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FINANCIAL RISK MANAGEMENT AND TRANSMISSION MECHANISM OF MONETARY POLICY: AN EMPIRICAL EVIDENCE FROM PAKISTAN

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ABSTRACT

Monetary policy plays a vital role in achieving development for any country. This study attempts to analyze the impact of the monetary transmission mechanism on unhedged interest rate exposure in the case of Pakistan. The study used time series data from 1980 to 2020 and applied the ARDL model to check the short-run and long run association between all the variables. First, URE (Unhedged interest rate exposure) was calculated and then estimated the factors affecting it. The study also used the perfect foresight model for addressing household behavior. The outcomes indicated that all exchange rates, interest rates, and money supply positively impact unhedged interest rate exposure, and they are significant both in the short and long-run. The interest rate substantially affects unhedged rate exposure more than the money supply. Development expenditures and money supply are negatively associated with income inequality; unhedged interest rate exposure is positively associated with income inequality.

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INTRODUCTION

Monetary policy is always considered an essential tool for attaining economic stability. The main objective of any country's monetary policy is to sustain price stability and increase real income; with the help of monetary policy measures, central banks can set targets for the rate of interest and the amount of borrowing in the economy. It is identified from the wide range of literature that monetary policy through transmission mechanism tends to alter the fundamental fiscal indicators, including prices. Through the monetary transmission mechanism, we can understand how the adjustments in monetary policy tools will bring changes in real income and price levels (Taylor, 1995). So, the monetary transmission mechanism is characterized by how financial policy controls the aggregate demand and the price levels by influencing the spending and investment decisions of firms, individuals, and monetary mediators. Therefore, the transmission mechanism is the critical factor for monetary policy to identify the real economy and to know the upcoming prices (Jimenez and Ongena, 2012; Ascarya, 2012). The effect of monetary transmission varies from country to country because of certain factors like scale, emphasis, and strong points of the financial sectors, investment market, and the condition of the economic structure (Baig, 2011).

The role of monetary policy in income redistribution has been one of the main concerns of economists in recent years. The low-interest rates have unequal effects on various households because some agents gain and others lose due to accommodative monetary policy. There is a traditional observation that redistribution results from monetary policy (Adrian et al., 2019). But we believe that redistribution is the channel through which monetary policy affects macroeconomic performance in developing countries, and Adrian did the same test for developed countries. There are two types of monetary policies, one is named accommodative monetary policy (expansionary monetary policy), and the other one is termed contractionary monetary policy. In accommodative monetary policy central bank increases the money supply, which results and will lead to the excess money supply; thus, to increase the demand for money, the central bank will prefer to decrease the interest rate such that the money demand will rise enough to have equilibrium again and will influence economic growth as well via transmission mechanism. The accommodative monetary policy will thus increase aggregate demand. This policy has negative and positive both types of effects on the household. When the monetary authority adopts an accommodative monetary policy, there will be a large flow of money supply to the market which will cause inflationary pressure. This inflation hurts the lenders and has a positive effect on the borrowers. The debtors will gain, and creditors will lose. The reason behind this argument is clear: whenever the price level increases, money's value decreases, so the lender who lends money to others will lose, and those who have borrowed will gain. Further, those who gained have higher MPCs than those who lost. This simple argument was discussed by Tobin (1982).

Tobin's idea to differentiate between borrowers and creditors is insufficient to assess the overall influence of redistribution through monetary policy on household consumption because expansionary monetary policy will increase inflation and lower the real interest rates. The heterogeneity channel states that due to any monetary expansion, all the economic agents are not get affected equally. An economy consists of both investors and households. So, the monetary expansion has no equal effect on both agents. Investors get their profit, and the labor will get their wages. So, in this way, some will gain and lose in real terms. This is a heterogeneous channel in terms of earning dynamics from monetary policy. Investors may enjoy huge profits because of a drop in real interest rate, and households will lose because of an upswing in the price level. The drop in the real interest rate will boost the agent's profit, and the increase in the price level will lessen the labor's real income.

