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The Essentials of Financial Policies and Interest Rate Shocks in Downturn and Upswing of Stock Market: A Cointegration and Causality Analysis

Sarfaraz Ahmed Bhutto[1] , Zulfiqar Ali Rajper[2] , Jai Kishan[3]

Abstract

The financial market (stock market) of any country play pivotal role in measuring economic prosperity of country, and it is notion that the global financial crisis has essentially destroyed all the stock exchanges. Therefore, the current study focuses on finding factors related to financial policies that affect stock market upswing and downturn. The interest rates and other linked monetary policies determine the direction of the stock market. Study considered monthly data from the period of Jan-2005 to Dec-2018 and measured the correlation, Cointegration and causality among variables. The GARCH (1, 1) model is used to generate stock market index variation and interest rate shocks. The developed model analyzes by using trace rank test of Johansen Cointegration analysis, Granger causality analysis and Impulse response analysis with proper contemplation of all diagnostic test. The results confirm the long-run negative and significant relationship of interest rate shocks, inflation rate, financial crisis, and stock market volatility. In a long-run, the exchange rate and money supply observed positively with stock market. All predictors and outcome variables have a causal relation with each other, but the financial crisis of the world does not show as causal relation with the stock exchange volatility. This study will help policymakers to take a closer look at these factors when making monetary and all associated policies because the study provides a realistic picture before the crisis, during the crisis and after the crisis effects of all these factors on the stock market. Moreover, it is imperative for authorities to look at all the factors that affect the market deeply.

Keywords: *Financial Policies, Upswings & Downturn of Stock Market, Interest Rate Shocks; Global Financial Crises; Granger Cause, Cointegration*

1. Introduction

Indeed, the significant purposes of monetary policy remain toward control the prices in the local market and to decrease unemployment of the nation. The financial experts and policymakers complete this ultimate target with proper contemplation of interest rate & its shocks, money supply for the market and therefore forth to improve the monetary change (Ali, Mahmood, & Bashir, 2015). Financial exchange and related decisions assumed to be a fundamental job in monetary improvement and development of a nation. Meanwhile, decision making is a rational process of selecting an outcome from the available opportunities. In recent decades of global financial crises, individuals and organizations faced a crucial problem in making the best investment decision. The corporations only focus on maximizes the wealth of shareowners, so maximizing the share value by effectively allocating the resources is a great deal to make the companies profitable. According to the theory of efficient market hypothesis (EMH) that investors should be unbiased while making investment decisions for enhancing their portfolio returns because they are not like uneducated irrigation agents. However, the information relating to the market easily accessible to all investors to make the finest investment decision because now the market is well-organized (Shleifer, 2000). Contrarily, the technical analysts are against the theory of EMH because they believe that future expectations are like past earnings, change in prices and trend of the volatility of the stock market.

PhD Scholar, Institute of Commerce, Shah Abdul Latif University Khairpur Sindh, Pakistan[1]
Assistant Professor, Department of Commerce, Shaikh Ayaz University Shikarpur Sindh,Pakistan.[2]
Lecturer, Department of Business Administration, Shaikh Ayaz University Shikarpur Sindh, ,Pakistan.Pakistan.[3]

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Behavior finance and economics rejected the prefect rationality assumption and hold that investors are affected by their sentiment in the decision-making process and which leads to a bias of irrationality in decision making (Baker & Wurgler, 2007). As assume in an economic model that human decision is not the relation but influenced by their emotions, so it's hard to determine their behavior accurately in reality (Kuzmina, 2010). This risk should manifest itself as an added price volatility of asset and market volatility as a whole effect by the action of an irrational trader. The policymakers of the countries always ruminate deeply to manage interest rates, control the money supply for stabilizing the exchange rate because it may create a cause to push the inflation of the country. Similarly, the increase in inflation, fluctuation of exchange rate invite reasons to increase the interest rate and then it affects the stock market adversely. That is why the monetary policy and all related issues which we discussed are more highlighted issues for the developing nations. Following graph shows the trend of the interest rate, shocks of interest rate, stock market index and Upswing and downturn of stock market index of Pakistan from 2005 to 2008. The table 1 listed below shows the trends of core interest variables for the selected period and it shows that the situation of shocks of the interest rate of Pakistan in more critical in the initial years and it is more versed in 2008-2009. The trend of the stock market of Pakistan depicts as crashed the market during 20082009 because of global financial crises and then its shows as stable after some period. Moreover, interest rate and related monetary policies are most important for the determination of the future situation of the stock market and then the economy of the country. From the last some decades, the behavior of the stock market became a major indicator of the direction of the economy of the nations. The securities prices traded in market changes on a daily bases due to market forces and index of the market also change.

Therefore, the demand and supply equally affected by different indicators such as interest rate, inflation rate, and exchange rate. Likewise, the increase in interest rate becoming an attraction sign of investors for banking sectors and consequently, the demand for securities effected. Correspondingly, high inflation and fluctuation in the exchange rate weakening the buying power of investors and investment shifted to the banking investment. On the other side, the lower rate of interest pushes the demand of investors to form banking to the industry sector and then the rate of inflation and exchange rate strengthens the power of investors of the security market. This key in-depth relationship finding is most important for all investors so that is why we going to conduct this particular research study. The study mainly focuses on measures of the influence of interest rate shocks and related monetary policies on the stock market volatility of Pakistan stock exchange. The remaining study divided into the following sections as chapter 2 is about literature review and hypotheses development, 3rd chapter will discuss the econometric tools and methodology of the study, 4th one related to results and discussion and then listed conclusion of the study.

2. Literature Review Theoretical Groundings

This section provides a concise summary of all published studies related to shocks of interest rate and stock market fluctuation with some critical review and comparison. Originally, we try to explain the related theories that are considered as a foundation of the study and then we talk about literature review and development of hypotheses of this study.

