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Impact of Macroeconomic Instability on Private Investment: Evidence from Pakistan

ABSTRACT

This paper investigates the effects of macroeconomic instability on private investment. Contrary to the existing studies about Pakistan, which use a single variable as a proxy for macroeconomic instability, we contributed by constructing a Macroeconomic Instability Index (MII) consisting of six variables. The study uses time-series data from 1976 to 2013 and applies the Autoregressive Distributed Lag (ARDL) technique. The empirical findings show an inverse relationship between macroeconomic instability and private investment. This warrants that policymakers should minimize macroeconomic instability as for as possible.

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1. INTRODUCTION

The importance of investment cannot be underestimated, especially in the multiplier theory and the incremental capital-output ratio. Levine and Renelt (1992) argue that private investment is a crucial mechanism to improve economic growth and the most critical factor of economic development. Investment accelerates economic growth through an increase in aggregate demand in two ways: an increase in aggregate demand because of investment on the one hand and an increase in consumption and employment on the other hand. However, developing economies like Pakistan, which usually have more population growth that turns into more workers to join the labor force, generally face obstacles in increasing investment to GDP ratio that constrain economic growth. A stable and certain macroeconomic environment, among other things, is necessary to give impetus to investment but developing economies are lacking it. This study attempts to explore the impact of macroeconomic instability on investment in the case of Pakistan while constructing Macroeconomic Instability Index (MII).

Theoretically speaking, saving is of utmost importance; however, the overall macroeconomic situation is also a crucial investment. Between the two primary components of investment - public and private - private investment is more sensitive to macroeconomic uncertainty or instability than public investment. Public investment is autonomous and mostly depends on government decisions, as concluded by (Mohey-ud-din & Siddiqi, 2014) in the case of Pakistan. Perhaps, it is the very reason that studies like (Aizenman & Marion, 1999; Moshi & Kilindo, 1999) used private investment rather than aggregate investment in their analytical work. Arif and Lee (2014) introduced investor sentiment (Azzimonti, 2018) incorporated partisan conflict interest in their study, whereas (Banerjee et al., 2015) reveal that uncertainty about future and expectations play a vital role. Interestingly, (Kopp, 2018) finds that even profit is of second-degree importance relative to expectations about future aggregate demand.

A variety of factors that influence investment has been identified in the literature. For instance, according to (Lucas & Prescott, 1971), it depends on a past decision of investment, present environment, and future expectations, whereas the importance of uncertainty has been highlighted by many studies (Bernanke, 1983; Dixit & Pindyck, 1994; Aizenman & Marion, 1999; Akkina & Celibi, 2002). This study investigates the impact of macroeconomic instability on private investment, both in the long run and in the short run.

The study contributes by constructing and using MII for Pakistan. MII is a multidimensional phenomenon comprising numerous indicators like instability in the exchange rate, unfavorable terms of trade, the vast burden of external debt, inflation rate, and high government budget deficit (Ismihan, 2003; Ismihan et al., 2005; Jaramillo & Sancak, 2007; Ahangari & Saki, 2012; Haghighi et al., 2012).

The remainder of the paper is organized as follows: Section 2 presents a causal relationship between uncertainty and private investment. Section 3 explains the construction of the MII. Section 4 continues with a description of data and econometric methodology. Section 5 presents empirical findings. Finally, the concluding remarks and policy implications are presented in section 6.

2. REVIEW OF LITERATURE

There are three strands of literature regarding the effects of macroeconomic uncertainty on investment. For example, (Demir, 2009) reported no clear-cut relation between macroeconomic instability and investment. Whereas (Abel & Eberly, 1994) and (Hartman, 1972) point out the positive correlation between these two variables as the marginal revenue product of capital is a convex function of output prices when uncertainty increase, it increases the incentives for investors to invest. However, the studies that follow the real options theory stated that investment is irreversible; therefore, increasing uncertainty discourages the investors (Bernanke, 1983; Dixit & Pindyck, 1994; Aizenman & Marion, 1999; Akkina & Celibi, 2002). The

empirical studies use different proxies and methods of macroeconomic uncertainty, and most studies found a negative connection between macroeconomic uncertainty and private investment.

