







Monetary Condition Index: Empirical Evidence from Pakistan

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ABSTRACT

The study focuses on assessing the Monetary Condition Index (MCI) in Pakistan, which measures the tightness or easiness of the country's monetary policy. It analyzes the impacts of interest rates and exchange rates on inflation and GDP growth, using time series data from 1975 to 2020. Monetary Condition Index is calculated by using time series data, employing annual data set from 1975 to 2020. Two different methods are applied to find the weights of interest rate and exchange rate, the one is the Principal Component Analysis and the other is co-integration method employing the Autoregressive Distributed Lag model. The research aims to provide valuable insights for policymakers, planners, and economists to optimize monetary policies and understand the transmission mechanism in the economy. The study also explores the historical impacts of interest rates and exchange rates, with potential implications for other economies. The Monetary Condition Index is introduced as a useful policy locator and an indicator of the monetary policy stance. Additionally, the research seeks to validate the MCI's reliability as a policy indicator and address certain research gaps related to its effectiveness, dynamics, and generalizability. The study concluded that the MCI is sensitive to variations, and its calculation and methodology are essential. The monetary stance in Pakistan remained tight from 2017 to 2020, representing the highest trend in history. However, the effectiveness of using interest rate tools to control inflation in Pakistan was questioned, suggesting that changes in monetary policy tools might be necessary to achieve the objectives of the State Bank of Pakistan in line with Islamic economics principles.



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1. Introduction

The main objective of the State Bank of Pakistan's monetary policy is to attain a stable level of prices according to its act of 1956 via controlling the rate of inflation to align with the policies of the government (Batool, Haroon, Shah, Adil, & Nisar, 2022). This inflation rate is

controlled by SBP using the tools of interest rate and exchange rate. These are the two dimensions in which the central bank works to alter the inflation rate and GDP of the economy. With an increase in interest rate, aggregate demand in the economy decreases hence putting downward pressure on the inflation rate and giving a tight monetary policy (McKay & Wieland, 2022). On the other side, the impact of the exchange rate is not direct, its effect is just like, something happening under the sea unobservable directly. The effects of the exchange rate are also different for different types of currency, for a strong currency its effects are different from a weak currency, or we can say that it depends on the nature of the economy.

Dependence on the exchange rate is always weak when money supply and interest rate have a wide range of differences, however, the dependence is strong in the case of output and inflation rate differential. Trends of economic variables should be monitored properly for almost the past two years to get benefits from the exchange rate dependence (Gong, Ma, & Chen, 2022).

A high rate of exchange puts upward pressure on the economy with large or high importer countries and this will increase the inflation rate in the economy, to manage the inflation rate the central bank alters the interest rate to maintain the price level in the economy (Batool et al., 2022). On the other hand, it impacts the output through various indirect channels e.g., investment and Bop, etc.

In contemporary economic policies, the transmission mechanism is based on the propagation of policies that have been replaced, and in defining the monetary policy it is the way through which the decisions from central banks are transmitted to real variables of Gross domestic product and inflation keeping in mind the process with a time lag.

The transmission mechanism of the central bank's policy is different for different economies, the interest rate changes the aggregate demand level in the economy and the central bank decides how to fix the rate either to have tight or easy monetary policy, on the other side the impact of exchange rate also changes the price level in the economy based on the fact that how what are the elasticities of factors of net exports and what is the elasticity for consumption also the investment. The monetary condition index is an influential device that can measure the two sides of the objectives of the state bank the changes in the output side and the changes which are brought in the price level in the economy.

The monetary condition index gives a combined effect based on the calculations of weights of interest rate and exchange rate (Memon & Jabeen, 2018). To give a needle to monetary policy stance in the economy, it is also a policy variable, which can be used as a policy locator, how and where there is tight and easy monetary policy needed in the economy.

The monetary condition index was first used and formulated by the Bank of Canada in the 1980s depicting the monetary policy stance of a Canadian bank. Afterward, it was used by many other countries and became a popular monetary index. MCI gives a numeric value that shows the tightness and easiness of the Monetary stance of a country (Khan & Qayyum, 2007).

