-06	9.11E-07	9.836605	0.0000
C(9)	7.91E-06	9.07E-07	8.729516	0.0000
C(10)	0.126834	0.008673	14.62377	0.0000
C(11)	0.129201	0.007523	17.17492	0.0000
C(12)	0.191884	0.013516	14.19660	0.0000
C(13)	0.857838	0.008039	106.7142	0.0000
C(14)	0.864036	0.004410	195.9108	0.0000
C(15)	0.826321	0.007695	107.3840	0.0000

Log likelihood	5407.450	Schwarz criterion	-10.26908
Avg. log likelihood	2.592258	Hannan-Quinn criter.	-10.31327
Akaike info criterion	-10.34027		

Equation: PRT_04CH = C(1) + C(2)*PRT_04CH(-1) + C(3)*PRT_01B(-1)

R-squared	0.928572	Mean dependent var	-0.015975
Adjusted R-squared	0.928434	S.D. dependent var	0.102352
S.E. of regression	0.027381	Sum squared resid	0.779709
Durbin-Watson stat	2.005828		

Equation: PRT_01B = C(4) + C(5)*PRT_04CH(-1) + C(6)*PRT_01B(-1)

R-squared	0.945581	Mean dependent var	-0.026569
Adjusted R-squared	0.945476	S.D. dependent var	0.106578
S.E. of regression	0.024886	Sum squared resid	0.644101
Durbin-Watson stat	1.493347		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	1.74E-05	1.48E-06	11.72554	0.0000
M(1,2)	8.96E-06	9.11E-07	9.836605	0.0000
M(2,2)	7.91E-06	9.07E-07	8.729516	0.0000
A1(1,1)	0.126834	0.008673	14.62377	0.0000
A1(1,2)	0.129201	0.007523	17.17492	0.0000
A1(2,2)	0.191884	0.013516	14.19660	0.0000
B1(1,1)	0.857838	0.008039	106.7142	0.0000
B1(1,2)	0.864036	0.004410	195.9108	0.0000
B1(2,2)	0.826321	0.007695	107.3840	0.0000

* Coefficient matrix is not PSD.

Food Producer and Banking Sector

System: SYS_05FP
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:51
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 63 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.000169	0.000489	0.346043	0.7293
C(2)	0.965938	0.007560	127.7691	0.0000
C(3)	0.011581	0.003672	3.153708	0.0016
C(4)	-0.000363	0.000537	-0.674541	0.5000
C(5)	0.006898	0.006772	1.018594	0.3084
C(6)	0.962557	0.006102	157.7443	0.0000
Variance Equation Coefficients				
C(7)	2.59E-06	4.57E-07	5.670680	0.0000
C(8)	-2.36E-08	2.26E-07	-0.104518	0.9168
C(9)	9.35E-06	1.65E-06	5.659571	0.0000
C(10)	0.072144	0.009164	7.872675	0.0000
C(11)	0.018810	0.004756	3.954948	0.0001
C(12)	0.180184	0.018815	9.576665	0.0000
C(13)	0.926163	0.008153	113.6027	0.0000
C(14)	0.971903	0.003984	243.9749	0.0000
C(15)	0.822899	0.013669	60.20226	0.0000

Log likelihood	5392.324	Schwarz criterion	-10.24008
Avg. log likelihood	2.585007	Hannan-Quinn criter.	-10.28426
Akaike info criterion	-10.31126		

Equation: PRT_05FP = C(1) + C(2)*PRT_05FP(-1) + C(3)*PRT_01B(-1)

R-squared	0.943262	Mean dependent var	0.004240
Adjusted R-squared	0.943153	S.D. dependent var	0.074403
S.E. of regression	0.017740	Sum squared resid	0.327281
Durbin-Watson stat	1.581144		

Equation: PRT_01B = C(4) + C(5)*PRT_05FP(-1) + C(6)*PRT_01B(-1)

R-squared	0.945454	Mean dependent var	-0.026569
Adjusted R-squared	0.945349	S.D. dependent var	0.106578
S.E. of regression	0.024915	Sum squared resid	0.645605
Durbin-Watson stat	1.484736		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	2.59E-06	4.57E-07	5.670680	0.0000
M(1,2)	-2.36E-08	2.26E-07	-0.104518	0.9168
M(2,2)	9.35E-06	1.65E-06	5.659571	0.0000
A1(1,1)	0.072144	0.009164	7.872675	0.0000
A1(1,2)	0.018810	0.004756	3.954948	0.0001
A1(2,2)	0.180184	0.018815	9.576665	0.0000
B1(1,1)	0.926163	0.008153	113.6027	0.0000
B1(1,2)	0.971903	0.003984	243.9749	0.0000
B1(2,2)	0.822899	0.013669	60.20226	0.0000

* Coefficient matrix is not PSD.

