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Effects of Exchange Rate on Inflation Rate in Pakistan

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Abstract: *The main objective of the research is to explore the impact of the exchange rate (ER) on the inflation rate (INF) in Pakistan. This study used data from 1975 to 2019 for Pakistan and utilized Autoregressive Distributed Lag (ARDL) procedures to analyze the data. This research found that devaluation of the Pakistani Rupee against the dollar has a positive and significant impact on the inflation rate in the long run (LR) but has an insignificant effect on INF in the short run (SR). The money supply (MS) has a positive and noteworthy impact on the inflation rate. The population growth (POP) has a positive and noteworthy effect on the INF in the LR only. The government investment (INV) has a positive and noteworthy effect on the inflation rate in the LR but has an inconsequential effect on INF in the SR. The study concluded that the devaluation of the Pakistani Rupee against the dollar has a noteworthy effect on the inflation rate in the long run only and strongly supports the Turnovsky and Kaspura (1974) theory of the association between inflation and exchange rate. The government needs to focus on the stability of the domestic currency to control the price level and to increase exports and investment to maintain the domestic price level and increase production. The SBP needs to regulate the MS to sustain the price level, and the government needs to control population growth to maintain the price level.*

Introduction

The primary aim of the macroeconomic policymakers is the reduction of inflation and to sustain the economic growth at higher levels. Therefore, the topic of inflation is under debates and researches of the microeconomics policy makers and researchers for the last many years. The inflation has attained such because it has severe consequences on income distribution and GDP, and the contributing factors of the inflation rate have been extensively debated around the world. The demand-pull inflation is happened due to upsurge of cumulative demand while cost-push inflation is caused due to supply shocks. It is believed that there is strong positive correlation of inflation rate and output growth (Ayyoub et al., 2011). Furthermore, Semuel and Nurina (2015) defined economic growth as that rise the capacity of a country in supplying for the economic demands of the population. The level of economic growth can be determined by estimating the GDP. They used exchange rates, inflation and interest rate as a

supplementary variable of GDP. Their result revealed that interest rate (InR) has a noteworthy and adverse impact on GDP. They also found a positive and noteworthy relationship among exchange rates, and GDP, whereas inflation rate has no noteworthy impact on GDP.

The Mexican Tequila crises in 1995 and the Asian crises in 1997 have urged the interest among policymakers and academia on the debatable issues of general policies regarding exchange rates and regimes of the ER. The consequences of financial crises upon the global economy are becoming much critical, while capital moments and trade beyond borders have been considered as main factors in the upsurge of these crises. Local factors involved in these crises vary from country to country, yet there are certain common features of these crises like depreciation or excessive devaluation in the domestic currency and the preceding significant consequences of crises-hit countries. However, the association between INF and GDP is dependent on the economic state of the country. High growth while the constant inflation is possible when the aptitude of the economy is growing a certain pace to overcome the intensity of demand. The case of the negative output gap is possible when the potential output is above the actual output and there is enough additional capability to manage the strain of demand side. If the level of the real output balances through the level of prospective output, it means the economy is operating on an extreme level of employment and somewhat additional increase in development will lead towards a rise in inflation. At such a stage, when the demand level increases but there is no expansion in the production capacity, there will be an increase in the level of price in the LR deprived of any addition of output growth. This stage of rising inflation put some severe effects on the economy (Berument & Pasaogullari, 2003).

The international policymakers and academia have stimulated more discussion on the selection of the ER regime. A little economic literature is available on the influence of ER on inflation and GDP both empirically and theoretically. On a theoretical basis, it is too complicated to recognize clear relationships due to numerous ways in which the exchange rate may influence and be influenced by other macroeconomic variables. Similarly, the empirical literature also does not depict any clear association between the ER and macroeconomic goals (Ghosh et al., 1996).A lot of scholars are tried to investigate the connection among exchange rate and INF. Many scholars found that there is a positive relationship among the exchange rate and the inflation rate (Chhibber & Shafik, 1990) and (Bleaney & Fielding, 2002) while, other scholars found that there is an inverse link among the exchange rate and the inflation (Dordunoo & Njinkeu, 1997) and (Udoh & Egwaikhide, 2008). Elbadawi (1990) found that there is no connection among the ER and the INF. Bleaney and Fielding (2002) argue that the effect of ER regimes, and movements on the price stability and output growth has debated empirically for emerging economies. But they give different results and fail to generalize. These studies concluded that the increases in the money supply is the main determinants of inflation, but also much more factors are also triggered inflation. However, the effect of the variation in the nominal ER on inflation is still controversial. All the empirical studies confirmed that decrease in the nominal ER is correlated with impermanent increase in inflation, but the magnitude of the exchange rate was yet confirmed.