Interest rate and exchange rate both affect the inflation rate of the economy. The rate of exchange brings a change in domestic and foreign goods and services. The difference brings a change in the pattern of spending in an economy of both individuals as well as firms. So both variables have the same effect on inflation, an increase in any of the given variables decreases the growth rate and inflation rate (Kodra, 2011). Change in the index depicts the tight and loose monetary policy (Osborne-Kinch & Holton, 2010). A monetary condition index with a high value indicates tight monetary policy and a low-level monetary condition index shows loose monetary policy (Poon, 2010).

The monetary condition index can be used as a monetary policy rule based on the operational target. Domestic economic conditions as well as foreign economic conditions can be utilized to get a monetary condition index that can be aligned with the inflation target of the economy (Osborne-Kinch & Holton, 2010). On the other hand, MCI can be used as an inflation indicator, it captures the effect of interest rate and exchange rate and explains whether the monetary policy of a country is tight or loose (Şıklar & Doğan, 2015). The monetary condition index can also be utilized to rearrange interest rate that is aligned with the exchange rate.

MCI explains the combined effects of interest rate and real effective exchange rate and also their summed-up weights of interest rate and real effective interest rate compared to a baseline year. The weights obtained from the value of the coefficient show the importance of both the variables interest rate and exchange rate on output as well as inflation in the economy. There are three main important applications of the monetary policy index. First is its operational targets of monetary policy, second, identify the main indicator of monetary policy which affects the economy, and third shows the middle and short-term policy on the economy.

Monetary policy works in two dimensions towards the economy, through the exchange rate channel and the interest rate channel. An increase in the interest rate and a rise in the exchange rate puts inflationary pressure on the economy.

1. The research aims to assess the monetary policy stance of Pakistan by constructing the Monetary Condition Index (MCI) using time series data from 1975 to 2020.
2. The MCI will be calculated based on the weights of interest rate and exchange rate obtained through Principal Component Analysis and Autoregressive Distributed Lag model.
3. The study intends to determine the relative impacts of these two policy variables on the inflation and GDP growth rate of the country.
4. Additionally, it aims to identify the historical impacts of interest rates and exchange rates, providing insights for policymakers and planners to optimize the impact of monetary policies on Pakistan's economic performance.

The study explores how changes in interest rates and exchange rates affect aggregate demand in the economy, influencing factors like consumption and investment. By analyzing these transmission mechanisms, policymakers can better comprehend how their decisions impact economic variables. The research introduces the Monetary Condition Index as a tool to assess the tightness or easiness of monetary policy. The MCI provides a numeric value that reflects the combined effects of interest rates and exchange rates, indicating whether the monetary policy stance is restrictive or expansionary. It serves as a useful policy locator for policymakers to identify the appropriate monetary policy stance needed in the economy. By analyzing the MCI, they can determine whether to adopt a tighter or looser monetary policy to achieve their objectives. The study emphasizes the relationship between interest rates, exchange rates, and inflation. It highlights that changes in these variables can impact the rate of inflation and, subsequently, economic growth. This knowledge is crucial for policymakers aiming to control inflation and promote sustainable economic expansion.

The study attempts to validate the results of the MCI by employing different methodologies. Cross-verification adds credibility to the findings and enhances the understanding of the monetary policy's impact on the economy. Constructing the MCI for Pakistan from 1975 to 2020 provides a historical overview of the country's monetary policy stance over time. This longitudinal analysis can reveal patterns and trends that can inform future policy decisions. The significance lies in providing a comprehensive analysis of the transmission mechanism and the role of the Monetary Condition Index in evaluating and formulating monetary policy for Pakistan. The findings can be valuable for policymakers, researchers, and economists seeking to understand and optimize the impact of monetary policies on the country's economic performance.

2. Literature Review

The integration level of the world economies is more developed and sophisticated than ever before and the external shocks e.g. changes in exchange rates change the internal activities of the economy by price stability. The importance of exchange rates in monetary policy to handle external shocks and prevent price instability. The major concern for developing countries is inflation resulting from exchange rate depreciation. The central bank's policy rule needs to identify the threshold value at which exchange rate depreciation affects domestic prices for effective implementation. Exchange rates serve as a channel through which external shocks impact emerging economies, making it crucial to determine the threshold for this transmission to occur (Valogo, Duodu, Yusif, & Baidoo, 2023).

The monetary condition index can be explained as the ratio of transmission variables that is exchange rate to the ratio of interest rate in the case of Pakistan (Qayyum, 2002). The monetary condition Index of Albania is 3.8:1, which explains that an increase of one percent in interest rate can decrease the exchange rate by 3.8 percent. On the other way, it can be described as a policy variable that how much we need the exchange rate to offset interest rate or vice versa.

