Journal of Management Sciences
Vol. 1(1): 35-48, 2014
DOI 10.20547/jms.2014.1401103

Impact of Macroeconomic Factors on Non-financial Firms' Stock Returns: Evidence from Sectorial Study of KSE-100 Index

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Abstract: *This paper attempts to study the impact of pre-specified set of macroeconomic factors on firms' stock returns for nine nonfinancial sectors listed in Karachi Stock Exchange. The macroeconomic factors included are consumer price index, industrial production index, market returns, risk free return and money supply. The studied sample covers data from 2001 to 2011. Panel analysis using pooled OLS shows that all studied sectors firm's stock returns have negative relationship with consumer price index, money supply and risk free rate, whereas industrial production index and market returns indicates a positive relationship. The results of this study have important implications for the equity investors and policy makers.*

Keywords: Macroeconomic factors, stock returns, regression analysis, KSE

1 Introduction

Stock valuation models have always been a center of attention for the developers and users of financial theory. Investors undertake either top-bottom or bottom-up approach for estimating a stock's intrinsic (Graham, 1949). Top-Bottom approach uses all the available information including external macro-economic with the purpose to find out which firms perform well in the forecasted economic environment. Whereas the bottom-up approach is based on estimating firm's value by comparing it with its current market price. Financial markets are important contributor in the economy. They facilitate by channeling the savings as an input for productive activities. They also provide a platform for the exchange of various financial assets with differing characteristics of risk and return (Pethe & Karnik, 2000). Thus trading in stocks is a sign of economic activity and it contributes towards the nation's social uplift (Fama, 1990).

Asset pricing theory emphasis that all the factors which affects the prospect

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†The aurthor would like to thank Mr. Syed Ali Raza and the two reviewers of the journals for their comments on an earlier version of this paper. All remaining error are the author's

investment choices in a risk averse economy therefore should produce risk premia (Merton, 1972; Ross, 1976). Stock returns are influenced by various economic forces (N. F. Chen, Roll, & Ross, 1986). Flannery and Protopapadakis(2002) studied that macro-economic factors potentially have an impact on firm's cash flows thus may affect the opportunity cost of capital, hence affect the investment decisions.

Sharp (1964) proposed a single factor model that laid the preliminary form of what we know today as Capital Asset Pricing Model (CAPM), enhanced by the work of Lintner (1965) and Mossin (1966). Another major milestone came when Ross (1976) developed Arbitrage pricing theory (APT). APT basically represents a model with multiple factors that characterize the primary risks in the economy. In the context of APT, macro-economic factors are used as measure of economy wide risk factors. [1]

Karachi Stock Exchange (KSE), Pakistan largest stock exchange established in 1949. It is one the oldest stock exchanges in South Asia. In 1991, KSE was awarded with the status of upgraded native market index (International Finance Corporation, 1992). In year 2003, it was declared the number one stock market in terms of upgraded turnover ratio, also in year 2006 it stood third based on the same ratio (Global Stock Markets Fact book, 2004; 2007). In year 2013 KSE has risen in native currency by 40%.[2]

Motivation of the Study

The prime objective of this paper is to analyze the impact of a predetermined set of macro-economic factors on firm's stock returns, a sectorial study of non-financial firms listed on KSE 100 index. Most of the past studies investigated the impact of macro-economic factors on stock returns at aggregate level (N. F. Chen et al., 1986; Apte, 1997; Ataullah, 2001; Nishat & Shaheen, 2004; Hussain & Sohail, 2011). Therefore, this paper contrasts by investigating the effect of macroeconomic factors on equity returns for different non-financial sectors listed on KSE 100 Index. Moreover this research employs the panel data as compare with (Ataullah, 2001; Nishat & Shaheen, 2004; Hussain & Sohail, 2011), to study the relationship between macro-economic factors and stock returns. Since panel data is capable of studying the dynamic relationships among units of interest (Frees, 2004). Therefore this paper attempts to differentiate the sectors whose firm's returns are sensitive to macro-economic factors.

The paper continues as follows: Section 2, consists of existing empirical literature and theoretical framework; Section 3, discusses the data, its methodology and data sources; Section 4, presents the results and analysis and Section 5, comprises conclusion and recommendations.