A large field of research had absorbed on the determinants of inflation the results show that higher inflation is found under the economies which have higher dollarization. Depreciation currency harms the economy. A highly dollarized economy has higher inflationary effects; the harmful balance sheet effect is more intense. If the dollarization level is higher in the economy, large depreciation leads to a more harmful balance sheet effect, investment by the firm will be reduced. The main focus is on developing countries that have a high degree of dollarization and they suffer large ER fluctuation or inflation (Carranza et al., 2009). A common observation is that continues devaluation in the currency is the main determinants of INF in Pakistan. This means that level of general prices is quickly adjust to the traded goods prices. The policymakers stated oppositely and believe that the devaluation of currency is inventible to maintain competition strength in the international market because the inflation in Pakistan is higher than INF in the world. Therefore, this study was conducted to investigate the effect of ER on INF in Pakistan to answer the controversial question that increase in the exchange rate will harm or helpful for inflation and minimize the gap. This study is significantly contributed to the existed literature and believes that the results of the study will minimize the existing gap and generalized for all

developing countries. Therefore, this study was more beneficial for the government to control the current inflation in Pakistan. Therefore, it was conducted to investigate the impact of ER on INF in Pakistan.

Relevant Literature

London (1989) inspect the consequences of ER and MS upon inflation of 23 African countries and used the time period from 1974-85. He used Harberger-type, exposes that the money supply growth, core inflation and real income were the important influential factor of inflation. Later on, the monetarists add ER as determinant of INF in the 1980s and showed that the fluctuation in the ER has significant effect on INF. Furthermore, Chhibber and Shafik (1990) examined the association among ER and INF for the period range between 1965 to 1988 for Ghana. Their outcome suggested that increase in inflation can caused due growth in money supply mainly, while the real wages and official exchange rate has no relationship with inflation. Though, there was positive association amongst the inflation and market exchange rate. Elbadawi (1990) examined the connection of inflation with exchange rate in Uganda. He attributed the inflation data for the period 1988 to 1989 of swift increase in the MS and the precipitous devaluation of ER. He found that the depreciation in the ER has no effect on inflation rate, however, the prices have accustomed to the exchange rate.

Canetti (1991) examined the influence of MS and ER separately on inflation. He used the data of ten African countries and used VAR model and found money supply growth control level of inflation in the four (4) countries, while deprecation in the ER are the control factors in the three countries. Furthermore, Asogu (1991) conducted the study to investigate the open economy, structural and monetary aspects of inflation based on ten different specification in Nigeria. He confirmed that the monetary, exchange rate, open economy and structural characteristic of the economy aspects of trend of inflation in the Nigeria. Aghevli et al. (1991) also give the same outcome but most of the countries used fixed exchange rate and have high inflation rate due to unsuitable fiscal and monetary policy. Contrariwise, most of the countries have experience of floating exchange rate and obtained small inflation rate by used the appropriate fiscal policy. Sowa and Kwakye (1993) accompanied a research for the examination of link between the INF and ER in Ghana and employed a simple multiple regression model to explore the consequence of structural as well as monetary factors on inflation. They found that the increase in the MS has too smell impact on INF while the exchange rate has no consequence upon inflation rate.