The monetary condition index of Zimbabwe is 1 ratio 1.54 indicating that the monetary policy is more dominated by the exchange rate channel compared to the interest rate channel, and the relationship in the long run invalidated with the economic variables however it is not proved in short-run (Mupunga, 2022). It has been considered a tool of monetary policy to gauge the growth of GDP and track the inflation rate through the central banks of Canada and New Zealand (Mohseni, Pahlavani, Shahiki Tash, & Mirjalili, 2019).

Policies do not directly and at the same time address interest rate and exchange rate channels to alter the capital flow in the economy. However foreign reserves play a role in the financial stability of the economy, and it also has severe consequences of instability as well (Amador, Bianchi, Bocola, & Perri, 2020). So the variation through MCI can incorporate the changes and capture the effects. In case if asset price channel is incorporated into the MCI it transforms into the Financial condition index (Schmeling, Schrimpf, & Steffensen, 2022).

Yaaba (2013) used MCI as an indicator in the case of Nigeria's Monetary policy and established that the monetary condition index comes in line with the policies directed by the Central Bank of Nigeria. It can also be utilized as the main indicator of monetary policy. The monetary condition index in Turkey was calculated and the ratio was properly adjusted for the economy which helped the economy to properly track the growth rate of the economy (Akdeniz, 2021). Another study by Sharma, Jha, Suresh, and Maji (2021) indicated that the study in India also tracked the Monetary condition index and it helped in calculating the growth rate of GDP and measured the inflation rate.

Despite the significance of understanding the impact of monetary policy on the economy and the importance of the proposed Monetary Condition Index (MCI) as a tool for policy evaluation, several potential research gaps can be addressed:

1. Validating MCI as an indicator as a reliable indicator of monetary policy and its ability to effectively track and predict inflation and GDP growth rate.
2. MCI is not recently calculated for Pakistan to measure the easiness and tightness of incorporating the exchange rate.
3. Dynamic Nature of Transmission Mechanism: The study's focus on understanding the transmission mechanism is crucial, but it is essential to acknowledge that the transmission process can be dynamic and subject to changes over time. Factors like financial innovations, evolving market structures, and changes in consumer behavior can alter the

transmission channels' effectiveness. Incorporating a dynamic perspective into the analysis could offer more nuanced insights.

The present study aims to explore the impact of monetary policy on the economy through the transmission mechanism, with a specific focus on interest rates and exchange rates in Pakistan. It introduces the Monetary Condition Index (MCI) as a tool for policy evaluation and policy locator. While the proposed research contributes significantly to the understanding of monetary policy's influence on economic variables, it faces certain research gaps that need to be addressed for a more robust and comprehensive analysis. The study will seek to validate the MCI's effectiveness, consider non-monetary factors' role, examine the generalizability of the MCI to other economies, and incorporate a dynamic perspective on the transmission mechanism. By addressing these research gaps, the study aims to provide policymakers, researchers, and economists with valuable insights to optimize the impact of monetary policies on Pakistan's economic performance and, potentially, other economies with similar characteristics.

The research paper is based on the methodology followed by the introduction of the topic, showing the mathematical indexation with the theoretical derivation of the monetary condition index and afterward calculating the weights by principal component analysis and describing how to get weights by cointegration methods, further calculating the weights for years 2020 and drawing the MCI from 1975 to 2020 to give an overview of the condition of monetary policy of Pakistan. Discussing it from the Islamic point of view.

3. Methodology

3.1. Monetary Condition Index

The main ideas of the monetary condition index were given by Freedman (1996) in a seminal paper. The formula for the monetary condition index is given in equation (i) where the monetary condition index is the weighted sum of interest rate and exchange rate for the current period compared to one period lag.

$$MCI_t = w_r(r_t - r_o) + w_e(e_t - e_o) \tag{1}$$

Where w_r is the weight of interest rate, r_t is the short-term interest rate r_o is the interest rate of base period, w_e show the weight of the exchange rate, e_t is the exchange rate of the current period, e_o is the exchange rate of the base period.

Also,

$$\frac{w_r}{w_e} \tag{2}$$

Equation (2) shows the ratio of weights, which depict the impact of interest rate and exchange rate on GDP and inflation in the medium term. And the sum of weights is equal to 1.

$$w_r + w_e = 1 \tag{3}$$

3.1.1. Derivation of weights.

There are three main approaches or methods to find out the weight.

