

Revisiting the Financial Development-Inflation Nexus: The Role of Institutional Quality in Pakistan

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Abstract

This study explores the relationship between financial development and inflation in the presence of institutional quality. The ARDL bounds testing technique is applied to two different specifications using annual time-series data from 1984 to 2023. In the first model, the study measures the direct effect of financial development on inflation in the presence of other control variables including money supply, real effective exchange rate, trade openness, and GDP per capita. The second specification is the extension of model 1, where the institutional quality index is introduced as a moderator to examine how governance structures influence this nexus. The findings of the study indicate that in the absence of institutional quality, money supply, financial development and GDP per capita have a significant positive effect on inflation, whereas trade openness has a negative effect. In fact, the introduction of institutional quality brings about a more differentiated pattern. The positive inflationary effects of money supply, GDP per capita and financial development remains the same. However, the trade openness, real effective exchange rate, institutional quality and the interaction term all have negative relationships with inflation,

indicating that they may help to prevent the inflationary pressures. These results emphasize the dual aspect of financial development in the inflation process. An increase in money and credit creation is always inflationary, but can be offsets by strong improvements in the institutional quality. This study's empirical evidence specific to Pakistan, however, indicates that institutional quality is an important channel through which financial development can lead to disinflationary outcomes. The results suggest that from a policy perspective, a more robust institutional environment, more openness to trade, and continuation of exchange rate stability are mutually reinforcing measures to manage inflation effectively.

Keywords: Inflation, Financial Development, Money Supply, Institutional Quality

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1. Introduction

The relationship between financial development, institutional quality, and inflation has been a subject of considerable interest and debate among economists and policymakers worldwide. In the context of Pakistan, a rapidly developing economy with a complex set of economic challenges, this relationship becomes particularly significant. Inflation has major social consequences because it causes serious social and political issues. As a result, researchers, politicians, and especially policymakers have long been interested in finding the root causes of inflation. Since the statement that "inflation is always and everywhere a monetary factor", cross-country factors of inflation have earned economic attention. These factors include openness, institutions, and the level of economic development. (Salahodjaev and Chepel, 2014). The sharp increase in the inflation rate has been one of the most noteworthy changes in the current economic scenario. (Hassan et.al.,1995).

Changes in the overall price levels can also stem from immoderate or imbalanced demand, which could be triggered by factors such as population growth, decreases in real income, and similar elements. However, in the contemporary global context, it is noticeable that inflation cannot be solely attributed to domestic influences. External factors, such as surges in oil prices, foreign financial aid, and fluctuations in foreign exchange volume and rates, might play a significant role in driving up domestic prices. (Chaudary et.al., 2011). Due to the importance of inflation, experts have long been interested in learning more about its causes. According to Friedman, "Inflation is everywhere, and always a monetary phenomenon", and factors that affect inflation have been the

subject of interest in the economic world. This includes the level of openness, institutional and economic development. (Yousaf and Mukhtar, 2018). These factors include transparency, institutions, and economic development. Institutional factors such as political stability, law and order, and corruption, in particular, have a critical role in supporting development as well as influencing inflation.

Corruption, characterized by the illegal and self-serving utilization of governmental authority, constitutes a reality that exerts influence over the macroeconomic dynamics of an economy in terms of causality. A pronounced interplay of causation and consequence exists between corruption and inflation. The correlation between corruption and inflation demonstrates statistical significance and displays a positive orientation. (Akça et.al., 2012). Reduced levels of political instability led to decreased inflation, particularly in developed and low-inflation nations. Nonetheless, when factoring in political freedom, the significance of political instability becomes evident primarily within high-inflation countries.

Financial development refers to the qualitative and quantitative improvements, alongside enhanced efficiency, within the financial service sector, ultimately benefiting both financial institutions and the broader population. Empirical research suggests that financial development serves as a primary engine of economic expansion and plays a pivotal role in narrowing income disparities across nations (Khan, 2002; Levine, 1997). Financial development in underdeveloped countries is a multidimensional process enabled by the privatization of the existing economy. The assessment of financial development in countries has often relied on price comparisons, specifically the extent of interest rate disparities or stock-flow ratios involving the comparison of debt aggregates with GDP. (Zamanet.al., 2010). A connection exists between the development of the financial sector and inflation, acting as a mechanism through which both variables exert influence on long-term activities (Sanusi, 2017). Strong institutional quality is fundamentally disinflationary. Economies with independent central banks and credible monetary policy frameworks possess a stronger commitment to price stability, which anchors inflation expectations. Furthermore, high-quality institutions ensure fiscal discipline—preventing governments from pressuring central banks to monetize excessive fiscal deficits (fiscal dominance). Robust rule of law and low corruption also reduce inefficiencies and rent-seeking behavior, which lowers the cost of doing business and reduces cost–push pressures.

The inflationary implications of institutional governance and financial sector deepening have been rigorously examined across both theoretical models and empirical studies. However, most of these studies have analyzed the individual impact of these variables on inflation. There is hardly any study that has specifically concentrated on assessing the combined influence of these two variables on inflation in the context of Pakistan. The impact of inflation or disinflation depends entirely on the quality of governance and is therefore not independent of FD. High institutional quality (for example, strong regulation, effective supervision, and independence of the central bank) enables financial development to effectively increase the flow of credit to supply-enhancing investments. This will increase the overall production level and suck out the excess liquidity, which will further increase the disinflationary effect of FD. As for the case of poor institutional quality (weak governance, corrupt government, weak credibility of the central bank), financial deepening paradoxically generates unproductive credit booms, speculative asset bubbles, and a large amount of demand, which brings financial deepening into the realm of excessive inflation. This institutional "filter" is given by the interaction term.

