

CAPITAL ACCOUNT LIBERALIZATION, INSTITUTIONAL QUALITY AND INFLATION DYNAMICS: The Case of Pakistan

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Abstract

Price stability is considered an essential component of macroeconomic management of an economy because the higher inflation rate is harmful for various sectors of the country. The main objective of this paper is to investigate the dynamics of inflation in presence of capital account liberalization and the institutional quality variables for Pakistan. The study covers the time period of 1984 to 2015 and employs the ARDL estimation technique to estimate three different specifications based on trade liberalization and the institutional quality measures. The long-run and short-run estimates of different specifications reveal that the model which incorporates the institutional quality measures along with the capital account liberalization index can best explain the inflationary process in. Moreover, growth rate of money supply and the real effective exchange rate are proved significant contributors of inflation; whereas, capital account liberalization, trade openness, per capita GDP and the institutional quality index are helpful in reducing inflation in the country. The study suggest that along with opening of capital account, the government should also ensure stability of institutional quality measures, such as law and order, democratic accountability, transparency and the government stability to control inflation rate in the economy. Furthermore, the policy makers should take proper cautionary measures for controlling growth rate of money supply.

Key Words: Inflation, Capital Account, Capital Account Liberalization, Trade Openness.

JEL Classification: C32; E66; F43; E31.

I. Introduction

To reach the consequences of a society inflation results in social and political complications of serious nature [Zijlstra (1975)]. Therefore, understanding the drivers of inflation has always been at the center of interest to researchers, politicians and policymakers. Since the statement that ‘inflation is always and everywhere, a monetary factor’ and determinants of inflation have been subject to economic attention.¹ These include openness, institutions and level of economic development.² Particularly, the

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¹ Campillo and Miron (1997).

² For more details, see Romer (1993), Cukierman (1992) and Aisen and Veiga (2008).

institutional measures, such as bureaucratic quality, law and order, democratic accountability, and political stability play a vital role in promoting economic growth and development of an economy along with affecting the level of inflation.³ Ubiquitous number of studies have discovered a strong positive impact of institutional development on macroeconomic stability, such as growth and low level of inflation [Barro (1991), Cukierman (1992), Torstensson (1994), Aisen and Veiga (2008), Salahodjaev and Chepel (2014)]. Therefore, it is quite important to analyze the institutional quality and inflation nexus for a developing country, like Pakistan.

On the other hand, the nature and volume of international capital flows have altered in both the developed and developing countries. The process of capital account liberalization has transformed the nature and mechanism of the international lending and borrowings. The capital accounts liberalization refers to the termination of financial regulations and credit controls over the international capital flows, deregulation of interest rates, free entry and exit into the banking sector, sovereignty of commercial banking system and the private ownership of banks. Nevertheless, there exists a difference of opinion among economists regarding the capital account liberalization practices and its implications. The neo-classical economists promote *laissez-faire* suggesting that liberalization is beneficial for the aggrandizement of an economy; whereas, the Keynesian economists believe that the controls work better because liberalizing capital accounts may impede the growth process. However, consensus in support of any of these two views regarding capital account liberalization is not found.

In this study, the inflation dynamics is investigated in presence of capital account liberalization and the institutional quality measures, because it is generally believed that with liberalization of capital account in presence of strong institutional structure, most countries experience lower inflation. Moreover, the process of liberalization reduces the policy makers' incentive to introduce any inflationary shock because with liberalization of the capital account it becomes difficult for central authority to control the consequences of easy monetary policy. Similarly, the continuous capital account liberalization process also affects the investors' expectations regarding future course of monetary policy which in itself can be inflation reducing [Gupta (2007)]. The elasticity of demand for money is the primary channel through which capital account openness affects inflation. Similarly, easier access to foreign exchange also increases the elasticity of money demand which in turn make the central authority more vulnerable towards quick reserve losses. However, the rapid reserve losses are not a problem of concern under the flexible exchange rate regime but inflation can emerge as consequence of currency depreciation. As a result, it reduces the incentive of policymakers to print more money which also alters the expectations of economic agents regarding the monetary policy.

The rest of the study is structures as follows: Section II analyzes the historical

³ For more details, see Alchian, (1965).

trends of the capital account liberalization, inflation and money supply in Pakistan. Section III presents literature review and Section IV illustrates the theoretical framework along with data sources and econometric methodology used in the study. Section V contains the empirical results and discussion on the estimated models; and finally Section VI concludes the study with some policy recommendations.

II. Historical Trends of the Capital Account Liberalization, Inflation and Money Supply in Pakistan

1. The Capital Account Liberalization Process in Pakistan

The process of capital account liberalization depends mainly on the De Jure Indicators which are based on measures taken for openness of the capital account, and liberalization of the exchange rate regimes. In Pakistan, the foreign currency accounts became operative during 1991-92. The main purpose behind the opening of foreign currency accounts was to attract the earnings of Pakistani nationals living abroad, along with using their reserves to finance the fiscal deficits. As main motive behind liberalization of capital accounts is to attract the capital inflows Pakistan also took profound steps towards liberalization of the capital flows after implementation of structural adjustment program of the IMF. The main purpose behind such steps was to remove restrictions on inflows and outflows of capital, and to encourage foreign investment in the country [Haque (2011)].

During 1991, with the removal of foreign exchange control, the Pakistani rupee became partially convertible; and, the dollar bearer certificates (DBC) based on interest rate linked with the London Interbank Offered Rate (LIBOR) were introduced. These DBCs carried one year maturity period and were denominated in the US dollar along with the convertibility facility for purchasers at the prevailing exchange rates. The removal of capital restrictions and the convertibility of Pak-rupee also resulted in foreign borrowings and certain outward investment flows during 2000s. Later, steps such as establishment of an inter-bank foreign exchange market were also considered as an important move towards the decentralization of foreign exchange management [Khan and Kim (1999)]. However, the process was culminated when the government of Pakistan decided to freeze all foreign currency accounts (FCAs) in response to the financial and economic sanctions imposed by the US, European countries and Japan, after the nuclear tests in May 1998. After this move, focus of liberalization policies during Musharraf era were directed towards creation of an efficient and transparent foreign exchange regime, along with improvement of the institutional supervision. This was an important step towards elimination of unauthorized money changers, narrowing the gap between the interbank exchange rate and the open and kerb-side rates, directing remittance through the formal banking channel and discouraging the informal channels of money transfers, such as Hawala and Hundi. Furthermore, the SBP also took steps

to rationalize the forward premium and ensured the availability of liquidity in foreign exchange markets by creation swap desks in the country [SBP (2003)].