[1] (N. F. Chen et al., 1986)
[2] (*http://www.economist.com/blogs/economist-explains*, 2014)

2 Literature Review

Relationship between stock returns and macro-economic factors is an important area of investigation for the capital market's financial analysts and academicians. Various studies have been conducted to examine the behavior of different macro-economic factors and stock returns. This section of the paper is attempting to have an insight into some of the studies done in this field. One such pioneer study is done by N. F. Chen et al. (1986). They have examined the influence of macroeconomic factors like inflation, term structure, risk premia, industrial production index, Consumption and Oil Prices on return of Value weighted NYSE index. Industrial production, changes in risk premia affects the stock returns significantly well, however inflation is weakly significant in explaining the stock returns. Whereas consumption, market indices and oil prices are insignificant in explaining the stock returns.

Similarly Darrat (1990) explored empirically the influence of monetary and fiscal policy on stock prices in Canadian reference. The variables in the study include percentage change in monetary base, fiscal policy change in cyclically adjusted budget deficit, stock prices from Toronto Stock Exchange 300 Index; other macroeconomic factors are inflation rate, industrial production index, short term and long term interest rates, exchange rate volatility, and interest rate volatility. By employing likelihood ratio tests and Granger causality test, result shows that the lagged value of monetary policy is not significantly related to stock prices, however fiscal policy is significantly related to stock prices. Other factors like inflation and interest rate are negatively related to stock prices. Cozier and Rahman (1988) studies the association between economics factors like inflation and real returns on stock in Canadian perspective. Their result shows a negative relationship between real stocks returns and inflation.

In a study by Kazi (2008) interest rate and industrial production index are found to be significantly associated with the Australian stock market's returns in the long run. Ngoc and Hussainey (2009) empirically examined the impact of macroeconomic factors on Vietnamese stock prices. The result shows that Vietnam's industrial production and money supply are significantly associated to stock prices. Singh, Mehta, and Varsha (2011) studied the impact of macro-economic factors such as money supply, GDP, exchange rate and employment rate on Taiwan 50 Index stock returns. GDP and exchange rate are significantly affecting the stock returns whereas money supply and employment rate are insignificant factors.

Pethe and Karnik (2000) observed the effect of different macroeconomic factors on equity prices in Indian context. The macroeconomic factors in their study are exchange rate of rupee verses dollar, prime lending rate, narrow money supply (M1), broad money supply (M3), industrial production index (IPI), Bombay Sensex (BSE) index and Nifty index. The result shows a weak causality directing from IPI to BSE/Nifty. Unidirectional causality exists between stock

price and money supply i.e. from money supply to stock prices (Apte, 1997; Panda, 2008).

Ataullah (2001) empirically examined APT in the Pakistan stock market by using pre-specified macroeconomic factors. He found that four macroeconomic factors i.e. unexpected inflation, exchange rate, trade balance, and oil prices, affects the equity returns in Pakistan. Nishat and Shaheen (2004) empirically investigated the effect of money market rate in interbank market rate proxy for interest rate, Consumer price index proxy for inflation, industrial production index (IPI) proxy for output, money supply (M1) on KSE equity prices. The result shows that industrial production index is positively and inflation is negatively related with the stock prices.

Flannery and Protopapadakis (2002) investigated the association between equity returns and monetary factors i.e. M1 and M2, inflation factors i.e. PPI (Producer Price Index) and CPI (Consumer Price Index), and real sector factors i.e. industrial production, balance of trade, personal consumption and real GNP. Results show that Industrial production and real GNP are not significant in explaining the equity returns, however PPI, M1 and CPI are significantly associated with the equity returns and their influence is negative on NYSE, NASDAQ and AMEX stock returns.

Durham (2003) studied the impact of monetary policy on stock returns of 16 countries (Sweden, South Africa, Canada, Finland, Germany, Italy, the Netherlands, Austria, Switzerland, Ireland, Belgium, the UK, France, Japan, New Zealand and the USA). The factors are discount rate substitute for monetary policy and stock returns. By using regression analysis, result shows a significant negative association between monetary policy and stock returns for all the countries by and large.