The arbitrage pricing theory was produced by Ross with the choice of the available capital resource calculating model as it proposes that the cost advantage may be gained by different full rule financial variables (Ross, 1976). The theory established that the return from money related resources can be determined using the conventional capacity of different macroeconomic factors. The APT also advised the one-factor model which we can also modify with other multifactor of macroeconomics that affects the stock market and creates the valuation in it.

The fisher effect theory proposed that the interest rate in the real term, the nominal rate of interest, and the expected rate of inflation is independent of monetary measure. The real interest rate is a rate that we adjusted for the expected effect of inflation over time. The nominal rate of interest having a reverse relationship with the rate of inflation, so the monetary policy should be effective and neutralized. Practically, whenever the central bank increases the supply of money, the rate of inflation also rises, and then the interest rate should be increased by the central bank for balancing the effects of inflation and money supply simultaneously (Dimand, 2003).

The Interest rate parity theory talk about the interest rate parity situation in two different markets, the parity is the situation when there is no change to gain profit from the differential effects of two different markets (Bleaney &

Fielding, 2002). When this kind of situation exists among the markets, the investors should focus on the exchange rate differential for gaining the benefits from the differential of the rate of currency which is the focal point of arbitrage theory. This situation ultimately reduces the fluctuation of stock markets because of no more other options for the investors of different markets (Karfakis & Kim, 2005).

2.1 Elements of Financial Policies, Interest Rate Shocks and Volatility in Stock Markets

Wang (2001) conducted study in China to determine the different factors that affect the stock returns and they found the negative Granger-Causal connection among interbank interest rates and the stock returns. Liu & Sinclair (2008) some other scholars also established that the negative reaction of stock prices was found in the presence of high shocks in interest rates. Similarly, some researchers took monthly data in the case of Pakistan using Co-integration and Granger Causality test and founded that the stock price and interest rates depict the opposite direction in both the short and long run (Azim, Asif & Mehar, 2015). Based on the random walk model for fifteen developing and developed countries, the scholars concluded that all countries show a negative link between the rate of interest and change in the share prices. Additionally, they said the intensity of influence in South Asian Countries greater than the other countries (Uddin & Alam, 2010).

For having certain causal relationship, Granger causality has been used to observe bidirectional relationships, in this sense Stock returns and Overnight interest rate were used. Moreover, a unidirectional relationship is also observed between treasury interest rate and stock returns. Inflation is also considered to have granger cause on return of stock. Similar to the findings of other scholars (Ramzan, Asif & Mustafa, 2013). Likewise, the study also indicates stock returns do Granger cause inflation (PPI). Scholars indicate both the CPI and PPI are strong risk factor candidates for the New York stock exchange. However, the other scholars' study for Turkey shows that is no causal relationship between inflation (CPI and PPI) and stock returns.

Some other methodologies have been used to extract the association or linkage between financial policies and stock returns. Such as the study of Lee et al (1991) and Mehar et al., (2019) have used models with respect to the market timing to reveal the short-run association between interest rate volatile and its negative consequences on market returns. Moreover, the study of Nishat et al. (2004) studied a time series data from 1989 to 2012 to determine negative influence of rate of interest on stock returns. The bring evidence that under certain financial crises interest tend to move downward and emphases negative effects on market returns. Similarly, the studies found that interest rate, exchange rate, and inflation rate proved to be major determinants of portfolio investment in stock markets (Mehar & Hasan, 2018).

The economists like Gali & Monacelli (2005) and Devereux & Engel (2003) documented that the certain changes in financial policy is one of the most useful tool obtainable for every central bank of an individual in association with influencing the actual economic activity. Indeed, it is true that the global financial crisis is far from over. So far, the global financial crisis has gone through many different stages. The crisis began in the subprime mortgage market, primarily in the summer of 2007, and in September 2008 it became more severe as the Lehman Brothers default. As a result, financial distresses fallen into the real economy, which led to recession in almost all industrialized countries and smashed stock markets. At that time monetary policy confronted it with unprecedented power and responded with very low interest rates. Finally, the economic activities recovered in 2010, but countries that had huge public and private debt burdens like Pakistan face many problems to redounded economy and their stock market in actual position. The actual picture before, during and after crisis for Pakistan stock exchange is missing and has not received much attention in the literature. Therefore, our paper aims to fill this gap.

3. **Hypotheses of the Study**

H1: Interest rate shocks and stock market upswing and downturn (volatility) are negative and significantly related.

H2: Inflation and stock market upswing and downturn (volatility) are negative and significantly related

H3: Exchange rate and stock market upswing and downturn (volatility) are positive and significantly related

H4: Money supply and stock market upswing and downturn (volatility) are positive and significantly related

H5: World financial crises and stock market upswing and downturn (volatility) are negative and significantly related

4. ECONOMETRIC TOOLS AND METHODOLOGY

The positivist philosophy of researchers to collect the secondary monthly data which covers the time span from Jan 2005 to Dec 2018 utilizing the official websites of state bank of Pakistan, investing. Come, and financial market association. Priority for the use of monthly data is suggested by the first work done by the scholars

Bamrungsap, et. al., (2019). The KSE-100 index of Pakistan stock exchange is used for the stock market representation and then we calculated volatility of this index by using the GARCH (1, 1) model. The monthly on average interest rate prevailing for the selected time period was taken and then generated a series of interest rate shocks by using the GARCH (1, 1) model. The conditional Upswing and downturn of stock market is calculated by Autoregressive Conditional Heteroscedasticity (ARCH) and its extension version Generalized Conditional Heteroscedasticity model. GARCH (1, 1) has been applied in this study to measures conditional stock market volatility, this measure is recommended by many scholars (Adeniji, Obansa & Okoroafor, 2018; Bamrungsap, et. al., 2019). This model applied to KSE-100 using 1 lagged and then generates the GARCH residual series, this series presenting as Upswing and downturn of stock market. The similar model applied to the interest rate using 2 lagged and then generate residual series with using software outputs, this series is best for predicting interest rate shocks because similar calculations were suggested by many studies. GARCH model were developed by the Engle and Bollerslev (1986) is considered to be best for capturing time varying volatility and shocks of the factors. We captured volatility of stock market and shocks of interest rates using following equation:

$$SMt = \beta 0t + \beta 1tSMt\text{-}1 + \delta\sigma 2t + \varepsilon t,\ \varepsilon t \sim N(0, \sigma 2t) \quad \textbf{(1)}$$

$$\sigma 2t = \alpha 0 + \alpha\ 1\varepsilon 2t\text{-}1 + \gamma 1\sigma 2t\text{-}1 \quad \textbf{(2)}$$