The study by (Rehman et al., 2009) explores the key drivers of private investment from 1972 to 2005and concludes that there is evidence of accelerator theory and crowding-out theory in Pakistan. Traditional factors like Foreign Direct Investment (FDI), inflation, and bank credit are insignificant, whereas nontraditional factors such as entrepreneurial skills, governance, and quality of institutions are critical factors of private investment. On the contrary, (Ahmed & Qayyum, 2007) found the existence of crowding-in. The study also finds that macroeconomic uncertainty as a proxy of inflation rate volatility discourages private investment in Pakistan. Similarly, Ahmad et al. (2008) also observed the negative relationship between uncertainty and investment in the case of agriculture investment. Furthermore, (Sial et al., 2010) found that macroeconomic uncertainty also negatively relates to Pakistan's economic growth. However, none of these studies used an index to capture uncertainty.

The equivalence of change in inflation rate with macroeconomic uncertainty is prone to criticism. The studies related to Pakistan utilize inflation as a measure of macroeconomic instability. To the best of our knowledge, (Ismihan, 2003) is the first empirical study which constructs macroeconomic instability index to divulge the connection between economic uncertainty, investment, and economic progress for Turkey from 1963 to 1999. The study develops the macroeconomic index by incorporating four macro-level variables like the public deficit, inflation rate, exchange rate, and external debt and applies the Johansen cointegration technique. The results show that macroeconomic instability crowd-out capital decreases Turkey's economic growth and seriously impacts public and private investment. A study by (Rathnasiri, 2009) used six macroeconomic variables to study the impacts of economic stability on private investment from 1977 to 2008 for Sri Lanka. The six-macroeconomic variables were as follows: three for internal stability like real economic growth rate, inflation, and the government budget deficit, and three external stability like trade balance, overall balance, and exchange rate. The study suggests that economic stability has a significant positive impact on Sri Lanka's private investment. However, the study does not construct an index of these variables.

However, the study by (Ahangari & Saki, 2012), which shed light on the impacts of macroeconomic uncertainty on private investment, constructs a MII by adding four economic variables: foreign debt, exchange rate, inflation rate, and budget deficit. The study utilized the data from 1963 to 2003 and applied the Johanson cointegration method. The study found that macroeconomic instability has adverse impacts on private investment. Using ARDL technique (Ali et al., 2019) found that inward FDI substitutes domestic investment whereas outward FDI complements it in China. However, (Ali et al., 2018) explores the impact of outward FDI on economic growth and concluded asymmetric relationship for China. The study uses life expectancy as human capital that demands attention.

According to (Awad et al., 2021) there is negative relationship between interest rate and investment in Palestine. According to (Ayeni et al., 2020) exchange impacts investment negatively through cost channel. Furthermore, the study also finds that credit to the private sector does not boost private investment due to insufficient credit in Gambia. For Vietnam (Dang et al., 2020) investigated the relationship between monetary policy and private investment at provincial level. The study used GMM technique to estimate the coefficient. The study divides the variables in three blocks – monetary policy, investment activities, and local economic developments. Broad money, credit to private sector and interest rate turned out to be positive while exchange rate remained statistically insignificant. According to (Zahra et al., 2020) there is crowding-in hypothesis in the long run in Pakistan.

Similarly, (Haghighi et al., 2012) explore the effects of macroeconomic instability on economic development in Iran by constructing the MII, which consists of the inflation rate, exchange rate, budget deficit, and term of trade over the period 1974 to 2008 from the Central Bank of Iran. The authors apply the Johansen Co-integration technique and find that macroeconomic instability adversely impacts economic growth.