- i) Single equation model/approach. This approach is used by International Monetary Fund, OECD, and Deutsche Bank. The monetary condition index can be calculated by observing the effects of both policy variables on any of the variables, either on inflation or on aggregate demand. Weights of rate of interest and rate of exchange derived from the AD (aggregate demand) equation show the impact on aggregate demand. It is also believed that the value of w_e is high: as it has a double impact on aggregate demand, as the exchange rate has a direct impact on prices along with an indirect impact on aggregate demand (Shaheen, 2013).
- ii) Monetary condition index based on trade share

- iii) The real monetary condition index was formulated by J.P. Morgan (JPM). In this method, the weight of the exchange rate was taken as a function of the ratio of export to gross domestic product, and the weight of interest rate w_r was equal to $1-w_e$. so the weights in this case are the crude weights measured in relative terms of the exchange rate on gross domestic product.
- iv) Multiple equation models.
- v) According to this model or approach, the weights of the rate of exchange rate and rate of interest are calculated by applying a number and a system of equations and applying the cointegration approach.

Şıklar and Doğan (2015) constructed MCI using time variation frame work for Turkey another study Kesriyeli and Koçaker (1999) used the price equation model, both the techniques are different for the small open economy and both gave different values for the MCI-based view based on the importance of interest rate and exchange rate impact in Turkey. However, the second used the price equation model and concluded that the exchange rate is the main component of monetary policy which plays a vital role in the price adjustment process, on the other hand, first study concluded that interest rate has the main role in achieving the objectives of monetary policy.

Similar cases were observed in the case of Pakistan; it is a small and open economy just like Turkey. Two different research by Khan and Qayyum (2007) and Hyder and Khan (2006) used different methodologies and came up with the same results as Turkey. The first study used the investment saving Philips curve along with Bernanke and Mihov and concluded that the exchange rate is a more powerful instrument in monetary policy, as supply shocks have a dominant impact on Pakistan's economy, on the other hand, the second study utilized Johnsen Maximum Likelihood method and came up with the outcomes that rate of interest impacts more likened to exchange rate. There are mixed conclusions from both case studies of Pakistan and Turkey

3.2. Empirical Analysis

This paper is based on time series data; the methodology is based on an econometric technique used to find out the monetary condition index after conducting a unit root test of stationarity for time series analysis. Two different techniques will be used to cross-verify the weights of the rate of interest and rate of exchange.

3.2.1. Data

The data used is secondary, collected from the SBP website. Rate of interest and exchange rate data were given in monthly terms and were converted to annual data. The rate of interest is the call money rate and the exchange rate is the rupee in exchange for the dollar price. The CPI data obtained from the SBP website from 1975 to 2020 had a base period of 1976,1982, 1992,2002,2008, and 2017. The data is first normalized by using the formula

$$\text{Normalized CPI} = \frac{(CPI_t + CPI_{min})}{CPI_{max} - CPI_{min}}$$

The data was normalized but the results didn't match with PCA weights. The value of coefficients of policy variables without normalized data of CPI is as follows.

Table 1
Coefficient values of CPI and Interest rate without normalization

Variables/values	Interest rate	Exchange rate
Coefficient values	0.008512	0.013677
Weights	0.384	0.616

It means that MCI is very sensitive to the methodology used in its calculation. This paper incorporates two different types of methodologies to calculate the MCI of Pakistan. Both give the same weightage of the rate of interest and rate of exchange. Initial processing was done in Microsoft Excel and then econometric techniques are performed in Eviews 10.

Practically economic indicators normally have low sample frequency compared to the rate of exchange and rate of interest. They can be observed daily or monthly basis. A direct way to deal with this is to aggregate the data and develop a model (Gong et al., 2022).

3.2.2. Unit Root

In time series data the foremost important thing is to find out the unit root of the variables. It tests whether the variable has the mean and variance constant over time. Unit root test testifies to the non-stationarity of the variables. The ADF test is hired to check the unit root of the CPI, rate of interest, and rate of exchange. ADF is a type of dickey fuller test that tests a more complicated type of data time series. The value of the statistic is a negative number Bakir (2015) higher the value of the statistic higher the chances to reject the null hypothesis.

