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Can the Fisher Effect Theory Work in Pakistan?

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Abstract

This paper examines the relationship between the stock market and inflation rate in Pakistan, using the bootstrap Granger full-sample causality test and sub-sample rolling window estimation to test whether the results support the Fisher hypothesis in Pakistan. The empirical result of full sample size shows the unidirectional causality between the stock market and inflation rate. It further shows that in the presence of structural changes, full sample relationship is unstable and unreliable. We use the rolling window estimation considering the time-varying characteristics and conclude bidirectional causality between the inflation rate and stock market in the different sub-sample. The findings are inconsistent with Fisher hypothesis. The conclusion that Inflation rate and the stock market have no positive long-term relationship; the stock market does not offer a hedge against an inflation rate so the policy maker should take measures to balance the tradeoff between the stock market and inflation rate in the short run.

Keywords: Inflation rate, Stock market, rolling window, Bootstrap, Fisher hypothesis
JEL Classification: C32, E31, H54

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Introduction

The study examines the link between the stock market and inflation rate in Pakistan. The relationship has been extensively discussed in literature over the years (Linter, 1975; Nelson, 1976; Bodie, 1976; Fama and Schwert, 1977; Geske and Roll 1983; and Caporale and Jung, 1997). The Fisher hypothesis is the basis of this study, whether Fisher hypothesis holds in the perspective of Pakistan or not. According to the Fisher hypothesis, the stock market nominal return provides compensation to investors against the expected inflation. The expected nominal interest rate and inflation increase with the same ratio and remain stationary and independent of the rate of inflations (Nilgun, 2010). Some studies report positive relationships and accept that is hedging tool against inflation (Firth, 1979; Gultekin, 1983; Boudhouch and Richardson, 1993). The high inflation rate shows the weak economic position of an economy. It makes the investors cautious about investment in the stock market predicting tight monetary policy in the future of the central bank to manage inflation. However, lower inflation may indicate good economic and investment opportunities for the investors (Hunjra *et al*., 2014). The stock market and inflation are two important indicators to estimate the economic position of a country. The basic goals of many macroeconomic policies revolve around the high and stable growth rate of the stock market at a low rate of inflations (Soheila *et al*., 2015). The stock market linkage with other macroeconomic variables is a carefully monitored entity of a country and instability in the stock market may depress the future performance. The higher inflation adversely impacts the stock market return. The future expected the performance of the economy would cause a change in stock market return (Zakaria and Shamsuddin, 2012). As stock market performance vulnerable to variation in future cash flow and a discount rate of the firms. Inflation has a negative effect on the value of money, which ultimately affects investment and bonds. Silver, gold, foreign currency and share is a hedge to keep the value of money (Ahmed and Mustafa 2012)

The association of inflation with the stock market is essential for developing country like Pakistan. The stabilized inflation rate is crucial for the steady growth and macroeconomic stability. In the early 90s, Pakistan initiated a series of reforms to strengthen the economy. The economy passed through a stable position in the first half decade of this century and achieved a striking economic growth. The average GDP growth during 2002-2007 was 7 percent. After the brief period of stability, the economic growth sharply declined to 2.94 percent in 2008. Pakistan saw a record high level of the inflation rate of 25.3 percent in August 2008.The global financial crisis and internal political and economic problems have a strong consequence for Pakistan in the shape of stagnant low GDP growth, high inflation, and unemployment. However, stock market index achieved the highest level during this period. In the mid of August 2008, the State Bank of Pakistan increases the interest rate to control the high inflation rate, which resulted in a sharp decline in the stock market. Numerous measures were taken to resolve the structural issues to achieve the macroeconomic stability, including tight monetary policy and fiscal reforms. These measures yield substantial improvement in controlling inflation rate, which fell from 25.3 percent to 13.1. However, the economy as a whole displays a dismal and precarious position. These

characteristics motivate us to study the stock market and inflation rate in Pakistan in the perspective of Fisher hypothesis.

Considerable numbers of studies have been undertaken to analysis, inflation rate, and the stock market. The most important work is a Fisher hypothesis (1930) which estimates the positive association between inflation and stock market return. Chudhry (1998) reveals that stock is a good hedge against inflation in Argentina, Chile, Mexico, and Venezuela. King and Watson (1997) the study indicate a long-term Fisher effect. Omran and Pointon (2001) find that Egypt stock market and inflation have a significant relationship. Ioannides *et al*. (2005) they report the long-term relationship between the stock market and inflation in Turkey. Alagidede and Panagiotidis (2010) use the parametric and nonparametric cointegration and finding support the hedging technique in South Africa. The study of Graham (1996) and Eita (2012) indicates that stock market return and inflation have a positive relationship. Zheng *et al*. (2013) examine stock market and inflation under wavelet analysis and the result confirms a positive correlation between these two variables. Mbulawa (2015) finds weak evidence of the Fisher hypothesis in Zimbabwe. Tripathi (2015) examines the causality of the stock market on inflation in BRICS countries and the result shows that only in Brazil stock market and inflation has positive causality.

