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The Impacts of Remittances on Foreign Reserves of Pakistan: Does Pakistan Suffer from Dutch Disease?

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Abstract

Dwindling and oscillating foreign exchange reserves in Pakistan despite huge inflows in the form of remittances, exports earnings, foreign direct investment and foreign aid has been vexatious for researchers and policy makers. Thus, the main objective of this study is to investigate the impacts of remittances and other foreign financial flows over the foreign exchange reserves of Pakistan. For this purpose, the time series data from 1976 to 2022 taken from WDI has been analyzed by applying ARDL bound test. The findings of the study suggest that remittances, exports, GDP and FDI contribute in the foreign reserves positively and significantly. However, imports and external debt servicing affect negatively and significantly to the foreign reserves of Pakistan. Based on the findings of the study, it is concluded that there is no Dutch disease in case of Pakistan and foreign reserves are maintained for precautionary motive. The study recommends that government should focus to develop such mechanism and policies that augments the remittances inflows through formal sector and increase the exports, FDI and GDP growth rate and decrease the imports, external debt servicing and external debt burden of the country.

Keywords: Remittances, Foreign Reserves, Dutch Disease, ARDL, Pakistan.

Introduction

During last three decades, specially after East Asian financial crisis of 1997-98, most of the developing and middle income emerging countries have been involved in accumulating foreign reserves more than standard requirement of import bill cover of three months. The foreign reserves are maintained with the central bank of every country in the form of foreign currency, foreign bonds and precious metal such as gold and silver; to show to international creditors, investors, rating agencies and international business community that the country is in a position to pay the possible financial reverse flows in the form of external debt servicing, capital flight, import payment and multinational corporation's (MNCs) profits (TRAN & LE, 2020; Chen et al., 2007). Foreign reserves are basically maintained to build confidence and trust among the holders of domestic currency that

they will be provided with foreign currency or gold against the domestic currency whenever they would wish to convert. Besides, the foreign reserves also help to absorb any internal or external shock or sudden stops of foreign inflows. They are accumulated in good times and depleted in bad times. Usually, foreign reserves are built up for three motives such as transactionary motive, precautionary motive and development oriented motive. The provision of liquidity to international traders and tourists, return on investment and adopt international trade led growth are considered in transactionary motive, whereas financing Balance of Payment (BoP) imbalances, avoiding and mitigating exogenous shocks emanating from sudden stops of financial inflows and abrupt reverse flows and controlling speculative runs on currency are included into precautionary motives. However, maintaining public trust and confidence, enhancing international credibility, increasing credit rating in order to minimize costs of external borrowing by reducing the risk premium are part of development oriented motive (Nor et al., 2008) and (Wang, 2006). As per data of IMF Q_4 2022, total foreign reserve holdings of the world were $ 11,962.89 billion, Where US dollar dominated with 58.3%, followed by euro with 20.4%, Japanese yen with 5.5%, pound sterling with 4.9%, Chinese reminbi with 2.6%, Australian dollar with 2.44%, Canadian dollar with 2.37% and Swiss franc with 0.22% as shown in Figure 1.