Equation 1 represent mean variance and equation 2 for the conditional variance. SM and SM t-1 denote for the stock market and 1 month lagged value of stock market respectively; εt shows the normal distribution of stochastic term; σ2 is for conditional variance and t represent the time period which is depend on the relevant information from ε2t-1 and σ2t-1 showing the garch term. The vector α0, α1 and γ1 used for capturing the volatility transmissions changing over time and β0t, β1t used for allowing time varying. The similar equation but using 2 lagged value were utilized for capturing the shocks of interest rate, this measure was proposed by Adeniji, Obansa & Okoroafor (2018).

Initially, the ADF test of stationarity were used for the examination of the variables in the model to determine their order of integration using the following equation of ADF test.

$$\Delta Yt = \alpha 0 + \alpha 1\ yt\text{-}1 + \Sigma\beta i\Delta Yt{-}i + \mu t \quad pi{=}1 \quad \textbf{(3)}$$

Where, ΔYt is for first difference, Yt and p for the lagged length of augmented term which is suggested by Aliyu (2011). The long-run and causal relationship measured by utilizing Johansen normalized co-integrating coefficients analysis of Trace rank test and Granger causality test. The following equation used for trace rank test of Johansen co-integration analysis:

$$\lambda trace(rank) = -\ T\ \Sigma ln(1{-}\lambda' i) \quad ni{=}r{+}1 \quad \textbf{(4)}$$

this measure is suggested by Arshad & Javed (2009). The following two equations used for the causality test:

$$\mathbf{\Delta}Xt = \alpha x + \Sigma\beta x,\Delta Xt{-}i + \Sigma\gamma x,i\Delta Yt{-}i + \mu x,t \quad ki{=}1\ ki{=}1 \quad \textbf{(5)}$$

$$\mathbf{\Delta}Yt = \alpha y + \Sigma\beta y,\Delta Yt{-}i + \Sigma\gamma y,i\Delta Xt{-}i + \mu y,t \quad ki{=}1\ ki{=}1 \quad \textbf{(6)}$$

Where: **Δ**X and **Δ**Y depict the first difference of the variables and t shows the selected time period; α, β, γ are standardized coefficients of regression; μt is the error term (random), this model adopted from the framework given by Da Silva, et. al., (2014). Further, the impulse response analysis was also applied to detect the response of all predictive factors during a 1- shock or innovation (Adeniji, Obansa & Okoroafor, 2018). Details of all the variables, labels, and variables are listed in the table below:

Table 1: Variables, Label, and Description

Variables	Label	Description
Outcome variable:		
Stock Market Volatility	SMV	KSE-100 index used as a representative of the stock market of Pakistan and then created volatility of the index.
Predictor variables:		
Interest rate Shocks	IRS	Interest Rate is the cost of using other's money and taken as a percentage of the principal per period and then created shocks.
Exchange rate	ER	An exchange rate is the value of one nation's currency against the currency of another nation or economic sector.
Inflation rate	IR	The inflation rate is taken as a percentage and it represents the situation of rising prices of the goods and services.
Money Supply	MS	M2 proxy is used for measuring the money supply.
World Financial Crises	WFC	This dummy variable takes to present the period of financial crises of the world by 1 and 0 for otherwise

5. RESULTS AND DISCUSSIONS

This section illustrates the complete results and discussions of outcomes according to the objectives of the study. Firstly, we listed a correlation analysis to find out the relationship between said variables. So, the following table shows the correlation result of the study:

Table 2: Correlation Analysis

	SXV	IRS	IR	ER	MS	WFC
SXV	1.0000					
IRS	-0.1849**	1.0000				
IR	-0.1444*	0.6110***	1.0000			
ER	0.0163**	-0.1825**	-0.4238***	1.0000		
MS	0.0038*	-0.2485***	-0.5859***	0.9234***	1.0000	
WFC	-0.1241**	0.5413***	0.6583***	-0.2535***	-0.3179***	1.0000

Source: The Authors' Investigation ***p < 0.01, **p < 0.05, *p < 0.1

It can be observed in the above table that SXV, IRS, IR, ER, MS, WFC have significant associations. Further, it is seen that some variables have positive association and some have negative interrelationships. Mostly variables were found at .01 level of significance.