It is evident from the literature review that though multivariable macroeconomic instability indices have been developed and used yet, none of them covers the scope that is being adopted in the present study. For example, some proxied just one variable equivalent to macroeconomic instability, and others used four variables. The contribution of this study is that it constructs a comprehensive macroeconomic instability index by incorporating six variables. Moreover, no study has used the macroeconomic instability index as a determinant of private investment in Pakistan. Therefore, this work aimed to estimate whether macroeconomic instability discouraged private investment in Pakistan or not.

3. MACROECONOMIC INSTABILITY

Macroeconomic instability is a notion of the disequilibrium of the economy. This concept is widely described in policy-oriented literature and refers to the overvaluation of currency, high inflation rate, the deteriorating balance of payments, growing fiscal deficit, and fluctuation in the exchange rate. Every type of economic instability demands actions to bring the economy back of a stable path (Azam, 2001). Moreover, a less predictable local economic environment makes more volatile macroeconomic variables and increases uncertainty in their behavior (Jalil et al., 2012).

However, in the past, macroeconomic stability was a mixture of external and internal balance accompanied by a low level of inflation that implied full employment level and sustained economic growth. After that, during the 1970s, 1980s, and 1990s, the center of attention regarding macroeconomic instability moved to fiscal and trade balance. However, recently, the economists shifted their focus on long-term sustained and equitable growth (Ocampo, 2005). In the words of Fischer (1993a, 1993b) and (Bleaney, 1996), macroeconomic instability is an augmentation in the macroeconomic policy indicators like inflation, deficit to GNP ratio, and external debt to GNP ratio. More instability means more fluctuation in the way of economic development. However, macroeconomic instability is a phenomenon of developing countries due to more volatile economic growth, low investment (Servén, 2003), mismanagement of the economy, income inequality, and vulnerability to external shocks (Dornbusch & Edwards, 1990).

3.1 Measurement of Macroeconomic Uncertainty

In literature, different studies have used other proxies to capture macroeconomic certainty. For example, (Servén, 1998) uses five variables to measure macroeconomic uncertainty like inflation, real GDP growth rate, the relative price of capital goods, trade terms, and real exchange rate and applies the GARCH model. Similarly, (Rathnasiri, 2009) uses inflation, economic growth rate, government budget as a proxy of internal stability and trade balance, exchange rate, and external debt for external stability (Mohey-ud-din & Siddiqi, 2014) using the standard deviation of GDP. Output and exchange rate volatility were used to measure macroeconomic uncertainty (Chowdhury & Wheeler, 2015) using the GARCH method.

Nonetheless, some studies developed MII by using external debt, inflation, exchange rate, and government budget deficit (Ismihan, 2003; Ismihan et al., 2005; Ahangari & Saki, 2012), and some studies include trade balance instead of external debt (Jaramillo & Sancak, 2007; Haghighi et al., 2012). In the case of Pakistan, the studies that investigated the impact of macroeconomic stability on private investment were scarce and did not employ any multivariable measure of instability index. For instance, (Ahmed & Qayyum, 2007; Sial et al., 2010) used inflation volatility in a similar investigation. To the best of our knowledge, no study used the macroeconomic instability index in the case of Pakistan. Against this backdrop, the rationale of

the current paper is to determine the impacts of macroeconomic instability on private investment by using the MII, which incorporates six macroeconomic variables.

3.2 Macroeconomic instability index

MII has been developed by following the Human Development Index (HDI) methodology of the United Nations Development Program (UNDP). The construction of an index is better to capture the simultaneous and combined effects of macroeconomic policies on economic growth. Undoubtedly, it is more appropriate to use a composite indicator because a single variable just shows the partial effects. Our index is based on three internal instability indicators - percentage change in the inflation rate, the percentage change in real GDP, and government budget deficit as a percent of GDP - and three external instability indicators - percentage change in the exchange rate, external debt as a percentage of GDP and percentage change in the trade balance.