Quirk (1994) examined the association among the INF and ER. He examined the different ER. He showed that the fixed ER has more effective on INF and concluded that floating ER is more helpful to reduce the INF. Ajakaiye and Ojowu (1994) tested the consequence of the decrease in the ER on the prices over the period 1986 to 1989 and used the input-output price model for Nigerian economy. They found that continues decline in the ER leads to continuous increase in the inflation rate. The prices are increases much in the SR because the increase in InR, imported prices and petroleum prices. They further concluded that the depreciation in the ER is responsible for high inflation rate. Moser (1995) tested the relation among ER and INF. He identified that the main determinants of inflation rate in the Nigerian economy and used dynamic error correction and long run modal. He found that the MS has large and noteworthy impact on INF. The exchange rate and real income have also significant effect on inflation but has less effective than money supply, while, interest rate has insignificant effect on INF. Barro (1995) analyzed the link among ER and inflation and used the data period from 1960-1990 for the panel of 100 countries and simultaneous equation model to estimate the data. His study based on the neoclassical growth model. He found that there is adverse link between the GDP and INF.

Ndung'u (1996) examine the connection between INF and ER. He used the interest rate, real output, foreign price index, ER and money supply as dependent variables and used VAR model to estimate the data in the case of Kenya. He established that there are two way contacts between the exchange rate and INF. Ghosh et al. (1997) tested the relationship among the INF and ER for several countries and found that the inflation rate are less than in those countries who used fixed exchange rate and high inflation rate in those who used flexible exchange rate. Moreover, Kamin (1997) conducted a research to evaluate the linkages among the ER and INF in the multi-country comparison and used the time

period 1970-1996 and employed the Ordinary Least Square and Instrumental Variables techniques to estimate the data. He found that the level of the real ER and output gap were the main factors that causes inflation in the many countries. Dordunoo and Njinkeu (1997) tested the association among inflation and exchange rate for the sub-Saharan African countries and employed structural VAR and impulse response functions for approximation of the stated model. They found that the connection between the interest, exchange and inflation rate were negative. Similarly, Arize and Malindretos (1997) examine the connection among inflation and exchange rate in more than a hundred countries. He used the panel data of these variables for the period 1996-2004. He used the ARDL method, ECM model, and ARDL bound technique for this purpose. They found that a optimistic association among ER and INF in a long-run. S Ndungu and Durevall (1998) investigate the association between INF and ER and used Error Correction Model to analyze the behavior of prices in Kenya in the period of 1974-1996 and also employ the Johansen techniques to investigate the LR co integration. They concluded that ER has more effective than money supply in nominal term to influence the inflation rate.

Ndung'u (1999) employed a research for investigation of the connection among inflation and exchange rate and used VAR model t estimate the data in the case of Kenya. He found a positive impression of ER on INF. Nell (2000) tested the connection among inflation and exchange rate. He considered the South African countries data for the period 1960 to 1999 and distributed the analysis in the four steps and VAR technique to analyzed the data. They found that the single digit inflation rate is beneficial for GDP while double digit inflation have harmful effect on economic growth of a country. Holod (2000) assessed the connection among exchange rate and inflation. He examines the defined autoregressive model of the vector to model the connection in Ukraine between MS, CPI and ER. The findings indicate that price level behavior is greatly affected by exchange rate shocks. They reported that the supply of money reacts to positive price-level shocks. The analysis uses an overly sophisticated VEC model with a complex recognition framework to add to the sizeable literature on information technology. He clearly agrees that even the literature poses at least two questions. First, it is usually unacceptable to define intervals during which perseverance is constant using the existing regime of exchange rate. It directly ties, however, the variance in persistence over constant stretches of the regime to separate shifts in the key level of inflation, which is also controversial.

Adamson (2000) considering the distortionary implications of a civil conflict proceeded by a rather oil economic crisis and burst. To use a fundamental macroeconomic accounting methodology, he designed a methodology for evaluating the inflationary environment of Nigeria and concluded that any strategy of change that would not make the claim on the whole objective of non-inflationary economic development. The link between some of the inflation and exchange rate was assessed by Odusola and Akinlo (2001). They assessed the links among the inflation, depreciation, and development of Naira in Nigeria, by using Vector Auto regression (VAR) and its conceptual version. The findings of this study seem to indicate that, notably in the short to mid-term, the application of a flexible ER regime does not immediately equate to production expansion. Concerns like accountability, honesty and transparency mostly on result of the administration. Furthermore, The association amid exchange rate and inflation was evaluated by Batini and Nelson (2001). He expands and reinforces the findings of Milton Friedman on the lag amid behavior of economic and fiscal policy and the inflation response. Their proof is based on information from the UK and the US on money rates of growth, inflation, and interest rates for the period 1953-2001, and also on yearly data on money inflation and interest rates. Their results reiterate the conclusion that monetary policy intervention takes about a year to have its peak impact on inflation. There is a reasonably broad literature grappling about monetary predictor relationships and other macroeconomic variables.