Currently, commercial banks are facilitating their customers by providing variety of instruments, such as foreign travelers' cheques, remittance accounts and foreign currency in cash, along with opening of the FCAs for residents and non-residents of Pakistan; except the income coming from the exports of goods. In order to attract capital inflows the government has allowed the foreign firms and non-residents to open domestic currency accounts; convertible to any foreign currency subjected to the condition that all foreign funds should be channelized through proper banking system. Besides, non-residents are also allowed to purchase any listed securities with remittance from abroad, without any restriction on repatriation dividends, receipts from disposal of such securities, and the capital gains. The non-residents are also allowed to purchase all registered corporate debt instruments on the stock exchange, investment bonds, short-term and long-term treasury bills and the federal investment bonds. Some foreign banks, such as Albaraka Islamic Bank, Citibank, Barclays Bank, Oman International Bank, and the Bank of Tokyo, are also successfully operating in Pakistan. The liberalization process in Pakistan took more than two decades and it resulted in the autonomous SBP, privatization of the national banks, elimination of the financial repressions, improvement in the regulatory system, liberalization of the foreign banks and market driven interest rates [Ha que (2010)]. These financial and capital reforms resulted in improvement of an overall economy.

2. Trends in Inflation and Money Supply in Pakistan

Price stability is considered essential for macroeconomic management of an economy. High inflation and increase in money supply, both are associated with each other leading to harmful effects in macro-economy of a country, like Pakistan. The money supply which increases due to portfolio adjustment also has a positive impact on prices [Friedman and Schwartz (1983)]. Further, prices rise due to unexpected inflation in the economy. Hussain (2005) and Khan and Schimmelpfennig (2006) found that broader money growth and supply shocks (oil shocks, production of agricultural goods) are the key variables of inflation in Pakistan.

During 1960s, inflation was around 2.6 per cent in terms of wholesale price index (WPI) and 3.3 per cent in terms of consumer price index [Pakistan Economic Survey (PES), various issues]. The era of Ayub's regime is considered the best period for economic and price stability during the entire history of Pakistan. In 1970-74 inflation rate crossed the limit of 10 per cent, mainly due to currency devaluation, oil price shocks and floods in the country. During 1970-1974 the average annual growth rate of money supply (M2) was 10.91 per cent which shot-up to 22.04 per cent during 1975-1979. It clearly indicates that money supply is an important factor influencing inflation rate in Pakistan. The second episode of high inflation was in 1980-81, when it reached to 12

per cent [Saleem (2008)]. In 1980s, there was a shift away from the time deposits towards National saving schemes, as these schemes paid higher rate of return. In 1980-1984, an average annual growth rate of money supply declined from 14.93 per cent to 12.47 per cent in 1985-1989. In this period the rise in narrow money to monetary assets (M1/M2) ratio also showed the presence of high liquidity; and hence, there was a high rate of inflation in the economy, as it rose from 63.9 per cent in 1983-84 to 74.41 per cent in 1989-90 [Zaidi (2005)]. This was also the time when SAP of the IMF was underway and markets were being deregulated. Another peak period was observed in 1990-94 when due to the gulf war an average inflation remained above 10 per cent but however, during 1995-99, the average inflation declined to approximately 9 per cent. Overall, 1990s was the decade of high volatility and the annual growth rate of money supply declined from 19.07 per cent (in 1990-94) to 13.19 per cent in 1995-1999.

Improvement in production of food and non-food items, food stocks, as well as the tight monetary policy dampened the inflationary pressure to below 5 per cent, during 2001-02. In late 2004, monetary growth again picked up the pace and rose to 20.52 per cent, as a result inflation rate rose to nearly 8 per cent during 2004-05. However, by 2005-06 the rate of inflation stabilized to some extent and stood around 9 per cent. In 2008-09, inflation rate crossed the figure of 20 per cent which occurred first time in the history of the country. However, CPI and WPI based inflation rate dropped to 13.65 per cent and 7.2 per cent, respectively in the following year. The year 2010-11 was the most eventful year for the world inflation. Inflation in Pakistan rose to 13.88 per cent (CPI based) and 21.36 per cent (WPI based) which posed serious threat to macroeconomic stability of the country. The average annual growth rate of money supply also increased from 14.76 per cent in 2009-10 to 15.05 per cent in 2010-11 and then declined to 10.59 per cent in 2014-15; also reducing the inflation rate to 4.81 per cent [PEC (2014-15)].

In short, Pakistan attempted to pursue the path of internal and external liberalization during the sample period of the study. As far as growth rate of money supply is concerned, it has shown almost an increasing trend since 1960s. However, inflation rate have shown some fluctuating trends till 1990s and then it has been increasing. The movement towards integration of domestic economy with rest of the world had started late in the 1980s which got momentum over the time. Keeping in view all this it is imperative to analyze the inflation dynamics in presence of capital account liberalization and the institutional quality measures for formulating suitable economic policies to control inflation rate in the economy.

III. Literature Review

Some researchers devoted their efforts to check the capital account liberalization, institutional quality and inflation nexus in context of both the developed and developing countries. However, all such endeavors have provided mixed evidence regarding the impact of capital account liberalization and the institutional quality on inflation dynam-

ics. Romer (1993) argued that inclusion of openness variable to analysis of inflation is an important component to empirical analysis of the traditional closed economy explanation for inflationary process. According to Romer's hypothesis, inflation remains low in small and open economies. The first channel through which openness affects inflation is the policymaker's incentive to adopt stable monetary and fiscal policies, due to trade openness. Secondly, the trade openness reduces inflation through creating diversity in the country which also minimizes the price shocks. Thus, trade openness has various impacts on inflation, both in the short-run, as well as in the long-run.