MII is developed in two steps. In the first step, minimum and maximum are calculated, but they cannot simply summarize because each variable has a different range and units.

$$Z_t = \frac{I_t - I_{min}}{I_{max} - I_{min}} \tag{1}$$

Z_t is the index value of the variable I_t, a macroeconomic instability indicator. It is the actual value of hand I in year t. I_{min} (I_{max}) is the I indicator's minimum (maximum) value over a study time. The standard range of the I indicator of sub-indices lies between 0 and 1. Therefore, the value of MII also lies between zero and one. In the second step, Previous studies use a simple average of the indicator, but the present study follows the technique of (Haghighi et al., 2012), in which weights are given to the variables equivalent to their standard errors.

$$MII_t = \lambda\left(\frac{rgdp_t - rgdp_{min}}{rgdp_{max} - rgdp_{min}}\right) + \alpha\left(\frac{bd_t - bd_{min}}{bd_{max} - bd_{min}}\right) + \beta\left(\frac{inf_t - inf_{min}}{inf_{max} - inf_{min}}\right) + \varphi\left(\frac{ed_t - ed_{min}}{ed_{max} - ed_{min}}\right) + \delta\left(\frac{ex_t - ex_{min}}{ex_{max} - ex_{min}}\right) + \gamma\left(\frac{to_t - to_{min}}{to_{max} - to_{min}}\right) \tag{2}$$

The weighted sum of sub-indices is equal to 1.

$$\lambda + \alpha + \beta + \varphi + \delta + \gamma = 1 \tag{3}$$

The value of MII is bounded between 0 and 1. A higher value means more macroeconomic instability. The increase in the value of MII means either there is an increase in the volatility of one variable or more variables in the index.

4. DATA DESCRIPTION AND METHODOLOGY

The present study estimates the impacts of macroeconomic instability on private investment from 1976 to 2013, and data sources are World Development Indicator, World Bank (2015), and statistical handbook of Pakistan, State Bank of Pakistan (2015).

The study uses the following econometric model.

$$lnPI_t = \alpha_0 + \alpha_1 MII_t + \alpha_2 lnPIV_t + \alpha_3 lnBC_t + \alpha_4 lnFDI_t + \alpha_5 GNS_t + \alpha_6 RIR_t + \varepsilon_t \tag{4}$$

Whereas, PI, PIV, BC, FDI are private investment, public investment, bank-credit to the private-sector, and foreign direct investment respectively, and all these variables are in log form. MII, GNS and RIR are macroeconomic instability index, gross national saving as a percent of GDP, and Real Interest Rate (Nominal Interest Rate – Expected Inflation), respectively and ε_t is the error term. Furthermore, in the equation 4, MII is a variable of interest, RIR and PIV are policy variables, and the rest are control variables.

The present study applies the ARDL bound testing method to estimate the long-term and short-term relationship between private investment and macroeconomic instability.

4.1 Autoregressive-Distributed-Lag (ARDL) Method

We applied bounds testing procedure to cointegration within an ARDL approach (Pesaran & Shin, 1999; Pesaran et al., 2001) to examine the association between the MII and private investment in Pakistan from 1976 to 2013.

The general form of ARDL formulation is specified below for the abovementioned equation (4).

$$\begin{aligned}\Delta LnPI_t = {} & \gamma_0 + \sum_{i=1}^{l} \beta_1 \, \Delta LnPI_{t-i} + \sum_{j=0}^{l} \beta_2 \, \Delta MII_{t-j} + \sum_{j=0}^{l} \beta_3 \, \Delta lnPIV_{t-j} + \\ & \sum_{j=0}^{l} \beta_4 \, \Delta lnBC_{t-j} + \sum_{j=0}^{l} \beta_5 \, \Delta lnFDI_{t-j} + \sum_{j=0}^{l} \beta_6 \, \Delta GNS_{t-j} + \sum_{j=0}^{l} \beta_7 \, \Delta RIR_{t-j} + \\ & \lambda_1 lnPI_{t-1} + \lambda_2 MII_{t-1} + \lambda_3 lnPIV_{t-1} + \lambda_4 lnBC_{t-1} + \lambda_5 lnFDI_{t-1} + \lambda_6 GNS_{t-1} + \\ & \lambda_7 RIR_{t-1} + u_t \end{aligned} \quad (5)$$