Faria and and Carneiro (2001) address the correlation among inflation and production for Brazil’s economy, whereby for the last several years a persistent higher inflation shock has indeed been observed. They have used the 1980-95 data for almost the same timeframe to measure the short-run inflation-real production relationship. Their data corroborate that Sidrauski's cash super neutrality, which could be described as inflation, has little real long-run impact on production and productivity. Their findings indicate that, in the short run, inflation has real effects on production. The influence of ER

on INF in Tanzania has been assessed by Rutasitara (2004). The model estimate confirms the systemic view of inflation rate and indicates a high degree of perseverance, as the current rate represents around 0.6 in the last four quarters. The study adds to the discussion of the controversies surrounding the relative position of ER. It is also interesting to note that there are stationary levels of nearly all macro variables in the model. The association between the INF and ER was measured by Muço et al. (2004). During the transition period, they analyzed monetary policy in Albania and used VAR model to analyze the data. They found weak correlation among money supply, inflation rate and exchange rate up to mid-2000 and the liberalization of financial markets and the strengthening of the predictability of interrelationships between main macroeconomic factors.

Using non-linear ARDL techniques for ten European countries for the time frame of 1974-1998, Kool and Lammertsma (2005) inspected the link amid ER adjustment and the extent of inflation stability. They permit for the existence of an unknown number of changes in the mean inflation during the estimation process. Their findings provide supporting proof for the existence of a positive correlation amongst the accommodation of exchange rates and the persistence of inflation in smaller and more dependent on the mechanism of exchange rate countries, even when large inflation level changes are adequately accounted for. They find hardly any proof of such a positive association for the larger countries. Generally, their findings deliver moderate furtherance for the presence of a potentially hypothesized positive correlation among accommodation at the exchange rate and the persistence of inflation. Furthermore, Khan and Schimmelpfennig (2006) develop a simple inflation approach that integrates data from Pakistan's economy over the period 1998-I to 2005-VI and reveals that inflation rate in Pakistan is influenced by monetary factors. A 5% inflation target for sustainable output growth and stabilization is indicated by their projected performance.

Khan and Gill (2010) examined the relative among ER and INF in Pakistan. He used annual data of these variables for the period 1971-2006 and applied the OLS method to check the relation between these variables and concluded that depreciation of ER and increases the inflation and appreciation of ER and a decrease in the value of imports decreases the INF. Ahmed (2010) examine the association among the GDP and CPI, finding a 6% inflation threshold for Bangladesh’s economy. The investigational proof indicates that a statistically meaningful long-run negative association exists among the variables of this study. Hussain (2005) considers no definite level of INF threshold for Pakistan and only indicates that Pakistan’s economy can handle a 4-6 percent inflation range. The association between the ER and INF in 41 countries was examined by Asad et al. (2012). For the period 1973-1991, they employed the panel data of these variables. To investigate the relationship between these variables, they adopted the ARDL methodology and ARDL bound technique and estimated that a positive long-run link prevails amid ER and INF.

Akinbobola (2012) tested the relation between money supply Exchange rate and inflation in Nigeria. He employed annual time series data of these variables for the time span of 1980-2015. He applied the ARDL method, ARDL bound technique, and the error correction model to check the relation between these variables and concluded that a long-run negative relation exists between exchange rate, money supply, and inflation. Furthermore, Dutta and Saha (2015) conducted a study to examine the collaboration of INF, with the ER in Bangladesh. The INF shows a positive but weak relationship with the exchange rate because if inflation changes, the ER does not change by the same changing pattern. Furthermore, Achnab (2016) seeks to analyze where both an inflation management policy and an exchange rate regime aimed at enhancing their macroeconomic efficiency can be used by developing countries and to boost their growth and reduce their inflation. The study shows that the INF targeting policy is a replacement for the fixed ER system and a supplement to the flexible ER regime. The complicated relationship between INF, public debt and Nigeria's ER is investigated by Odior and Arinze (2017). The result demonstrates that the INF of the CPI has a positive link with domestic debt and the foreign ER and a moderate positive relationship with external debt. The SR findings suggest that historical inflation and domestic debt values have a substantial impact on the actual INF value, while external debt and ER is positive, but it will eventually be less significant. The study demonstrates how policymakers should represents specific and pragmatic policies aimed at significantly lowering both

domestic debts.