Fixed Line Telecommunication and Banking Sector

System: SYS_06FTL
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:51
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 68 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.000801	0.000782	-1.023113	0.3063
C(2)	0.922426	0.014679	62.83952	0.0000
C(3)	0.000375	0.009701	0.038680	0.9691
C(4)	0.000103	0.000450	0.229298	0.8186
C(5)	0.053587	0.009376	5.715078	0.0000
C(6)	0.944069	0.006958	135.6773	0.0000
Variance Equation Coefficients				
C(7)	3.21E-05	3.08E-06	10.41531	0.0000
C(8)	3.39E-06	9.02E-07	3.757180	0.0002
C(9)	5.16E-06	8.00E-07	6.457583	0.0000
C(10)	0.067356	0.004259	15.81315	0.0000
C(11)	0.039528	0.004825	8.193136	0.0000
C(12)	0.121466	0.011564	10.50367	0.0000
C(13)	0.897429	0.007108	126.2509	0.0000
C(14)	0.941919	0.003328	283.0194	0.0000
C(15)	0.877416	0.008533	102.8274	0.0000

Log likelihood	4967.664	Schwarz criterion	-9.425772
Avg. log likelihood	2.381430	Hannan-Quinn criter.	-9.469958
Akaike info criterion	-9.496958		

Equation: PRT_06FTL = C(1) + C(2)*PRT_06FTL(-1) + C(3)*PRT_01B(-1)

R-squared	0.880154	Mean dependent var	-0.012083
Adjusted R-squared	0.879923	S.D. dependent var	0.088812
S.E. of regression	0.030775	Sum squared resid	0.985007
Durbin-Watson stat	1.933527		

Equation: PRT_01B = C(4) + C(5)*PRT_06FTL(-1) + C(6)*PRT_01B(-1)

R-squared	0.946265	Mean dependent var	-0.026569
Adjusted R-squared	0.946162	S.D. dependent var	0.106578
S.E. of regression	0.024729	Sum squared resid	0.636000
Durbin-Watson stat	1.520152		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	3.21E-05	3.08E-06	10.41531	0.0000
M(1,2)	3.39E-06	9.02E-07	3.757180	0.0002
M(2,2)	5.16E-06	8.00E-07	6.457583	0.0000
A1(1,1)	0.067356	0.004259	15.81315	0.0000
A1(1,2)	0.039528	0.004825	8.193136	0.0000
A1(2,2)	0.121466	0.011564	10.50367	0.0000
B1(1,1)	0.897429	0.007108	126.2509	0.0000
B1(1,2)	0.941919	0.003328	283.0194	0.0000
B1(2,2)	0.877416	0.008533	102.8274	0.0000

* Coefficient matrix is not PSD.

Electricity and Banking Sector

System: SYS_07E
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:52
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 9 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.001001	0.000763	-1.311803	0.1896
C(2)	0.959130	0.008398	114.2113	0.0000
C(3)	-0.015660	0.009482	-1.651588	0.0986
C(4)	-0.000626	0.000567	-1.104058	0.2696
C(5)	0.006116	0.006556	0.933024	0.3508
C(6)	0.952351	0.008185	116.3490	0.0000
	Variance Equation Coefficients			
C(7)	1.21E-05	2.00E-06	6.029811	0.0000
C(8)	4.75E-06	7.19E-07	6.599270	0.0000
C(9)	7.20E-06	9.83E-07	7.326601	0.0000
C(10)	0.068392	0.007462	9.165379	0.0000
C(11)	0.057937	0.004402	13.16183	0.0000
C(12)	0.101722	0.007041	14.44693	0.0000
C(13)	0.919735	0.007858	117.0426	0.0000
C(14)	0.930004	0.003484	266.9138	0.0000
C(15)	0.885390	0.005349	165.5380	0.0000

Log likelihood	5079.360	Schwarz criterion	-9.639953
Avg. log likelihood	2.434976	Hannan-Quinn criter.	-9.684140
Akaike info criterion	-9.711140		

Equation: PRT_07E = C(1) + C(2)*PRT_07E(-1) + C(3)*PRT_01B(-1)

R-squared	0.942696	Mean dependent var	-0.030792
Adjusted R-squared	0.942586	S.D. dependent var	0.126028
S.E. of regression	0.030198	Sum squared resid	0.948389
Durbin-Watson stat	1.598921		