S. S. Chen (2007) examined the impact of monetary policy on the nominal and real stock returns for US stock market. The result shows that all monetary policy factors have significant influence on stock returns except M2 growth rate. Humpe and Macmillan (2009) observed that return on US stocks are positively associated with industrial production and money supply, and negatively related with inflation and long term interest rate. In the long run Inflation, real exchange rate and industrial production growth are positively associated with equity returns, whereas money supply and three-month risk free rate are negatively related to KSE 100 index equity returns (Hussain & Sohail, 2011). Macro-economic factors like inflation and GDP predicts the cross sectional US equity returns(Kang, Kim, Lee, & Min, 2011).

Money supply has negative affect on Canadian stock prices in the short run (Ariff, Chung, & Mohammad, 2012). Saeed (2013) examined the impact of interest rate, money supply, exchange rate, oil prices and industrial production on sectorial indices of KSE 100 Index. The results show that money supply and

interest rates are negatively related with most of the sector's returns. Whereas industrial production, oil prices and exchange rate produce mix results.

Bansal, Kiku, Shaliastoivh, and Yaron (2014) find that the frequent movements in macro-economic factors affect the discount rates inversely thus equity prices also face decline in US stock markets. By using data mining procedure Gupta and Modise (2013) suggest that interest rate, money supply, world oil production growth and inflation can significantly predict the South African stock returns.

Another study by Kalyanaraman and Al-Tuwajri (2014) shows that interest rates are inversely related with Saudi stock returns whereas money supply and industrial production are having positive impact on the stock returns.

Theoretical Framework

The study has employed multi-factor model[3]. According to asset pricing theories, the asset return is a function of systematic macro-economic factors (Ross, 1976) and (N. F. Chen et al., 1986). According to present value models, the stock returns are affected by the change in dividends and/or discount rate.[4] Therefore any macro-economic factor that can potentially influence dividends and/or discount rate, can also in turn affect the stock returns. The set of macro-economic factors undertaken in this study are based on the exhaustive literature reviews [5]. The macro-economic factors undertaken in this study are inflation, risk free rate, industrial production index, market return and money supply.

Theory suggested that a firm's cash flows are affected by the aggregate output like GD, industrial production etc. (N. F. Chen et al., 1986; Gjerde & Saettem, 1999; Maysami & Koh, 2000; Humpe & Macmillan, 2009). An increase in production is likely to have positive impact on gross domestic product and firm's profitability thus results in a positive influence on stock prices. Increases in aggregate output potentially raise the expected future cash flows and thereby increase stock prices, while the opposite effect would occur in a recession.

Inflation may affect the firm's income negatively, since the raising cost couple with slow adjustment in output prices results in lower profits and thus lower share returns (DeFina, 1991; Geske & Roll, 1983; Humpe & Macmillan, 2009). However another point of view is that people in the hope of earning a nominal rate of return, invest in various financial assets to hedge against inflation.

[3](Reinganum, 1981) (N. F. Chen, 1983)

[4](Brigham & Houston, 2009) edition = 12, publisher = South Western, A part of Cengage Learning,)

[5](N. F. Chen et al., 1986; Flannery & Protopapadakis, 2002; S. S. Chen, 2007; Panda, 2008; Humpe & Macmillan, 2009; Ngoc & Hussainey, 2009; Mohammad, Hussain, Jalil, & Ali, 2009)

Therefore, stock returns should be positively related with expected inflation (Firth, 1979).

Money supply also has an impact on stock returns[6] , firstly money supply may have positive influence on stock returns, since with an increase in money supply the investment will shift to financial securities like shares, thus share price increases; secondly it may have a negative impact on share price by increasing the inflation (Chaudhuri & Smile, 2004; Humpe & Macmillan, 2009).

3 Data and Methodology

The prime objective of this study is to analyze the impact of macroeconomic variables on stock returns in listed firms of Pakistan. In this study the annual firm level panel data from 2001 to 2011, of 115 non-financial firms listed on nine sectors of Karachi stock exchange have been used. Table 1 represents the details of number of firms of different sectors used in this study as a sample. The data of all macroeconomic variables were gathered from the different issues of economic survey of Pakistan which is published by State Bank of Pakistan (SBP). The data of stock returns and market returns were collected from official database of Karachi Stock Exchange.