The study tries to analyze the relationship between financial development and inflation under the condition of institutional quality, which is unique as it tries to analyze the nexus between financial development and inflation in Pakistan. The findings of this study are of significant interest in the context of Pakistan since it investigates the relationship between financial development and institutional quality with the inflation rate, one of the major concerns of Pakistan. The financial sector is expanding in Pakistan and can contribute to expanding the economy. If these institutions are weak, however, this growth can contribute to inflation increasing. This study contributes to understanding this link by demonstrating how the growth of money can lead to inflation and how robust institutions can help to curtail it. This study is very important for Pakistan where institutional capacity is low. It assists policy makers to control financial development without over-inflating. In addition to good inflation management, sound inflation control is important for the quest of stable and inclusive growth in Pakistan, which involves strengthening institutional quality, such as legal institutions and anti-corruption measures (Khan et al., 2018; Ahmed et al., 2020). Although financial development and institutional quality have been separately associated with inflation (Artana et al., 2002; Qayyum, 2006; Azizuddin, 2007; Aruman, 2015), the impact of both

on inflation has not been studied together in Pakistan. This study closes this gap by studying the inflationary effects of financial development, subject to institutional quality.

2. Literature Review

Numerous studies have explored the relationship among financial development institutional quality as well as inflation [Sanusi et al. (2017), Barugahara (2015), Telater et al. (2010)]. Some studies have shown a positive association with inflation, while others have revealed a negative relationship. The contradictory findings primarily originate from the use of different datasets, methodologies, countries, variables, and time periods [Yousaf and Mukhtar (2018), Ozsahin and Ucler (2017) Minea and Villieu (2008)]. Several studies focus on the impact of financial development along with institutional quality on inflation in the context of different developing and developed countries. According to Salahodjaev, et.al (2014) study the researchers, policymakers and politicians always focus on inflation. Institutional quality such as rule of law, political stability, corruption, and investment protection plays an important role in economic stability.

Utonga and Ndoweka (2023) study the financial development-inflation nexus. The conclusions of the study indicate that indeed financial development has a long run impact on inflation with a downward trend in inflation rates in Tanzania. However, over the short run the link between financial development and inflation is not significant. Wen et.al (2021) discuss the positive relationship between financial development and inflation. On the same note, Ayodeji (2020) discusses the intricate connection between money supply, inflation and corruption, this time focusing on the Economic Community of West African States (ECOWAS).

Yousaf and Mukhtar (2018) evaluate the trends of inflation in the existence of institutional quality and capital liberalization variables for Pakistan by using the ARDL estimation technique. This study shows that capital liberalization leads to a decrease in inflation in Pakistan however, when the institutional quality index is taken into account, its size rises. Ozsahin and Ucler (2017) examine the correlation between inflation and corruption, reveal a notable and positive relationship of statistical significance between inflation and corruption within developing nations. The study of Mazhar and Jafri (2017) test the empirical relationship between political stability as well as inflation in the existence of shadow economy. Sanusi et al, (2017) investigate the ever-changing correlation between financial development and inflation in the context of South Africa.

Salahodjaev, et.al, (2014) explore the impact of institutional quality on inflation in cross-country. According to the study's findings, the institutional development of the banking sector is an important indication of inflation in CIS nations. The investigation by Samimi et al. (2012) explored the influence of corruption on inflation within a chosen set of developing nations. Gelisme et al, (2012) investigate the examination of the interplay among inflation along with financial development within the context of Turkey. The findings highlight a demonstrable adverse influence of inflation on financial development. These outcomes are derived via the implementation of the ARDL methodology.

Abbey (2012) examines the effects of financial development on inflation in Ghana. The study confirms the traditional view that these pressures can be deterred by price stability, but also notes that there have been new conceptual debates about price stability and the policies needed to maintain it. The findings of Abbey (2012) showed that there was no long-term relationship between financial development and inflation, but a short-term relationship between financial development and inflation exists which implies that the financial development temporarily increases inflationary pressures.

Khan and Saqib (2011) explore the effects of political instability on inflation in Pakistan. In contrast, the results of the 'nonmonetary' model make it very clear that there is a positive relationship between political instability and inflation. The results of the monetary model determine that the effect of monetary drivers has only marginal effects and is dependent on Pakistan's political context. The results of the non-monetary model clearly show that political instability and inflation are positively linked.

Zaman et al, (2010), investigate the correlation between financial development and inflation. The findings suggest a co-integration between inflation and financial indicators. Telater et al, (2010) investigate the influence of institutional factors, especially political factors, on inflation utilizing a dynamic panel data approach. The findings suggest that a lesser degree of political instability leads to reduced inflation, primarily in developed and low-inflation countries. Their findings reveal that the impact of political uncertainty on inflation is contingent upon a country's development status and level of inflation. Khan and Hanif (2010) emphasize that political instability, along with polarization, raises the cost of production taxes in developing economies,

making the inflation tax practicable for monetary and fiscal authorities. The findings of the study back up other research that emphasizes the importance of political instability in shaping inflation. The implications of these findings for the conduct of monetary policy in developing nations are significant. Hence, by reviewing the literature, we have found mixed evidence and diverse samples. Further, there is hardly any study analyzing the impact of FD on inflation considering its interaction with the IQ index, based on a collection of broad indicators of institutional quality.