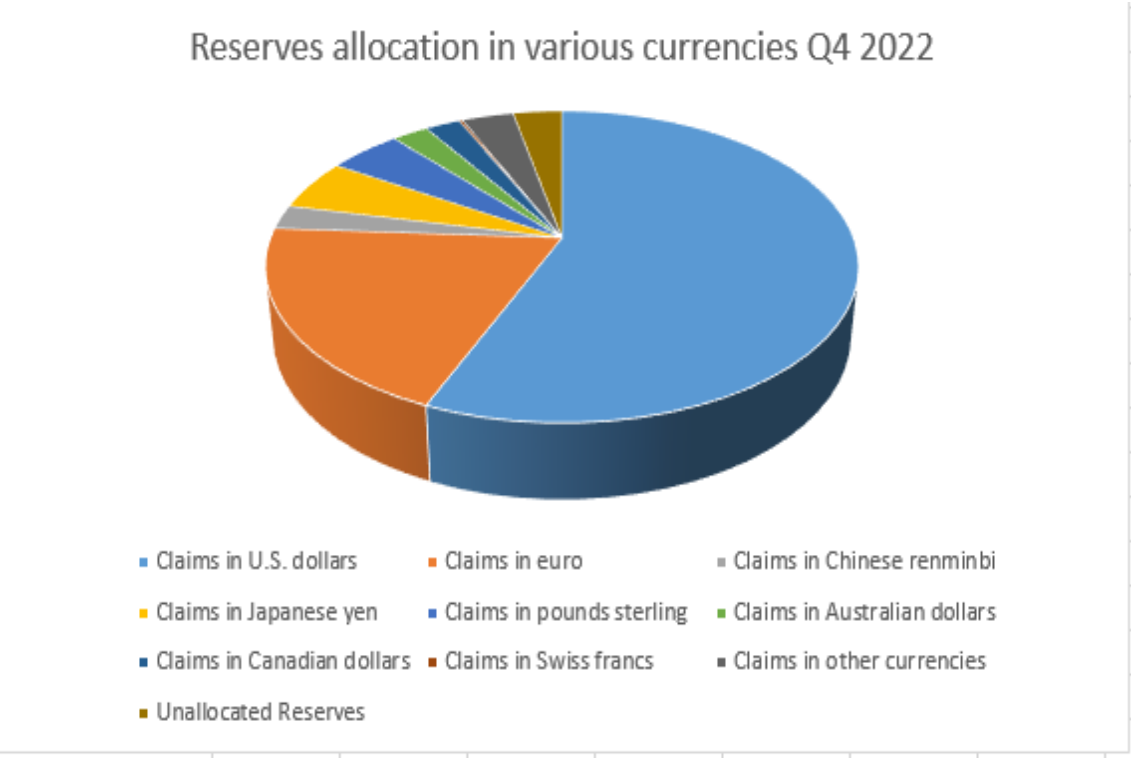

Figure 1: Foreign Reserves Holdings of the World in Various Currencies Q_4 2022
Source: Author's graphics by using data obtained from IMF

Foreign reserves serve as a crucial macroeconomic indicator for any nation, essential for stabilizing exchange rates and buffering against external and internal shocks like supply disruptions, trade imbalances, speculative attacks, sudden stop of capital flows and reversals. A higher reserve stock signifies greater security for a country. However, maintaining foreign reserves carries financial and economic costs such as opportunity

cost (lost investments due to holding reserves), adjustment costs (expected expenses in speculative scenarios and insolvency) and increased external debt. Hence, determining the optimal reserve level that meets these criteria is vital, yet challenging, for central banks (Shijaku, 2012).

There are generally four main motives guiding foreign exchange reserve holdings:
1. transaction motive, 2. precautionary motive (acting as self-insurance), 3. collateral motive and 4. monetary mercantilism (Mijiyawa & Oloufade, 2022, Nor et al., 2008).

Recently, the workers' remittances and their macroeconomic impacts have become the variable of immersion among researchers, academicians, development practitioners and regional and international financial and development institution in highly indebted and poor countries (HIPCs) and middle income emerging countries because the remittances —being the second largest international financial inflows after exports and greater than foreign direct investment, portfolio investment and official development assistance— has been protecting these countries against balance of payment and currency crisis through pile ups of foreign reserves with central banks (KNOMAD, 2021, Mijiyawa, 2022, Mohapatra et al., 2010, Nor et al., 2008). But unfortunately, despite increase in remittances and exports by 30% and 25% respectively and achieving growth rate of 6% in 2021-22, the Pakistan that is 5th most populous and only atomic power in the Muslim World, has again been trapped in economic and financial crisis as her foreign reserves with Central Bank have been plummeted by 76% to $ 4.2 from $ 17 billion during few months of fiscal year 2022-23, which is equivalent to import bill of three to four weeks only. Besides, her currency being worst performing in the region has depreciated by 60% from Rs.178/dollar to Rs.285/dollar culminating to hyperinflation of 40% and unemployment rate of 7.5% amid political instability, aftermath impacts of Covid-19. Consequently, the World Bank has predicted that Pakistan's GDP will fall by 2.5 point percent in 2022-23. It has not only created socioeconomic turmoil and unrest but politico economic uncertainty and crisis (MoF, 2022).