Bartolini and Drazen (1997) and Laban, et al. (1997) stated that governments liberalize the capital accounts to enhance confidence of domestic and foreign investors. The liberalization of capital accounts also shows strong commitment of government towards policy reforms because openness of capital accounts is a signal which may result in capital outflows. On the other hand, this liberalization process makes the monetary policy more vulnerable towards any change, such as an easy access to foreign exchange that increases the elasticity of money demand which in turn results in currency substitution effect.⁴ However, under a flexible exchange rate system, foreign reserves are not a serious problem but depreciation of the currency apply an inflationary pressure. The central bank can affect the private sector expectations about the expected monetary policy by formulating a system of penalties against excess money creation. This will not only reduce the money printing temptation but will also lower the inflation rate [Barro and Gordon (1983)]. Kraay (1998) used various measures of capital account openness to investigate the impact of capital account openness on economic growth, investment and inflation in a large sample of developed and developing countries, over the period of 1985 to 1997. The results obtained failed to establish a significant effect of capital account openness, either on output growth or to investment. However, when the returns structure of countries was incorporated in the model, the study indicated that countries with higher returns to capital experienced a surge in investment and growth, as a result of liberalizing the capital accounts. The analysis does not show any significant effect of financial liberalization on growth, investment and inflation. The author underlines two main factors for the insignificant effect of capital account liberalization on growth, investment and inflation. Firstly, the capital account openness proves beneficial in the presence of strong institutional environment. Secondly, benefits from liberalization are offset by the increased volatility brought about by financial openness. However, econometric analysis provides no evidence that more liberalized economies face increased volatility in capital flows or that countries with strong institutional environment experience greater benefits from financial liberalization. Finally, the study concludes that it would be unfair to say that capital account liberalization has no advantage but more likely situation could be that gains from capital account liberalization are not much significant for the selected set of countries.

⁴ The currency substitution effect states that liberalization process makes the central bank more vulnerable to reserves losses.

The empirical evidences indicate that in an economy there exists a negative relationship between growth and the level of inflation. Therefore, a policy which aims to reduce the level of inflation has crucial implications for the growth and poverty reduction as well [Robelo (1992), De Gregorio (1992) and Barro (1997)]. Thus, the capital account liberalization can be useful to maintain the lower level of inflation and achieve substantial growth in an economy. Redrik (1998) found no significant relationship between the capital account convertibility and the inflation rate. Gruben and McLeod (2002) extended Romer's (1993) work for a small open economy on inflation and trade openness to the capital account liberalization in presence of the managed exchange rate. The study covers a sample of 112 countries which is exactly similar to the Romer (1993) sample of 20 OECD and 82 developing countries. Findings of the study support the hypothesis that current account liberalization and disinflation are closely linked with each other, under all estimation techniques. Similarly, per capita GDP, political stability and change in the government surplus are significantly and negatively related to inflation rate; while, the trade openness does not appear to be a significant contributor of inflation for the sample countries. The proximity to equator which is measured by latitude is positively related to inflation.

Gupta (2007) investigated the openness and inflation nexus by using panel data of 163 countries over the time period of 1980 to 2013. The study tests the theory that capital account liberalization leads to reduce inflation in presence of the real per capita income, central bank dependency, budget deficit, political stability, trade openness, and the exchange rate regime by using the Prais Winstein regression method.⁵ The author uses the Chinn-Ito index to measure the capital account liberalization and employ an average inflation rate rather than the level inflation rate in order to make the inflation rates consistent, across different countries.⁶ Findings of the study reveal that capital account liberalization leads to reduce inflation across sample of the study which is also consistent with prediction of the theoretical model. When the author includes the per capita GDP in capital account liberalization and inflation model, it appears statistically significant and inversely related with the inflation rate. The exchange rate regime and the central bank dependence index are positively associated with inflation rate; while the political stability and trade openness help to reduce the inflation rate. Later, the author estimates the initial model again in presence of lagged value of the dependent variable by using the Arellano and Bond (1991) GMM technique. The results, again support the hypothesis that capital account liberalization leads to lower the inflation under all specifications. However, the budget deficit, trade openness and political stability no longer remain a significant contributor of inflation. The author also divided the whole sample countries on the basis of inflation, income and indebtedness. The findings show that inverse re-

⁵ This technique assumes that disturbance is heteroskedastic and contemporaneously correlated across panels.

⁶ The index is the first principal component of the binary variables pertaining to cross border financial transactions, based on the International Monetary Fund's (IMF) categorical enumeration reported in Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

relationship between the capital account openness and inflation is quite stronger in countries experiencing high inflation rate historically as compared to other countries with relatively low inflation rates. In case of high income countries this nexus does not hold; while in low income countries it is significant and negative. This hypothesis also holds true for the highly indebted countries. Finally, the author states that capital account openness has a disciplinary effect on the reserve bank of India (RBI) since 1990s; and it controls the inflation, strictly through managing the inflation expectations.

Miles (2011) analyzed the relationship between financial liberalization and inflation for a set of 75 developing countries, over the time period of 1971 to 1999. The study uses the Chinn and Ito index to measure the capital account openness and other variables including the money growth, exchange rate regimes, trade openness, fiscal balance and the central bank's independency. Later, following Kim's (2003) the author also estimates the model in presence of the current account balances. The model without money growth variable indicates that both the trade openness and capital account openness are statistically significant while all other variables appear statistically insignificant under this specification. The inclusion of yearly dummy under the first specification also makes the budget balance significant reducer of the inflation. The inclusion of money growth variable in the initial specification, turns both the trade and capital account openness insignificant and leaves the budget balance variable significant with quantitatively smaller affect on inflation. The third specification includes the current account balance variable without the money growth model. The results of the model controlling for the money supply shows that capital account openness does not have any effect on inflation. Similarly, inclusion of money supply variable in the current account specification shows that capital account openness has no effect on inflation. Thus, this study suggests that financial openness should not be exaggerated in the developing countries.