3. Data, Methodology and Estimation Technique

To estimate the financial development and inflation nexus in the presence of institutional quality, we adopt a model based on the studies of Salahodjaev and Chepel (2014) and Yousaf and Mukhtar (2018). We will run two models, one with an interaction term and one without, to see whether the inclusion of the interaction term makes any significant effect on the findings of the model. The general form of the relationship is as follows:

$$INF_t = f(MS_t, GDPPC_t, TO_t, REER_t, FD_t, INQ_t) \quad (1)$$

where, INF represents inflation and it is the dependent variable, INQ stands for the index of institutional quality (political stability, control of corruption, law and order, voice and accountability, regulatory quality), FD represents financial development (proxied by credit to the private sector as a % of GDP), REER shows real effective exchange rate, TO indicates is trade openness.

The first empirical representation is as follows:

$$LINF_t = \alpha_0 + \alpha_1 MS_t + \alpha_2 LGDPPC_t + \alpha_3 TO_t + \alpha_4 LREER_t + \alpha_5 FD_t + \mu_t \quad (2)$$

INF_t is the inflation rate at time t , which is the variable we are trying to explain. MS (Money Supply) represents the money supply in the economy. A rise in the money supply can lead to higher inflation if the economy is demand-driven, as there is more money available to spend. DCPS (Domestic Credit to Private sector as a percentage of GDP) is variable likely represents the level of financial development in the economy. Higher financial development can affect inflation through its impact on lending and borrowing activities. REER (Real Effective Exchange Rate) measures the value of a country's currency in comparison to a basket of foreign currencies, adjusted

for inflation. Changes in the REER can influence inflation by affecting the prices of imported goods and services. TO (Trade Openness): It measures how open an economy is to international trade. Increased trade openness can affect inflation through its impact on the availability and prices of imported goods. GDPPC (Gross Domestic Product per Capita): It represents the economic prosperity of the country. A higher GDPPC may indicate more economic activity and potentially higher inflation if it outpaces productivity growth. INQ (Political Stability, Control of Corruption, Law and Order, Bureaucratic Quality, Government Commitment to Contracts, and Risk of Expropriation). These variables likely represent the overall political and institutional environment in the country. Government stability, Corruption and law and order can contribute to lower inflation by creating a stable economic environment. To analyze the overall institutional quality, five PRS indicators have been utilized in the manner described by Knack and Keefer (1995). These include Government stability, Corruption and law and order. These variables are scaled from 0 to 6. Higher index values correspond to higher-institutional quality. This approach is consistent with empirical research reported by Hall and Charles (1999). Clarke (2001), Law (2009), Knack and Keefer (1995) and Chong and Calderon (2000). The institutional quality variables were constructed by summing the values of all three indicators ¹ which have been discussed before as each aspect of the institutional environment holds significance for protection of property rights. The Institutional Quality Index (INQ) is constructed using a weighted method based on data sourced from the International Country Risk Guide (ICRG). In this model, the coefficients α_0 , α_1 , α_2 , α_3 , α_4 , α_5 , and α_6 represent the estimated effects of each independent variable on inflation. The error term is represented by the μ_t term, which captures the unexplained variance in inflation that cannot be explained by the independent variables.

This study explores the association among financial development, institutional quality as well as inflation. The rationale behind investigating this nexus is the belief that the efficiency of an economy is enhanced by financial development [(Sadorsky,2011)]. To estimate the impact of FD and INQ on inflation, we have adopted the model based on the study of Salahodjaev et al. (2014).

¹ The scale for law and order, Government stability and corruption is converted to a 0 to 10 scale by multiplying by 5/3 so that these can be equivalent to other scales included in the analysis. This method is aligned with empirical literature presented by Hall & Charles (1999), Clarke (2001), Law (2009), Knack & Keefer (1995) and Chong & Calderon (2000).

The functional form of model is as follows:

$$LINF_t = \beta_0 + \beta_1 MS_t + \beta_2 LGDPPC_t + \beta_3 TO_t + \beta_4 LREER_t + \beta_5 FD_t + \beta_6 INQ_t + \beta_7 (FD_t * INQ_t) + \mu'_t \quad (3)$$

This model is similar to the first one, but it includes an additional interaction term between FD and INQ (FD*INQ). An interaction term allows for the possibility that the combined effect of these two variables on inflation is different from the sum of their individual effects. In Eqn. (3), where *INF* stands for inflation, *MS* stands for money supply, *FD* shows financial development, *REER* represents real effective exchange rate, *INQ* shows institutional quality, *GDPPC* (*GDP* per capita), *TO* shows trade openness, and μ' is a normally distributed random error that accounts for unobservable influences on inflation, while *t* shows time. *FD*INQ* is the interaction term that represents how the interaction among financial development (*DCPS*) and institutional quality (*INQ*) affects inflation. It suggests that the impact of financial development on inflation may vary depending on the level of institutional quality. In this model, the coefficients β_0 , β_1 , β_2 , β_3 , β_4 , β_5 , β_6 , and β_7 represent the coefficients of each independent variable, including the interaction term, on inflation.

4. Variables Description

Financial development is proxied by the percentage of domestic credit to the private sector as a percentage of a country's GDP, capturing the depth, efficiency, and accessibility of the financial sector. The financial sector encompasses a collection of institutions, tools, and markets, along with the legal and regulatory structure, that facilitate transactions by extending credit. This proxy represents the financial resources supplied by financial entities to non-governmental sectors, including loans, purchases of non-equity securities, and trade credits, among other transactions. Financial institutions encompass deposit money banks, insurance companies, pension funds, monetary authorities, and similar entities. A well-developed financial system improves the efficiency of monetary policy transmission by effectively channeling credit and absorbing excess liquidity. By reducing transaction costs and information asymmetries, FD facilitates supply-side productivity gains, which can lower production costs and exert disinflationary pressure. Yet, financial deepening, which can

happen quickly and unchecked, can lead to inflation of credit going to households and firms, that far exceeds productive capacity, and so create demand–pull inflation.