This channel is named after the famous economist Fisher (2001). In this channel, unexpected inflation changes the nominal balance sheet. Due to unexpected inflation, the nominal creditors lose, and the nominal debtors gain. This channel was discovered by Doepke and Schneider (2006), who measured equilibrium experiments in several market segments and the number of US households during different periods of inflation. The number of net nominal positions (NNPs) affected by an unexpected increase in the price level.

The current and future inflation alters the nominal balance sheets of households due to inflation, the value of assets, and liabilities fluctuations. In contrast, the rise in the nominal interest rate will shift the discounted value of future flows. So, in this way, nominal debtors will gain, and nominal creditors will lose. This channel is called the Fisher channel.

The decrease in the real interest rate is one of the most sensitive aspects of redistribution; because of the decline in the real interest rate, financial asset price increases. But only looking at these prices, we can't say that asset holders will get benefits. As such, we have to see whether their asset has lengthier periods or their liabilities have longer maturities. This logic is because the liabilities comprise expenditures plans, and the assets contain human capital. Thus, in this way, the unhedged interest rate is the proper measure of a household's balance sheet exposures to the changes in real interest rates, similar to net nominal situations for price level fluctuations.

The third most accurate form of redistributive change in real interest rates. Whenever the price increases, the real interest rate decreases.

$$i = R + \pi_e$$

i = nominal interest rate

R= real interest rate

$$\pi_e = expected\ inflation$$

Balance sheets of households not only comprise monetary assets and liabilities, but they also contain their future income and spending plans. So, to determine whether a household benefits from a raise in the price level (decrease in real interest rate), one should not look only at the price of assets. Still, we also have to think about whether his total assets have more extensive intervals than his total liabilities. Unhedged interest rate exposure (UREs) is an exact strategy to gauge accounting reports to real interest rate changes. The URE is a prosperity metric that detainments how much households are exposed to fluctuations in real interest rate. It repeats the immediate accomplishments and misfortunes in pay streams experienced by household after such a transformation. For instance, financial specialists whose money-related abundance predominantly puts resources into momentary authentications will generally have positive UREs. In contrast, those with considerable interests in long-haul securities or movable rate contract holders will generally have negative UREs. A fall in the real interest rate moves the first group to the second; this is called the interest rate exposure channel.

Existing literature consists of many studies that have explored the influence of interest rates on economic expansion and inequality. Still, in this study, we calculated the unhedged rate exposure for the first time in Pakistan. After that, we checked the factors affecting unhedged rate exposure, and in the last, we showed the effect of unhedged interest rate exposure on income inequality. Recent literature shows the URE impact on the micro level data, but in this study, we are going to calculate the URE for the first time in case of Pakistan; there is no study in which this work has been done. This study aims to check how monetary policy is vital in income redistribution. In this study, our primary focus is on the calculation of URE and what are its determinants. So based on the theoretical framework developed above, the objective of the study was calculate unhedged interest rate exposure and to identify the factors that affect unhedged interest rate exposure. The study also investigated how unhedged rate exposure (URE), money supply (M), and development expenditures (DE) will affect income inequality.

Monetary transmission Mechanism

There are three primary monetary mechanism channels. First is Money channel and the second is Asset price channel (ER and equity price channel).

Money Channel

The money channel is established on the money market equilibrium (IS-LM). This channel is also called the interest rate channel and is the most used monetary transmission mechanism. This channel includes two assets, i.e., bonds and money did not play a vital part in this channel. However, the monetary mechanism directly influences output through monetary policy. Economic contraction can raise the nominal interest rate. The monetary contraction raises the cost of real interest, which also increases capital costs. This will lead to a decrease in investment and output levels (Mishkin, 1995). Furthermore, Taylor (1995) prolonged the theory by assessing the consumer's choices to acquire home and durable goods as an investment. So, in this way, monetary contraction affects both the firm and household. The central bank changes the monetary base (Cash in circulation + reserve at the central bank). In case of unpredictable and large money demand shocks, most of the countries' state banks target the short-term interest instead of targeting the monetary base as an economic policy (Ozdogan, 2009).