The definition of variates in equation (5) is abovementioned. The estimated short-run coefficients represented by β_j and long-run coefficients are denoted byλ_i, and $l$is display optimal lag length. The null hypothesis of bound testing indicates that variables involved in the model don't have a long-run association, and all the long-run parameters have zero explanatory power. At the same time, the alternative hypothesis ratifies that all examined variables have a long-run relationship.

4.2 The Long-run Coefficients of ARDL Model

After confirming cointegration among examined series, the long-run parameters are estimated in the second step of the ARDL method, and appropriate lags are selected based on AIC or SBC. The long-run model is described below.

$$\begin{aligned} lnPI_t = {} & \chi_0 + \sum_{i=1}^{l} \beta_1 \, \Delta lnPI_{t-i} + \sum_{j=0}^{l} \beta_2 \, \Delta MII_{t-j} + \sum_{j=0}^{l} \beta_3 \, \Delta lnPIV_{t-j} + \sum_{j=0}^{l} \beta_4 \, \Delta lnBC_{t-j} + \\ & \sum_{j=0}^{l} \beta_5 \, \Delta lnFDI_{t-j} + \sum_{j=0}^{l} \beta_6 \, \Delta GNS_{t-j} + \sum_{j=0}^{l} \beta_7 \, \Delta RIR_{t-j} + \varepsilon_t \end{aligned} \quad (6)$$

4.3 The Short-run ARDL Model

To analyze the short-run parameters, the lag dependent variable and UECM coefficient is considered in the model to differentiate the long-run and short-run coefficient.

$$\begin{aligned}\Delta lnPI_t = {} & \lambda_0 + \sum_{i=1}^{l} \beta_1 \, \Delta lnPI_{t-i} + \sum_{j=0}^{l} \beta_2 \, \Delta MII_{t-j} + \sum_{j=0}^{l} \beta_3 \, \Delta lnPIV_{t-j} + \\ & \sum_{j=0}^{l} \beta_4 \, \Delta lnBC_{t-j} + \sum_{j=0}^{l} \beta_5 \, \Delta lnFDI_{t-j} + \sum_{j=0}^{l} \beta_6 \, \Delta GNS_{t-j} + \sum_{j=0}^{l} \beta_7 \, \Delta RIR_{t-j} + \\ & \gamma(ECM_{t-1}) \end{aligned} \quad (7)$$

Where γ is the error-correction coefficient that shows the speed of adjustment to long-run equilibrium because of a shock in the short-run.

4.4. Stability Test

To observe the reliability of short-run and long-run coefficients, the CUSUM and CUSUMSQR stability tests are implemented. The results of the stability test show that all variates are cointegrated. Likewise, the results indicate that CUSUM and CUSUMSQR statistics exceed the critical values.

4.5. Diagnostic Test

The reliability of the results is confirmed from the diagnostic tests. The diagnostic tests revealed the non-existence of serial correlation and heteroscedasticity by employing serial correlation Lagrange Multiplier (LM) and autoregressive conditional heteroscedasticity (ARCH) tests. The normality of the error term is confirmed by using the Jarque-Bera test. Similarly, the Ramsey RESET test revealed that the model has correctly specified the functional form. Moreover, the normality of residuals is verified by the Skewness-Kurtosis test.

5. EMPIRICAL RESULTS

The outcome of the Augmented Dicky Fuller (ADF) and Phillips Perron (PP) tests are presented in Table 1. It indicates that the macroeconomic instability index and gross national savings are stationary at a level. The notable point is that both tests explain bank credit and foreign direct investment differently. According to the ADF test, FDI and BC are stationary at level, whereas the PP test described that both variables are first-difference stationary.