The extent of a nation's trade activity both exports and imports over a given time period, usually one year is measured through trade openness, expressed as a percent of GDP. The Romer (1993) hypothesis suggests that there is a disinflationary effect of trade openness. Domestic competition is more intense when domestic firms face international competition, which makes them more efficient and less inclined to raise prices to their customers when costs rise. Furthermore, openness makes an economy more dependent on global supply chains, so that companies can import lower cost intermediate goods from outside the country and lower production costs. In contrast, high openness also means that foreign inflationary pressures are also imported into the domestic economy (imported inflation).

To calculate per capita GDP, one would divide a country's real GDP by the number of people in the country. This implies that the higher GDP per capita, the higher the level of household disposable income and strength of overall demand. When incomes increase, consumption spending increases, leading to an increase in the prices of goods and services, especially if there are supply limits in the short-run (demand–pull inflation). But on the supply side, continued GDP expansion means an improvement in productivity, which can also boost production and lead to a reduction in inflationary pressure. The demand-side effect is usually more dominant in the short to medium term in the context of the developing economy.

Institutional quality refers to the overall effectiveness, transparency, and credibility of a nation's institutions, including its governance structures, legal framework, regulatory systems, and administrative procedures. Institutional quality based on six separate indicators of governance: regulatory quality, control of corruption, political stability, rule of law, government effectiveness, and accountability. It encompasses the extent to which these institutions uphold the rule of law, protect property rights, ensure accountability, foster a stable business environment, and promote fair and efficient economic and social interactions. High institutional quality generally contributes to a stable and conducive environment for economic growth, investment, and development. The Institutional Quality Index (INQ) is constructed using a PCA (Principal Component Analysis) method based on data sourced from the International Country Risk Guide (ICRG).

The money supply (M2 as a percentage of GDP) encompasses the total of currency held outside of banks, demand deposits excluding those belonging to the central government, and the deposits of resident sectors (excluding the central government) in terms of time, savings, and foreign currency. According to the Quantity Theory of Money, there is a direct and proportional positive relationship between money supply growth and the general price level. An increase in the supply of money brings excess money into the economy, which leads to a rise in demand for goods and services. If there is more demand than the economy has the capacity to supply (produce), prices will rise. Moreover, a high level of money supply further reduces interest rates, increasing the credit and consumption and investment, thus further aggravating the demand–pull inflation.

The REER is a measure of the value of the domestic currency in relation to a trade-weighted basket of foreign currencies, with adjustments for inflation differentials. Under the exchange rate pass-through theory (Goldberg and Knetter, 1997; Taylor, 2000; Campa and Goldberg, 2005), currency changes have a direct link to domestic prices through the prices of imported goods. An appreciation (higher LREER) decreases the cost of imported raw materials, machinery and final consumer products to the domestic currency.. This reduces input costs for domestic producers and makes foreign goods cheaper relative to domestic substitutes, directly suppressing the overall CPI (disinflationary). Conversely, a depreciation (lower LREER) makes imports expensive, fueling cost–push inflation as firms pass on higher input costs to consumers.

5. Estimation Technique

The study will use the auto-regressive distributed lag (ARDL) estimation technique presented by Pesaran et al. (2001) in order to experimentally investigate the nature of the association among inflation, financial development, and institutional quality measures. For a number of reasons, this co-integration technique is preferred over other co-integration techniques [Stamatiou and Dritsakis (2014)]. First of all, the ARDL technique yields reliable results when the variables are integrated $I(0)$ or $I(1)$. Secondly, the ARDL delivers accurate and reliable results when working with small data sets. [Dritsakis and Stamatiou (2014)].

5.1. ARDL Bound Testing Approach

The ARDL bounds testing approach was introduced by Pesaran et al. (2001) to explore whether there exists a long-run association among variables. Economic theory suggests that changes in one economic variable can have an impact on another variable over time. The relationship between variables has been widely analyzed using the ARDL model, which is a single-equation time series approach. It is considered a flexible and comprehensive model within the field of econometrics. In this model, the dependent variable is determined by the current and lagged values of independent variables, as well as its own lagged values. We employed the ARDL bounds test to assess the existence of cointegration among the series, which offers several advantages over alternative one-time integer approaches. Firstly, the ARDL bounds test allows for the inclusion of variables with mixed orders of integration, without requiring any specific assumptions. All variables can be integrated in the analysis at the same order, providing greater flexibility. Secondly, the ARDL bounds test exhibits greater accuracy, particularly when dealing with small sample sizes. It overcomes the limitations of other methods and provides more reliable estimations for long-term models. Overall, the ARDL approach offers advantages in terms of flexibility, accuracy, and reliable estimation of long-term models, making it a valuable tool for analyzing cointegration in various scenarios. The ARDL approach is a suitable econometric technique for estimating short-run as well as long-run elasticities of a limited sample set simultaneously. The ARDL approach offers flexibility in terms of the integration order of variables. It is suitable for independent variables in the model that are I (0), I (1), or mutually cointegrated (Frimpong & Oteng, 2006). However, it is not effective when there is an I (2) presence in any of the variables.