Yu (2014) measured the capital account openness for USA, China, 19 countries of the G20 group (G19), G7 and G4 groups by using the weighted average method for each financial and capital account items.⁷ The study disaggregates all countries into three main categories on the basis of openness; namely, the low level of openness, medium level of openness and high level of openness. On the basis of this division the author concludes that countries with low level of openness are mainly less developed, thickly populated and their economic structure is based on the manufacturing and agricultural sectors. Therefore, the development of real estate and finance industries in such economies requires rigorous restrictions to encourage the capital mobility because the outflow of capital remains lower than the inflow of capital in the underdeveloped countries. On the other hand, developed countries experience high level of openness and their capital outflows is more than their inflows. Such countries can further be divided into two sub categories; the first group of countries generates their income through energy and mineral resources, such as Saudi Arabia, Russia and Australia. Subsequently, the loose regulations of these countries encourage capital outflows to provide investment

⁷ The data of the EU was not available.

opportunities. The second group consists of those countries which are economically developed with limited markets and the labor; such as France, Canada, South Korea and the Britain. These countries encourage the direct investment and security investment to explore better investment opportunities abroad, as compared to the domestic ones. For US, the study shows that restrictions for large projects are higher as compared to the small projects. For example, in order to protect its industries US has strict regulations relating to transportation, nuclear energy, ship construction, foreign direct investment, and the purchase of local stock by foreigners. Besides this, in order to avoid national security weaknesses; the US not only impose restrictions on its security investment markets but also punishes some countries for supporting the terrorist and militants groups through their investment.

In context to Pakistan, there is not even a single study which examines the capital account liberalization and inflation nexus on institutional quality measures. However, a limited number of studies have been conducted to examine the impact of trade openness on inflation; e.g., Hanif and Batool (2006) investigated the relationship between trade openness and inflation for Pakistan, using the annual data for the time period 1973 to 2005. The study employs the regression analysis using Heteroscedasticity and Autocorrelation Consistent (HAC) estimator to measure the impact of openness on trade in the presence of real GDP growth, monetary growth, interest rate, and agriculture subsidy. The findings of close economy model indicate that the lagged value of money growth, agriculture subsidy, and interest rate are significant contributor of the inflation in Pakistan. Later, the model is estimated again in the presence of trade openness variable; the results of which shows that trade openness is negatively and significantly associated with inflation; whereas, growth rate of money supply, interest rate and agriculture subsidy are positively related to inflation, while the real GDP appears statistically insignificant.

Similarly, Mukhtar (2010) also analyzes the inflation dynamics in Pakistan by using the single equation model. The study covers the time period 1960 to 2007 and employed the cointegration technique. Findings of the study reveal that there exists a long-run relationship between inflation and the other explanatory variables of the study including budget deficit, GDP, exchange rate and trade openness. In the long-run, both the GDP and trade openness affect the inflation negatively and significantly; whereas, the budget deficit and exchange rate are significantly and positively associated with inflation. The short-run estimates of the model, shows that the exchange rate, GDP and trade openness positively affect the inflation. In short, the long-run estimates of the study support the validity of Romer's hypothesis for Pakistan, while the short-run results do not provide evidence in favor of the Romer's hypothesis. The study of Zakria (2010) also tests the Romer's hypothesis for Pakistan by using the Generalize methods of moment (GMM) technique. The findings invalidate the existence of Romer hypothesis for Pakistan in the presence of a number of control variables; such as exchange rate depreciations, money supply, foreign inflation, fiscal deficit, terms of trade, democracy and foreign debt. Recently, Munir and Kiani (2011) empirically analyzed the validity of Romer's

hypothesis for Pakistan by using the time series data from 1976 to 2010. The study employ different measures of openness to check the robustness of results. Findings of the multivariate model show that trade openness, exchange rate, agriculture value added, and financial openness have positive impact on inflation in Pakistan; whereas, both the money supply and real GDP variables appear statistically insignificant. When authors replace the trade openness variable with another measure of openness (import ratio) again, the results show the positive association between the openness variable and inflation. Finally, when export ratio is used as a measure of openness, again the results reveal that openness variable is positively and significantly associated with inflation. Hence, the study finds that Romer's hypothesis does not hold in case of Pakistan.

IV. Theoretical Framework

Keeping in view the objectives of the study, the first step is to specify the method, to empirically determine the relationship between capital account liberalization and inflation. The general procedure of Gupta (2007) has been adapted to empirically test the capital account liberalization and inflation nexus in context of Pakistan. The first step is to derive the government welfare functions based on the quadratic cost function but before deriving this function it is important to provide theoretical explanation of the structure of an economy. The monetary and the fiscal authorities play a vital role in working of a country because the fiscal authority through issuance of debt, helps the governments to finance the purchase of goods and services; while, the central bank or the monetary authority through printing of money or buying the stock back from the public, monetize the government debt. The amount of printed money which a government acquires from the central bank to purchase non-monetary assets and goods is called seignorage. On the one hand, seignorage helps the government to finance its expenditures which enhances the government's welfare. On the other hand, printing of money (to meet government's money demand) is more likely to be inflationary. Thus, the central bank of a country do not only help the government but is also concerned about the cost of inflation in the country. The inflationary pressure, under the fixed exchange regime results in loss of reserves and depreciates the currency in the flexible exchange rate system. Similarly, expectations regarding future inflation affect the demand money for money. Keeping in view all these aspects the government welfare function can be written as:

$$W = K(\pi) - \theta \frac{1}{2} \pi^2 \quad (1)$$

where θ is the weight assigned by the government to the increasing inflation. It can be in term of gain from inflation; such as revenue from seignorage and cost in form of currency depreciation and loss of foreign reserves; whereas, the demand for money function is presented by using the Cagan money demand function which used the nominal inflation rate instead of nominal interest rate. supposing that M is the supply of

money and P denotes price level, the Cagan money demand function in its discrete time version assumes that the real money balances demand (M/P) depends on future inflation and it is iso-elastic, i.e.,

$$\left(\frac{M_t}{P_t}\right) = \left(\frac{P_{t+1}}{P_t}\right)^{-\lambda} \quad (2)$$