Ahmed (2018) explores the relation between Nigeria's inflation, ER, and economic development and used the ARDL technique to assess association between the variables. The empirical outcomes specify that the variables have a long-run association. Meo et al. (2018) tested the link among the ER and INF in Pakistan. He used annual time series data of these variables for the timeframe of 1980-2015. He applied the ARDL method and ARDL bound technique to check the relation amid these variables and concluded that a LR asymmetric connection present among ER and INF. A research was conducted by Lucas et al. (2019) to investigate the returns of equity capital, the implications of market timing, inflation, and the US Dollar exchange rate. The outcome is that equity fund return is determined by market return, the investment manager's market timing capacity is not significantly present in an equity fund. Inflation and the US Dollar exchange rate impact the return on equity securities, so when investing in an equity fund, investors need to pay attention to all variables. In developing economies, Caselli and Roitman (2019) quantify the ER to INF. Important indications of non-linear times greater than 10 and 20 percent during depreciation episodes. The pass-through coefficient of the ER is found to be 18 and 25 per cent respectively after one month, compared to a coefficient of 6 per cent in the linear case. The study also explores the role of transient vs. permanent shocks in translating exchange rate changes to prices and implementing an inflation-targeting regime. Furthermore, Hoanga et al. (2020) conducted a study to explore the influence of the ER on Vietnam's INF and GDP and then used the VAR approach to calculate the data for the period 2015 to 2018. They noticed confident impacts in the economy from exchange rate to inflation rate, production, supply of capital, import, and export. The findings have shown that the determination of past inflation explains the variation in current inflation, while the volatility of money supply explains the variation in inflation.

Theoretical Framework

As the continues increase in the inflation rate of Pakistan, this study assumed that the Monetraisrt model to explained the inflationary process more significantly in Pakistan strongly supported empirically by (Ahmad & Ram, 1991) and (Khan et al., 1996). According to this theory the aggregate demand (AD) of goods and services market directly depends on the domestic prices level and inversely on the quantity of money. Therefore, $P_d$indicated domestic price level, M indicated money supply, and Y indicated domestic output and assumes the log-linear aggregate demand function. Now solve the equation for goods market-clearing conditions to produce the following equation for the domestic price level equilibrium.

$\log(P_d) = a + b\log(M) + c\log(Y), \quad b > 0, c < 0$..... (1)

Abovementioned equation suggested that it might not be sufficient for the relationship of the price elasticity level with MS and real GDP to be the same as assumed in the strict Monetarist model (the money quantity theory). The main explanation seems to be that the influence of monetary expansion on aggregate spending would be standardized, while adjustments in real GDP would not have the same effect on the general price level, whereas the timing of such effects is also significant. As some of the channels through which this effect is transmitted are indirect, the primary effect of monetary expansion, especially where it is not anticipated, will be minimal. On the other hand, the impact of GDP growth will be more immediate, especially on the prices of those products that require significant changes in the level of production (Ahmad & Ali, 1999).

The price level facing a country's people would comprise of the price of all domestically consumed products and services (Ahmad & Ali, 1999). The generalized price level has been established by Turnovsky and Kaspura (1974) as the weighted geometric mean of the price levels of both imported and domestically manufactured products. They considered a more general prices index, P, as the weighted geometric mean of the level of price exported (P_x) price of imported (P_m) and domestically produced (P_d) goods. The weights are set equal to the shares of exported$(-S_x)$, imported(S_m) and domestically produced(S_d) goods out of gross domestic preoccupation.They can write in the natural log:

$log(P) = S_m\log(P_m) - S_x\log(P_x) + S_d\log(P_d), \quad S_m - S_x + S_d = 1$ ..... (2)

The price level of exported goods is allotted a negative weight in the procurement the general price level due to that if the prices of exports raise then for the given domestically produced goods prices

which also included exported prices, while the general prices level decreases without the prices of exported goods.