Zhao (1999) analysis the effects of inflation on the stock market and conclude that inflation has a negative impact on the stock market. Yeh and Chi (2009) examines the link between stock return and inflation in 12 OECD countries and reveals an inverse relationship between inflation and stock market returns. Usman and Adejare (2013) explore the impact of inflation on the performance of the stock market in Nigeria and conclude that the stock market and inflation have negative linking. According to Kimani and Mutuku (2013), the stock market return has a negative with inflation relationship in Kenya. Khumalo (2013) finds that in South Africa, inflation has a negative impact on the stock market. Some of the scholars suggest that inflation and the stock market have no relationship. Floros (2004) use OLS and cointegration methods to examine the impact of inflation on the stock market in Greece. The empirical result shows no relationship between stock market return and inflation. Spyrou (2004) the study examines ten emerging economies concerning the validity of a Fisher hypotheses, and findings do not support the Fisher hypothesis in these countries. The study of Samiran (2014) finds no support for the Fisher hypothesis in two main stock markets in India.

In previous literature, we find empirical work related to Pakistan, which, show mixed results of the applicability of the Fisher hypothesis. Akmal (2007) investigates that whether the Fisher hypothesis holds for Pakistan or not. The finding supports the Fisher hypothesis. Shahbaz and Islam (2010) explore the Fisher hypothesis validity using the ARDL approach and result suggests that the stock is a good hedge against inflation. Tiwari *et al*. (2015) investigates stock returns and inflation in Pakistan using continues wavelet transform method. The result finds a long-term relationship and acknowledges the validity of the Fisher hypotheses. Ahmed and Mustafa (2012) use full information maximum likelihood (FIML) and finds a negative causal link between inflation and the stock market. Saleem *et al*. (2013) examine the impact of inflation on the

stock market in Pakistan, and result reveals no causal relationship. Qamri *et al*. (2015) examine the association of the stock market with inflation in Pakistan, the empirical results indicate a negative link between the stock market and inflation.

This study is an addition to the literature with a unique dimension of taking into account time-varying characteristics of the data. As per previous research, the structural changes may cause an inappropriate and unreliable result. This study examines causal relationship inflation with the stock market in Pakistan. Pakistan has always been facing unstable economic conditions and with the beginning of the new millennium, it witnessed more challenges in the form high inflation, huge current account and trade account deficit, high foreign and external debt, high fuel prices, a security issue and political instability. The structural changes occur in the full sample data of these two variables, which lead unstable and unreliable causal link between inflation rate and the stock market in Pakistan. The full sample causality may be no longer valid. The issue of the structural changes is solved with a new proposed method of the bootstrap rolling window. The bootstrap rolling window has a unique characteristic as compared with conventional methods to identify the time variation on the sub-sample data. This study uses a rolling bootstrap method to revisit stock market and inflation relationship. The bootstrap rolling method examines the full sample and sub-samples causality considering structural changes within the model. The inflations have both positive and negative impact on the stock market in several sub-sample periods and on the other hand; the stock market has a significant impact in several sub-sample periods. The findings do not support the Fisher hypothesis.

The structure of this study is as follows. Section 2 mentions the Fisher effects. Section 3 explains the methodology. Part 4 of the paper consists of data. Section 5 gives the details empirical result and sections 6 conclusion.

Theoretical framework

Fisher effects

In this section of the paper, we focus on the Fisher relations and test that whether the stock is a good hedge against inflation. The Fisher hypothesis provides the basic concept to explain the mutual relationship of the stock market and inflations. The interest rate helps in predicting the future inflation rate. The expected nominal return should be equivalent to the expected real return and expected inflation (Fisher, 1930) Nominal interest rate comprises of expected real return and expected inflation.

The real interest rate is the difference between the nominal rate and expected inflation.

$$r_t = i_t - \boldsymbol{\pi}^{e} \quad (1)$$

where r_t is the real interest rate, i_t nominal interest rate and $\boldsymbol{\pi}^{e}$ is expected inflation.

Fisher hypothesis defines" the one on one relationship between the expected inflation and nominal interest rate."

$$1+i_t = (1+r_t) + (1+\boldsymbol{\pi}_t^{e}) \quad (2)$$

Fisher equation identifies the connection between the nominal interest rate, real interest rate, and the expected inflation rate as follows.

$$i_t = r_t + \pi_t e, \quad (3)$$

where i is the nominal interest rate, r_t is the real interest; π_t^e is the expected inflation rate at time t

We can extend the Fisher hypothesis to the stock market as the stock market is claiming ownership of assets. The study of Nelson (1976) and Boudoukh—Richardson (1993) supports the argument against the Fisher hypothesis extension to the stock market. The stock market is determined as the basis of the future cash flow, and inflation declines the future cash flow. To maintain the time value of money against inflation, investors demand compensation.

$$Si_t = Srt + \pi_t^e, \quad (4)$$

where Si_t is the nominal stock return Sr_t is the real stock return, π_t^e is the expected inflation rate.