Equations (2 and 3) can be written in the ARDL form as follows

$$\begin{aligned} \Delta LINF_t = & \alpha_0 + \alpha_1 MS_{t-1} + \alpha_2 LGDPPC_{t-1} + \alpha_3 TO_{t-1} + \alpha_4 LREER_{t-1} + \alpha_5 FD_{t-1} + \\ & \alpha_6 INQ_{t-1} + \alpha_7 (FD * INQ)_{t-1} + \sum_{k=1}^n \beta_{1k} \Delta MS_{t-k} + \sum_{k=1}^n \beta_{2k} \Delta LGDPPC_{t-k} + \\ & \sum_{k=1}^n \beta_{3k} \Delta TO_{t-k} + \sum_{k=1}^n \beta_{4k} \Delta LREER_{t-k} + \sum_{k=1}^n \beta_{5k} \Delta FD_{t-k} + \sum_{k=1}^n \beta_{6k} \Delta INQ_{t-k} + \\ & \sum_{k=1}^n \beta_{7k} \Delta (FD * INQ)_{t-k} + \varepsilon_t \end{aligned} \quad (4)$$

where, α_0 represents the trend component, while Δ signifies the first difference, and ε_t denotes the error term. The study applies the Akaike information criterion (AIC) to determine the lag length. After establishing the long-term relationship among the variables, the study employs the

error correction model (ECM) to analyze short-term dynamics. The general form of the ECM for equations (2 and 3) is formulated in equation (5 and 6) below:

$$\Delta INF_t = \alpha_0 + \sum_{k=1}^n a_k \Delta MS_{t-k} + \sum_{k=1}^n b_k \Delta FD_{t-k} + \sum_{k=1}^n c_k \Delta REER_{t-k} + \sum_{k=1}^n d_k \Delta GDPPC_{t-k} + \sum_{k=1}^n e_k \Delta TO_{t-k} + \phi ECM_{t-1} + \epsilon_t \quad (5)$$

$$\Delta INF_t = \alpha_0 + \sum_{k=1}^n a_k \Delta MS_{t-k} + \sum_{k=1}^n b_k \Delta FD_{t-k} + \sum_{k=1}^n c_k \Delta REER_{t-k} + \sum_{k=1}^n d_k \Delta GDPPC_{t-k} + \sum_{k=1}^n e_k \Delta TO_{t-k} + \sum_{k=1}^n f_k \Delta INQ_{t-k} + \sum_{k=1}^n g_k \Delta (FD * INQ)_{t-k} + \phi ECM_{t-1} + \epsilon_t \quad (6)$$

In this model, Δ shows the first difference, while ϕ denotes the coefficients of the Error Correction Model (ECM) that measures short-run dynamics. The ECM indicates the speed of adjustment in long-run equilibrium following a short-term shock.

6. Data Source

The current research will utilize secondary data from numerous sources, mainly Pakistan Economic Survey data, WGI (Worldwide Governance Indicators), WDI (World Development Indicators), and ICRG (International Country Risk Guide), to explore the impact of financial development and institutional quality on inflation in Pakistan. To achieve the objectives of the study, we will cover the years starting from 1984 to 2023, and will use the ARDL estimation technique to estimate specifications based on financial development and institutional quality measures.

Table 1: Variables and their data sources

Variables	Measures	Sources
INF	Inflation (CPI)	WDI
MS	Money supply (M2) as a percentage of GDP	WDI
GDPPC	GDP per Capita (In constant 2010 US Dollars)	WDI
TO	Trade openness (Trade % of GDP)	WDI

REER	Real Effective Exchange Rate	IMF
FD	Financial development is the ratio of Domestic credit to the private sector as a per cent of GDP.	WDI
INQ	Institutional quality (political stability, control of corruption, law and order, voice and accountability, regulatory quality)	ICRG

7. Results and Discussions

Applying a unit root test is crucial to prevent erroneous regression. By considering differences and employing stationary processes to determine the equation of interest, it determines whether the variables in a regression model are stationary. When a time series is stationary, it means that the effects of shocks on the series are temporary, and the series tends to revert to its long-run mean values over time. Conversely, a non-stationary time series has a permanent component and does not have a long-run mean to which it converges. Fuller and Dickey (1979) introduced a formal procedure, which is called the Dickey-Fuller (DF) test, to test for stationarity. Some studies suggest that using multiple unit root tests to establish the series' integration order is crucial because the effectiveness of these tests can change based on the sample size. This study utilized the Dickey-Fuller generalised least squares (DF-GLS) test suggested by Elliott et al. (1992) to identify the presence of an autoregressive unit root. It was checked that no variable surpassed the order of integration using the unit root test.

Based on the test results, table 1 represents that INF (Inflation), FD (Domestic Credit to private sector), GDPPC (Gross Domestic Product per Capita), REER (Real Effective Exchange Rate), and MS (Money Supply as a percentage of GDP) are non-stationary at the level but becomes stationarity at their first difference, indicating they are integrated of order one, denoted as I (1). In addition, INF (Consumer price inflation), TO (Trade openness), and INQ (Institutional quality) are stationarity at the level I (0).

Table 2: Dicky-Fuller-GLS Unit root test (1984-2023)

Variable	Level	First Difference	1%	5%	10%	Result	Order of Integration
LINF	-2.4434	-6.179045	-2.6307	-1.9503	-1.6112	Stationary at first difference	I(1)
MS	-1.4112	-4.974940	-2.6307	-1.9503	-1.6112	Stationary at first difference	I(1)

LGDPPC	-0.5318	-2.946303	-2.6326	-1.9506	-1.6110	Stationary at First difference	I(I)
TO	-1.7009		-2.6307	-1.9503	-1.6112	Stationary at level	I(0)
LREER	-0.8979	-2.848471	-2.6307	-1.9503	-1.6112	Stationary at First difference	I(I)
FD	-0.8488	-3.545855	-2.6307	-1.9503	-1.6112	Stationary at first difference	I(I)
INQ	-1.9348		-2.6307	-1.9503	-1.6112	Stationary at level	I(0)