Equation: PRT_01B = C(4) + C(5)*PRT_07E(-1) + C(6)*PRT_01B(-1)

R-squared	0.945524	Mean dependent var	-0.026569
Adjusted R-squared	0.945420	S.D. dependent var	0.106578
S.E. of regression	0.024899	Sum squared resid	0.644767
Durbin-Watson stat	1.475565		

Covariance specification: Diagonal VECH

GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	1.21E-05	2.00E-06	6.029811	0.0000
M(1,2)	4.75E-06	7.19E-07	6.599270	0.0000
M(2,2)	7.20E-06	9.83E-07	7.326601	0.0000
A1(1,1)	0.068392	0.007462	9.165379	0.0000
A1(1,2)	0.057937	0.004402	13.16183	0.0000
A1(2,2)	0.101722	0.007041	14.44693	0.0000
B1(1,1)	0.919735	0.007858	117.0426	0.0000
B1(1,2)	0.930004	0.003484	266.9138	0.0000
B1(2,2)	0.885390	0.005349	165.5380	0.0000

* Coefficient matrix is not PSD.

Personal Goods and Banking Sector

System: SYS_08PG
Estimation Method: ARCH Maximum Likelihood (Marquardt)
Covariance specification: Diagonal VECH
Date: 02/01/10 Time: 10:52
Sample: 1/02/2008 12/30/2011
Included observations: 1043
Total system (balanced) observations 2086
Presample covariance: backcast (parameter =0.7)
Convergence achieved after 11 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.000664	0.000481	1.380936	0.1673
C(2)	0.863914	0.007776	111.0975	0.0000
C(3)	0.060696	0.004700	12.91528	0.0000
C(4)	1.41E-05	0.000329	0.042825	0.9658
C(5)	0.006876	0.007897	0.870696	0.3839
C(6)	0.962226	0.006870	140.0659	0.0000
Variance Equation Coefficients				
C(7)	3.83E-05	3.00E-06	12.75199	0.0000
C(8)	1.09E-05	1.16E-06	9.408226	0.0000
C(9)	4.00E-06	5.15E-07	7.759524	0.0000
C(10)	0.275263	0.016015	17.18790	0.0000
C(11)	0.169530	0.014162	11.97045	0.0000
C(12)	0.183939	0.013507	13.61793	0.0000
C(13)	0.735757	0.007543	97.53996	0.0000
C(14)	0.822729	0.011792	69.77032	0.0000
C(15)	0.847862	0.007836	108.2073	0.0000

Log likelihood	4953.214	Schwarz criterion	-9.398063
Avg. log likelihood	2.374503	Hannan-Quinn criter.	-9.442249
Akaike info criterion	-9.469250		

Equation: PRT_08PG= C(1) + C(2)*PRT_08PG(-1) + C(3)*PRT_01B(-1)

R-squared	0.825335	Mean dependent var	-0.028414
Adjusted R-squared	0.824999	S.D. dependent var	0.081691
S.E. of regression	0.034174	Sum squared resid	1.214568
Durbin-Watson stat	2.323920		

Equation: PRT_01B = C(4) + C(5)*PRT_08PG(-1) + C(6)*PRT_01B(-1)

R-squared	0.945407	Mean dependent var	-0.026569
Adjusted R-squared	0.945302	S.D. dependent var	0.106578
S.E. of regression	0.024926	Sum squared resid	0.646157
Durbin-Watson stat	1.485981		

Covariance specification: Diagonal VECH
GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)
M is an indefinite matrix
A1 is an indefinite matrix
B1 is an indefinite matrix*

Transformed Variance Coefficients

	Coefficient	Std. Error	z-Statistic	Prob.
M(1,1)	3.83E-05	3.00E-06	12.75199	0.0000
M(1,2)	1.09E-05	1.16E-06	9.408226	0.0000
M(2,2)	4.00E-06	5.15E-07	7.759524	0.0000
A1(1,1)	0.275263	0.016015	17.18790	0.0000
A1(1,2)	0.169530	0.014162	11.97045	0.0000
A1(2,2)	0.183939	0.013507	13.61793	0.0000
B1(1,1)	0.735757	0.007543	97.53996	0.0000
B1(1,2)	0.822729	0.011792	69.77032	0.0000
B1(2,2)	0.847862	0.007836	108.2073	0.0000

* Coefficient matrix is not PSD.