Exchange Rate Channel / Asset Price Channel

The exchange rate or asset price channel is operative in open economy macro-economic models. As the exchange rate is

highly connected to the level of trade and balance of payments, the exchange rate channel primarily affects the open economy macro models. Contraction in monetary policy increases the interest rate, which will attract the foreigner to buy our assets; as our asset price increases, the capital inflow increase. This will raise the value of that country's local currency, making the imports more expensive to other countries; therefore, our exports decrease (double edge sword) and decrease in output. The exchange rate channel shows a weak result in developed countries, as firms can bear the outcome of exchange rates on prices by decreasing profit margins.

This channel shows its effect on asset markets such as bonds and stocks. The household wealth and the market value of company shares affect the investment judgments. As Tobin (1969) showed, a firm investment decision depends on q, where q shows the market value of a firm.

$$q = \frac{Market\ value\ of\ the\ firm}{Repalcement\ cost\ of\ capital}$$

When the q ratio is high, the price of shares is high, so the firm will invest more. When the interest rate increases, it will decrease the firm's q value, decreasing the investment. Furthermore, in this prospect life cycle, the income theory by Ando and Modigilani (1963) shows the effect of the asset channel on the household. This theory states that a upsurge in rate of interest will decrease the value of an asset a household holds, so their overall wealth decreases. Furthermore, this will reduce consumption and overall output. In addition to these factors, speculative attacks and opportunities, changes in risk premiums also affect the changes in asset prices. Therefore, the fluctuations in Tobin's q will occur.

REVIEW OF LITERATURE

Bielecki et al. (2022) explore the relationship between monetary policy and distributional consequences among various generations. In their study, they used a life-cycle model, rich asset structure, and real rigidities. They concluded that easing in monetary policy redistributes welfare to younger from older generations and reduces the net worth inequality accompanying life cycle intentions. Lenza and Slacalek (2018) examined the relationship between quantitative easing and income inequality. They have used the data set of the four largest euro area countries. They found that the heterogeneity channel plays an important role; they stated that quantitative easing compresses the income distribution. Furthermore, many households become unemployed, especially those with low-income levels.

A study by Mumtaz et al. (2017) try to determine the role of monetary policy shocks in explaining the increase in inequality. In their study, they used micro-level data ranging from 1969 to 2012. They concluded that a tight monetary policy would increase earnings, consumption, and inequality. Furthermore, they found that tight monetary policy has shown a large negative effect on households with a low-income level compared to those with high incomes. Olivier (2012) examines the effects of monetary shocks on household consumption and inequality in the United States. In the study author used micro-level data and concluded that tight monetary policy leads to a rise in inequality in labor earnings and consumption., it is stated that this effect of inequality depends on the monetary policy channels like Fisher, URE, and heterogeneity income channels that could be prevailing in the economy.

Macroeconomists tend to analyze the impact of monetary policy on asset prices, as well as on stock prices and other assets. The monetarist theory is the principal theory used to explain the relationship between asset prices and liquidity. Another aspect given by the monetarist school of thought is that the supply of money provides information about the degree of uncertainty for the future boom of asset prices. High liquidity stocks, which might be held with the aid of economic establishments may signal a destiny uncertainty in asset prices. An increase in money supply results in increased demand for property together with currencies and, therefore, asset prices rise. In this procedure, the progression of the money supply can push for a change in asset prices, and it is operative in the assortment portfolio of financial institutions (Adalid and Detken, 2007).