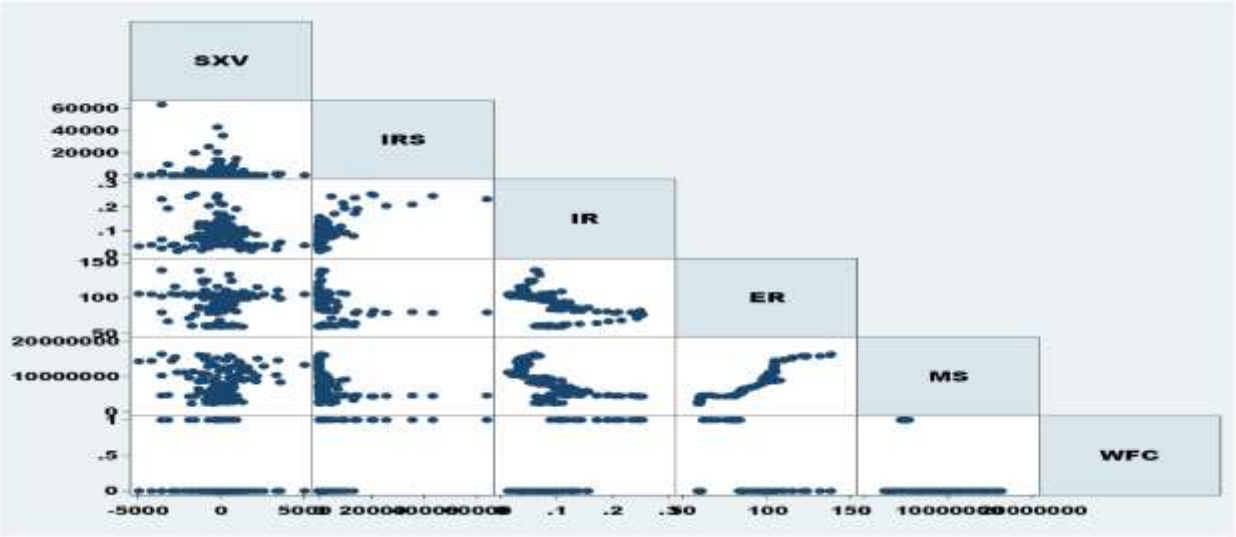

Figure 2: *Correlation trend among Outcome and all Explanatory Variables*

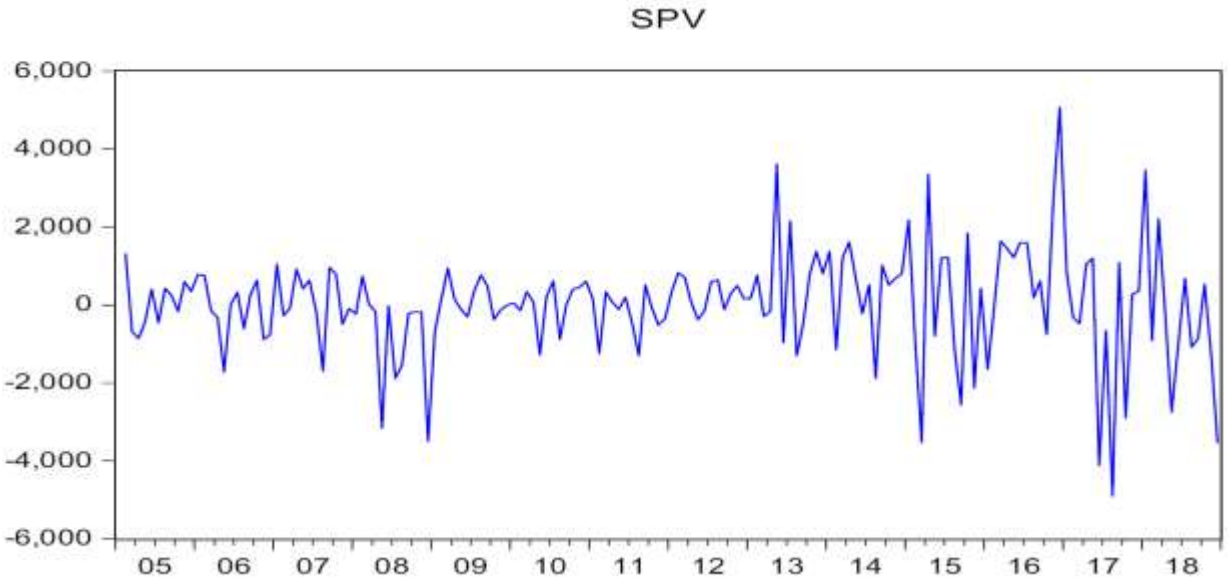

Figure 3: *Trend of Stock Market Volatility*

The similar results observed in both correlation and trend correlation analysis, the above-listed graph and results of the table depict that there are an inverse and significant connection among interest rate shocks and the upswing & downturn of Pakistan's stock market. The result demonstrates that the increase in shocks of interest rate immediately causes to decreases the stock market return as we have already grasped in table 1 shown in the introduction, this finding is like the findings of other scholars. Meanwhile, the inflation rate and financial crises also associated significant and negatively with the Upswing and downturn of stock market. On the other hand, the exchange rate and money supply have a positive and significant connection with the Upswing and downturn of stock market in both the numerical and graphical findings. Logically, the results portray if the exchange rate and money supply increase in Pakistan it immediately causes to increase in the Upswing and downturn of stock market. These findings are similar to the fisher effect model as the increase in money supply causes high inflation and the stock market affected negatively if the interest rate assumes constant (Ibrahim & Alhassan, 2014). The following table 3 shows the conditional mean equation result of KSE-100 index of Pakistan stock exchange regressed on its lagged value. The GARCH (1, 1) model was applied and then generate the variance series of model. This series serve as a volatility of stock market with neither exogenous nor endogenous as this measure was recommended by many scholars (Engle, 2002; Adeniji, Obansa & Okoroafor, 2018). All the listed variables in results are statistically significant except the value of constant. Similarly, the graphical depictions of stock market volatility show that volatility is stationary because it does not follow a random pattern.

Table 3: The Stock Market Volatility Equation

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	200.3634	193.0869	1.037685	0.2994
SP(-1)	0.997791	0.008248	120.9689	0.0000
Variance Equation				
C	33615.01	37465.17	0.897234	0.3696
RESID(-1)^2	0.063300	0.035328	1.791769	0.0732
GARCH(-1)	0.927907	0.055097	16.84146	0.0000

The result of table 4 shows the results of interest rate as it regressed with its 2-period lagged and economically the residual series consider shocks which is generated through this process (Qin, & Gilbert, 2001). The both lagged 1 and 2 period variables in following table shown statistically significant, but the constant value is not significant. Like the above case, the graphical picture of the interest rate shocks is viewed as stationary because there is no pattern in the series.