Table 1: Sector Wise Distribution of Sample Firms

Sr No.	Sector	No. of Sample Firms
1	Automobile and parts	16
2	Beverages	3
3	Chemicals	16
4	Construction and materials	27
5	Fixed line telecommunication	4
6	Food producers	17
7	General industrials	8
8	Industrial engineering	8
9	Oil and Gas	16
	Total	115

In this study Im, Pesaran and Shin (IPS) unit root test has been used to ascertain the level of stationarity in the variables. Im, Pesaran and Shin uses a combination of time series aspect and cross sectional aspect of the data, thus even with less number of observations, the test displays a better power to explain. Also this test was employed to examine unit root in heterogeneous panel series. Pooled Ordinary Least Squares (POLS) is used to analyze the relationship between macroeconomic variables and stock returns. The rationale for

[6](Rogalski & Vinso, 1977; Urich & Wachtel, 1981)

using POLS is primarily driven by the fact that it minimizes the distance between the observed set of data and the estimated values. After reviewing the empirical studies, the model to analyze the relationship between macroeconomic variables and stock returns in Pakistan is determined by following function:

$$SR_{it} = \alpha + \beta_1 INF_{it} + \beta_2 RF + \beta_3 IPI_{it} + \beta_4 MR_{it} + \beta_5 MS_{it} + \epsilon_{it}$$

Where i refer to the number of firms listed on different sectors, t represents number of observations over time and is the error term. SR is stock return which is obtained as ratio of difference between the annual average closing stock prices of year t and year t-1, to average annual closing stock price of year t-1.

$$SR_{it} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

INF inflation which is measured by consumer price index, RF is risk free rate which is measured by treasury bill rate issued by Government of Pakistan. IPI is industrial production index which is used to measure the level of economic activities and industrial productions in the given period. MR is market return which is used to control the effects of systematic risk in the model. MS is money supply which is used to reflect the effects of circulation of money in the economy. Hypotheses of the study are constructed as follows:

- H01 = Inflation has an insignificant impact on Sectors' Returns of Pakistani listed firms.
- H02 = Risk Free Rate has an insignificant impact on Sectors' Returns of Pakistani listed firms.
- H03 = Industrial Production has an insignificant impact on Sectors' Returns of Pakistani listed firms.
- H04 = Market Return has an insignificant impact on Sectors' Returns of Pakistani listed firms.
- H05 = Money Supply has an insignificant impact on Sectors' Returns of Pakistani listed firms.

4 Results & Analysis

Results include the descriptive statistics, unit root test, and regression analysis. Table 2 reports the descriptive statistics (mean and standard deviation) for macro-economic factors and sector returns.

Table 2: Descriptive statistics, Annual data (2001-2011)

Variable	Mean	Std. Dev.
IPI	162.876	41.905
RF	8.673	3.932
MR	7699.939	4361.467
CPI	9.015	5.375
M2	6.399	0.358
SR (Auto & Parts)	0.2292	0.7081
SR (Beverages)	0.1089	0.42
SR (Chemicals & Pharma)	0.1795	0.452
SR(Construction&Materials)	0.0883	0.5607
SR(FixedLineCommunication)	0.0256	0.4861
SR (Food)	0.2242	0.5833
SR (General Industrials)	0.1636	0.5041
SR (Industrial Engineering)	0.3261	0.9941
SR (Oil, Gas & Energy)	0.0864	0.4426

For all practical purposes, any study that can be used to predict or forecast a relationship between variables and its results can be used to make a general statement, is considered more valuable and contributing[7]. In case the research variables do not display stationarity i.e. they show unit root, then the estimated results no longer serve the objective of prediction and/or making any generalization about the results for different time periods. For investigating the nature of stationarity in the variables, Im, Pesaran and Shin (2003) unit root test was employed.
Table 3 shows the results of IPS panel unit root test at level and first difference in intercept and intercept plus trend. The result indicates that the variables are not stationary at level I(0), i.e. the null hypothesis of a panel unit root cannot be rejected at level. However all the variables are stationary at first difference I(1). This evidence suggests that this series of variables may demonstrate a long run relationship.

Table 4 shows the results of POLS estimators for all nine sectors. The research show that Risk free rate (RF) has a negative and significant impact on all sector returns[8]. RF seems to be having better explanatory power for Industrial Engineering, Construction & Materials and Beverages sectors. With the rise in risk free rate, investment in less risky instruments like T-bills and bonds increases, reducing the investment in stocks, thus decreasing in the demand for stocks and stock return decreases.