Fisher effect theory indicates that when inflation rate changes, the nominal return of stocks will also change. That is when the inflation rate increases; stock returns will increase, when the inflation rate decreases, the stock return will decrease. Therefore, the stock market is a useful tool to hedge against the currency devaluation caused by inflation. Fisher claimed that the expected real return is unaltered of expected inflation.

Methodology

In the case of violation of stationary of the standard causality, an asymptotic distribution does not hold. The estimation of VAR model is difficult in the absence of standard asymptotic distribution (Sims *et al*., (1990) and Toda and Phillips (1993, 1994). Toda and Yamamoto (1995) come up with modified Wald test to find the asymptotic distribution using the augmented VAR 1(1) variables. Monte Carlo simulation reveals that modified Wald's test do not support the accurate size in small and medium size (Shukur and Mantolos, 1997b). Shukur and Mantalos (1997a) the residual-based bootstrap (RB) method solves the size and power issue. Numerous studies established the better performance of RB method over the standard asymptotic distribution irrespective of cointegration or not (Mantalos and Shukur, 1998; Shukur and Mantalos, 2000; Mantalos, 2000; Hacker and Hatemi-J, 2006; Balcilar *et al*., 2010). In this regard, the most important work of Shukur and Mantalos (2000) established that *LR* test with small sample size gives better power and size. This paper uses the *RB* based modified-*LR* statistic to find the causality between inflation rate and the stock market in Pakistan.

The bivariate VAR (p) need to calculate *RB* based modified-*LR* causality test as follows.

$$x_t = \phi_0 + \phi_1 x_{t-1} + \ldots\ldots\ldots + \phi_p x_{t-p} + \varepsilon_t, \; t = 1,2,\ldots\ldots\ldots,T \quad (5)$$

Where $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ are a white-noise process of zero mean and covariance matrix$\sum$. The Schwarz Information Criteria (*SIC*) provides the optimal provide lag length. On the base of equation (5) $x_t = (x_{1t}, x_{2t})'$ are divided into two sub-vectors, x_{1t} and x_{2t}.

$$\begin{bmatrix} IR_{1t} \\ SP_{2t} \end{bmatrix} = \begin{bmatrix} \phi_{10} \\ \phi_{20} \end{bmatrix} + \begin{bmatrix} \phi_{11}(L)\phi_{12}(L) \\ \phi_{21}(L)\phi_{22}(L) \end{bmatrix} \begin{bmatrix} IR_{1t} \\ SP_{2t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}, \quad (6)$$

where x_{1t} indicates inflation, and x_{2t} represent the stock market. The latter variable in the analysis portion denotes the stock market, and *L* is the lag operator defined as $L^k x_t = x_{t-k}$.

Equation (6) test Granger Causality of the inflation rate on the stock market with imposing the restriction, $\phi_{12,k} = \mathbf{O}$ for $k = 1,2, \ldots., p.$ In the same way, the null hypothesis of Granger Causality of the stock market on inflation rate is tested by imposing the restriction, $\phi_{21,k} = \mathbf{O}$ for $k = 1,2, \ldots., p.$

Parameter stability test

It is assumed that parameter of VAR model in the full sample Granger causality remains constant but due to structural changes, the assumption of parameter constancy does not hold. The results are no longer valid, and the causal link becomes unstable (Balcilar and Ozdemir, 2013). The recent literature offers evidence that the parameter instability is a major problem (Granger, 1996). We use short-term parameter stability test to overcome this problem. Andrews (1993) and Andrews and Ploberger (1994) developed *Sup-F, Mean-F* and *Exp-F* tests to explore short-run parameter constancy. The parameter stability of overall VAR system investigated by using the L_c test proposed by Nyblom (1989) and Hansen (1992), calculated from the sequence of *LR* statistics aiming to evaluate parameter constancy and address the structural change problem. These tests display the non-standard asymptotic distribution. Andrews (1993) and Andrews and Ploberger (1994) calculate critical values and *p*-values by the parametric bootstrap procedure. Monte Carlo simulations with 10000 samples from a VAR model with constant parameter are used to obtain the critical and *p*-values. As according to Andrew (1993) these tests are trimmed 15 percent from both sides of the sample. This trimming specifies (0.15, 0.85) fraction of the sample to be evaluated by these tests. On the L_c tests, they are computed in the current paper for equations and VAR system separately.

Sub-sample Rolling Window Causality Test.