Ganger Causality Test on Monthly Portfolio Returns

Oil and Gas and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1043	0.04630	0.8297
PRT_02OAG does not Granger Cause PRT_01B		7.17405	0.0075

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1042	8.87670	0.0002
PRT_02OAG does not Granger Cause PRT_01B		4.49905	0.0113

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:54
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1041	4.45157	0.0041
PRT_02OAG does not Granger Cause PRT_01B		3.40350	0.0172

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:54
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1040	3.43427	0.0085
PRT_02OAG does not Granger Cause PRT_01B		2.79088	0.0253

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1039	4.35384	0.0006
PRT_02OAG does not Granger Cause PRT_01B		2.26228	0.0464

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1038	3.40716	0.0025
PRT_02OAG does not Granger Cause PRT_01B		2.65083	0.0148

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1037	3.68323	0.0006
PRT_02OAG does not Granger Cause PRT_01B		3.59652	0.0008

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1036	3.64191	0.0003
PRT_02OAG does not Granger Cause PRT_01B		3.23676	0.0012

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1035	2.97242	0.0017
PRT_02OAG does not Granger Cause PRT_01B		2.95296	0.0018

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_02OAG	1034	2.86503	0.0016
PRT_02OAG does not Granger Cause PRT_01B		2.77284	0.0022

Construction and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1043	2.36840	0.1241
PRT_03CON does not Granger Cause PRT_01B		0.80719	0.3692

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1042	9.07567	0.0001
PRT_03CON does not Granger Cause PRT_01B		0.27414	0.7603

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1041	5.96592	0.0005
PRT_03CON does not Granger Cause PRT_01B		0.43556	0.7276

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1040	4.71773	0.0009
PRT_03CON does not Granger Cause PRT_01B		0.53606	0.7093

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1039	7.02435	2.E-06
PRT_03CON does not Granger Cause PRT_01B		0.43701	0.8229

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1038	9.30977	6.E-10
PRT_03CON does not Granger Cause PRT_01B		0.33250	0.9200

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1037	8.80000	2.E-10
PRT_03CON does not Granger Cause PRT_01B		0.28763	0.9589

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:54
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1036	8.11860	1.E-10
PRT_03CON does not Granger Cause PRT_01B		0.26387	0.9773

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1035	7.31739	2.E-10
PRT_03CON does not Granger Cause PRT_01B		0.51618	0.8636

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_03CON	1034	6.62178	5.E-10
PRT_03CON does not Granger Cause PRT_01B		0.60299	0.8122

Chemical and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:54
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1043	3.70491	0.0545
PRT_04CH does not Granger Cause PRT_01B		2.92381	0.0876

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1042	11.3459	1.E-05
PRT_04CH does not Granger Cause PRT_01B		7.57733	0.0005

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1041	8.30940	2.E-05
PRT_04CH does not Granger Cause PRT_01B		5.77736	0.0006

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1040	6.08143	8.E-05
PRT_04CH does not Granger Cause PRT_01B		5.04559	0.0005

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1039	4.89644	0.0002
PRT_04CH does not Granger Cause PRT_01B		4.07651	0.0011

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1038	5.04067	4.E-05
PRT_04CH does not Granger Cause PRT_01B		3.33538	0.0029

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1037	5.23322	7.E-06
PRT_04CH does not Granger Cause PRT_01B		2.85833	0.0059

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1036	5.28131	2.E-06
PRT_04CH does not Granger Cause PRT_01B		3.84828	0.0002

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1035	4.83047	2.E-06
PRT_04CH does not Granger Cause PRT_01B		3.51222	0.0003

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_04CH	1034	4.15417	1.E-05
PRT_04CH does not Granger Cause PRT_01B		3.76481	5.E-05

Food Producer and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1043	1.21450	0.2707
PRT_05FP does not Granger Cause PRT_01B		0.01794	0.8935

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1042	0.68106	0.5063
PRT_05FP does not Granger Cause PRT_01B		0.38945	0.6775

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1041	0.64022	0.5892
PRT_05FP does not Granger Cause PRT_01B		0.34836	0.7904

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1040	0.67304	0.6107
PRT_05FP does not Granger Cause PRT_01B		0.28111	0.8903

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:13
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1039	0.67493	0.6425
PRT_05FP does not Granger Cause PRT_01B		0.27029	0.9294

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:13
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1038	0.65321	0.6876
PRT_05FP does not Granger Cause PRT_01B		0.50089	0.8080

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:13
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1037	0.58041	0.7723
PRT_05FP does not Granger Cause PRT_01B		0.48744	0.8442

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:14
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1036	0.50739	0.8514
PRT_05FP does not Granger Cause PRT_01B		0.43549	0.9001

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1035	0.56074	0.8298
PRT_05FP does not Granger Cause PRT_01B		0.45846	0.9025

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:16
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_05FP	1034	0.61627	0.8009
PRT_05FP does not Granger Cause PRT_01B		0.52685	0.8720