The nominal exchange rate (E) and foreign currency price level of imports(π_m) and exports(π_x), the above equation can also be written as

$$log(P) = (S_m - S_x)\log(E) + S_m \log(\pi_m) + S_x \log(\pi_x) + S_d \log(P_d), \quad S_m - S_x + S_d = 1$$ ..... (3)

Substituting for $\log(P_d)$ from equation (2.1) into (2.3) yields:

$$log(P) = (S_m - S_x)\log(E) + S_m \log(\pi_m) + S_x \log(\pi_x) + S_d \log(a + b\log(M) + c\log(Y))$$ ..... (4)

The above equation indicated that an increase in the imported good prices can further add to the inflation by decreasing the supply of domestically produced goods available as imports are decreased.

Methodology

This research is Quantitative and time-series data will be used from1975 to 2019, the data will be collected fromWorld Development Indicators (WDI) (2020).

Model Specification

Inflation is amongst the most studied subjects in academic literature since growth and income distribution have significant inferences. The determinants of inflation have also been extensively discussed in the world. The effects of population growth affect the inflation rate positively as with an upsurge in population growth the demand for consumer goods increases which in turn increases the prices and inflation. In particular, the role of investment in an economy has been of major concern in deciding prices. Some research studies have also assessed the impact of the Real Effective ER on INF and it has been found that the Real Effective ER has influenced the inflation rate in many countries. So, the following model is used for the current study to check the link between inflation and some of its determinants. The same model was used by Asad et al. (2012), Ahmad et al. (2024), Khan and Gill (2010), and Udoh and Egwaikhide (2008).

$$INF_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} INF_{t-i} + \sum_{i=0}^{n} \beta_{2i} POP_{t-i} + \sum_{i=0}^{n} \beta_{3i} ER_{t-i} + \sum_{i=0}^{n} \beta_{4i} INV_{t-i} + \sum_{i=0}^{n} \beta_{5i} MS_{t-i} + \mu_t$$ ----------(5)

An ARDL Bound techniques form

$$\Delta INF_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta INF_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta POP_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta ER_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta INV_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta MS_{t-i} + \gamma_1 POP_t + \gamma_2 ER_t + \gamma_3 INV_t + \gamma_4 MS_t + \omega_t$$ ----------(6)

Table 1: Description of Variables

Variable	Unite	Symbol
Inflation, consumer prices (annual %)	Percentage	INF_t
Exchange rate (official) (LCU per US$)	Rate	ER_t
Broad money (% of GDP)	Percentage	MS_t
Population growth (annual %)	Percentage	POP_t
Monetary Sector credit to the private sector (% GDP)	Percentage	INV_t

Econometric Techniques: Autoregressive Distributed Lag Model

There are a lot of techniques for the estimation of LR and short-run coefficient. Like Johansen Co-integration test (Johansen & Juselius, 1990) and Engle and Granger test for co integration developed by (Engle & Granger, 1987). These techniques are more suitable for the same order data and large sample data. This study used the ARDL techniques developed by (Pesaran & Shin, 1998) to estimate because the ARDL techniques are more suitable for mixed or data.

Results and Discussion

Unit root test results

The Augmented Dickey Fuller (ADF) result indicated that inflation rate and population growth have zero order of integration while exchange rate, money supply and investment have first degree of integration. Therefore, the investment series has I(1). Therefore, the unit root test results recommend the use of ARDL techniques to estimate because the order of integration of the variables is mixed.