Similarly, due to occurrence of twin deficit, the Pakistan has had been in acute shortage of foreign exchange amid more financial outflows as compare to inflows. In order to maintain foreign exchange reserves at the minimum required level of at least equivalent to import bill of three months; the Governments of Pakistan has had been depending on workers' remittances, external borrowings, exports, foreign direct investment and foreign grants. In July 1988, Pakistan's foreign exchange reserves were depleted and reached to the level equivalent to import bill of three weeks only. Again in 1998-99 the country was faced with severe financial crisis due to heavy sanctions imposed by western countries and United States of America after nuclear test on 28th May 1998. The situation was further exacerbated when the then chief of Army staff General Pervez Musharraf imposed Martial law on 12th October 1999. The foreign exchange reserves were plunged to only USD 300 million that were equivalent to only one week's import bill.

Later on in 2007-08, the foreign exchange reserves were again exhausted due to political uncertainty resulting from the martyrdom of Benazir Bhutto. Similarly, in 2013- 14, the foreign exchange reserves had fallen due to political uncertainty emanating from political protests and sit inns in Islamabad. Again in 2017-18, the foreign reserves were plummeted amid historically highest level of trade deficit of USD 45 billion and current account deficit of USD 19 billion and political instability. Likewise, in 2022-23, the foreign exchange reserves of Pakistan again had fallen to lower level due to political uncertainty,

emerging from the premature removal of government through no confidence motion as shown in Figure 2.

Due to explosive nature of external debt servicing and burgeoning growth rates in imports along with stagnant exports, fall in foreign direct Investment and frequent plunge of unilateral transfers, the foreign exchange reserves of Pakistan have always been dwindling, volatile and under pressure. It has been observed in Pakistan that whenever there is a change of any government, the foreign exchange reserves are vanished out overnight and currency is depreciated due to increase in its supply along with increase in demand of US dollar as most of the people start to convert their savings into dollar and transfer their savings and wealth abroad amid political, social and economic uncertainty, unrest and turmoil as depicted in Figure 2.

Source WDI World Bank 2021

Figure 2: Foreign Exchange Reserves of Pakistan

Fortunately, overseas worker's remittances have to some extension supported the Pakistani economy in balance of payments and maintenance of foreign exchange reserves. However, the magnitude of trade deficit and debt servicing has been so high that it has had been outstripping the contribution of remittances. Despite the huge inflow of foreign exchange in the form of remittances almost equivalent to exports of the country, the current account of the country has remained most of the times in deficit. Besides, the country's capital account has not been in desirable situation due to very less foreign direct investment and portfolio investment in the country amid worsening law and order situation, political instability, poor governance, energy crisis and higher cost of doing business.

The main reasons behind the depletion of foreign reserves in Pakistan mentioned in literature are burgeoning external debt servicing, import bills, capital flight, money laundering, smuggling of dollars to Afghanistan, stagnant exports, falling foreign direct investment and political instability. However, the remittances have been very supportive to stabilize foreign reserves. Therefore, the main objectives of the study is to explore:

- ✧ The impacts of remittances on foreign reserves of Pakistan.
- ✧ The effects GDP growth rate on foreign reserves of Pakistan.
- ✧ The nexus between foreign direct investment and foreign reserves of Pakistan.
- ✧ The relationship between external debt servicing and foreign reserves of Pakistan.
- ✧ The influence of exports and imports on foreign reserves of Pakistan.

. Previously, only three such studies have been conducted in case of Pakistan like (Ahmad et al., 2020), (Khan et al., 2005) and (Azeem & Khurshid, 2019). However they have used traditional econometric methods such as Dynamic OLS, Johnson Co integration and Granger causality. While, this study has used modern econometric techniques such as KPSS test for unit root and ARDL bound test for the regression analysis. Thus, this study is different from previous studies as it covers the longer time period and applies modern econometric techniques.

Rest of the study is followed by section 2 that consists on literature review containing theoretical review and empirical review and section 3 encompasses the methodology, data sources and econometric models and their relevant diagnostic and robustness checks. While the results and policy recommendations and conclusion are presented in section 4 and section 5 respectively.

Literature Review

Theoretical Framework

The literature identifies two primary theories explaining the accumulation of foreign reserves: the buffer stock theory and the monetary approach to Balance of Payments (Huang & Shen, 1999).

(a) *Buffer Stock Theory*

The buffer stock theory, introduced by Frenkel and Jovanovic (1981), pertains to strategies adopted by central banks or governments to maintain an adequate level of foreign reserves, mitigating potential risks and uncertainties associated with international trade and financial transactions. It's also known as the "precautionary demand for reserves theory," emphasizing the need to hold reserves as a precaution against volatile capital flows, such as sudden stops and reversals fows due to financial integration (Aizenman & Lee, 2007, Calvo, 1998). Additionally, the mercantilism approach suggests that holding foreign reserves can boost a country's exports and direct domestic and foreign investments towards export-oriented industries (Aizenman & Lee, 2007).