Table 4: The Interest Rate shocks Equation

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.177243	0.025538	6.940320	0.0000
IR(-1)	0.823135	0.093154	8.836309	0.0000
IR(-2)	0.144217	0.093567	1.541324	0.1232

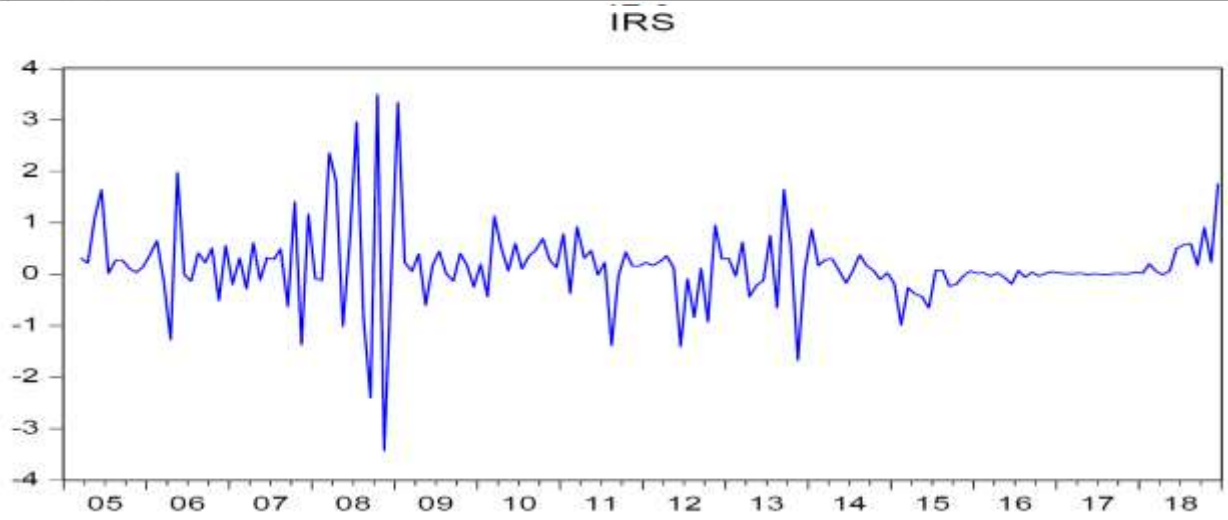

Figure 4: *Trend of Interest Rate shocks*

Data Stationarity

The Stationarity test is like a diagnostic check of a patient to identify the disease and its intensity for recommending the prescription. Similarly, we apply this test to know the nature and condition of time series because the assumption of the classical regression model is the time series must be stationary. It measures the stationary or non-stationary of time series data at level and trend (Chen, 2007). The presence of a unit root in the autoregressive model is measured by applying the Augmented Dickey-Fuller test. The equation and results of the unit root test of Stationarity listed below:

Table 5: Unit Root Test

Variable	Test	Test- Statistic	Critical Value		
			1%	5%	10%
Stock Market Volatility	At Level	-0.54462 (0.8781)	-3.46969	-2.87872	-2.57601
	First Diff.	-12.6363 (0.0000)	-3.46993	-2.87882	-2.57606
Interest rate Shocks	At Level	-1.58307 (0.4890)	-3.47042	-2.87904	-2.57618
	First Diff.	-7.33457 (0.0000)	-3.47042	-2.87904	-2.57618
Inflation rate	At Level	-0.97794 (0.7604)	-3.47281	-2.88008	-2.57673
	First Diff.	-6.82354 (0.0000)	-3.47281	-2.88008	-2.57673
Exchange rate	At Level	0.87619 (0.9950)	-3.47042	-2.87904	-2.57618
	First Diff.	-4.08026 (0.0014)	-3.47042	-2.87904	-2.57618
Money Supply	At Level	-2.36330 (0.1539)	-3.47281	-2.88008	-2.57673
	First Diff.	-11.5251 (0.0000)	-3.47281	-2.88008	-2.57673
Financial Crises	At Level	-2.02843 (0.2745)	-3.469691	-2.878723	-2.576010
	First Diff.	-12.80625 (0.0000)	-3.469933	-2.878829	-2.576067

Source: The Authors' Investigation **Note:** The values shown in parentheses with T-statistics shows the probability values of the T-stat

The results of the unit root that we obtained from the ADF test of the unit root show the all included variables have unit root problems at the level as we can observe that all variables are not significant. At 1st different, the result shows all variables are statistically significant at 1st difference, it means all factors are stationary at 1st difference. In this situation, the best technique for a long-term relationship is the Co-integration model, and the Granger causality model is appropriate for a causal relationship (Fama & Schwert, 1997; McMillan, 2010).

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The Co-integration test applied to all included factors for measuring the long-term association among them. This econometric technique recommended by many scholars when we have non-stationary time series. It means if two-time series are non-stationary but the linear association among them depict as stationary, then we called as two-time series are co-integrated in the long run (Shah, et. al., 2012; Sundqvist, 2002). After that, we applied a test of selecting the lag criteria for the causality test and then applied the Granger causality test for measuring the two-way causal effect among factors.

The table 6 listed below shows the results of the lag selection criterion test and outcome direct us as 1 is the best lag value for all factors. The all diagnostic of lag selection as FPE, AIC, HQIC, and SRIC shows significance at the lag value of 1, so now we can run the Granger causality test using lag 1. The results of the Trace rank test of Johansen Cointegration and Granger causality test are listed below:

Table 6: Test for Selection of Lag value: Selection-Order Criteria

Lag	LL	LR	df	P	FPE	AIC	HQIC	SRIC
0	-5836.5				5.3e+24	73.956	74.0032	74.0723
1	-4685.5	2302	36	0.000	**3.9e+18***	**59.8421***	**60.1727***	**60.6562***
2	-4670.9	29.143	36	0.784	5.2e+18	60.1134	60.7274	61.6253
3	-4646.1	49.53	36	0.066	6.0e+18	60.2556	61.153	62.4653
4	-4623.5	45.238	36	0.139	7.2e+18	60.425	61.6057	63.3325
5	-4583.7	79.618	36	0.000	6.9e+18	60.3768	61.8409	63.9821
6	-4567.5	32.478	36	0.637	9.1e+18	60.6269	62.3745	64.93
7	-4545.2	44.547	36	0.155	1.1e+19	60.8006	62.8316	65.8016
8	-4504.5	81.368	36	0.000	1.1e+19	60.7414	63.0557	66.4401
9	-4470.8	67.379	36	0.001	1.2e+19	60.7706	63.3683	67.1672
10	-4443.9	53.881*	36	0.028	1.4e+19	60.8853	63.7664	67.9796

Source: The Authors' Investigation **Note:** for the calculation of the above lag selection criteria, SXV, IRS, IR, ER, MS, and WFC taken as endogenous and _cons taken as exogenous. * shows the probability value at which lag is best.