The log-linear stochastic Cagan model can be expressed as,

$$\ln(M_t) - \ln(P_t) = -\lambda E_t [P_{t+1} - P_t] \quad (3)$$

This expression can also be written as,

$$m_t - p_t = -\lambda E_t [P_{t+1} - P_t] \quad (4)$$

where m_t is the log of nominal money supply, p_t is the log of price level and λ denotes elasticity of demand for real money balance with respect to the expected future inflation. Both, the demand for real money balances and the expected inflation are negatively associated with each other because higher expected inflation decreases the current demand for money by increasing opportunity cost of holding money. A number of researchers including McKinnon and Mathieson and ckinnon (1981), Bartolini and Drazen (1997), and Gruben and McLeod (2002) found that elasticity of money balances (λ) increases with openness of capital account. The capital account openness results in higher currency substitution opportunities and easier access to foreign currency which in turn increases the elasticity of demand. Therefore, it is assumed that both the semi-elasticity of money demand and capital account liberalization are linked with each other through a constant elasticity relationship which can be written as:

$$\lambda = \frac{1}{\alpha} \eta^\alpha \quad \alpha > 0, \eta > 0 \quad \text{and} \quad n(\eta) > 0 \quad (5)$$

where η is the degree of capital account liberalization and α is semi-elasticity of money demand with respect to capital account liberalization. It takes value of greater than and less than the unity. When value of α is greater than unity it shows that capital account liberalization raises the semi-elasticity of money demand by a larger amount. On the other hand, when α assumes value of less than unity the capital account liberalization increases the semi-elasticity of money demand by a smaller amount. Furthermore, real revenue of government through printing of money in time period t are given by

$$S_t = \left(\frac{M_t - M_{t-1}}{P_t}\right) \quad (6)$$

where, the numerator of Equation (5) is the change in money supply in period t and $t-1$ and the denominator converts nominal government seignorage revenues into a flow of real government revenue. However, it does not mean that governments always earn revenue through printing of money because if inflation exceeds a particular level the marginal revenue from seignorage becomes negative. Thus, the equilibrium requires the growth rate of money supply to be equal to inflation rate. Now, suppose that money grows at a constant rate δ and with this assumption Equation (4) can be re-write as,

$$p_t = m_t + \lambda\delta \quad (7)$$

Combining Equation (7) with Equations (5) and (6), the following is obtained:

$$S_t = \delta (I + \delta)^{-\frac{1}{\alpha}\eta^{\alpha-1}} \quad (8)$$

The first order condition for seignorage revenue maximizing growth rate of money is given as,

$$\delta (I + \delta)^{-\frac{1}{\alpha}\eta^{\alpha-1}} - \delta \left(1 + \frac{I}{\alpha}\eta^\alpha\right) \delta (I + \delta)^{-\frac{1}{\alpha}\eta^{\alpha-2}} = 0 \quad (9)$$

$$\pi^s = \delta^{Max} = \frac{1}{\left(\frac{1}{\alpha}\eta^\alpha\right)} = \frac{\alpha}{\eta^\alpha} \quad (10)$$

Now consider π^s as a seignorage revenues maximizing the rate of inflation on which is negatively related to liberalization of capital account. In other words, capital account openness lowers down the seignorage revenue maximizing the rate of inflation. The welfare function given by Equation (1) by using the seignorage Equation (5) can be re-written as,

$$W = \pi (I + \pi)^{-\frac{1}{\alpha}\eta^{\alpha-1}} - \theta \frac{1}{2} \pi^2 \quad (11)$$

It shows that α is the rate at which welfare of the government decreases with the capital account liberalization. At higher rate of inflation the government's welfare decreases rapidly along with reducing incentive to impose inflation tax. In order to maximize overall welfare of the government, following optimality condition is solved to obtain optimal inflation rate as,

$$\delta (I + \delta)^{-\frac{1}{\alpha}\eta^{\alpha-1}} - \delta \left(1 + \frac{I}{\alpha}\eta^\alpha\right) \delta (I + \delta)^{-\frac{1}{\alpha}\eta^{\alpha-2}} - \pi = 0 \quad (12)$$

By solving Equation (12) optimal level of inflation and capital account liberalization is obtained by applying implicit function theorem on Equation (12)

$$\frac{\partial \pi^w}{\partial \eta} = \frac{(1+\pi) \alpha \eta^{-1+\alpha} (\pi \alpha + (\alpha - \pi \eta^\alpha) \log(1+\pi))}{(-2+\pi) \alpha \eta^\alpha + \pi \eta^{2\alpha} - \alpha^2 \left[2 + (1+\pi)^{\frac{2+\pi}{\alpha}} = \theta \right]} \quad (13)$$

This is the baseline model to analyze inflation and capital account liberalization nexus. The sign of Equation (13) entirely depends on structure of the country and it can be estimated through empirical methods. Later, this model will also be estimated in presence of some other control variables, such as per capita GDP, trade openness, money supply, exchange rate, and the institutional quality. Following Kim (2003) the final specification incorporate the capital account balance as an explanatory variable. Hence, it will estimate three specifications of the base-line model to investigate the change in inflation and capital account liberalization relationship in presence of different variables [Miles (2011)].

The Bivariate Model of the study is:

$$\pi_t = \alpha_o + \alpha_1 CAL_t + \varepsilon_t \quad (14)$$

Multivariate model without Institutional Quality variable:

$$\pi_t = \alpha_o + \alpha_1 CAL_t + \alpha_2 TO_t + \alpha_3 MS_t + \alpha_4 PGDP_t + \alpha_5 ER_t + \omega_t \quad (15)$$

Multivariate model with Institutional Quality variable:

$$\pi_t = \alpha_o + \alpha_1 CAL_t + \alpha_2 TO_t + \alpha_3 MS_t + \alpha_4 PGDP_t + \alpha_5 ER_t + \alpha_6 INQ_t + \mu_t \quad (16)$$

where, π_t is the inflation rate, CAL_t is capital account liberalization index, TO_t is trade openness, MS_t is money supply, $PGDP_t$ is per capita GDP , and INQ_t is the institutional quality index.

1. Data Description

There is not a single source which can provide continues data for Pakistan. Therefore, different secondary sources have been used to extract the data for empirical analysis of this study which covers the time period from 1984 to 2015. All the required data have been sourced from the Pakistan Economic survey (various issues), International Country Risk Guide (ICRG), assembled by the Institutional Reform and Informal Sector (IRIS), Center of the University of Maryland and the World Development Indicator (WDIs), the World Bank.