The buffer stock theory proposes that central banks accumulate foreign exchange reserves during favorable times to finance international transactions such as reverse flows, trade deficits, terms of trade deterioration, speculative runs and sudden stops of financial inflows during challenging periods. In this way, these reserves act as a buffer against fluctuations in external accounts. For instance, during the East Asian financial crisis of 1997-98, countries with substantial reserves were able to protect their currencies from significant depreciation.

(b) *Monetary Approach to Balance of Payment Theory*

The monetary approach to the balance of payment theory, developed by Robert Mundell and Marcus Fleming in the 1960s, elaborates on balance of payment transactions, exchange rates, and foreign reserve dynamics based on the quantity theory of money. According to this theory, exchange rates, trade balances, and foreign reserves are

determined by money demand and money supply. It posits that reserves increase with higher demand for aggregate money (M_3), while the opposite occurs with an increase in the supply of aggregate money.

Since a stable exchange rate is crucial for trade and economic stability, most central banks maintain stable foreign reserves to shield their currencies from large fluctuations stemming from changes in money supply and demand. This is achieved through buying or selling domestic currency through open market operations. Remittances can positively affect foreign reserves, similar to other foreign capital and financial inflows, by increasing demand for aggregate money. This can lead to exchange rate appreciation. Consequently, the country's central bank is expected to buy foreign currency from the market by increasing the money supply, thereby accumulating foreign reserves to prevent Dutch disease effects on the economy.

Conversely, remittances can have a negative impact on foreign reserves if the country suffers from Dutch disease effects. In this scenario, remittances cause appreciation of the real exchange rate due to increased demand for domestic currency, leading to reduced competitiveness in international markets. This may result in decreased foreign exchange reserves. However, excessive depreciation of the currency due to an increase in aggregate money supply may not be desirable for the economy, as it can lead to higher import prices and inflation. In such cases, the country's central bank is expected to protect its domestic currency by using foreign reserves.

Similarly, domestic currency may come under speculative attacks, especially when investors anticipate significant depreciation due to currency overvaluation. Consequently, they begin purchasing foreign currency and foreign assets, increasing the supply of domestic currency. To counteract this, the central bank is likely to intervene in the market by buying domestic currency using foreign reserves, thus protecting the currency from significant depreciation.

Furthermore, external adverse shocks and financial crises can lead to falling commodity prices and deteriorating trade balances. To mitigate these shocks, central banks step in to finance deficits using available foreign reserves.

Moreover, foreign reserves are also maintained to build confidence and credibility in a country's monetary and exchange rate policies. The knowledge that a country has sufficient foreign reserves to intervene in the market if necessary can deter speculative runs and enhance market confidence.

Additionally, foreign reserves are built up to ensure timely import payments by issuing and honoring letters of credit (LCs) and to prevent disruptions in supply chains while maintaining economic stability. Thus, the monetary approach to the BoP theory argues that maintaining an appropriate level of foreign reserves is a strategic tool for mitigating balance of payment and currency crises. By utilizing foreign reserves, countries can mitigate exchange rate fluctuations, protect against speculative attacks and defend the economy against external shocks that could otherwise disrupt economic stability. The required strategy and level of foreign reserves may vary from one country to another, depending on its specific circumstances and policy objectives.

Empirical Review

Research about the contribution of worker's remittances in economic development of capital scarce countries like Pakistan is emerging in diaspora of researchers, academicians, development economists and policy makers in order to architect desirable policies to