The different methods are used to avoid the structural changes in the full sample data which result in the pre-test bias. The Rolling-window sub-samples Granger causality test based on the modified bootstrap estimation used to resolve the structural problem. The absence of stationery in the entire period and detection of instability in different sample periods justifies using rolling window estimation. The rolling window based on the fixed size rolling sequentially from beginning to the end of the full sample (Balcilar *et al.,* (2010). A fixed rolling window with *l* observation of full size is transformed into a sequence of *T-l* sub-samples; that is, τ-*l*+1, τ-*l*, ..., T for τ= *l*, *l*+1, ..., T. then each sub-samples causality is determined upon the basis of the *RB* based modified-*LR* causality test. The bootstrap *p*-values of observed *LR*-statistic rolling through T-*l* sub-samples provide variation and magnitude of the relationship between IR and SP in Pakistan. The causality of IR on SP is equal to the average of the entire bootstrap estimates and presented by formula $N_b^{-1}\sum_{k-1}^{p}\hat{\phi}_{21,k}^{*}$, where N_b

refers the number of bootstrap repetitions. Similarly, $N_b^{-1}\sum_{k-1}^{p}\hat{\phi}_{12,k}^{*}$ is the formula which displays the impact of SP on IR. Both $\hat{\phi}_{21,k}^{*}$ and $\hat{\phi}_{12,k}^{*}$ are bootstrap estimates from the VAR models in *Eq.* (6). The 90-percent confidence intervals are also computed, where the lower and upper limits equal 5th and 95th quantiles of each of the $\hat{\phi}_{21,k}^{*}$ and $\hat{\phi}_{12,k}^{*}$ respectively (Balcilar *et al.,* 2010).

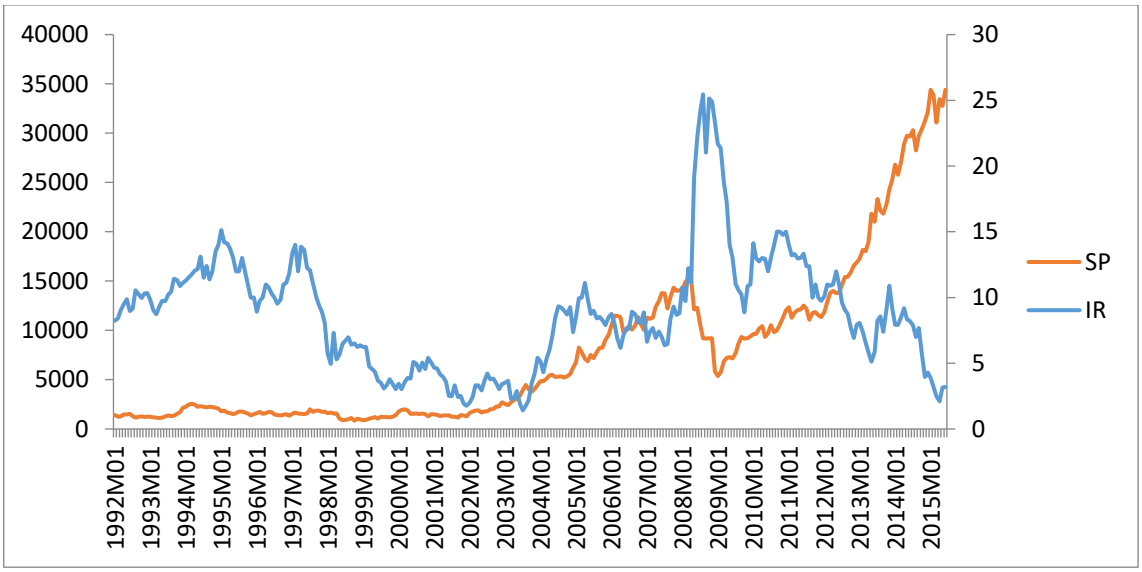
The accuracy of the estimated parameter and representativeness of the model over the sub-sample periods are the two conditions of the rolling window estimation. The precise estimation is made by the window size. The accuracy is achieved with large window size, but in the presence of heterogeneity, it reduces representativeness. However, the small window size may have a lack of accuracy and improvement in the representation. Thus, we must select the appropriate window size to represent an equilibrium between the accuracy and representativeness. These are no hard-and-fast rules for the selection of the rolling window size estimation (Balcilar *et al*., 2010). Pesaran and Timmerman (2005) use the root mean square error to calculate the window size under structural change and establish that optimal window size depends upon on the persistence and size of the break. As per Monte Carlo simulations, they suggest the minimum 20 window size with the frequent breaks. Given balance between accuracy and representativeness, we select a window size of 24 months (this excludes the observations required for lags and hence is the actual number of observations in the VAR)