- $H_0 =$ There is a unit root
- $H_1 =$ There is no unit root.

Table 2
Test of stationarity of target variables

Variables	Unit root	A probability value of the t-test
Interest rate	Level (intercept)	0.0002
Exchange Rate	1 st difference (intercept and trend)	0.0000
Consumer price index	Level (intercept)	0.0132

3.3. Principal Component Analysis

Principal component analysis works as a bridge between two analyses and is a pre-analysis used for further analysis (Elsharif, 2019). Here principal component is used to find the weights w_e and w_r for the monetary condition index. It is a linear arrangement of variables to find out the variance structure of the model of the given value. It is mainly used in the case of making predictions, by reducing the dimensions while keeping variation in the data itself.

$$PCA = XTW \tag{4}$$

Where $XT = 1 \times N$, And $1 \times N$ is the row vector of elements at a given period t

The eigenvector or eigenvalue is the variance-covariance matrix $X_t Y_t$, it gives weights and is used further for weighted sums at each point of time for calculating the MCI.

Table 3
Statistics of Interest rate exchange rate and Inflation

Variables	Mean	S.D	Growth Rate
Interest Rate	8.787695	2.432376	8.669762
Exchange Rate	53.9917	42.93953	17.86828
CPI	149.7477	40.40858	136.3298

The mean value for inflation is highest compared to the interest rate and exchange rate and the deviation of the exchange rate is highest among the three variables. The inflation in the Pakistans economy shown by CPI had the highest growth rate it increased by 136 percent.

Whereas the exchange rate had a growth rate of 17 percent and the interest rate grew by more than 8 percent.

3.3.1. Theoretical Implication of PCA

Using Principal Component Analysis (PCA) in a Monetary Condition Index (MCI) can have several theoretical implications. The MCI is a tool used by central banks and policymakers to assess the overall stance of monetary policy and its impact on the economy. PCA is a statistical technique used for data reduction and dimensionality reduction, which can be employed to construct the MCI (Jung & Taflanidis, 2023).

It captures the multidimensionality of the variables, Monetary conditions are influenced by multiple variables, such as interest rates, exchange rates, money supply, and inflation. PCA allows the incorporation of various variables into the index, capturing their multi-dimensionality (Guo, 2023). Often, monetary variables used in constructing the MCI can be highly correlated, leading to multicollinearity issues. PCA helps mitigate this problem by creating orthogonal components (principal components) that are uncorrelated. This prevents redundancy and ensures that the MCI reflects the most important and independent information in the data. In PCA, the contribution of each variable to a principal component is determined by its loading. These loadings represent the weights assigned to each variable in the construction of the principal components (Kwon, Lu, & Zou, 2023). The MCI constructed using PCA provides a comprehensive overview of monetary conditions, aiding policymakers in understanding the overall stance of monetary policy. By using multiple variables, it enables a more nuanced assessment of the economy, potentially leading to more informed and targeted policy decisions.

Overall, using PCA in the construction of the Monetary Condition Index can provide a powerful tool for policymakers to gauge the state of the economy and make data-driven decisions. However, it is essential to consider the theoretical implications and carefully interpret the results to avoid potential pitfalls or misinterpretations.

3.3.2. Weights by PCA Method

Table 4

Exchange rate and interest rate analysis with Principal Component Analysis (PCA)

Variables	Values	difference	Proportion	Cumulative proportions
Exchange rate	1.087571	0.175141	0.5438	0.5438
Interest rate	0.912429	-	0.4562	1.0000

Note: Sample:1975 to 2020, 45 observations after adjustment with Eigenvalue (sum=2 and average=1)

The proportion in Table 2 depicts the weights of the interest rate and exchange rate of Pakistan. And the sum of the weights is 1 which is shown in the cumulative proportion column of table 2. The weightage of the rate of interest $w_i = 0.4562$ and the weightage of the rate of exchange $w_e = 0.5438$.