Industrial Production Index (IPI) is found to be having a positive [9] and sta-

[7](Gujrati, 2004)
[8]Also supported by the researches results of (Geske & Roll, 1983) (N. F. Chen et al., 1986)
[9]The result is in line with the research of (N. F. Chen et al., 1986; Gjerde & Saettem, 1999; Maysami & Koh, 2000; Humpe & Macmillan, 2009)

Table 3: Stationary Test Results

Variables	**Im, Pesaran and Shin**			
	I(0)		**I(1)**	
	C	C&T	C	C&T
IIP	-0.089	-0.587	-2.045**	-2.258**
TB	-0.258	-0.897	-3.021*	-3.458*
KSE	-0.989	-1.005	-3.498*	-4.258*
CPI	-0.099	-0.458	-2.125**	-1.998***
M2	-0.578	-0.888	-2.451**	-2.712**
Auto & Parts	0.056	-1.108	-1.644**	-2.218**
Beverages	-0.787	-0.253	-2.586*	-2.044**
Chemicals & Pharma	0.975	0.193	-2.297**	-1.547***
Construction & Materials	1.374	-0.885	-4.178*	-3.298*
Fixed Line Communication	-0.02	1.09	-7.660*	-5.408*
Food	0.384	1.32	-7.929*	-8.844*
General Industrials	-0.345	-0.587	-4.258*	-4.298*
Industrial Engineering	-0.112	-0.879	-3.883*	-5.215*
Oil, Gas & Energy	-0.578	-1.178	-6.225*	-7.112*

Author's Estimation *,**,*** represents significance at 1% , 5% and 10% respectively

tistically significant impact on all sectors' returns except, for Fixed Line Communication sector. Since the firms listed in Fixed Line Communications sector are primarily service providers therefore IPI is having an insignificant positive impact on the sectors' returns. As the firms listed on the Karachi Stock Exchange are local firms, therefore an increase in the production, increase firm revenues, profitability, results increase in stock prices thus the stock returns increases.

KSE 100 index market based returns show statistically significant and positive relationship with all the sectors' returns[10] except for the Industrial Engineering sector.

CPI demonstrates a statistically significant and negative impact on all the sectors' returns[11]. CPI represent the level of inflation rising inflation may decrease the basic purchasing power, decrease savings and investment, hence the stock prices fall and the stock return as a result would decline. However, CPI is not having a statistically significant impact on sectors like Auto, Food and General Industrials. As most of the firms in Food sector are fast moving consumer goods producers, due to inelastic demand for such products, increase in prices doesn't normally harm demand. Accompanied by the booming younger generation and use of social media by the producers, have contributed in better

[10](N. F. Chen et al., 1986)

[11]This result is in accordance with the empirical research by (Geske & Roll, 1983; Humpe & Macmillan, 2009)

Table 4: Pooled Ordinary Least Square Estimation

Model	***C***	***IIP***	***RFR***	***MR***	***CPI***	***M2***	***Adj. R2***	***F-stats (Prob)***
Auto and Part	-14.4798	0.0367	-0.0784	0.0002	-0.0076	-3.0861	0.3069	16.49
	(0.03)	(0.01)	(0.00)	(0.00)	(0.67)	(0.02)		(0.00)
Beverages	11.516	0.022	-0.0986	0.0655	-0.0302	-2.0953	0.6071	10.88
	(0.11)	(0.00)	(0.00)	(0.00)	(0.00)	(0.14)		(0.00)
Chemical and Pharma	-3.2408	0.01	-0.0508	0.064	-2.4194	-0.8029	0.3693	21.49
	(0.44)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)		(0.00)
Construction and Materials	15.7746	0.0327	-0.1047	0.0001	-0.035	-2.9156	0.4379	47.11
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)
Fixed Line Communication	-2.3001	0.4945	-0.0373	0.0245	-0.0418	-0.0529	0.2671	4.13
	(0.44)	(0.83)	(0.00)	(0.05)	(0.00)	(0.96)		(0.00)
Food	-0.9446	0.0067	-0.0657	0.0649	-0.0091	-0.3765	0.2011	10.36
	(0.87)	(0.00)	(0.00)	(0.00)	(0.06)	(0.00)		(0.00)
General Industries	-11.5585	0.0294	-0.0503	0.0002	-0.0083	-2.4467	0.3824	11.77
	(0.08)	(0.04)	(0.00)	(0.01)	(0.63)	(0.06)		(0.00)
Industrial Engineering	-21.778	0.0491	-0.1333	0.0253	-0.0264	-4.4958	0.2801	7.76
	(0.12)	(0.01)	(0.00)	(0.05)	(0.00)	(0.00)		(0.00)
Oil, Gas and Energy	-3.1141	0.0092	-0.0614	0.0602	-0.0037	-0.75	0.3269	18
	(0.46)	(0.00)	(0.00)	(0.00)	(0.04)	(0.05)		(0.00)