Data

This paper examines the stock market relationship with an inflation rate from 1992:01 to 2015:06. Inflation is measured by the consumer price index (CPI), and the stock market is presented by the Karachi Stock Exchange 100 index (KSE-100). The inflation data are obtained from an economic survey of Pakistan, whereas the KSE-100 index data is obtained from the Karachi stock market and economic survey of Pakistan. First, we take the log of the data to adjust the problem of the heteroscedasticity. The period of the study is important for many perspectives. It witnessed some opportunities for economic growth and prosperity. The Karachi Stock Market declared as one of the emerging and best-performing markets throughout the region. On the other hand, it faced record level of inflation in the history of the country, global financial crisis, internal weak economic performance, political instability, security risk, high foreign debt. An average growth rate of 7 was observed during 2000-2007. **Figure 1** portrays several changes in the inflation rate and stock market. The first significant changes were observed in 2003 when the inflation rate was at the lowest ebb. The main reasons behind this lowest inflation rate include; appreciation of the exchange rate, massive foreign reserve, and better supply situation of the essential food commodities. However, the stock market remained stable in the same period. The other point of major change in the inflation rate is observed in August 2008 when the inflation rate was at the highest level of 25.3 percent due to Rupee depreciation against the dollar, excessive government borrowing from the State and withdrawal of different subsidies from the government. The State Bank of Pakistan (SBP) pursued a tight monetary policy to control inflation. The stock market continued to move upward regarding

index and market capitalization. In April 2008, the stock reached its peak. However, 2009:01 stock market decline sharply as a result of macroeconomic instability, political instability, global financial shocks, weak economic growth, depreciating Pak Rupee, which shattered the foreigner investors' interest in the Pakistan capital market. Since 2010-2015 inflation rate declined but at the same time, stock markets gained an upward momentum and achieved a record-high index. The direction of momentum in inflation rate and the stock market are not consistent. These factors give impetus to investigate the association between the inflation rate and stock market in Pakistan.

Figure 1: Stock market and inflation



Empirical analysis

The result of the unit test for SP and IR is stationary at first difference. In the next step, we perform the full-sample causality test between IR and SP using the VAR model. The optimal lag lengths based on the Schwarz Information Criterion (SIC) criteria of IR and SP are 3. The full sample causality underlying the *RB*-based modified *LR* causality tests are presented in **Table 1**. According to results to the bootstrap *p*-values, the IR does not Granger cause the SP whereas, on the other hand, SP Granger causes the IR.

Table 1. Full sample Granger Causality Test

Test	H_0: IR does not Granger cause SP		H_0: SP does not Granger cause IR	
	Statistics	*p*-values	Statistics	*p*-values
Bootstrap-*LR* test	0.2203	0.8300	4.7783*	0.0500

Note: * 10% percent significance level

The presence of structural change violates the assumption of a single causal relationship between IR and SP, and it shifts with time. The time-varying may cause whole sample period results misleading and precise inference cannot be made on the basis of such results (Zeileis *et al.*, 2005). Andrews (1993) and Andrews and Ploberger (1994) proposed *Sup-F, Mean-F and Exp-F* test to address the structural issue in the whole sample period. The *Sup-F, Mean-F and Exp-F* test examines parameter stability of the VAR model of inflations and the stock market. The parameter stability of the overall VAR system by L_c test developed of Nyblom (1989) and Hansen (1992). The results of the *Sup-F, Mean-F, and Exp-F* tests for inflation equation are reported in **Table 2**. The *Sup-F* test rejects the null hypothesis of parameter consistency against the one-time sharp shift for inflation equation. The *Mean-F and Exp-F* reject the null hypothesis of martingale process and evolve gradually over the time. The L_c test shows the evidence of a random walk process. The empirical results of stock the market equations are also presented in **Table 2**. The *Sup-F* fails to reject the null hypothesis of the parameter constancy against the one-time sharp shift. The *Mean-F* shows the significance at 10%, and *Exp-F* follows the martingale process. The overall results for IR, SP, and VAR system show the parameter non-constancy and evolve gradually. The L_c test in the overall VAR model is estimated, and result displays the short-run parameter instability in full sample data.

Table 2. Parameter stability test

	IR Equation		SP Equation		*VAR* System	
	Statistics	Bootstrap	Statistics	Bootstrap	Statistics	Bootstrap
Sup-F	32.185***	0.000	15.615	0.116	28.761**	0.028
Mean-F	8.757***	0.056	8.501*	0.065	14.098*	0.094
Exp-F	12.107***	0.000	5.111	0.107	10.008*	0.056
L_c	1.535**	0.038	1.314	0.087	2.849**	0.018

Notes: We calculate p-values using 10,000 bootstrap repetitions.

*, ** and *** denote significance at 10, 5 and 1 percent, respectively.

a Hansen-Nyblom parameter stability test for all parameters in the VAR jointly.