In the study, inflation rate has been measured by the growth rate of consumer price index (CPI). The CPI consists of reasonably large baskets of goods and is easy to com-

pute. In order to measure the capital account liberalization the index of capital account liberalization developed by Chinn and Ito (2009) have been used. This index is better than the other measures of capital account openness like the AREAER index developed by IMF because it captures both the breadth and intensity of controls [Miles (2011)]. The higher value of the index implies less capital control or capital account openness and vice versa. Other variables included in the analysis are money supply (M_2) and trade openness (TO), institutional quality index (INQ) and the effective exchange rate (EER). The trade openness (TO) variable is the sum of imports and exports as percentage of GDP. The institutional quality index is measured by five indicators ranging from zero to five. It is the weighted average of bureaucracy quality, corruption, democratic accountability, ethnic tensions and law and order.⁸ The data on CPI , M_2 , and EER is sourced from the IFS; whereas, the data on TO is sourced from the WDIs data on institutional quality index (INQ), which is sourced from the ICRG and the weighted method applied to calculate the index.

2. Estimation Technique

In order to empirically analyze the nature of relationship between inflation, capital account liberalization and institutional quality measures the ARDL bound testing approach developed by Pesaran et. al. (2001) has been applied. This cointegration technique is preferable over all other available cointegration techniques due to number of reasons [Stamatiou and Dritsakis (2014)]. Firstly, the ARDL approach provides robust results whether the variables are integrated $I(0)$ or $I(1)$. Secondly, in case of small data set the ARDL provides efficient and consistent results. Finally, this technique overcomes the endogeneity and the autocorrelation problems while providing the long-run and short-run estimates of the model. The ARDL framework of the study can be written as follow;

$$\Delta INF_t = \alpha_0 + \alpha_1 INF_{t-1} + \alpha_i X_{t-i} + \sum_{i=1}^n \gamma_i \Delta INF_{t-i} + \sum_{i=1}^n \gamma_i \Delta X_{t-i} + \eta ECT_{t-1} + \mu_t \quad (17)$$

where, X represents different regressors which are used from Equations (14) to (16). By using Equation (17) the short-run and long-run estimates for our models employed in this study can be measured. In the above equation the coefficients attached to difference operators measure the short-run dynamics; whereas the terms with first lagged captures the long-run relationship. Here, the null hypothesis of no cointegration will be tested against the alternative hypothesis of presence of the cointegration relationship. The ARDL test is based on two critical bounds and the F-statistics value. If the value of F-statistics is above the upper limit or upper critical bound values then the long-run relationship exist among the time series. However, if F-statistics value is below the lower critical bound values then the long-run relationship does not exist between the time se-

⁸ The weighted method has been applied to calculate the index. It consists of law and order index, the government stability index, and the democratic accountability index.

ries. After estimating the long-run relationship, the next step is to find the short-run estimates of the model. The ECM equation can be written as,

$$\Delta INF_t = \beta_0 + \sum_{i=1}^p \beta_i \Delta X_{t-i} + \eta ECT_{t-1} + \mu_t \quad (18)$$

where ECT_{t-1} is the error correction term and η indicates the speed of adjustment which is linked to the above cointegration equation.

V. Results and Discussion

1. The Unit Root Test Results

Over the past several years the unit root test has turned out to be widely popular for checking the stationary property of time series data [Gujarati, et al. (2009)]. There are various procedures for testing the unit root; the Dicky-Fuller (DF) GLS, the Augmented Dicky-Fuller (ADF), Phillip-Perron (PP) test, [Cheema and Atta (2014)]. This study employs the Dicky-Fuller-Generalized least square (DF-GLS) test to check the stationarity property of time series. The ADF-GLS [Dickey and Fuller (1979)] test specifies the following null and alternative Hypothesis i.e., H_0 : Series has a unit root (non-stationary) and H_1 : Series is stationary. If calculated t-statistics is greater than the critical values, then null hypothesis is rejected. Table 1 represents the ADF-GLS test results. It is evident from the results that only money supply (*MS*) and capital account liberalization index (*KO*) are stationary at level; whereas, all other variables including *INF*, *PCGDP*, *TO*, *REER* and *INSQ* are non-stationary at level but they become stationary at their first difference. Hence, the results indicate that order of integration is different and no variable integrate the order (2). Therefore, we can further proceed with the empirical analysis by employing ARDL bound testing technique, as it provides robust results when variables follow different order of integration.

TABLE 1
Dicky-Fuller GLS Unit Root Test (1972-2015)

Variable	Level	First Difference	5 per cent	Order of Integration
LCPI	-0.167	-2.13	-1.952	I(1)
LPCGDP	-1.0076	-3.432	-1.952	I(1)
LMS	-2.11256	-	-1.952	I(0)
LTO	-1.284	-6.072	-1.952	I(1)
KO	-5.4537	-	-1.952	I(0)
INSQ	-1.0818	-4.02085	-1.952	I(1)
LREER	-0.38622	-2.16042	-1.952	I(1)

Source: Author's own calculations.

2. Long-Run and Short-Run Results of the Models

Before estimating the long-run and short-run estimates of the models, it is important to apply the bound test to check the existence of cointegration relationship among the variables of interest.⁹ Table 2 reports the F-Statistics results along with the upper and lower bound values at 90 and 95 per cents. The results reveal that values of F-statistics are greater than the upper bound values in case of all the three models; which is indicative of the fact that all variables are cointegrated.¹⁰ Hence, there exists a long-run relationship among variables in all the three models of the study (see Table 2).

TABLE 2
F-Statistics Results

Dependent Variable: INF	F-Statistics	95 per cent	
		Lower Bound	Upper Bound
Bivariate Model	6.4295	3.1543	5.4297
Multivariate Model Without Institutional Quality Measures	20.669	2.5338	3.9682
Multivariate Model With Institutional Quality Measures	17.0416	2.4829	3.9494

Source: Author's own calculations.