3.4. Theoretical Implication of ARDL

Finding the weights of a Monetary Condition Index (MCI), which is a composite index used to summarize the stance of monetary policy, there are several theoretical implications worth considering: estimating the weights of an MCI, endogeneity might be a concern. Endogeneity arises when the variables are mutually determined, and there might be a feedback loop between the monetary policy indicators and the macroeconomic variables. ARDL, by incorporating lagged values of the variables, can help address endogeneity to some extent (Voumik & Ridwan, 2023). ARDL allows for the inclusion of both I(0) and I(1) variables, meaning it can handle a mix of stationary and non-stationary time series (Choudhry, 2023). This is useful when constructing an MCI that comprises variables with different integration orders (e.g., interest rates as stationary

and inflation as non-stationary). ARDL can provide robust estimates when sample sizes are small or when data are subject to measurement errors, which can be particularly helpful in practical applications where data limitations might exist (Raihan, 2023). Additionally, the ARDL approach assumes linear relationships between variables, so non-linear relationships may require alternative modeling techniques.

3.4.1. Weights by ARDL Method

Co-integrating the policy variables on the consumer price index employing the ARDL model. This model is used in the cointegration technique because this model had three variables two integrated at the level and one integrated at 1st difference. Table 3 shows the result of the Autoregressive Distributed Lag Model with the model selection of (1,0,0) General form of ARDL equation for the model (p, q) is given below.

$$\Delta y_t = \beta_0 + \sum_{i=1}^p \beta_i y_{t-i} + \sum_{i=1}^k \sum_{n=0}^q \alpha_j x_{j,t-s} + \varepsilon_t \quad (5)$$

In equation 5 the lag for the dependent variable is shown by p, q shows the lags of independent variables, j's shows the number of independent variables and the error term is shown by the ε_t . The ARDL model for this analysis is given in equation 6

$$\Delta INF = \beta_0 + \sum_{j=1}^n b_j INF_{t-j} + \sum_{j=0}^n c_j IR_{t-j} + \sum_{j=0}^n d_j ER_{t-j} + \delta_1 INF_{t-1} + \delta_2 IR_{t-1} + \delta_3 ER_{t-1} + \varepsilon_t \quad (6)$$

The parameters b_j , c_j and d_j are three short run coefficient of the model and δ_1 , δ_2 and δ_3 are the long run multiplier.

Table 5
Co-integration results from the ARDL model (1,0,0)

Variables	Coefficient values
CPI	0.550806
Interest rate	1.323996
Exchange rate	1.189396

The coefficient of the rate of interest = 1.323996

The coefficient of the exchange rate = 1.189396

The Principal Component Analysis gives the weights through the direct analysis by the software however this(cointegration) technique needs further manual calculation for calculating the weights.

Step 1: To find out the total weightage of both policy variables we add the coefficient values of both variables.

$$1.323996 + 1.189396 = 2.513392$$

Step 2: Dividing the coefficient values by the sum of coefficients gives the weights.

$$\text{Weight of interest rate } \frac{1.323996}{2.513392} = 0.53$$

$$\text{Weight of exchange rate } \frac{1.189396}{2.513392} = 0.47$$

The weights calculated manually are ≈ 1 (equal to 1)

The weights calculated manually (after cointegrating) and principal component analysis are the same.

3.4.2. MCI

The MCI in simple is the ratio of coefficients of rate of interest rate and rate of exchange.

MCI = ratio of coeffecint of interest rate to coeffecient of exchange rate

$$MCI = \frac{1.323996}{1.189396}$$

So, the value $MCI = 1.1132$

By using the coefficient values of the rate of interest and rate of exchange, we can calculate the monetary condition index. That is 1.1132: 1. The MCI ratio gives the relative value of monetary dimension and channels of rate of interest and rate of exchange, during the transmission mechanism. The value 1.1132: 1 depicts that one percentage alteration in the rate of interest is equal to a 1.1132 out of a hundred variation in the rate of exchange of Pakistan while affecting the inflation rate. Same we can describe the statement as a 1 percent variation in interest can be offset by a 1.1132 percent decline in the rate of exchange. The direction of policy variables works in the opposite case of the monetary stance while exerting pressure on the inflation rate to be unaffected.

3.5. The Behavior of the MCI in Pakistan

Using the weights calculated previously for policy variables, different studies have used different base periods to calculate the MCI. In this study (t-1) is the base period, the reason for taking lag value as the base period is that monetary policy has gone through several reforms and changes, for example, the reforms in monetary policy in the 1980s shifted the policy to the next form.

On the other hand, Pakistan's economy is affected by the supply shock and is mostly dependent on imports, so pegging the base period for the exchange rate is not considered to be a realistic option, so the base year for the exchange rate is also based on (t-1). That is the previous year's value.