A conclusion can be drawn from the above parameter stability test that structural changes cause instability in the full sample data model. The full sample data relationship between IR and SP is not reliable in Pakistan. To overcome the structural changes, we proposed rolling window estimation method to revisit full sample size causal link between IR and SP. The rolling window estimation results are more reliable and valid taking into account the structural changes in the different sub-sample. In rolling window, the *RB* bootstrap is used to estimate causal link between IR and SP in Pakistan. **Figure** 2 to 5 reported the *p*-values of the *LR*-

statistics by the VAR model for full sub-sample data comprising 24-month observation are computed. After deducting the 24-month observation[1], these rolling estimates cover 1994:01 to 2015:06

The results that IR does not Granger cause SP presented in **Figure 2**. In the following sub-samples of (1997:09-1998:05,2004:09-2004:12,2008:09, 2009:08-2010:01, 2015: 04) IR has a significant impact on the SP. In these sub-samples, the null hypothesis that IR does not Granger cause is rejected at the 10 percent significance level. **Figure 3** indicates the magnitude of causality between two variables. These sub-samples indicate both positive and negative influences of IR on SP. The sub-sample of (2004:09-2004:12, 2009:08-2010:01) displays the positive impact of IR on SP. However, in the sub-sample of 1997:09-1998:05, 2008:09, 2015:04 IR has a negative impact on SP. In the period of the 1997-1998 inflation rate and the stock market has a negative relationship, and both variables declined. The East Asian financial crisis and economic sanction due to the atomic explosion caused both SP and IR. The 2004-2005, an eventful year for the Pakistan economy and economic recovery further strengthens. In this period stock market and inflation rates have a positive relationship. According to **Figure** 1, IR indicates the decreasing trend since 2000, which has a positive impact on SP and IR leads to the stock market during this period. The IR starts a slight decreasing at the end of 2008 after reaching the highest level of inflation, which has a negative impact on SP in 2008:09. In 2008-2009 depreciation of the rupee, high international prices, the global financial crisis, and the domestic economic problem exerted pressure on the inflation rate. In August 2008, inflation raised 25.3 percent highest levels in the history of Pakistan and stock market index declined by 41 percent. After the disastrous performance both, IR and SP have regained ground due to prudent monetary policy management by State Bank of Pakistan. The stock market recovered 33 percent after all the internal and external challenges. The State Bank of Pakistan (SBP) pursued the tight monetary policy to curb the adverse impact of inflation. In 2009:08-2010:01 IR has a positive impact on SP. In the same period, both IR and SP moved in the same direction. The stock market flourished during this period and accelerated to rise from 5210 to 10303-point index.

[1] Though an interpretation for the selection of 24-month window size has been mentioned earlier, we still implemented different bootstrap rolling-window causality tests using 20-, 30-, 36-month window size and estimated the magnitude of the effect of IR on SP and that of SP on IR. The results are proved much similar to those from the causality test based on 24-month window size, which further indicates that the results based on 24-month window size are robust.