7.1. Results of ARDL Bound Test

It is important to perform a bound test before estimating the long-run as well as short-run model estimates to check the existence of long-run relationship between inflation and the regressors of the study. This includes the stationarity properties of the series and running the ARDL bounds test for cointegration. The Akaike's Information Criterion (AIC) was used to select the appropriate lag duration for the computation of the F-statistic in this investigation. Table 2 shows the outcomes of the ARDL bounds test to examine the cointegration relationship between the variables. If the calculated value of the F-test is above the lower and upper bounds, then there is a long run association between the variables. The results of the F-statistic are presented in Table 5.2 with lower and upper bound values. The result suggests that the obtained F statistic value (6.348) exceeds the upper and lower critical limits at 10%, 5%, 2.5% and 1% levels for the F test value leading to the rejection of the null hypothesis and inferring that there is a long-term association between the variables.

Table 3: F-Statistic Results

Dependent Variable: INF						
	90%		95%		99%	
F-Statistics	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
6.348858	1.99	2.94	2.27	3.28	2.88	3.99

8. Long Run Estimates of the Model

Table 3 below reflects the outcomes of the statistical model, which examines the long-run relation of inflation (dependent variable) and different independent variables from 1984 to 2023. We have estimated two models. In Model 1, we have estimated the association between financial development and inflation, while in model two, we have taken the institutional quality. This model is estimated with and without the interaction term between INQ and LDCPS.

Model 1 shows some of the crucial variables apart from financial development which could play a key role in affecting inflation in the economy of Pakistan. The coefficient of money supply has yielded positive and statistically significant results, which means that with the increase in the money supply, the inflation rate is increasing. It is found that with a one percent increase in money supply, the inflation increases by 1.23 percent. It is evident that this outcome supports the quantity theory of money which treats the money supply as the key determinant of inflation. Likewise, the monetarist school of thought believes that the inflation is caused due to monetary factors. A number of studies including Nasir et.al (2021), Yousaf and Mukhtar (2018) found the positive association between money supply and inflation in Pakistan. However, the coefficient of LGDPPC is positive and statistically significant, which means that with the increase in economic development, there is an increase in inflation rate. Some of the most influential theories which can be considered for the explanation of such a phenomenon include the demand-pull theory according to which GDP per capita increases due to the increase in aggregate demand and purchasing power of consumers.

In a sample of Asian countries, Chen and Lin (2015) discovered that the GDP per capita had a positive correlation with the inflation rate. Likewise, there was positive and significant relationship between GDP per capita and inflation as reported by Mustafa and Arshad (2018) for the case of Pakistan. The coefficient of LTO is negative and statistically significant, implying that an increase in trade openness should lead to a decrease in inflation. Evidence for the negative association between TO and INF has come from empirical studies. A study by Gokal and Hanif (2004) revealed that higher the trade openness of Pakistan, lower was the inflation rate in the long run. Economist Paul Romer's (1993) hypothesis proposes a link between TO and INF. Romer says "the higher the TO, the lower the inflation. This hypothesis relies on the notion that foreign markets can affect the price of goods downward due to the instabilities of market competition, whereby

firms aim to keep their price competitive. Countries that open up to international trade are confronted by competition of other foreign firms. They have to cut costs or be more efficient in order to remain competitive and, in turn, can help limit inflationary pressures. Additionally, access to cheaper imports can directly lower consumer prices, contributing to lower inflation rates.

Similarly, a study by Nair-Reichert and Weinhold, (2001) found that increased trade openness in Latin American countries led to lower inflation rates. In Pakistan, there is a significant positive relationship between the real effective exchange rate (LREER) and inflation. One potential explanation for this positive connection between the real effective exchange rate and inflation is an increase in the real effective exchange rate indicates the devaluation of the domestic currency, resulting in higher prices along with inflation within the home country Ijaz, et al. (2013). Some studies have found a positive association between the REER and inflation. A study by Mohanty and Klau, (2004) examined the link between the REER and inflation for a group of Asian countries and found that a depreciation in the REER was associated with higher inflation. The coefficient of LDCPS (1.614) indicates that a one-unit increase in LDCPS results in a 1.614-unit increase in inflation. This suggests that higher levels of LDCPS (represents domestic credit to the private sector) are positively related to inflation. It indicates that as DCPS increases, it puts upward pressure on inflation. This positive relationship suggests that changes in domestic credit availability or utilization by the private sector can have an inflationary impact on the economy.

For the model with INQ, the results show that four variables are statistically significant at the 5 percent level of significance. The coefficient for LMS is positive and statistically significant. The coefficient for LGDPPC shows a positive and statistically significant results, indicating that the rise in economic development is associated with an increase in inflation. The coefficient for LTO is negative and statistically significant, indicating that the rise in TO is associated with a decrease in inflation. The coefficient for INQ is negative and statistically significant, indicating that better INQ is associated with a decrease in inflation. Finally, the coefficient for the interaction term (LDCPS*INQ) is negative and statistically significant, suggesting that the impact of FD on inflation is moderated by INQ. The significant coefficient of -0.434 for the interaction term suggests that the relationship between LDCPS and inflation is reduced in the presence of INQ. This implies that the positive impact of domestic credit to the private sector on inflation is weakened when INQ is higher. The negative coefficient and its significance suggest that

institutional quality plays a crucial role in moderating the impact of financial development on inflation. Higher institutional quality reduces the effect of financial development on inflation, implying that better institutional frameworks might lead to more stable or predictable inflation outcomes even with increased financial development.