However, two experiential studies have found two channels of monetary policy, as Auclert (2019) emphasizes in his work in this chapter, focusing on displacement rather than the effect on public demand. As mentioned above, Doepke and Schnider (2006) account for the possible redistribution of Fisher channels in different bursts of inflation. In addition, Coibion et al. (2012) use consumer spending surveys and show that monetary policy accommodation leads to lower levels of income inequality. In terms of advanced secondary income agents in the MPC, this suggests that channels of income heterogeneity can increase the aggregate demand for low interest rates. Finally, there are several other dynamic general equilibrium models that investigate the effects of mortgage structure on remittance mechanisms. As Calza et al. (2013) find that the monetary policy shock is much larger for variable rate mortgages than for fixed rate mortgages (FRMs). Auclert (2019) highlights the role of unhedged interest rate risk in explaining some of these results. Public spending can help reduce income inequality. Tax and transfer payment systems redistribute to the poor. According to Goni et al. (2008) highlighted the impact of public spending on income inequality. Government spending and transfers can help reduce income inequality (Frenette et al., 2009; Milligan, 2013). Using accurate household data from OECD countries, Causa and Hermansen (2017) show that income inequality, including taxes such as income tax, corporate income tax, capital gains tax, social security spending and transfers, is likely to decline gradually. Sanctioned and sound fiscal policy can reduce income inequality and poverty. Bhatti et al. (2015) and Naqvi et al. (2011) also emphasize that these public transfers, especially the agricultural income tax, can reduce income inequality and poverty.

METHODOLOGY

The following model will explain theoretical links to observe how URE behaves as an exogenous variable for inequality and endogenous variable for income, consumption, assets, and liabilities.

Perfect-Foresight Model

In the utility function model the c_t is showing the nondurable consumption of the household, the n_t is showing the number of working hours. We assumed that there was no uncertainty in the model. y_t Denotes the wealth of the household, and the P_t is showing the price level, and the consumer has perfect knowledge about the prices (markets are complete). We take the time as discrete, and the time horizon is not defined (finite or may be infinite). Equation 1 given below explains the utility maximization function.

Max $\quad U(\{c_t, n_t\})$

s.t. $\quad P_t c_t = P_t y_t + W_t n_t + (t-1B_t) + \sum_{s\geq 1}(tQ_{t+s})(t-1B_{t+s} - tB_{t+s}) + P_t\,(t-1b_t) + \sum_{s\geq 1}(tq_{t+s})\,P_{t+s}(t-1b_{t+s} - tb_{t+s})$ (1)

In equation (1), the term tB_{t+s} showing the nominal payment of the agent which he arranges in the previous period and gets a reward on it in the period $t+s$ (future period). Whereas the term tb_{t+s} is showing the return in real terms. Similarly, tQ_{t+s} is showing the defense certificate price in nominal terms, while tq_{t+s}denotes the price of a defense certificate in real terms. So the first part of the summation shows the return and price in nominal terms and the second part shows the recovery and prices in real terms.

This study apply only one restriction on the environment, assuming there is no arbitrage, which results in a Fisher equation for the nominal term.

$$tQ_{t+s} = (tq_{t+s})\frac{P_t}{P_{t+s}} \qquad \forall t, s \qquad (2)$$

This start our study of the individual problem at t=0, which means we have no returns because we will get a return in a t+1-time period, so we have no earnings both in real and nominal terms, and the remaining time will be like this.

$$\sum_{t\geq 0} q_t c_t = \sum_{t\geq 0} q_t(y_t + w_t n_t + (-1b_t) + (\tfrac{-1B_t}{P_t})) \qquad (3)$$

$q_t c_t =$ Total financial wealth (WF)

$$W^F = \sum_{t\geq 0} q_t\left((-1b_t) + (\tfrac{-1B_t}{P_t})\right) \qquad (4)$$

Calculation of URE

UREt = Yt – Ct + Bt – Dt (5)

This study have followed the calculation method of URE (Auclert, 2019). Where Yt characterizes household income, Ci denotes consumption, Bt denotes the maturing assets, and Dt denotes the maturing liabilities. Hence, it determines the total reserve a household require to invest or borrow over the first period of its consumption plan. The maturity of the assets plays a crucial role since assets with a lengthier maturity than the scheduled consumption period are "hedged", i.e., not influenced by the transformation in the interest rate.