Figure 2: Granger causality from IR to SP

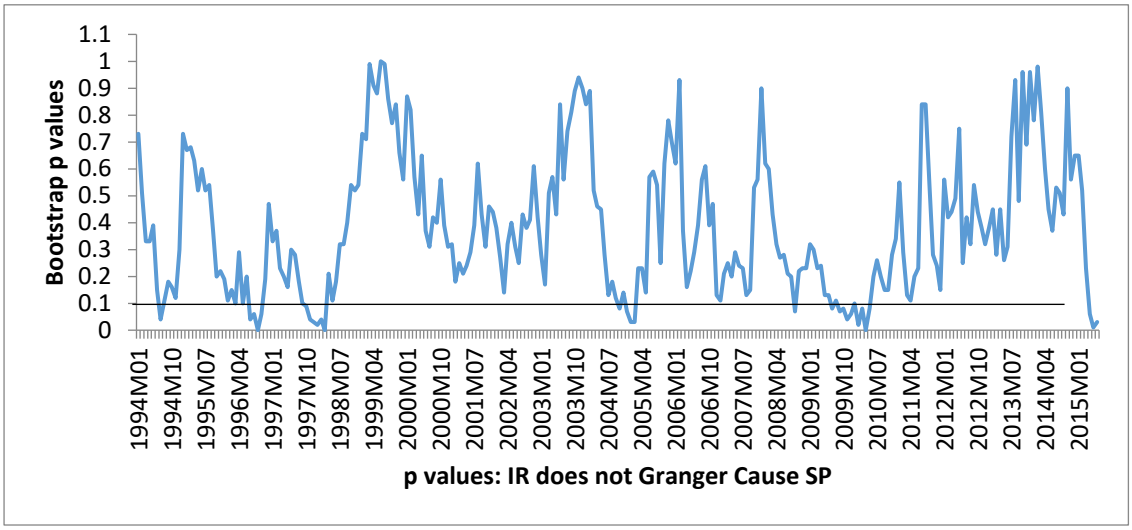
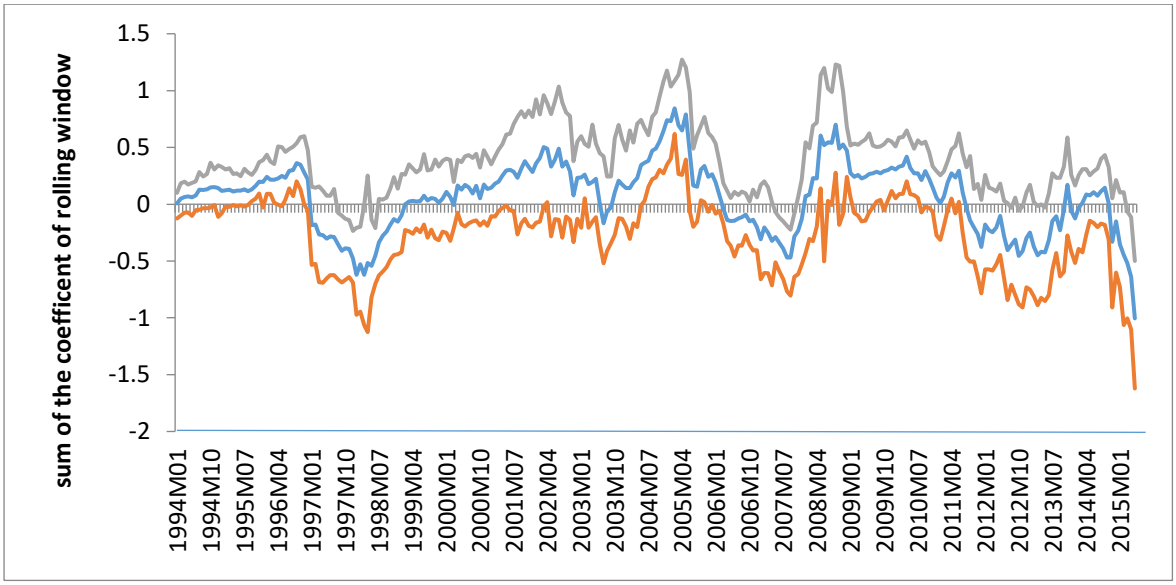


Figure 3: Coefficient of impact of IR on SP



The result that SP does not Granger causes the IR presented in **Figure 4**. The sub-sample of (1994:07,1995:06-1996:02,2000:06-2000-09,2007:04-2008:01,2009:01,2009:09,2010:03-2010:05, 2013:10) report that SP Granger Cause the IR. The sub-sample of (1994:07, 1995:06-1996:02, 2007:04-2008:01, 2010:03-2010:05) have a positive impact of SP on IR. On the other hand, sub-sample (2000:06-2000-09, 2009:01, 2009:09) SP has a negative impact on the IR. In 1994-1995, stock market achieved the highest price index and share turnover. Inflation was relatively stable in the corresponding years. The political stability, investor's friendly economic policies and revival of investors' confidence have positive effects on the stock market and inflation. In 2007:04-2008:01 SP has a significant positive influence on IR. In this period stock market reached its peak and in April 2008 KSE-100 crossed the highest point index of 15126. During 2007, inflation moved at a slow pace. In December 2008 stock market sharply declined by 62 percent. In the same period, the inflation touched

the peak of 25.3 percent. In 2009, the SP has a negative effect on IR; during this period, inflation touched highest ever level in Pakistan. Since 2009, both stock market and inflation rate moved in an opposite direction. The stock market witnessed a consistent upward trend and at the same time inflation is declining. These developments were mainly of numerous domestic and international factors. The most important factors are the sharp declines of international oil price, containing the current account deficit, growth in the remittance and a successful bailout package of the International Monetary Fund (IMF).