Khan and Qayyum (2007) constructed MCI by using the data from July 1990 to June 2001 and set the base period as June 1990 without mentioning justification for setting a base period, however, it is an arbitrary choice. Shaheen (2013) estimated the MCI and no theoretical reason is given for the selection of the base period.

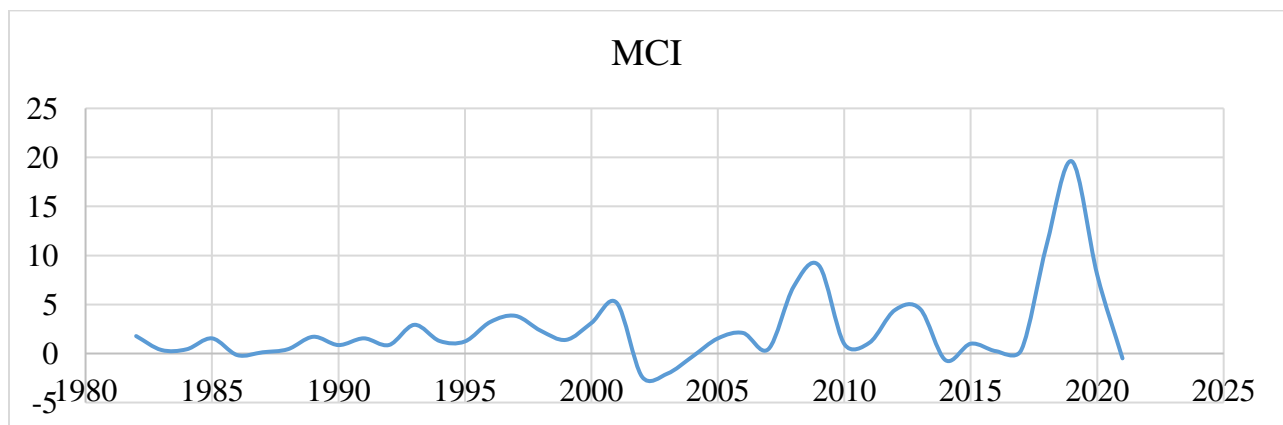


Figure 1: Behavior of MCI in Pakistan 1980-2020

The high value of MCI shows tight monetary policy and the decreased value shows easy monetary policy. The peaks of the curves are with the tight monetary stance in Pakistan however decline shows easy monetary policy.

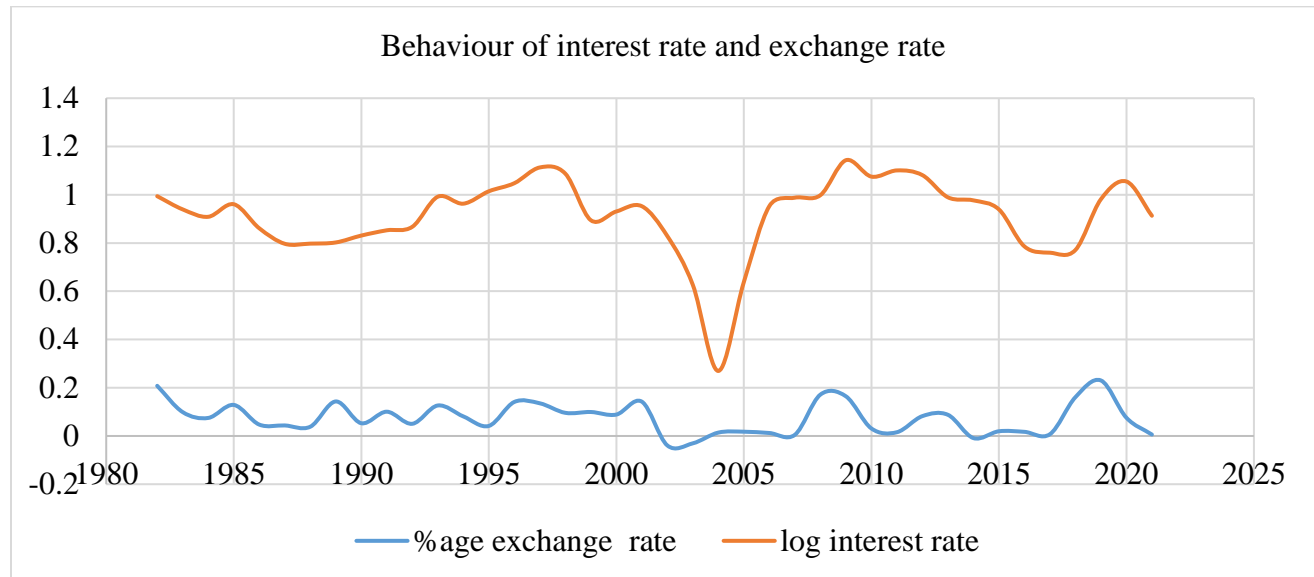


Figure 2: Behavior of Rate of Interest and Rate of Exchange.