Overall, the results suggest that institutional quality and financial development are important factors in understanding inflation in Pakistan. The impact of financial development on inflation is moderated by institutional quality, such as the positive effect of financial development on inflation is smaller in the presence of better institutional quality because strong institutions provide mechanisms to reduce inflationary risks and ensure that the benefits of financial development are channeled towards sustainable economic growth and stability. The results also suggest that trade openness and GDDPC have different effects on inflation in Pakistan. Finally, the results suggest that money supply is the most important factor in controlling inflation in the long run.

Table 4: Long Run Estimates of the Model (1984-2023)

Dependent variable: Inflation (INF)		
Variables	Model without INQ	Model with INQ
MS	1.233*** (6.975)	3.294** (2.750)
LGDP	0.645*** (3.644)	0.382*** (3.623)
TO	-1.848*** (-4.432)	-0.166** (-2.042)
LREER	0.315*** (4.207)	-0.019 (-0.025)
FD	1.614*** (5.232)	0.512** (2.477)
INQ		-0.727** (-2.735)
FD* INQ		-0.434** (-2.189)
C	-47.439*** (-5.376)	-66.881*** (-5.136)

Note: The values in parentheses are t-statistics, and the asterisks denote the level of significance (*significant at 10%; ** significant at 5%; *** significant at 1%).

The short-run estimates of the model are presented in Table 4 which show the impact of the independent variables on inflation in the short-run. The model with the interaction term between institutional quality (INQ) and financial development (LDCPS) is preferred as it provides a better fit to the data than the model without INQ.

The coefficient of INQ is negative and significant at 1 percent level of significance, indicating that higher institutional quality is associated with lower inflation in the short-run. This finding is consistent with previous research studies that have shown that institutional quality plays a crucial role in controlling inflation. Better institutions can provide more transparency and accountability in the policymaking process, which helps to keep inflation under control.

The coefficient of LMS is positive and significant at the 1 per cent level, indicating that an increase in money supply leads to higher inflation in the short run. This finding is also consistent with economic theory, which states that an expansionary monetary policy leads to higher inflation. The coefficient of LGDPPC demonstrates a statistically significant positive relationship at the 1% significance level, indicating that higher levels of GDPPC are associated with higher inflation in the short-run. This finding contradicts some previous research studies that have shown that GDPPC is associated with lower inflation. However, it is possible that the positive link between economic development and inflation in the short run is due to demand-side pressures arising from increased consumer spending. In the model without INQ, the coefficient for LREER shows a positive but statistically insignificant impact on inflation. This suggests that changes in the real effective exchange rate do not have any short run impact on inflation in this model. However, in the model with an interaction term, the real effective exchange rate has a significant and negative impact on inflation in the short run. The coefficient of LTO is positive and significant at the 5 per cent level in the model without an interaction term, indicating that higher trade openness leads to higher inflation in the short run. However, in the model with an interaction term, the coefficient of LTO shows a considerable negative correlation at the 1 per cent significance level. The results of this study are consistent with several previous studies that have highlighted the importance of institutional quality in shaping the link between FD and INF. For example, Beck et al. (2006) found that the positive impact of financial development on inflation is conditional on the quality of

institutions. Likewise, Gupta et al (2005) suggested that the success of monetary policy to regulate inflation depends on the quality of the institutions. The overall findings of the study corroborate the idea that the quality of the institutions is the critical variable to explain the relationship between FD and INF in Pakistan. The error correction term is important and negative for both models, suggesting that disequilibrium is corrected by 64 percent and 57 percent respectively in a year. In conclusion, the short-run estimates show that institutional quality, money supply, GDPPC, and trade openness are important determinants of inflation in Pakistan. The results also suggest that the impact of GDPPC and trade openness on inflation is conditioned by the level of institutional quality. These findings correspond with earlier research studies that have analyzed the factors affecting inflation in different countries.

Table 5: Short-Run Estimate of the Model (1984-2023)

Dependent variable: Inflation (INF)		
Variables	Model without INQ	Model with INQ
MS	0.641*** (3.253)	1.879* (1.741)
LGDPPC	1.471*** (3.504)	0.570*** (3.031)
TO	2.821** (2.468)	-0.921*** (-4.431)
LREER	0.410 (0.592)	-0.011 (-0.017)
FD	1.035* (1.764)	0.268*** (4.005)
INQ		-1.578*** (-4.426)
FD*INQ		-1.278** (2.622)
ECM(-1)	-0.641*** (-5.341)	-0.570*** (-5.713) _t

C	-30.429** N (-2.690)	-38.167** (-2.680)
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Note: The values in parentheses are t-statistics, and the asterisks denote the level of significance (*significant at 10%; ** significant at 5%; *** significant at 1%).

9. Stability tests (CUSUM Test and CUSUM SQ Test)

The research utilizes the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests, as suggested by Brown et al. (1975), to confirm the long-term relationships between variables. Previous research by Pesaran & Shin (1999) and Pesaran et al. (2001) has indicated that these tests effectively demonstrate the suitability of the Autoregressive Distributed Lag (ARDL) model. These tests are utilized to graphically represent the residuals of the Error Correction Model (ECM). The Cumulative Sum (CUSUM) and CUSUM of Squares tests have been used to verify the model's stability. The estimates of the multivariate model with institutional quality measures have shown it to be the most suitable model for the study. Consequently, the CUSUM test and CUSUM of Squares test results for Model (2) are presented in Figures 1 and 2, respectively. The results demonstrate that the estimated lines are statistically significant at the 5 percent level, as they fall within the critical limits; Therefore, it is confirmed that the model, which includes institutional quality measures, is stable, and the variable will eventually converge to its equilibrium. Likewise, Figure 2 illustrates the outcomes of an additional CUSUM of Square stability test.