Estimation of URE

Looking at the recent literature, this study use these following variables to determine URE.

$URE = f(ER, R, MS)$

URE= unhedged interest rate exposure

ER= Exchange rate

R= Nominal interest rate

M= Money supply

Time is in continuous form, and there is no uncertainty in the model.

$$\text{URE}_t = \int_{t=0}^{T}(e^{\alpha ER} e^{\beta i} e^{\gamma M})\,.\,dt \qquad (6)$$

$$\text{Ln URE}_t = \int_{t=0}^{T}(\alpha ERlne + \beta ilne + \gamma Mlne).\,dt \qquad (7)$$

$$\text{Ln URE}_t = \alpha_1(ER_t) + \beta_1(i_t) + \gamma_1(M_t) + c \qquad (8)$$

$$\text{Ln URE}_t = \alpha_0 + \alpha_1 ER + \beta_1 i_t + \gamma_1 M_t + \varepsilon_{it} \qquad (9)$$

Proposition: Financial assets with the same initial present value W^f deliver the exact solution to the consumer problem. In this proposition, this study assume that households always have the same plan $\{c_t, n_t\}t_{\geq 0}$ for consumption and labor supply. Suppose it is a ARM (adjustable-rate mortgage), FRM (Fixes rate mortgage) or PLAM (Price level adjusted mortgage). In that case, they will not affect the household's position of assets and liabilities. It is because when the interest rate increases, it may raise the value of assets, but it will also raise the value of liabilities. So, in this way, the whole effect will be cancelled out. So, assets and liabilities will always be equal by assumption

Data and Methodology

This study used quarterly data for 1980-2020 to calculate the Unhedged interest rate (URE), showing its effect on inequality in the case of Pakistan. As the old studies used annual data, we are using quarterly data for the first time in the estimation of URE and for the checking of what are the determinant of URE.

Unit Root Test

Every time a series exhibits a trend, there is likely nonstationary in individual series. So, before proceeding to the formal empirical analysis of the model, all series are tested for their order of integration. For that purpose, we have used the ADF test to check the stationarity of the data.

$$\text{Log UREt} = \alpha_0 + \alpha_1 \text{Log}(ER) + \beta_1 Log(i_t) + \gamma_1 \text{Log}(M_t) + \varepsilon_{it}$$ (Model 1)

$$\log(IE_t) = \beta_0 + \beta_1 \log(URE_t) + \beta_2 \log(M_t) + \beta_3 \log(DE_t) + \varepsilon_t$$ (Model 2)

URE= Unhedged interest rate exposure

ER= Exchange rate

i = Nominal interest rate

M= Money supply

IE= Income inequality

DE= Development expenditures

Serial Correlation LM Test

We used the LM rank correlation test to detect autocorrelation problems; test follows chi-square; we see the probability values Obs R squared for rejection and acceptance. If the p-value is less than 0.05, we reject the null hypothesis.

H_o: There is no autocorrelation

H_1: There is autocorrelation

Table 1. Unit root test results.

Variables	Intercept/Trend	T-stats	P-value	Decision
L (i)	I	-3.190164	0.0282	I(0)
L (URE)	I	-10.10421	0.0000	I(1)
L (MS)	I	-4.918490	0.0003	I(1)
L (ER)	I	-5.293470	0.0001	I(1)

Table 2. Serial correlation LM test.

F-stat	0.312330	P-value	0.7341
Obs-r-square	0.795495	P-value	0.6718

Since the Obs-R squared probability value is greater than 0.05, we will accept the null hypothesis, which means there is no autocorrelation in this model.

CUSUM Square Test

For the stability of the model, the blue line must line in between these red lines, so as the Figure 1 shows that blue line is lying within these red lines, which means our model is stable.