Fixed Line Telecommunication and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1043	0.00059	0.9806
PRT_06FTL does not Granger Cause PRT_01B		15.4201	9.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1042	0.00418	0.9958
PRT_06FTL does not Granger Cause PRT_01B		4.58943	0.0104

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1041	0.13517	0.9391
PRT_06FTL does not Granger Cause PRT_01B		3.05406	0.0277

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1040	0.23329	0.9197
PRT_06FTL does not Granger Cause PRT_01B		2.30825	0.0563

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1039	0.22411	0.9522
PRT_06FTL does not Granger Cause PRT_01B		1.89509	0.0926

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1038	0.39350	0.8835
PRT_06FTL does not Granger Cause PRT_01B		2.15123	0.0455

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1037	0.72883	0.6476
PRT_06FTL does not Granger Cause PRT_01B		2.19506	0.0325

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1036	1.54334	0.1380
PRT_06FTL does not Granger Cause PRT_01B		1.89896	0.0568

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1035	1.68097	0.0891
PRT_06FTL does not Granger Cause PRT_01B		1.64382	0.0984

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_06FTL	1034	1.92282	0.0387
PRT_06FTL does not Granger Cause PRT_01B		1.56674	0.1114

Electricity and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1043	0.84296	0.3588
PRT_07E does not Granger Cause PRT_01B		7.92942	0.0050

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1042	0.45042	0.6375
PRT_07E does not Granger Cause PRT_01B		6.00687	0.0025

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1041	0.15248	0.9281
PRT_07E does not Granger Cause PRT_01B		6.86259	0.0001

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1040	0.32816	0.8592
PRT_07E does not Granger Cause PRT_01B		5.45646	0.0002

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1039	0.58420	0.7121
PRT_07E does not Granger Cause PRT_01B		4.49385	0.0005

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1038	2.57781	0.0175
PRT_07E does not Granger Cause PRT_01B		6.02099	3.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1037	2.23378	0.0295
PRT_07E does not Granger Cause PRT_01B		5.17895	8.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1036	1.86064	0.0627
PRT_07E does not Granger Cause PRT_01B		5.27011	2.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1035	1.77327	0.0692
PRT_07E does not Granger Cause PRT_01B		4.55996	7.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_07E	1034	2.05067	0.0258
PRT_07E does not Granger Cause PRT_01B		4.27272	7.E-06

Personal Goods and Banking Sector

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1043	14.6385	0.0001
PRT_08PG does not Granger Cause PRT_01B		0.51917	0.4714

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1042	19.5661	5.E-09
PRT_08PG does not Granger Cause PRT_01B		0.59401	0.5523

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1041	17.7307	3.E-11
PRT_08PG does not Granger Cause PRT_01B		0.41577	0.7417

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1040	13.7323	6.E-11
PRT_08PG does not Granger Cause PRT_01B		0.31847	0.8657

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1039	10.5974	6.E-10
PRT_08PG does not Granger Cause PRT_01B		0.33300	0.8931

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1038	8.86156	2.E-09
PRT_08PG does not Granger Cause PRT_01B		0.65207	0.6885

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1037	7.58377	6.E-09
PRT_08PG does not Granger Cause PRT_01B		1.08026	0.3737

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1036	6.58815	2.E-08
PRT_08PG does not Granger Cause PRT_01B		1.07432	0.3786

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1035	6.14069	2.E-08
PRT_08PG does not Granger Cause PRT_01B		1.06161	0.3888

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
PRT_01B does not Granger Cause PRT_08PG	1034	5.66416	3.E-08
PRT_08PG does not Granger Cause PRT_01B		1.07475	0.3787

Granger Causality Test on Monthly Volatility

Oil and Gas and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1011	0.00036	0.9848
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		7.16077	0.0076

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1010	6.84116	0.0011
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		7.52889	0.0006

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1009	9.08239	6.E-06
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		4.80935	0.0025

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1008	6.54040	3.E-05
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		4.12375	0.0026

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1007	5.53476	5.E-05
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		3.51664	0.0037

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1006	5.65862	9.E-06
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		3.37463	0.0027

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1005	4.54886	5.E-05
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		3.32135	0.0017

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1004	3.86678	0.0002
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		3.05243	0.0021

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1003	3.65433	0.0002
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		2.76778	0.0033

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:00
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_02OAG	1002	3.76481	5.E-05
STDEV_M_02OAG does not Granger Cause STDEV_M_01B		2.49210	0.0059

Construction and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:05

Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1011	1.63007	0.2020
STDEV_M_03CON does not Granger Cause STDEV_M_01B		1.36083	0.2437