Table 7: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.256562	141.7939	95.75366	0.0000
At most 1 *	0.199215	94.06222	69.81889	0.0002
At most 2 *	0.140243	58.29393	47.85613	0.0039
At most 3 *	0.102318	33.96590	29.79707	0.0156
At most 4 *	0.072467	16.58765	15.49471	0.0341
At most 5 *	0.027419	4.476149	3.841466	0.0344

Source: The Authors' Investigation: The outcomes of the unrestricted Co-integration rank test (Trace) of analysis portray that there are all generated six equations are co-integrated at a significant level of 5%. It means all selected predictors proved as the determinant of the stock market volatility in the long run with statistical significance. The trace statistics value also greater than the Eigen and critical value, another indicator of long-term association among factors. The directions of the relationship among all the variables we already measured through the correlation analysis. This test indicates that all variables have a long-term relationship with our response variable with the same directions which we observed in the correlation analysis. Following table shows the test of Granger causality test:

Table 8: The Granger Causality Test

	SXV	IRS	IR	ER	MS	WFC
SXV	-					
IRS	✓ ✓	-				
IR	✓	✓ ✓	-			
ER	✓	✓	✓ ✓	-		
MS	✓	-	✓	✓	-	
WFC	-	✓	✓	✓	✓	-

Source: The Authors' Investigation **Note:** ✓ shows unilateral relationship, ✓ ✓ shows bi-directional relationship, and – for no relationship. All relationships are causal in nature. The above-listed table shows the results of the causality test using lag-1 if the value of probability less than 0.05 then we reject the null hypothesis as the factors have Granger cause among each other. The full results of Granger Causality test listed in appendix at the end of this paper, but the above listed table 8 only shows the summary of the outcome of this test. Results depict that interest rate shocks and the upswing & downturn of stock market of Pakistan, interest rate shocks and inflation rate, inflation rate and exchange rate Granger cause to each other which mean they has bilateral causal

relationship. The market volatility granger causes the inflation rate, exchange rate, and money supply, but granger's cause of the stock market with financial crises does not significant. The results of all the econometric tools confirm our established hypothesis of the study. We conclude this analysis and discussion chapter as outcome of correlation, co-integration and Granger causality test indorse that the negative, significant and causal long-term relationship among shocks of interest rate, inflation rate, global financial crisis and volatility of stock market. However, exchange rate and money supply have positive, significant and causal relationship with the stock index volatility.

Finally, the following graphs show the results of impulse response analysis response to Cholesky one standard deviation innovations. Below listed graphs in figure 5 depicts the response of all included variables as a result of 1% innovation or dynamics. The first graph shows the reaction of stock prices volatility as a result of 1& fluctuation, graphical picture shows a rapid decrease in volatility of stock prices in first 3 months, increases in last week of 3rd month, and thereafter it stabilizes for whole period. The response of interest rate shocks swiftly down in initial 2 months and then showing increasing trend after 2nd months to 4th month in response of 1% increase. It shows positive relationship among fluctuation and interest rate shocks. The enhancing trend of dynamics lead to increase the shocks in interest rate. Similarly, a 1% innovation or dynamics cause to increase the exchange rate, inflation rate, and money supply in country. The change or dynamics also lead to increases the probability of financial crises.