Table 1: Results of "PP-test and ADF-test" with Intercept and Trend

	ADF test		Phillip-Perron test	
Variables	Level	1st Diff.	Level	1st Diff.
$lnPI$	-2.52	-5.30*	-2.63	-5.29*
MII	-6.60*	-6.06*	-6.59*	-32.99*
$lnPIV$	-2.32	-5.09*	-2.53	-5.19*
$lnBC$	-4.12**	-4.42*	-2.40	-4.37*
$lnFDI$	-3.78**	-4.88*	-2.71	-4.88*
GNS	-4.08**	-6.76*	-4.08**	-6.99*
RIR	-4.15**	-8.75*	-4.15**	-9.66*

Where *, ** and *** point to1%, 5% and 10% significance level respectively.
Source: Authors' estimations.

However, ADF and PP both test suggest that private and public investment and interest rates are integrated of order 1. The current work applies the ARDL technique because few variables are stationary at a level, and few are integrated at first difference.

5.1 ARDL Approach

The first stage of the ARDL process measured the cointegration among variates. For this point, F-statistic is counted, and an appropriate lag length of 2 maximum range is used as suggested by Schwarz-Bayesian-Criterion (SBC).

Table 2: Results based on ARDL "Bounds-Testing" technique

Model	Lag length	F-Tabulated		F-Calculated	Result
		I(0)	I(1)		
F($lnPI$ / MII, $lnPIV$, $lnBC$ $lnFDI$, RIR, $lnGNS$)	2	2.87	4.00	4.77** [.001]	Cointegration

** show that calculated "F-statistic "exceeds tabulated "F-statistic" upper bound at the 5% level.
Source: Authors' estimations.

The empirical result of Table 2 confirms cointegration among variables at the 5% level of significance as the calculated F-value is above the upper critical bounds. Thus, the null hypothesis is declined, suggesting the presence of cointegration.

5.2 Long-run Result

The long-run results presented in Table 3 show significant adverse effects of MII on private investment consistent with the third strand of theoretical and empirical studies (Ismihan et al., 2005; Ahangari & Saki, 2012). These results warrant that macroeconomic stability demands high priority.

This study finds that investment by the government has a positive link with private investment since the public investment generates complementarities, as it was found by (Akkina & Celibi, 2002; Ahmed & Qayyum, 2007). Bank credit to the private sector has a positive and significant relation with private investment. This is contrary to the results by (Rehman et al., 2009). Their study explains that sick units are responsible for this empirical anomaly. We contend that directed credit to different sectors and the not-so-huge problem of sick units in Pakistan demand a positive relationship, as is in our study. Furthermore, the ill unit phenomenon is not prevalent over a long period.

Gross national saving and FDI positively impact private investment, the former is statistically significant, and the latter is insignificant. The insignificance of FDI in the case of Pakistan is not queer one. Since the impact of FDI on domestic investment can be ambiguous, theoretically speaking, because of opposing forces. For instance, adding to the domestic stock of capital and bringing spillover affects one hand and pulls out the less competitive domestic firms from the business on the other hand. In our case, the coefficient is insignificant; the reason might be a low level of FDI as a percent of GDP. It remained as low as 0.87 percent of GDP from 1976 to 2013.

The insensitivity of investment to the interest rate is not peculiar to our study. Literature provides mixed evidence, and there are examples of insensitivity (Sharpe & Suarez, 2014). Furthermore, the relationship between interest rate and investment demands a firm-level data set since firms' investment in the real interest rate also depends on the firm's size. The bank-based or market-based firms, large or small, are the features to be investigated to uncover the genuine relationship between interest rate and investment.