4. Discussion

The weightage of the policy variables for the monetary policy of Pakistan is calculated by principal component analysis which shows that the weighted impact of interest rate on the inflation of Pakistan is 0.53 and exchange rate is 0.47 showing that interest rate changes have more impact in the transmission mechanism of monetary policy on the GDP and inflation of exchange rate. the importance of the exchange rate cannot be denied in the monetary policy, it has a dominant role in the changes in attaining the objectives of the Central Bank. There is an approximately equitant impact of interest rate and exchange rate in the monetary policy transmission mechanism of Pakistan.

The policy rate has been increased to 21 basis points in the policy statement of April 2023 due to high inflation which grew to 34.5 percent. The tightening nature of monetary policy indicated by the policy rate will lower the inflation rate in the coming eight quarters. However, there is a need to explore new dimensions of monetary policy to curtail inflation in Pakistan.

Monetary policy is designed in such a way that the macroeconomic factors of inflation and economic growth are aligned with a sustainable growth rate in the economy. An increase in the inflation rate needs regulation in the money supply, with increased inflation the circulation of money is decreased by adopting tight monetary policy, and to increase the level of economic activity the expansionary policy is opted for. Both these expansionary and contractionary policy requires the tool of interest rate (Putra & Solehudin, 2022).

Money is demanded for two reasons one is for transaction purposes and the other is for precautionary reasons both of these factors can be addressed through the money supply tool in the economy by passing the interest rate tool in the economy, to match the money demand the quantity of money supply in Islamic monetary system can be worked by development and making the Islamic institution strong. The money supply is controlled by the government and it has the monopoly to control to justify and make a welfare state. A prototype institution that has a strong value is baitaul mall for the supply of money in the Islamic monetary system and maintains the level of the exchange rate in the economy. Addressing excessive demand for money in the

economy does not have the solution of printing new money notes to equalize the excessive demand however putting fees on the assets which are not used and are set idle in the economy so that these assets can generate output employment and equalize the money demand and supply.

In a regime with high-interest rates and high rates of exchange, the inflation rate in Pakistan is still not under control so, it's important that the dual system can be explored to get the best results in the best interest of the economy.

5. Conclusion

The study calculated Monetary Condition Index using CPI as an inflationary variable using time series data with 45 observations based on annual calculations from 1975 to 2020. Before estimating the MCI the weights of the rate of interest and rate of exchange are calculated, by using PCA and ARDL models. The monetary condition Index is very sensitive to the variations, its calculation, and methodology. Most of the previous analyses were done on quarterly data, this study is based on the Annual calculation of the Monetary Condition Index to check the overall trend of monetary condition in the past 45 years. The movement of the MCI is tandem, the first wheel of the MCI is the rate of exchange, second is the rate of interest. The ratio of MCI is 1.1132:1 showing that 1.1132 is the value of interest rate to forego for 1 ratio of exchange rate to remain at the same level of price in the economy. The calculation and base taken here incorporated the trend, seasonal cyclical, and irregular factors. The MCI graph shows that the monetary stance of Pakistan remained tight from 2017 to 2020. It is the highest trend in the history.

The monetary condition index is used to go through the monetary stance of the monetary policy committee. Interest rate is used as a tool to curtail the inflation rate in the economy however increase in interest rate to 18 percent in the current scenario did not help in decreasing the inflation, according to Islamic economics changes in the monetary policy tools are necessary in case of Pakistan to attain the objectives of SBP.

Authors Contribution

Iram Firdous: Initiated the core idea of the core idea of the performed data analysis and drafting
Dr Arshad Mahmood: Reviewed and revised overall work of manuscript
Dr Abdul Rahman: Reviewed and revised overall work of manuscript
Dr Farida Faisal: Provided guidance for overall work.

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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