The long-run estimates of all the three models are reported in Table 3 which reveals that in all these models capital account liberalization (*KO*) is statistically significantly and negatively associated with inflation in Pakistan. This finding is consistent with the study of Gruben and McLeod (2001), and Gupta (2007) stating that capital account liberalization lowers the inflation in a country. This finding is also consistent with the theoretical predictions which state that capital account openness lowers the policy makers' incentive to adopt any inflationary monetary policy because of high loose monetary policy penalties. The opening of capital account also disciplines monetary authorities and conveys the signal to economic agents that loose monetary policy can result in capital outflows. Hence, the central authorities have the power to change future expectations of economic agents which itself is an inflation reducing.

Later, the model without institutional quality index incorporated some important variables along with the capital account liberalization which may significantly contribute to determine inflation in an economy like Pakistan. The findings indicate that per capita GDP (*LPCGDP*), negatively and significantly reduce inflation, though the effect is quite small in magnitude (0.015 per cent). This result is consistent with Fisher hypothesis which states that increase in per capita income reduces inflation through stimulating

⁹ The details of the bound test and the F-Statistic values are given in the section IV(2).

¹⁰ The present study is based on three models including the basic model, model without institutional quality measures and the model with institutional quality measures.

demand for goods and services [Ijaz, et. al. (2013)]. Moreover, Ahmed and Murtaza (2005) and Ayyoub, et al. (2011) also document negative relationship between growth and inflation in the context of Pakistan. However, growth rate of money supply (*LMS*) proved an important contributor of inflation in the country. One per cent increase in growth rate of money supply would increase inflation by 0.64 per cent. This finding is in line with the quantity theory of money which considers money supply as an important driver of inflation. Similarly, the monetarists also view that inflation is a monetary phenomenon. A number of researchers such as Liu and Qayyum (2006), Kemal (2006), Hanif and Batool (2006), Malik and Ahmed (2010), Saleem (2010), Ijaz, et al., (2013), and Mukhtar and Yousaf (2014) found positive association between growth rate of money supply and the inflation in case of Pakistan.

In Pakistan, the real effective exchange rate (*LREER*), affects the inflation positively and significantly. This finding is consistent with the study of Ahmad and Ali (1999) which reported positive nexus between exchange rate and inflation. One pos-

TABLE 3
Long-Run Estimate of the Models (1984-2015)

Variables	Dependent Variable: INFLATION (INF)		
	Bivariate Model	Multivariate Model Without Institutional Quality Variable	Multivariate Model With Institutional Quality Variable
KO	-0.643*** (-4.917)	-0.342*** (-3.106)	-0.681** (-2.209)
LPCGDP	-	-0.015** (-2.587)	-0.059** (-2.529)
LMS	-	0.642*** (4.917)	0.619*** (3.857)
LTO	-	-0.034** (-2.528)	-0.030* (-3.863)
LREER	-	0.645*** (4.947)	0.050** (2.169)
INQ	-	-	-0.480* (-1.801)
Diagnostics Test Statistics [P- values]			
χ^2 (Serial correlation)	0.698[0.403]	1.771[0.183]	1.787[0.181]
χ^2 (Functional form)	1.588[0.208]	0.121[0.728]	0.126[0.723]
χ^2 (Normality)	0.857 [0.355]	1.875[0.392]	1.858[0.395]
χ^2 (Heterosecdasticity)	0.121[0.728]	1.158[0.282]	1.160[0.281]

Note 1: ***, **, * denote significant at 1 %, 5% and 10 % level of significance, respectively.

2 values in Parenthesis are t-statistic.

Source: Author's own calculations.

sible reason for positive nexus between real effective exchange rate and inflation could be that its increase in real effective exchange rate shows the depreciation of domestic currency which leads to higher prices and inflation at the home country [Ijaz, et al. (2013)]. Moreover, the variable trade openness confirms the validity of Romer's hypothesis with Pakistan's data which states that inflation remains low in a small open economy. This finding is in accordance with the empirical findings of Romer (1993), Kim and Beladi (2005), Jin (2006), Wynne and Kersting (2007), and Gruben and Mcleod (2002). Furthermore, it validates the results of Hanif and Batool (2006), Irum (2006), Mukhtar (2010) and Mukhtar and Yousaf (2014) that openness has a significant negative impact on inflation in Pakistan.

The institutional quality index (*INQ*) have been introduced in the last specification of the model. According to Kraay (1998) capital account liberalization proves to be more beneficial in presence of the strong institutional measures. Results shows that introduction of institutional quality index in the model, improves the role of capital account liberalization in reducing inflation in Pakistan, as the coefficient value increase to 0.68. Similarly, the results reveal that with one per cent improvement in institutional quality, the index (*INQ*) reduces inflation statistically significantly by 0.48 per cent. Findings of the study also support the theoretical prediction that countries with strong institutional stability have higher ability to stabilize the prices and control inflation as compared to countries with weaker institutional setup [Gupta (2007)]. Finally, empirical findings of all the diagnostic tests (for all models); including serial correlation test, functional form test, normality test and the heteroscedasticity test are reported in the lower part of Table 3. Results indicate that all diagnostic tests failed to reject the null hypotheses.¹¹ In the long-run, the results show that capital account liberalization and institutional quality variables are more important contributors of inflation as compare to money supply, trade openness and the real effective exchange rate variables in the context of Pakistan. The short-run estimates of all models are reported in Table 4. Results indicate that the capital account liberalization (*KO*) variable appear statistically insignificant for the basic model. This finding is consistent with the results of Kraay (1998) who argues that benefits of liberalization may be offset by the increased volatility brought by financial openness; whereas, the other two models reported negative and statistically significant association of capital account liberalization index (*KO*) with inflation. Moreover, the real effective exchange rate (*LREER*) appears statistically insignificant in the specification without institutional quality measures but it becomes statistically significant when institutional quality index are introduced in the model. Overall, short-run results indicate that the introduction of institutional quality variable improve overall fit of the model which is also evident from the R-squared (0.99). Hence, it can be stated that while determining inflation rate institutional quality measures are important, in Pakistan. All other variables are statistically significant and carry theoretically correct signs in the short-run.

¹¹ Ho : No serial correlation, normality assumption for error term holds, no Heteroskedasticity.