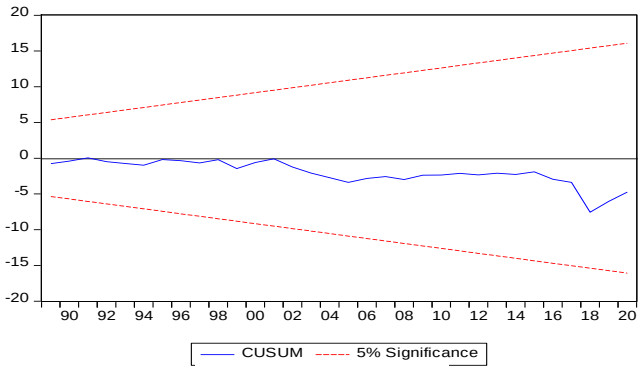

Figure 1. CUSUM Square.

Model Selection Summary

There are different criteria to check how many lags should be included in the model, like AIC, HIC, and SIC. We use the AIC criteria for selecting the lag; we take that lag at which the value is minimum compared to the other values.

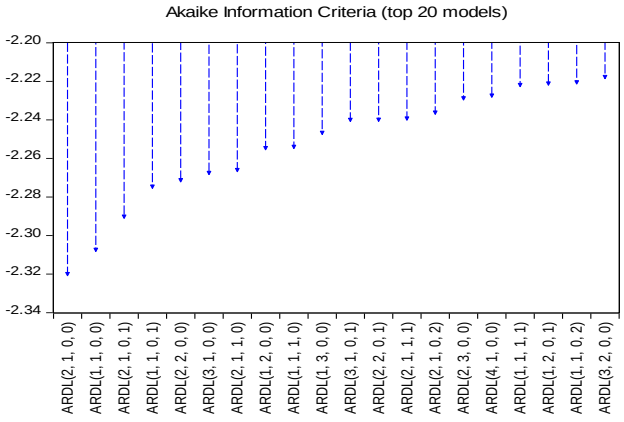

Figure 2. Lag length selection criteria.

ARDL Model

As the result of the unit root test indicate and the time series theory claims, there is mixed order of integrations that reflects the use of ARDL bound test to confirm the possible cointegration among the model variables.

Bound Test

The bound test is utilized to check whether a long-run association exists among the dependent and explanatory variables. It means a long-run cointegration exists, and the ECM sign must be negative. We check the F-stat value if this value is greater than the upper bound at 5%.

H_o: There is no long-run cointegration

H_1: There is long-run cointegration

The F-stat value should be greater than 5% higher and lower bound. As shown in Table 3 F-stat values is greater than the 5% upper and lower limits, which means that there is a long-run relationship between all these variables.

Table 3. Bound test results.

Test-statistics	Value	Significance	I (0)	I (1)
F-stat	4.957890	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Factors affecting URE (Model 1)

Table 4 shows the long-run results among all dependent and exogenous variables. The dependent variable is URE (unhedged interest rate exposure). And independent variables MS (money supply), ER (exchange rate), and DIR (Domestic Interest rate). The money supply is positively associated with URE and is statistically significant. The coefficient value of MS is 0.13, which states that due to a 1 % rise in money supply, URE will increase by 13%. Due to expansion in money supply will raise the level of inflation, as proposed by the quantity theory of money(QTM), which states that there is a positive connection among money supply and price level; the more the money supply will be, the inflation. So when inflation increases, it will also affect the price of assets, so the risk also increases.

Exchange rate fluctuation brings fluctuations in the domestic price of the assets, which will also redistribute the income level. The exchange rate is negatively related to URE, and it is also statistically significant, as its P-value is less than 0.05 and t-value is greater than 2. The coefficient value of ER is 0.24, which means that the 1% increase in the exchange rate will increase the URE by 24%. Our result shows that our ECM value is negative and is significant as its p-value is less than 0.05. The domestic interest rate also indicates a positive

relationship with URE and is statistically significant. The coefficient value of the Interest rate is 0.86, which means that due to a 1% increase in interest rate, URE will increase by 86%. A rise in interest rate will raise the asset prices, which increases the risk. The people with long-term assets will be better off, and those with short-term assets will be worse off.