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:05
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1010	3.19969	0.0412
STDEV_M_03CON does not Granger Cause STDEV_M_01B		2.38030	0.0930

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1009	6.95074	0.0001
STDEV_M_03CON does not Granger Cause STDEV_M_01B		1.07494	0.3588

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1008	6.26737	6.E-05
STDEV_M_03CON does not Granger Cause STDEV_M_01B		0.73529	0.5680

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1007	6.20188	1.E-05
STDEV_M_03CON does not Granger Cause STDEV_M_01B		1.25235	0.2825

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1006	4.62388	0.0001
STDEV_M_03CON does not Granger Cause STDEV_M_01B		2.13296	0.0473

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1005	5.04510	1.E-05
STDEV_M_03CON does not Granger Cause STDEV_M_01B		2.89931	0.0053

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1004	4.23037	5.E-05
STDEV_M_03CON does not Granger Cause STDEV_M_01B		2.64430	0.0072

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1003	3.77409	0.0001
STDEV_M_03CON does not Granger Cause STDEV_M_01B		2.45013	0.0093

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_03CON	1002	3.24354	0.0004
STDEV_M_03CON does not Granger Cause STDEV_M_01B		2.36841	0.0091

Chemical and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1011	3.37121	0.0666
STDEV_M_04CH does not Granger Cause STDEV_M_01B		20.2392	8.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1010	1.42427	0.2412
STDEV_M_04CH does not Granger Cause STDEV_M_01B		12.1125	6.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1009	3.14971	0.0243
STDEV_M_04CH does not Granger Cause STDEV_M_01B		6.97074	0.0001

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1008	2.04174	0.0865
STDEV_M_04CH does not Granger Cause STDEV_M_01B		5.23445	0.0004

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1007	1.95815	0.0824
STDEV_M_04CH does not Granger Cause STDEV_M_01B		4.45433	0.0005

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:47
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.

STDEV_M_01B does not Granger Cause STDEV_M_04CH	1006	1.90102	0.0778
STDEV_M_04CH does not Granger Cause STDEV_M_01B		3.67403	0.0013

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1005	1.64941	0.1179
STDEV_M_04CH does not Granger Cause STDEV_M_01B		3.64182	0.0007

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1004	1.85527	0.0636
STDEV_M_04CH does not Granger Cause STDEV_M_01B		3.65746	0.0003

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1003	1.67199	0.0913
STDEV_M_04CH does not Granger Cause STDEV_M_01B		3.53217	0.0003

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_04CH	1002	1.64966	0.0881
STDEV_M_04CH does not Granger Cause STDEV_M_01B		3.50272	0.0001

Food Producer and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1011	0.07369	0.7861
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.67177	0.4126

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1010	0.04086	0.9600
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.07662	0.9262

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1009	0.12597	0.9447
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.07747	0.9722

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1008	0.24586	0.9122
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.13664	0.9688

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1007	0.23714	0.9461
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.13156	0.9852

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.

STDEV_M_01B does not Granger Cause STDEV_M_05FP	1006	0.19437	0.9784
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.12846	0.9928

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1005	0.21510	0.9820
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.17198	0.9908

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1004	0.63343	0.7501
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.68110	0.7085

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1003	0.69161	0.7170
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.62192	0.7791

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_05FP	1002	0.96022	0.4768
STDEV_M_05FP does not Granger Cause STDEV_M_01B		0.70974	0.7159

Fixed Line Telecommunication and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1011	3.11263	0.0780

STDEV_M_06FTL does not Granger Cause STDEV_M_01B		29.3053	8.E-08

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1010	2.35175	0.0957
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		12.7469	3.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1009	1.13902	0.3322
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		7.01344	0.0001

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1008	1.02644	0.3925
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		6.71141	2.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1007	0.89723	0.4822
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		5.83036	3.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1006	1.05879	0.3856
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		4.65515	0.0001

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1005	0.70748	0.6658
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		3.95761	0.0003

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1004	0.34305	0.9491
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		4.36987	3.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1003	0.36388	0.9521
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		4.24648	2.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_06FTL	1002	1.19402	0.2907
STDEV_M_06FTL does not Granger Cause STDEV_M_01B		4.28749	7.E-06

Electricity and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:48
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1011	1.40794	0.2357
STDEV_M_07E does not Granger Cause STDEV_M_01B		20.1618	8.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1010	3.71854	0.0246
STDEV_M_07E does not Granger Cause STDEV_M_01B		15.5287	2.E-07