Figure 4: Granger casualty from SP-IR

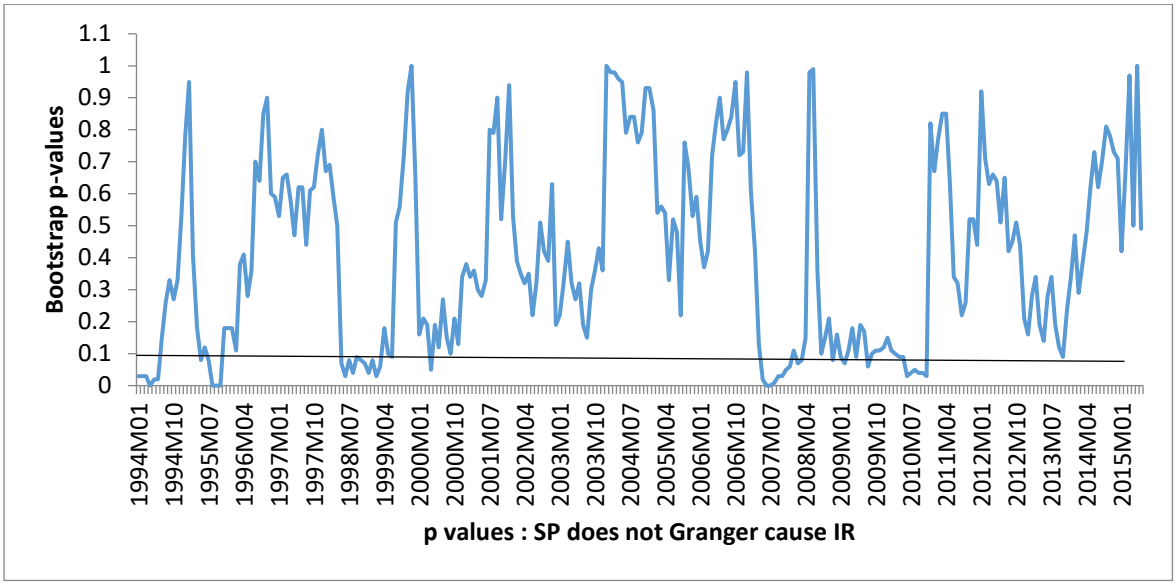
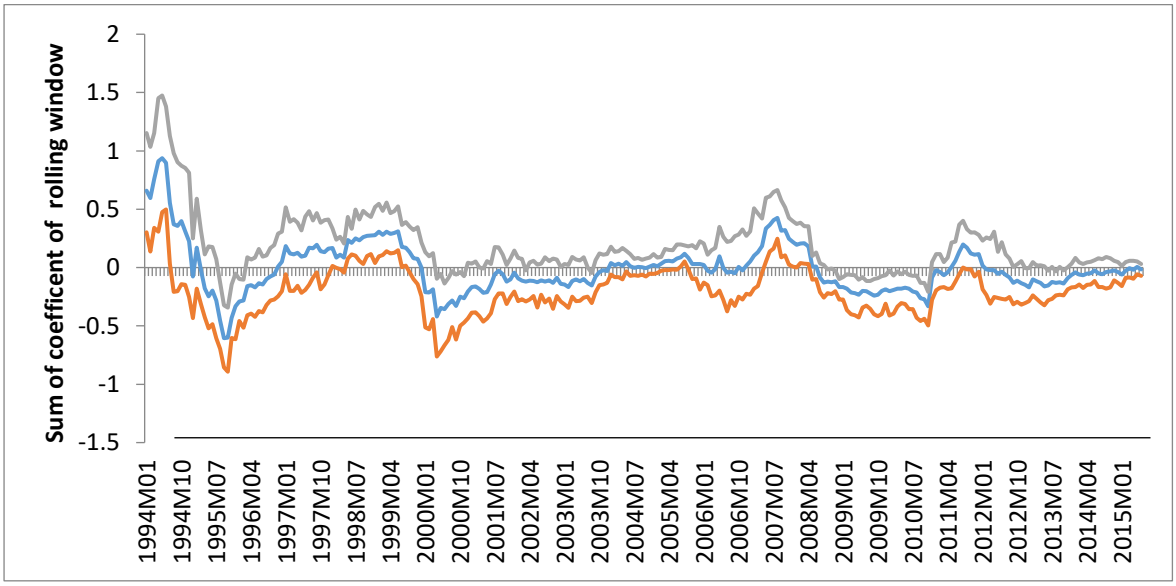


Figure 4: Coefficient of impact of IR on SP



The full sample Granger causality test with sub-sample rolling window adds a new dimension to estimate the causal link between SP and IR in Pakistan. The relationship between the SP and IR shows inconsistent

behavior over the time and contradicts the Fisher hypothesis of a positive relationship between inflation and stock market (Fisher, 1930). The recent global and domestic event have caused a deviation in causality between the stock market and inflation rate.

Conclusion

This study examines the causal link between the stock market and inflation to test the Fisher hypothesis that whether the stock market is a good hedge against the inflation in Pakistan or not. It uses bootstrap full-sample Granger causality test and sub-sample rolling estimation. The structural changes may lead unreliable results which no longer needed for the precise estimation. The full sample Granger causality test shows the unidirectional causality. The parameter stability test in the presence of structural changes exhibits a deviation in short-term between the stock market and inflation rate. In the next step, we use a bootstrap rolling approach to reconsider the causal link between inflation rate and the stock market, and the result shows the bidirectional relationship. The inflation rate has both positive and negative impacts on the stock market, whereas the stock market also has both positive and negative impact on the inflation rate. The finding does not support the Fisher hypothesis. The inflation and stock market return do not yield a positive long-run relationship. The study has some policy implication for Pakistan as Inflation rate, and the stock market has no positive long-term relationship. The stock market does not provide the hedge against the inflation rate, so the policymaker should take measures to balance the tradeoff between the stock market and inflation rate.

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