Unhedged interest rate exposure impact on income inequality (Model 2)

Table 5 shows the unit root test. The result indicates that GINI is stationary at the level, while MS (Money supply) and URE (Unhedged interest rate exposure), and DE (Development expenditures) are stationary at the first difference.

Table 4. Long-run relationships and short-run convergence results.

Variables	Long-run Coefficients	P-values	T-Statistics
LER	0.241035	0.0232	3.577776
Li	0.864117	0.0000	19.21247
LMS	0.137789	0.0141	4.177784
C	8.005428	0.0000	24.80206
ECM(-1)	-0.406515	0.0000	-20.46618

Table 5. Unit root results.

Variables	Intercept/Trend	T-stats	P-value	Decision
L(GINI)	I	-3.251851	0.0241	I(0)
L(DE)	I	-6.399415	0.0000	I(1)
L(MS)	I	-4.918490	0.0003	I(1)
L(URE)	I	-10.10421	0.0000	I(1)

Serial Correlation LM Test

Before applying ARDL, it is compulsory to test the problem of autocorrelation. If the model has a problem with autocorrelation, then we can't use ARDL on our model. So for the verification, we have applied the serial correlation LM test to checked the auto correlation problem. This test is preferred on other tests because it can check the order of higher auto. It follows Chi-square, and we have to look at the P-value of its observed R-square for the acceptance and rejection of the null hypothesis. We have to reject the null hypothesis if the P-value is less than 0.05.

H_o: There is no autocorrelation.

H_1: There is autocorrelation.

Table 6. Serial correlation LM test.

F-stat	1.180421	P-value	0.3225
Obs-r-square	3.055498	P-value (Chi-Square)	0.2170

As the outcome indicates that our p-values of Obs-r-square are higher than 0.05, we have to accept the null hypothesis, which states that our data has no autocorrelation.

Heteroscedasticity Test

After checking the problem of autocorrelation, we have to look for the issue of heteroscadcity. It is also necessary that there should be no problem of hetero in the model, it there is a problem of hetero in the model, we can't apply ARDL to our model. We have used a white noise test to check the problem of hetero. It is preferred over other tests because it can be employed in both cases whether the data is normally distributed. The null and alternative hypotheses are given below.

H_o: There is no Heteroscedasticity

H_1: There is Heteroscedasticity

Table 7. White noise Heteroscadicity test.

F-stat	1.232699	P-Value	0.3158
Obs-R-Square	9.642950	P- Values (Chi-Square)	0.2910

The Obs-R-Square p-value is greater than 0.05, so we have to accept the null hypothesis, which means there is no problem of heteroscedasticity in the data.

CUSUM Square Test

As there is no problem with hetero and auto in the model, the next step is to look up for stability of the model. We have applied the CUSUM square test to verify the model stability. Structural changes in the data can be checked through this test.

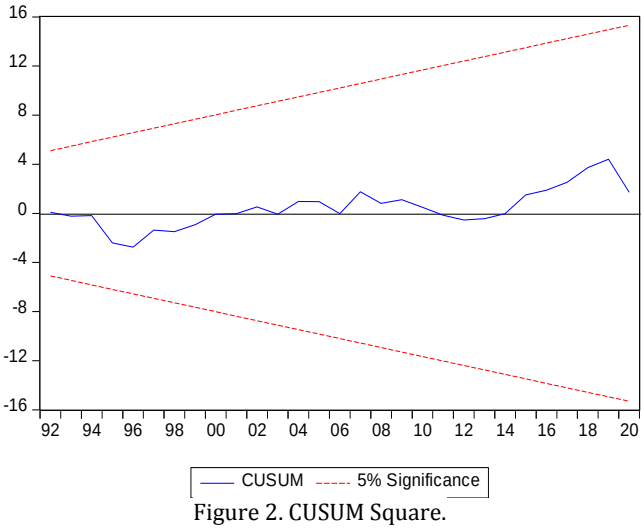

Figure 2. CUSUM Square.