channelize these received funds in productive and high return oriented investment. Worker's remittances have not only exerted the substantial impacts on economic growth of Pakistan by minimizing the current account deficits and improving foreign exchange reserves but they have also helped to reduce the foreign debt needs of the country. Besides, they have also played a pivotal role in off-setting the adverse effects of oil price shocks, decreasing the unemployment rate and enhancing the living standard of recipient households in the country. There is positive impact of worker's remittances on economic growth proved by using time series data from 1972-73 to 2002-03 and applying multiple regression frameworks by (Sattar, 2005). However there is an alternative point of view that it may hinder the economic activities by discouraging the labor force participation rate and decreasing the exportable competitiveness of the country in international market through appreciation of real exchange rate due to so called "Dutch Disease" in literature (Chami et al., 2005). There are various factors that can affect the foreign exchange reserves such as external debt, foreign direct investment, external debt services, remittances, exports, imports, terms of trade exchange rate, inflation, foreign aid, trade balance, current account balance etc. Some of these factors affect foreign exchange reserves positively and some affect them negatively. Various studies have incorporated various factors in their studies and found different results. Mijiyawa (2022) found that remittances affect foreign exchange reserves negatively in low and middle income countries (LMICc) by applying system generalized method of momentum model and using panel data from 1970 to 2017. They concluded that these countries suffer from dutch disease. On the other hand, Nor et al (2008) established that there is positive long run and short run co-integration between foreign exchange reserves and GDP per capita, imports to GDP ratio, exports variability, short term debt and current account balances in Malaysia. They used ARDL model and data from 1970-2004. Positive relationship between short term external debt and foreign exchange reserves shows that Malaysia has been maintaining the foreign exchange reserves for collateral motives.

Similarly, Khan et al (2005); Ahmad et al (2020); Azeem & Khurshid (2019) found that there is negative relationship between remittances and foreign reserves by using time series econometric models.

Conversely, Mahidud et al (2021) conducted their research studies in case of Bangladesh by applying auto regressive distributed lag model (ARDL) over the time series data spanning from 1986-2019 to establish the nexus between foreign exchange reserves, remittances, trade openness and exchange rate. They found that there is long run and short run relationship between foreign exchange reserves, remittances, trade openness and exchange rate. More specifically, there is positive and significant relationship between foreign exchange reserves, remittances and trade openness. It means Bangladesh is not suffering from Dutch disease. However, the exchange rate has positive but statistically insignificant impact on foreign exchange reserves. In addition, there is unidirectional causality from remittances to reserves and bidirectional causality between trade openness and exchange rate. However, there is no granger causality between trade openness and reserves. In another study carried out by ANDRIYANI et al (2020) in case of Indonesia by using ARDL model on monthly data from January 2016 to December 2018 showed that external debt and exports positively and significantly affect the international reserves, while the exchange rate has negative and significant impact on international reserves of Indonesia. However, the impacts of inflation on foreign exchange reserves are insignificant.

In addition, Jena & Sethi (2021) also conducted the research about determinants of foreign exchange reserves in case of Brazil by applying Granger-causality, Johnson Juselius Co-integration and auto regressive distributed lag model over time series data from 1960 to 2018. They demonstrated that current account balance to GDP ratio, Per capita GDP, trade to GDP, deposit to credit ratio to private sector and real interest rate positively affect the foreign exchange reserves. While, the debt to GDP ratio negatively impacts the foreign exchange reserves of Brazil. However, the effects of exchange rate and inflation are positive and negative respectively but statistically insignificant. Moreover, according to Johnson and Juselius co-integration test, there are nine co-integration equations. Besides, the granger causality test results show that there is bidirectional causality between current account balance to foreign debt and Unidirectional causality from reserves to current account balance, from reserves to per capita GDP, from per capita GDP to current account balance, from inflation to debt, from deposit to credit to private sector to foreign debt, from real interest rate to foreign debt, from inflation to exchange rate, deposit to credit to private sector to exchange rate and from deposit to credit to private sector to inflation rate.

On the other hand, Irefin & Yaaba (2011) argued that foreign exchange reserves are mainly determined by the income level earned from oil exports and imports of Nigeria. They applied modified "Buffer Stock Model" developed by (Frenkel & Jovanovic, 1980) by adding more independent variables such as income level, monetary policy rate, imports and exchange rate. ARDL bound test results exhibited long run co-integration among the variables. However, Sanusi et al (2019) are of the view that foreign exchange reserves in south African countries are determined by capital inflows, imports, exports, exchange rate and inflation in long run. They applied Panel ARDL model over the panel data spanning over 26 years from 1990 to 2015. In short run, none of the variables are significant except exchange rate to determine the reserves holdings. They concluded that its "fear of floating" not "fear of capital" that determines the foreign exchange reserves in southern African countries. Similarly, Gereziher & Nuru (2021) concluded that foreign exchange reserves are negatively and significantly affected by inflation and exchange rate in short run in case of Ethiopia which is foreign exchange constrained economy. However, in long run, the inflation and external debt affect foreign exchange reserves positively and significantly. The effects of exchange rate on foreign exchange reserves are similar (negative and significant) in long run as well as short run. They applied ARDL model on the time series data from 1981 to 2017. Conversely, Lane & Burke (2001) emphasized that financial deepening, trade openness, size and volatility of economy also have strong association with foreign exchange reserves. They opined that small and volatile countries tend to accumulate more foreign exchange reserves as compare to large, less volatile and less indebted countries. Similarly, more open economies maintain higher reserves as compare to less open or closed economies. Contrary, more indebted developing countries are likely to have less foreign exchange reserves. It indicates that these countries maintain foreign reserves for precautionary motives.