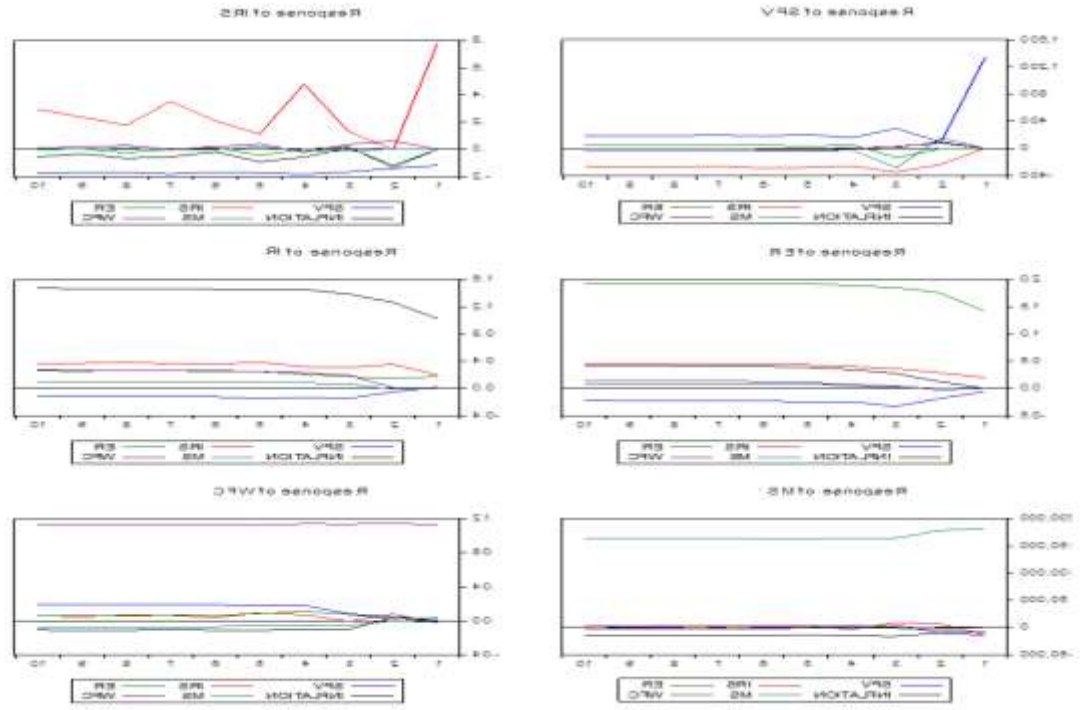

Figure 5: Impulse Response Analysis Response to Cholesky One S.D. Innovations

6. CONCLUSION & PRACTICAL IMPLICATION

This research has mainly observed the influence of interest rate shocks, financial policy on the upswing and downturn of stock market under the global financial crises 2008-2009. Monthly statistics were used from January 2005 to December 2018 as fluctuations and shocks are easier to see in short-term data compared to long-term data. The Upswing and downturn of stock market and shocks of interest rate calculated with the help of proposed GARCH (1, 1) model. The correlation analysis and trend-correlation analysis confirm all results according to our study hypotheses, there is a negative and significant association exists among interest rate shocks, inflation rate, financial crises and Upswing and downturn of stock market. It has been clearly seen that the duration of the crisis adversely affects the stock market, and the magnitude of the interest rate shock is shown to be more negatively affected by these variables which shows that the interest rate shock is riskier to the stock markets. The test of Cointegration confirmed the long-run affection among all predictor and outcome variables which means that the direction of association depicted by correlation analysis and the term of this association confirm with the

help of Cointegration analysis. The Granger causality test also confirms that the stock market volatility, interest rate shocks, inflation rate, exchange rate, and money supply Granger cause to each other but the financial crisis does not have any causal relation with market volatility. Impulse response analysis also shows a positive response of all factors resulting from 1% change or dynamics except market volatility and interest shocks. The stock market volatility and shocks of interest rate indicated continuous fluctuation in response of 1% dynamics or innovation. The overall study concluded that there is a long-term and causal relationship between predictor and outcome variables. The study will helpful for policymakers to closely concern about these factors while making money and all related policies because the study provides an actual picture before the crisis, during the crisis and after the crisis effects of all these factors on the stock market. As we all know that nowadays the stock market considers a big indicator of the economy of the country so that's why its compulsory for authorities to observe all factors that affect the market very deeply.

REFERENCES

1. Adeniji S. O., Obansa, S. A. J., & Okoroafor, O. K. (2018). Monetary policyshocks and stock market prices volatility in Nigeria, *Business and Economic Quarterly*, 3, 3–26.
2. Aggarwal, R. (2003). Exchange rates and stock prices: A study of the US capital markets under floating exchange rates. *Review of Economics Studies, 60*(6), 813-836.
3. Ali, T. M., Mahmood, M. T., & Bashir, T. (2015). Impact of Interest Rate, Inflation and Money Supply on Exchange Rate Volatility in Pakistan. *World Applied Sciences, 33*(4), 620-630.
4. Aliyu, S. U. R., (2011) Reactions of stock market to monetary policy shocks during the global financial crisis: The Nigerian case. *In: MPRA Paper.* RePEc: pra:mprapa:35581.
5. Arshad Hasan & M. Tariq Javed (2009). An Empirical Investigation of the Causal Relationship among Monetary Variables and Equity Market Returns. *The Lahore Journal of Economics,* 14(1), 115-137
6. Azim, A., Asif, M., & Mehar, M. R. (2015). Co-integration and Granger Causality Test of Crude Oil Price, Exchange Rate, KIBOR and Consumer Price Index of Pakistan. *The International Journal of Humanities & Social Studies, 3*(1), 319-322.
7. Bahmani-Oskooee, M., & Sohrabian, A. (. (1992). Stock Prices and the Effective Exchange Rate of the Dollar. *Applied economics, 24*(4), 459-646.
8. Baker, M., & Wurgler, J. (2007). Investor Sentiment in the Stock Markets. *The Journal of Economics Perspectives, 21*(2), 129-151.
9. Bhattacharya, B. (2012). Causal relationship between stock market and exchange rate, foreign exchange reserves and value of trade balance in India: An empirical analysis. *The Journal of Management Business Review, 22*(4), 66-72.
10. Bleaney, M., & Fielding, D. (2002). Exchange rate regimes, inflation and output volatility in developing countries. *Development Economics, 68*(1), 233-245.
11. Chen, S. S. (2007). Does Monetary Policy Have Asymmetric Effects on Stock Returns? *Credit and Banking, 39*(3), 668-688.
12. Da Silva FM, Coronel DA, Vieira KM (2014) Causality and Cointegration Analysis between Macroeconomic Variables and the Bovespa. *PLoS ONE* 9(2): e89765. doi:10.1371/journal.pone.0089765
13. Devereux, M. B., & Engel, C. (2003). Monetary Policy in the Open Economy Revisited: Price Setting and Exchange Rate Flexibility. *The Review of Economic Studies, 1*(1), 36-44.
14. Dimand, R. (2003). Irvin Fisher on the International Transmission of Booms and Depression Through Monetary Standards. *The Journal of Money, Credit and Banking, 35*(1), 49.
15. Engle, R. F., and Bollerslev, T. (1986). Modelling the persistence of conditional variances. *Econometric reviews*, 5(1), 1-50.
16. Engle, R. (2002). Dynamic conditional correlation: A simple class of multivariate generalized autoregressive conditional heteroskedasticity models. *Journal of Business & Economic Statistics*, 20(3), 339-350.