The coefficient of error correction terms, appear statistically significant and carrying negative signs in all specifications which indicate the stability of long-run equilibrium. The values of error correction terms are 0.324, 0.069 and 1.62 for models (1), (2) and (3), respectively. It implies that in these models any deviation from the long-run equilibrium is corrected by 0.324, 0.069, and 1.62 per cents, respectively. In the long-run, results show that capital account liberalization and institutional quality variables are important contributors of inflation as compared to money supply, trade openness and the real effective exchange rate variables in context of Pakistan. Overall, the study shows that the model with institutional quality measure along with the capital account liberalization index is the most appropriate model for analyzing the dynamic behavior of inflation in Pakistan.

TABLE 4
Short-Run Estimate of Models (1984-2015)

Variables	Dependent Variable: INFLATION (INF)		
	Bivariate Model	Multivariate Model Without Institutional Quality Variable	Multivariate Model With Institutional Quality Variable
KO	-6.048 (-1.323)	-0.029* (-1.897)	-0.441*** (-4.097)
LPCGDP	-	0.326** (2.604)	0.024* (1.838)
LMS	-	0.341*** (5.716)	0.931*** (28.88)
LTO	-	-0.450* (-1.717)	-0.0131** (-2.383)
LREER	-	0.51 (0.252)	0.675*** (4.55)
INSQ	-	-	-0.311* (-1.67)
ECT(-1)	-0.324** (-2.182)	-0.0689** (-2.139)	-1.6183*** (-10.36)
Diagnostic Test Statistics [P-value]			
R ²	0.75	0.875	0.996
Adjusted R ²	0.703	0.871	0.995
F-statistics	3.722 [0.037]	20.326 [0.001]	29.644 [0.000]

Note 1: ***, **, * denote significant at 1 %, 5% and 10 % level of significance, respectively.

2 values in Parenthesis are t-statistic.

Source: Author's own calculations.

3. Stability Tests

In order to check stability of the model, Cumulative Sum (CUSUM) and CUSUM of Squares test have been applied. As estimates of the multivariate model with institutional quality measures proves the most appropriate model of the study; therefore, it is reported that CUSUM test and CUSUM of Squares test results for Model (3) in Figures 1 and 2, respectively. The result reveals that estimated lines are within the critical limits at 5 per cent level of significance; therefore, it is verified that the model with institutional quality measures is stable and the variable will converge towards its equilibrium in the long-run. Similarly, the test for other CUSUM of Square stability test is shown in Figure 2.

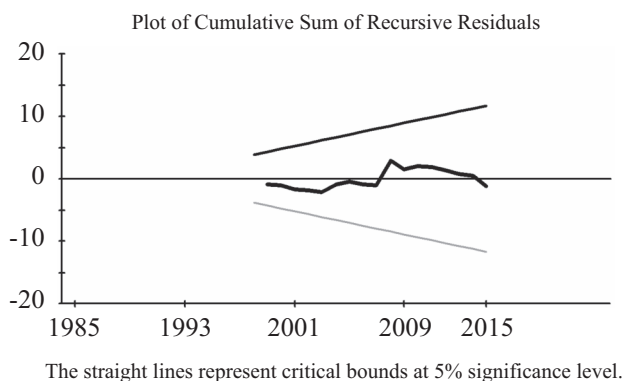


FIGURE 1
Result of CUSUM Test

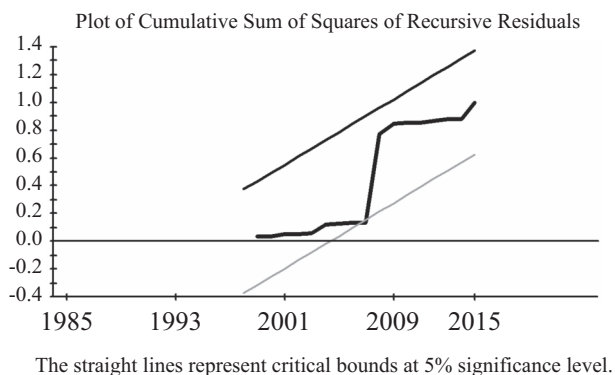


FIGURE 2
Result of CUSUM Squares Test

Source: Author's own calculations.

VI. Conclusion and Policy Recommendations

Pakistan has been struggling against inflation, since the last three decades. Similarly, over the time, it has seen that many economic and political reforms have been introduced for better management. On the economic front, capital account liberalization is considered as one of the significant innovations introduced during the early 1990s in the country. At the same time it is seen that on political side, issues of governance and institutional quality has remained at the priority agenda of different governments in Pakistan.

The present study endeavors to examine the inflation dynamics in presence of capital account liberalization and the institutional quality measures. Three different model specifications were estimated by employing the ARDL bound testing procedure. The study covers the time period from 1984 to 2015. Findings of the study reveal that capital account liberalization, significantly reduces inflation in Pakistan but its magnitude increases or is magnified when institutional quality index is incorporated. It is indicative of the fact that presence of stable institutional quality measures is a crucial requirement for realizing full benefit from the capital account liberalization process. Results of long-run and the short-run indicate that capital account liberalization and institutional quality variables are more important contributors of inflation as compared to money supply, per capita GDP, trade openness and the real effective exchange rate variables in context of Pakistan. Overall, the study shows that the model with institutional quality measure along with the capital account liberalization index is the most appropriate model for analyzing the dynamic behavior of inflation in Pakistan.

The policy implications of the study are straight forward; firstly, the inverse relationship between the capital account liberalization and inflation suggest that the policy makers should encourage the capital account liberalization process in Pakistan by terminating/reducing financial regulations and eliminating credit control over the international capital flows to maintain lower inflation rate in Pakistan. Secondly, the significant and negative relationship between institutional quality and inflation implies that the government should introduce reforms to ensure improvement in law and order, bureaucratic quality; democratic accountability, reduction in the ethnic tensions and corruption in Pakistan. Thirdly, the positive inflation and growth rate of money supply nexus suggests that the central bank should take steps to control the growth rate of money supply in the economy. Moreover, the central bank can also affect the private sector expectations about the expected monetary policy by formulating a system of penalties against excess money creation. Finally, the adverse effect of real effective exchange rate on inflation implies that the policy makers should adopt stable exchange rate policy to avoid depreciation of the domestic currency which may lead to the imported inflation in the country.

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