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1009	3.03640	0.0283
STDEV_M_07E does not Granger Cause STDEV_M_01B		10.1316	1.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1008	1.79171	0.1283
STDEV_M_07E does not Granger Cause STDEV_M_01B		7.50009	6.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1007	1.77693	0.1148
STDEV_M_07E does not Granger Cause STDEV_M_01B		6.00771	2.E-05

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1006	1.39794	0.2123
STDEV_M_07E does not Granger Cause STDEV_M_01B		6.39781	1.E-06

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1005	1.25922	0.2675
STDEV_M_07E does not Granger Cause STDEV_M_01B		6.01179	7.E-07

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1004	1.30699	0.2360
STDEV_M_07E does not Granger Cause STDEV_M_01B		5.29913	2.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1003	1.10300	0.3576
STDEV_M_07E does not Granger Cause STDEV_M_01B		4.66400	5.E-06

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_07E	1002	2.36072	0.0093
STDEV_M_07E does not Granger Cause STDEV_M_01B		4.43047	4.E-06

Personal Goods and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1011	3.07480	0.0798
STDEV_M_08PG does not Granger Cause STDEV_M_01B		0.14174	0.7066

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1010	8.64113	0.0002
STDEV_M_08PG does not Granger Cause STDEV_M_01B		3.66651	0.0259

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1009	8.52428	1.E-05
STDEV_M_08PG does not Granger Cause STDEV_M_01B		3.91498	0.0086

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1008	6.76997	2.E-05
STDEV_M_08PG does not Granger Cause STDEV_M_01B		2.94206	0.0196

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1007	5.29568	8.E-05
STDEV_M_08PG does not Granger Cause STDEV_M_01B		3.31327	0.0057

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1006	4.27390	0.0003
STDEV_M_08PG does not Granger Cause STDEV_M_01B		2.73687	0.0121

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1005	3.70285	0.0006
STDEV_M_08PG does not Granger Cause STDEV_M_01B		2.50247	0.0149

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1004	3.21232	0.0013
STDEV_M_08PG does not Granger Cause STDEV_M_01B		2.47318	0.0117

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1003	2.85976	0.0025
STDEV_M_08PG does not Granger Cause STDEV_M_01B		2.26616	0.0164

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
STDEV_M_01B does not Granger Cause STDEV_M_08PG	1002	2.84655	0.0017
STDEV_M_08PG does not Granger Cause STDEV_M_01B		1.95141	0.0355

Ganger Causality Test on Monthly Conditional Standard Deviation

Oil and Gas and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:25
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1042	20.2377	8.E-06

COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		8.40214	0.0038

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1041	7.99756	0.0004
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		3.27738	0.0381

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:55
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1040	4.74951	0.0027
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.15825	0.0913

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:56
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1039	3.19573	0.0127
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.12258	0.0760

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1038	2.78565	0.0166
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.18783	0.0535

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:57
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1037	2.27637	0.0345
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.14527	0.0460

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1036	2.03300	0.0483
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		1.94431	0.0597

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:58
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1035	2.29775	0.0193
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.44042	0.0129

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1034	2.27446	0.0159
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.26930	0.0162

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:59
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_02OAG_ does not Granger Cause COSTD_PRT_M_02OAG_	1033	2.32376	0.0105
COSTD_PRT_M_02OAG_ does not Granger Cause COSTD_PRT_M_01B_02OAG_		2.00870	0.0296

Construction and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1042	6.36323	0.0118
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		0.15260	0.6961

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:02
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1041	5.10712	0.0062
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.61356	0.1997

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1040	2.21875	0.0844
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.07868	0.3571

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:03
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1039	4.27079	0.0020
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.89753	0.1087

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:04
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1038	5.50166	5.E-05
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.76962	0.1163

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:04
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1037	4.34903	0.0002
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.77867	0.1002

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:05
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1036	4.34570	9.E-05
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.47942	0.1707

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:05
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1035	4.09472	8.E-05
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.32576	0.2265

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1034	3.96135	6.E-05
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.24390	0.2641

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:06
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_03CON_ does not Granger Cause COSTD_PRT_M_03CON_	1033	3.67340	8.E-05
COSTD_PRT_M_03CON_ does not Granger Cause COSTD_PRT_M_01B_03CON_		1.01659	0.4270

Chemical and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:18
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1042	4.31199	0.0381
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		4.01858	0.0453

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:21
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1041	3.32859	0.0362
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		5.31948	0.0050

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:22
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1040	3.22485	0.0219
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		3.77800	0.0103

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:22
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1039	2.45444	0.0443
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		3.06342	0.0160

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:23
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1038	2.65822	0.0214
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		2.82707	0.0152