17. Fama, E., & Schwert, G. (1997). Asset Return and Inflation. *Journal of Financial Economics, 5*(1), 115-46.
18. Gali, J., & Monacelli, T. (2005). Monetary Policy and Exchange Rate Volatility in a Small Open Economy. *Review of Economic Studies, 1*(1), 223-241.
19. Humpe, A., & Macmillian, p. (2009). Can macroeconomic variable explain long-term stock market movement? A comparison of the USand Japan. *Applied Financial Economics, 19*(2), 111-119.
20. Ibrahim, M., & Alhassan, M. (2014). An Econometric Analysis of the Impact of Macroeconomic Fundamentals on Stock Market Returns in Ghana. *Research in Applied Economics, 6*(2), 47-72
21. .Karfakis, C., & Kim, S. (2005). Exchange Rates, Interest Rates and Current Account News: Some Evidence from Australia. *Journal of International Money and Finance, 14*(4), 575-595.
22. Kuzmina, J. (2010). Emotion's component of Expectations in Financial Decision Making. *Baltic Journal of Management, 5*(3), 295-306.
23. Lee, C., Shleifer, A., & Thaler, R. H. (1991). Investor sentiment and the closed-end fund puzzle. *The Journal of Finance, 46*(1), 75-109.
24. Liu, x., & Sinclair, p. (2008). Does the linkage between stock market performances an economic growth vary across Greater china? *Applied economic letter, 15*(7), 505-508.
25. McMillan, & G, D. (2010). Present Value Model, Bubbles and Returns Predictability: Sector-Level Evidence. *Journal of Business Finance & Accounting, 37*(5-6), 668–686.
26. Mehar, M. R., & Hasan, A. (2018). The Factors Effecting Portfolio Investment in Pakistan. *International Journal of Family Business and Management, 2*(1), 1-7.
27. Mehar, M. R., Tahir, H., & Nazeer, M. (2019). Influence of Firm's Intangible Assets Intensity on Stock Prices Volatility: Evidence from Emerging Market of Pakistan. *Indian Journal of Public Health Research & Development, 10*(1), 472-477.
28. Nishat, M., Shaheen, R., & Hijazi, s. t. (2004). Macroeconomic factors and the Pakistani Equity Market [with comments]. *The Pakistan Development Review, 19*(2), 609-637.
29. Qayyum, A., & Kemal, A. R. (2006). Volatility spillover between the stock market and the foreign exchange market in Pakistan. *The Journal of Pakistan Business Review, 19*(2), 44-59.
30. Qin, D., & Gilbert, C. L. (2001). The error term in the history of time series econometrics. Econometric theory, 17(02), 424-450.
31. Ramzan, M., Asif, M., & Mustafa, M. (2013). Impact of Trade Openness and Macroeconomic Variable on GDP Growth of Pakistan. *Paradigms: A Research Journal of Commerce, Economics and Social Sciences, 7*(1), 37-47.
32. Ross, S. A. (1976). The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory, 13*(3), 341-360.
33. Shah, A., Rehman, J. U., Kamal, Y., & Abbas, Z. (2012). The Interest Rates-Stock Prices Nexus in Highly Volatile Markets: Evidence from Pakistan. *Basic and Applied, 2*(3), 2589-2598.
34. Shleifer, A. (2000). *Inefficient Market: An Introduction to Behavioural Finance.* New York, Landon: OUP Oxford.Sitthidej Bamrungsap, Pachara Suksumek, Raweemas Wattanasak, Sirinuch Inlakorn, Sitapa Buakase, Sitthikarn Benjasupattananun, & Thitima Chaiyakul (2019). Crude Oil Price Behavior: Random Walk, Mean Reversion, and Is there a Presage of Thailand Inflation? *International Journal of Management and Applied Science*, 5(9), 96-100.
35. Sundqvist, E. (2002). An empirical investigation of the international fisher effect. *Social Science and Business Administration Programs, 42*(1), 1-41.
36. Uddin, G., & Alam, M. (2010). The Impacts of Interest Rate on Stock Market: Empirical Evidence from Dhaka Stock Exchange. *South Asian Journal of Management Sciences, 4*(1), 21-30.
37. Wang, C. (2001). Investor sentiment and return predictability in agriculture future markets. *Journal of Future Markets, 21*(10), 929-953.

Appendix-A

Equation	Excluded	Chi2	Df	Prob > Chie2	Decision
SXV	IRS	5.1023	1	0.049	Rejected
SXV	IR	3.1891	1	0.074	Rejected
SXV	ER	2.7991	1	0.094	Rejected
SXV	MS	3.9328	1	0.047	Rejected
SXV	WFC	.00334	1	0.954	Accepted
SXV	ALL	8.2205	5	0.144	Accepted
IRS	SXV	3.08439	1	0.041	Rejected
IRS	IR	11.737	1	0.001	Rejected
IRS	ER	1.1328	1	0.287	Accepted
IRS	MS	1.9829	1	0.159	Accepted
IRS	WFC	.24507	1	0.621	Accepted
IRS	ALL	19.473	5	0.002	Rejected
IR	SXV	.74495	1	0.388	Accepted
IR	IRS	7.088	1	0.008	Rejected
IR	ER	5.8511	1	0.016	Rejected
IR	MS	3.5795	1	0.058	Rejected
IR	WFC	4.2525	1	0.039	Rejected
IR	ALL	16.647	5	0.002	Rejected
ER	SXV	1.5155	1	0.218	Accepted
ER	IRS	4.2704	1	0.039	Rejected
ER	IR	8.0374	1	0.005	Rejected
ER	MS	11.789	1	0.001	Rejected
ER	WFC	1.3625	1	0.243	Accepted
ER	ALL	22.759	5	0.000	Rejected
MS	SXV	.16257	1	0.687	Accepted
MS	IRS	.55282	1	0.457	Accepted
MS	IR	1.6685	1	0.196	Accepted
MS	ER	1.5745	1	0.210	Accepted
MS	WFC	.03418	1	0.853	Accepted
MS	ALL	3.5049	5	0.623	Accepted
WFC	SXV	.09619	1	0.756	Accepted
WFC	IRS	3.8375	1	0.050	Rejected
WFC	IR	1.2422	1	0.265	Accepted
WFC	ER	5.0075	1	0.025	Rejected
WFC	MS	3.6633	1	0.056	Rejected
WFC	ALL	11.951	5	0.035	Rejected

Source: The Authors' Investigation **Note:** The above table shows the results of the hypotheses which is generated by software regarding casualty. The lag value for each hypothesis is 1 because lag selection criterion results suggested 1 lag for each variable.