Table 2: ADF test results

Variables	ADF test statistics with probability value		Order of Integration
	At Level	At 1st Difference	
ER_t	2.8500 (1.0000)	-5.2338* (0.0001)	I (1)
INF_t	-4.6517* (0.0005)	-------	I (0)
MS_t	-1.5114 (0.5186)	-5.8130* (0.0000)	I (1)
POP_t	-3.5275* (0.0118)	-------	I (0)
INV_t	-1.6654 (0.4414)	-5.9450* (0.0000)	I (1)

Regression results

Table 3 indicated the long run results of autoregressive distributed lag (ARDL) techniques results. The ARDL analysis demonstrates as the exchange rate has an optimistic and significant consequence on inflation. A one-unit upsurge in the ER will increase the inflation rate by 0.3189 percent. The results are similar to (Chhibber & Shafik, 1990) and (Bleaney & Fielding, 2002) and dissimilar with (Dordunoo & Njinkeu, 1997) and (Udoh & Egwaikhide, 2008). The money supply has a significant and noteworthy consequence on the inflation rate. A % augment in the MS will augment INF by 0.5267 percent. In the same way, population growth has a helpful and noteworthy effect on the inflation rate. A % upsurge in population growth will increase the INF by 1.8436 percent. Similarly, the investment has a positive and significant effect on the inflation rate. A one percent increase in investment will increase the INF by 0.9496 percent. Hence, there is no long-run co-integration relation exist among the variables.

Table 3: **ARDL Long Run Results**

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Probability**
ER_t	0.3189	0.1812	1.7601	0.0906
MS_t	0.5267	0.3025	1.7413	0.0939
POP_t	-1.8436	1.0718	-1.7200	0.0978
INV_t	0.9496	0.3567	2.6620	0.0134
C	5.0845	9.5941	0.5299	0.6008
F-statistic (P-value)			3.8549 (0.0013)	
ARDL Bounds Test	Test Statistic	Value	Df	
	F-statistic	3.9070	4	
Critical Values	**Significance**	**Lower Bound**	**Upper Bound**	
	10%	2.45	3.52	
	5%	2.86	4.01	
	1%	3.74	5.06	

Table 4 shows the SR coefficient and error correction term results. The ER has a positive but unimportant consequence on INF. Similarly, the money supply has a helpful and noteworthy effect on the INF. A % increase in the MS will increase INF by 0.3749 percent in the short run. Population growth has a negative but insignificant effect on INF. Similarly, the investment has a helpful but unimportant effect on the INF. The coefficient of the ECT is negative and noteworthy at a 1% level of significance. The coefficient value of the ECT is -0.4499 which means that there is a 45% speed of adjustment from the SR to LR equilibrium and 46% disequilibrium errors are corrected annually and take 2 years and three months.

Table 4: **ARDL SR Results**

Variables	**Co-efficient**	**Std error**	**T-statistics**	**Prob**
D(ER_t)	0.0542	0.0960	0.5651	0.5754
D(MS_t)	0.3749	0.1320	2.8405	0.0073
D(POP_t)	-0.6868	0.4568	-1.5034	0.1412
D(INV_t)	0.3737	0.2292	1.6302	0.1115
ECM	-0.4499	0.0763	-5.8963	0.0000
C	-0.0753	0.4456	-0.1691	0.8666

Conclusion

The international has stimulated more debate on the selection of the ER regime. A little economic literature is available on the effect of ER on INF and GDP both empirically and theoretically. The effect on inflation of nominal exchange rate fluctuations is somewhat more obscure nowadays. Most empirical studies suggest that the depreciation of the nominal exchange rate is associated with the temporary rise in consumer prices, although the scale of the exchange rate has not yet been verified. The main objective of the study is to explore the effect of the exchange rate on Pakistani inflation. For Pakistan, this research used the time series from 1975 to 2019 and used ADF to check the unit root problem, ECM for the speed of adjustment, ARDL techniques to estimate the data. The exchange rate has a positive and important long-term impact on inflation, but it has an insignificant short-term effect on inflation. The supply of money has a positive and important long-term and short-term impact on the inflation rate. Population growth has an optimistic and important long-term impact on the inflation rate, but it has a marginal short-term effect on INF. In the LR, the investment has a positive and important impact on the INF, but in the SR, it has an insignificant impact on INF. The study concluded that exchange rate has a major long-term impact on inflation but has no short-term effect and strong support for the theory of the relationship between exchange rate and inflation.

Recommendations

- The government needs to focus on the stability of domestic currency against the foreign currency to minimize the ER to control INF.
- The government needs to increase exports to decrease the domestic INF.
- The State Bank of Pakistan needs to control the money supply to maintain the price level.
- The government needs to control POP to maintain the price level.
- The government needs to increase investment to maintain the price level.

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