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:23
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1037	2.93435	0.0076
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		2.40171	0.0261

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1036	2.57720	0.0123
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		2.10198	0.0408

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1035	2.30035	0.0191
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		2.60511	0.0080

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1034	2.18570	0.0209
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		2.56168	0.0065

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:26
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_04CH_ does not Granger Cause COSTD_PRT_M_04CH_	1033	3.04414	0.0008
COSTD_PRT_M_04CH_ does not Granger Cause COSTD_PRT_M_01B_04CH_		2.41886	0.0076

Food Producer and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:49
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1042	0.44511	0.5048
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		0.23871	0.6252

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1041	0.36326	0.6955
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		0.32548	0.7223

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:50
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1040	0.68006	0.5643
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.28085	0.2796

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1039	1.19172	0.3128
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.20339	0.3077

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1038	1.22297	0.2961
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.43414	0.2093

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:51
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1037	1.51127	0.1710
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.55627	0.1567

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011

Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1036	1.30456	0.2446
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.40473	0.1996

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1035	1.61151	0.1172
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.24724	0.2679

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:52
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1034	1.49326	0.1454
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		1.20392	0.2886

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 21:53
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_05FP_ does not Granger Cause COSTD_PRT_M_05FP_	1033	1.34606	0.2009
COSTD_PRT_M_05FP_ does not Granger Cause COSTD_PRT_M_01B_05FP_		0.97425	0.4641

Fixed Line Telecommunication and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1042	1.15998	0.2817
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		4.25215	0.0394

Pairwise Granger Causality Tests

Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1041	6.67781	0.0013
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		2.90998	0.0549

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1040	4.85738	0.0023
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.93184	0.1227

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1039	4.07695	0.0028
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.69233	0.1495

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1038	3.24778	0.0065
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		2.19110	0.0531

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1037	2.89217	0.0084
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.94982	0.0701

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.

COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1036	2.92831	0.0049
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.69566	0.1063

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:10
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1035	2.53473	0.0098
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.66091	0.1039

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1034	2.33271	0.0133
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.61395	0.1065

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_06FTL_ does not Granger Cause COSTD_PRT_M_06FTL_	1033	2.05251	0.0257
COSTD_PRT_M_06FTL_ does not Granger Cause COSTD_PRT_M_01B_06FTL_		1.40215	0.1739

Electricity and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1042	5.90460	0.0153
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		3.03976	0.0815

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1041	7.64057	0.0005
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		3.65236	0.0263

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:07
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1040	5.04737	0.0018
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		4.22606	0.0056

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1039	3.74606	0.0049
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		3.25000	0.0116

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1038	3.03351	0.0100
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		2.61238	0.0234

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1037	2.63858	0.0152
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		2.57006	0.0178

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1036	2.46308	0.0165

COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_	2.38294	0.0203

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:08
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1035	2.35260	0.0165
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		2.06648	0.0364

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1034	2.09748	0.0272
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		1.93977	0.0432

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:09
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_07E_ does not Granger Cause COSTD_PRT_M_07E_	1033	1.95086	0.0355
COSTD_PRT_M_07E_ does not Granger Cause COSTD_PRT_M_01B_07E_		1.74812	0.0660

Personal Goods and Banking Sector

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1042	5.57383	0.0184
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.56420	0.2113

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.

COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1041	4.53228	0.0110
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		3.10007	0.0455

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:11
Sample: 1/01/2008 12/30/2011
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1040	2.77485	0.0403
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		2.25073	0.0809

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1039	2.59527	0.0351
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.70922	0.1457

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:12
Sample: 1/01/2008 12/30/2011
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1038	2.59837	0.0241
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.46924	0.1972

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:14
Sample: 1/01/2008 12/30/2011
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1037	2.02200	0.0601
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.25432	0.2760

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:14
Sample: 1/01/2008 12/30/2011
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1036	2.03145	0.0485
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.58877	0.1348

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:14
Sample: 1/01/2008 12/30/2011
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1035	1.96723	0.0475
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.53219	0.1416

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 9

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1034	1.91984	0.0458
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.43426	0.1685

Pairwise Granger Causality Tests
Date: 03/26/13 Time: 22:15
Sample: 1/01/2008 12/30/2011
Lags: 10

Null Hypothesis:	Obs	F-Statistic	Prob.
COSTD_PRT_M_01B_08PG_ does not Granger Cause COSTD_PRT_M_08PG_	1033	1.84303	0.0495
COSTD_PRT_M_08PG_ does not Granger Cause COSTD_PRT_M_01B_08PG_		1.41068	0.1701