Figure 2 shows that blue line is lying between the red lines, so our model is stable.

Bound test

H_o: There is no long-run cointegration.

H_1: There is long-run cointegration.

Results given in Table 8 show that the F-stat value is greater than the upper and lower bounds of 5%, indicating a long-run relationship between our variables.

Table 8. Bound test results.

Test-statistics	Value	Significance	I (0)	I (1)
F-stat	3.886435	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Table 9. Long run relationships and short-run convergence.

Variables	Long-run Coefficients	P-values	T-Statistics
LDE	-0.00677	0.1327	-1.544173
LMS	-0.101909	0.0003	-4.068128
LURE	0.201638	0.0009	3.670383
C	0.708018	0.0140	2.603653
ECM(-1)	-0.908214	0.0000	-5.834560

In this model given in Table 9, GINI (income inequality) is our dependent variable, while DE (Development expenditure), MS (Money supply), and URE (Unhedged Interest rate exposure) are the independent variables.

The results show a negative relation between development expenditures and income inequality, as its coefficient sign is negative but insignificant as its p-values are greater than 0.05. The coefficient value of DE is -0.006778, which means that a 1% increase in DE will decrease the income inequality by 0.6%, but this result is not significant. Most developing countries face a dualistic economy; one sector of the economy is growing at a higher rate and the other sector of the economy is growing at a significantly lower rate. Developing countries like Pakistan are making more expenditures in urban areas, and the urban sector is already developed, so the urban sector's income is increasing, and the gap between rich and poor becomes wider. Doumbia and Kinda (2019) found similar results. The result shows a negative relationship between money supply and GINI, as its coefficient sign is negative and significant. Its coefficient value is -0.101909, meaning that a 1% increase in money supply will decrease income inequality by 10 %. This is also true in the economic sense that when the money supply increases, it will reduce the interest rate. This will increase investment, increase the production level, and create more economic employment opportunities. All these as a whole will increase the income of every household. So as a whole increase in money supply will decrease the income inequality in the economy. While the result shows that there exists a positive relation between URE and income inequality as its coefficient sign is positive and statistically significant. Its coefficient value is 0.201638, which means that the 1 % increase in URE will increase income inequality by 20%. ECM results are also significant as their p-values are less than 0.05, and their coefficient sign is negative.

CONCLUSIONS AND RECOMMENDATIONS

Income inequality in Pakistan increased dramatically after the 1990s, especially in urban areas, where the burden on the urban population has increased. Monetary policy has become an effective redistributive tool as income inequality increases in Pakistan. In addition, empirical studies link income inequality to rising interest rates, money supply, and exchange rate volatility. Monetary policy affects the formation of aggregate demand for goods and services and is an effective tool for income distribution. However, most empirical results focus on the impact of fiscal policy on economic effort. There are relatively few empirical results on the effects of fiscal policy on income distribution.

The main objective of this research is to calculate the unhedged interest rate exposure for Pakistan and then to find out the factors affecting the unhedged interest rate exposure. Then we extended our study and found that unhedged interest rate exposure affects income inequality in the presence of monetary policy. Our finding shows a positive relationship between interest rate and unhedged interest rate exposure, and the exchange rate positively impacts unhedged interest rate exposure. Unhedged interest rate exposure is showing a positive impact on income inequality; the increase in unhedged interest rate exposure will increase income inequality. Development expenditures and money supply show a negative effect on income inequality. Moreover, our results suggest that money supply substantially affects income inequality, while development expenditures have less impact on income inequality. On the bases of our findings, the following policies are suggested. There should be certainty in the central bank's decision-making so that the household make their investment plan accordingly. The government should invest more in development expenditures and rural areas so the gap between rich and poor can be minimized.

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