Author‘s Estimation
Numbers in paranthesis are prob values

profits for this sector. Hence inflation seems to be not significantly affecting their stock returns as well. Firms in General Industrials sector have diversifiable nature of businesses; therefore inflation is not significant for this sector. Inflation is insignificant for Auto sector as well, due to availability of cheap fuel like CNG and auto financing this sector has faced growth, hence less affected by inflation as such.

Money Supply (M2), in this study shows a negative and statistically significant impact on the stock returns[12] for all the sectors except for Beverages, General Industrials and Fixed Line Communications sectors. Since an increase in M2, increases discount rate and inflation, it decreases the stock returns. Beverages sector consist of firms that are producing fast moving consumer goods products, their demand is less sensitive to changes in price, and firm profits are less vulnerable to inflation hence stock prices would not fall significantly and the same would be the effect on their stock returns. Firms in Fixed line communication sector are having a cut throat price competition, the customers are getting economical packages, and with the availability of cheap and reasonable mobiles phones in the country, this sector have seen growth for quite sometimes. Therefore inflation does not seem to have a significant impact on the stock returns for this sector.

5 Conclusion and Recommendations

The purpose of this research is to empirically identify the impact of set of macroeconomic factors on firms' stock returns. The set of macroeconomic factors used in this research i.e. Risk free rate (Treasury bills rate) , KSE 100 index (Market return), Money supply (M2), Inflation (CPI) and industrial production index (IPI) are the independent variables and Sectors return is the dependent variable. The statistical sample included annual data of 115 firms from nine nonfinancial sectors, listed on the KSE 100 index from the year 2001 to 2011. By applying regression analysis, IPI and KSE 100 index both are positively related to stock returns. CPI, M2 and risk free rate demonstrates a negative impact on the stock returns for almost all sectors. Most of the macroeconomic factors used in the study, are found to be statistically and economically significant in explaining the stock returns. Overall, money supply displays the most explanatory power for stock returns and inflation and market returns exhibits relatively weaker role.

The findings of this research have implications for equity investors, financial managers, capital market authorities and central bank policy makers. Since risk free rate shows a negative impact on stock returns for all sectors, therefore for the development of the stock market for domestic investors, State Bank needs

[12]Same is the result in studies by (Chaudhuri & Smile, 2004; Humpe & Macmillan, 2009)

to maintain a ratio between money supply and risk free rates that motivate investors to invest in risky assets like shares. As Fama (1990) suggested that stocks returns predict real activity, State Bank should monitor the rate of inflation, as instability in prices could hinder the stock return and in turn economic growth. As market returns and stock returns display a positive relationship, Securities and Exchange Commission of Pakistan (SECP) should devise and implement proper risk management practices in the capital market that safeguards and motivates the domestic investors. The macroeconomic conditions specifically focused in this study should be encouraging for the growth of profitable business operations so that the adequate numbers of business develop therefore their sustainability requires capital market to serve as a financing channel for them.

The investments in the securities market need an equal support from fiscal policy regime, e.g. different income tax rates or capital gain tax rates from various financial tools will alter financing and investment decisions. This sectorial study could serve the investors in making a diversifiable portfolio by taking into account the impact of different macroeconomic on respective sectors stock returns.

To develop a better understanding about the factors or variables affecting the firm's stock returns, further research can undertake the macroeconomic factors' data with different frequencies i.e. monthly and/or quarterly. Furthermore the study can be extended to other sectors as well besides the nine nonfinancial sectors investigated in this research. Yet another possibility can be to extend the study to time periods other then covered in this research by using different sophisticated econometric techniques.

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