Table 3: Results of Long-run Coefficients of "ARDL-Method"

ARDL (1-0-0-0-0-0-0) using Schwarz-Bayesian-Criterion (SBC), dependent variable $lnPI$			
Variables	Coeff.	S. E.	t-value [Prob]
MII	-0.3413	0.1592	-2.1431** [.041]
GNS	0.0300	0.0105	2.8608* [.008]
$lnFDI$	0.0958	0.0580	1.6530 [.110]
$lnBC$	0.5708	0.2016	2.8317 *[.009]
$lnPIV$	0.3039	0.1616	1.8808*** [.070]
RIR	-0.0015	0.0083	-0.1869 [.853]

Where *, ** and *** imply 1%, 5% and 10% significance level respectively.
Source: Authors' estimations.

5.3 Short-run Results

Table 4 shows the short-run results of ARDL. It indicates that MII also has significant adverse effects on private investment in the short run. Gross national saving, FDI, public investment, and bank credit positively relate to private investment. The negative coefficient of ECM is very significant demonstrates a more incredible speed of adjustment, almost 76 percent of disequilibrium resulting from shock in the past year is converged toward long-run equilibrium in the current year.

Table 4: Results of "Error-Correction"

ARDL (1-0-0-0-0-0-0) using Schwarz-Bayesian-Criterion, dependent variable is *lnPI*			
Var.	Coeff.	S.E.	t-Value [Prob]
ΔMII	-0.2603	0.1145	-2.2736* [.008]
ΔGNS	0.0229	0.0084	2.7358* [.010]
$\Delta lnFDI$	0.0730	0.0426	1.715*** [.097]
$\Delta lnBC$	0.4355	0.1726	2.5227* [.018]
$\Delta lnPIV$	0.2318	0.1372	1.6891 [.102]
ΔRIR	-0.0012	0.0087	-0.1878 [.852]
$ECM(-1)$	-0.7628	0.1279	-5.9647* [.000]
R- Squared	0.9923	Adj.R-Squared	0.9902
$F(7, 27)$	454.33[.000]	DW-Statistic	2.0639

Note: *, ** and *** shows 1%, 5% and 10% significance-level respectively.
Source: Authors' estimations.

5.4 Diagnostic Test

The results of the diagnostic test are documented in Table 5. This reflects that the model is free from the problem of heteroskedasticity serial correlation. Furthermore, the model is correctly designed, and data is usually distributed.

Table 5: Results of different "Diagnostic-Test"

	Test-Applied	Stat. [Probability]
Serial Correlation	Breusch-Godfrey LM Test	1.3117 [0.624]
Functional Form	Ramsey Reset Test	0.1762 [0.678]
Normality	Jarque-Bera Test	2.2436 [0.349]
Heteroskedasticity	ARCH Test	0.2393 [0.887]
DW-Statistic = 2.0639	DH –Statistics = -1.3550[0.175]	

Note: Authors calculations based on Eviews-9.

5.5 Stability Test

If cointegration is verified, then the reliability of regression coefficients is essential. The CUSUM and CUSUMSQ test of (Brown et al., 1975) are utilized to study the stability of short-run and extended-run parameters. The null hypothesis of this test is that all the regression parameters remain stable over the study time. In addition, the chart of both CUSUM and CUSUMSQ lies within the critical limits at a 5% significance level.