9.1. CUSUM Test

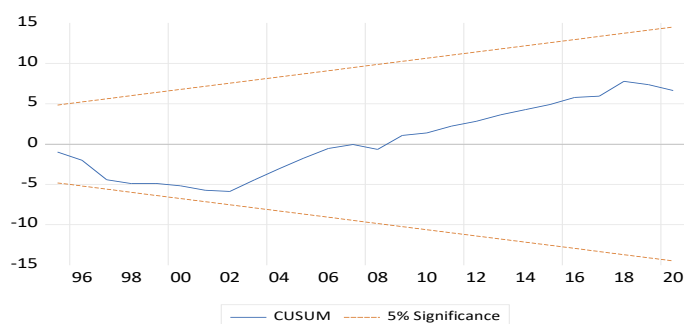


Figure 1: The straight lines represent critical bonds at 5% significance level.

9.2. CUSUM square TEST

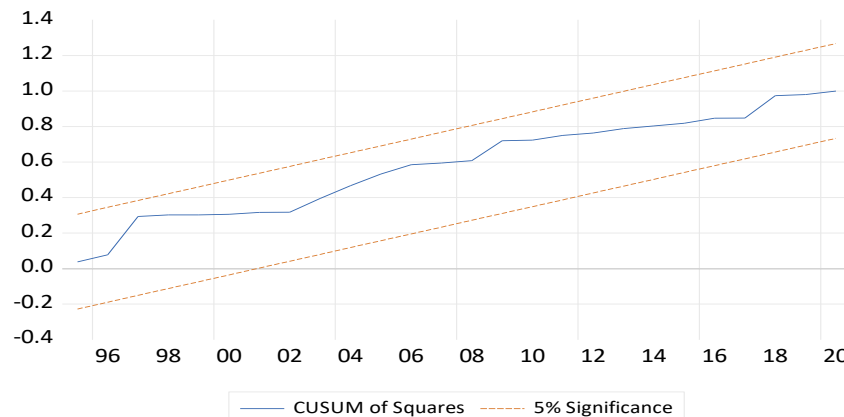


Figure 2: The straight lines represent critical bonds at 5% significance level.

10. Conclusion and policy recommendation

This study aims to investigate how inflation in Pakistan is influenced by financial development and institutional quality. ARDL bound testing was utilized to estimate two different model specifications. The study covers the period from 1984 to 2023. The findings suggest that both financial development and institutional quality significantly influence inflation dynamics in Pakistan. Financial development, as measured by indicators such as domestic credit to the private sector (DCPS), has a positive relationship with inflation. This association emphasizes how increased credit availability in the private sector drives upward pressure on inflation levels. Meanwhile, economic development (measured by GDP per capita) and trade openness show complex relationships with inflation, influenced by the quality of institutions. The study emphasizes the importance of institutional quality in alleviating inflationary pressures caused by financial development and economic growth. It emphasizes the significant association among financial development, institutional quality, and other economic indicators in shaping inflation dynamics in Pakistan's economy. The long- and short-run results show that, in the case of Pakistan, money supply, per capita GDP, trade openness, as well as the real effective exchange rate factors are less significant drivers of inflation than are financial development and institutional quality variables. The introduction of institutional quality (INQ) in the second model provides insights into its role in the relationship between inflation and financial development. Better institutional quality moderates the impact of financial development on inflation, suggesting that a favorable institutional environment can alleviate the inflationary effect of financial development. Trade

openness and GDP per capita continue to exhibit significant associations with inflation, and the interaction term between LDCPS and INQ highlights the complex relationship between financial development and institutional quality.

The study emphasizes the significance of financial development, institutional quality, economic development, and trade openness as determinants of inflation in Pakistan. The findings reveal that these relationships are complex and can vary between the short run and long run, as well as under different institutional conditions. The study adds to the existing body of literature by emphasizing the moderating role of institutional quality in the association between financial development and inflation. These insights have important implications for policymakers seeking to effectively manage and control inflation in Pakistan's economy.

Based on the findings and conclusions, here are some policy recommendations that policymakers in Pakistan could consider to effectively manage and control inflation. Firstly, the positive link between FD and inflation suggest that a substantial growth in credit can result in high inflation. Hence, it is essential to put in place policies for balanced and sustainable credit growth in the private sector. Government should be aware of credit growth and enact anti-inflationary measures to act as a constraint on excessive credit growth. Secondly, the fact that the growth rate of money supply is positively related to inflation suggests that the central bank should take steps to reduce the inflation rate when the money supply growth rate is rising. Private sector expectations of monetary policy can be shaped by the central bank by adopting policies that limit the amount of money that can be created. Thirdly, the negative relationship between the institutional quality and inflation rate indicates that institutional reforms in Pakistan are required to enhance law and order, political stability and curb corruption. Legal and regulatory mechanisms need to be reinforced to deter corruption and enhance governance, anti-corruption mechanisms should be robust, rule of law must be maintained and the functioning of public institutions improved.

The study focuses on Pakistan, and the findings may not be generalizable to other developing or emerging economies. Future research could compare these results with other countries in the region or use panel data to explore cross-country differences in the impact of financial development and institutional quality on inflation. The analysis is based on data from 1984-2023, which might not capture recent developments or changes in economic conditions. Expanding the

sample period or including more recent data might reveal new trends or shifts in the relationship between financial development, institutional quality, and inflation. The current model includes key economic indicators (e.g., money supply, GDP per capita, trade openness, and real effective exchange rate); however, according to the theoretical literature, rational expectations can also play an important role in determining inflation. Future studies may also incorporate the role of expectations in determining inflation.

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