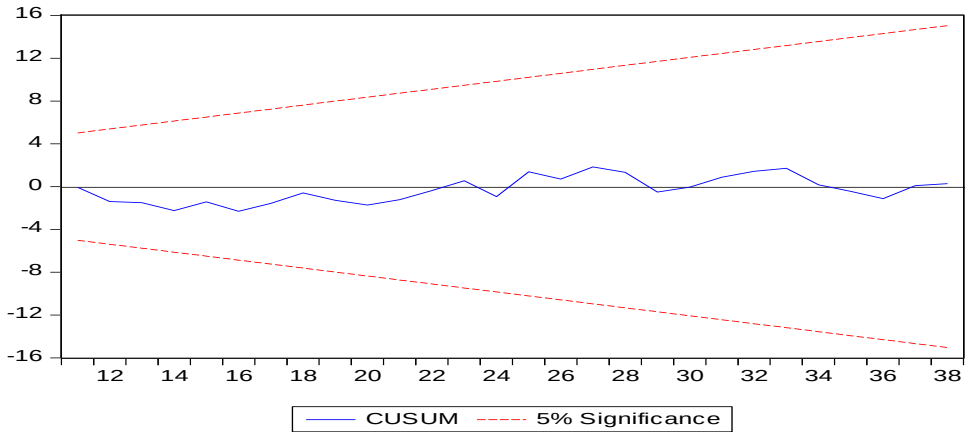

Figure 1: Plot of CUSUM

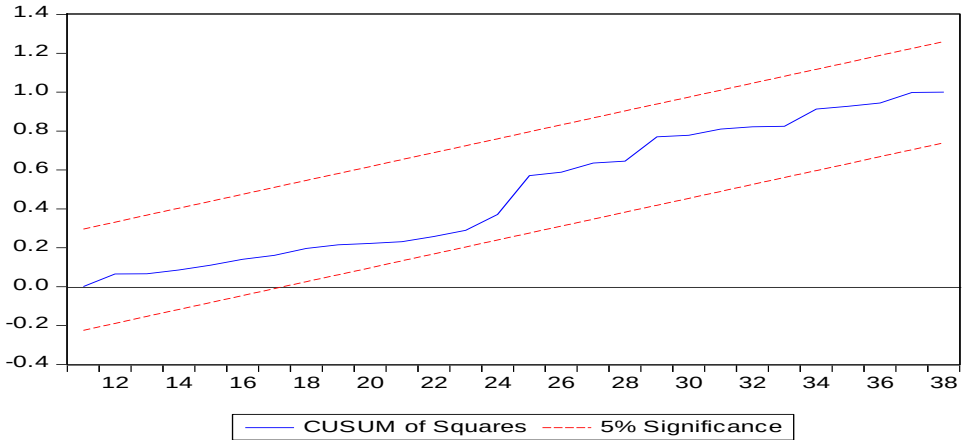

Figure 2: Plot of CUSUMSQ

6. CONCLUSION AND POLICY IMPLICATIONS

This study investigated the impact of macroeconomic instability on private investment in Pakistan by utilizing the ARDL co-integrated approach during the period of 1976-2013. Contrary to the earlier studies about Pakistan that used a single variable to gauge macroeconomic instability, this study developed a macroeconomic instability index following the methodology of the Human Development Index. Our index consists of six macroeconomic variables: internal instability like real GDP growth rate, inflation rate, and government budget deficit and external instability such as real effective exchange rate, external debt, and trade term.

The results showed that macroeconomic instability bore crucial negative impacts on private investment in the case of Pakistan. The results were consistent with (Bernanke, 1983; Pindyck, 1988; Dixit & Pindyck, 1994; Aizenman & Marion, 1999; Akkina & Celibi, 2002; Ismihan et al., 2005). Moreover, public investment, gross national savings, and foreign direct investment showed a positive connection with private investment, though FDI is insignificant, which is not unusual.

The positive and statistically significant effect of bank credit and private investment, whereas the insignificant association between real interest rate and investment highlighted that availability of credit (volume) is more important than the price effect. The insensitivity of investment to the interest rate is in line with (Sharpe & Suarez, 2014). Khan and Khan (2007) also find less interest sensitivity in the case of Pakistan.

The most apparent policy implications are that macroeconomic instability is detrimental for private investment; thus, the government should focus on ensuring macroeconomic stability ineffectiveness of monetary policy due to revealed insensitivity of investment to the interest rate. However, the importance of monetary policy cannot be discounted, as inflation and exchange rate are constituents of MII. Since the MII includes both monetary and fiscal-related variables, thus the study concludes that fiscal and monetary policy can boost private investment.

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