However,there are other ways which can be utilized to bring stability in economy instead of accumulating huge foreign exchange reserves. Arslan & Cantú (2019) emphasizes that prudential macroeconomics policies and currency swaps between central Banks can be implemented instead of accumulating huge foreign exchange reserves as there is relatively higher costs of unnecessarily accumulating foreign reserves at domestic as well as global level. They pointed out that the higher reserves accumulation has played major role in

reducing the long term interest rates in United States of America so reserves bear very low return as compare to their costs in the form of opportunity costs and adjustment costs. They concluded that beside the predominantly precautionary motive, there is also major role of of goals associated with monetary policy and exchange rate policy behind the overwhelming accumulation of foreign reserves in emerging market economies.

Besides, Verma & Bhakri (2021) are of the view that foreign exchange reserves in India have been dependent on exports, foreign direct investment, exchange rate and short term and long term external debt of India. They used time series data from 1991 to 2019 and multivariate regression model to analyse the effects of these variable on foreign exchange reserves. They found that FDI, exports and external debt are positively related with foreign exchange reserves while the nominal exchange rate negatively affect the reserves of India. In other words, if Indian rupees starts depreciating against US dollar, Indian Reserve Banks starts accumulating more foreign reserves. Conversely, Khomo et al (2018) by applying Buffer stock model through ARDL model over the time series data from 1990 to 2014 of Eswatini found that GDP per capita and nominal exchange rate contribute positively in building up the foreign exchange reserves. While, Current account deficit and government spending affect negatively and significantly to foreign reserves in long run as well as short run.

From above discussion, it seems that there are various objectives behind the foreign reserves build up. The emerging developing countries and under developed countries have started to accumulate substantial level of foreign reserves; specially after 1980s and 1997-98 financial crisis to safe guard themselves against any possible expected and unexpected shocks in the form of natural disasters, oil price shock, commodity price shocks, short term external debt shocks and sudden stops of financial inflows of FDI, foreign aid, remittances etc. Moreover, there are two type of drivers of foreign reserves such as internal and external. Internal factors include Output, population, inflation, government expenditures, political stability and institutional performance. While the external factors include: foreign direct investment, exchange rate, external debt, terms of trade, remittances, foreign aid and trade openness. Researchers and academician couldn't have reached at the consensus level regarding the determinants and their impacts on foreign reserves and regarding adequacy of foreign reserves. Therefore, this study intends to identify certain factors of foreign reserves adequacy and their impacts on foreign reserve accumulation in case of Pakistan so as that appropriate policy implications may be suggested to monetary authorities for properly management of the foreign reserves of the country.

Research Methodology

Data type and Source

The annual time series data from 1976 to 2022 for relevant variables in the model will be obtained from World Development Indicators data base of the World Bank.

Tentative Models

In order to ascertain the role of remittances in determining foreign exchange reserves, the following model Equation 1 will be estimated.

$$FOREXF\ (FDI,\ EXP,\ IMP,\ WR,\ TDS,\ GDP\ ) \quad (1)$$

Econometric Model

In order to investigate the impacts of remittances on foreign reserves Equation 2 would be run.

$$FOREX = \alpha + \beta_1 FDI + \beta_2 TDS + \beta_3 WR + \beta_4 EXP + \beta_5 IMP + \beta_6 GDPG + e_t \quad (2)$$

Where: alpha and beta are the intercept and coefficients to be estimated, FOREX = foreign exchange reserves as a % of external Debt, FDI = Foreign Direct Investment as a % of GDP Exp= Exports as a percent of GDP, Imp= Imports as a % of GDP, TDS = Total External debt servicing as % of GDP, WR= workers' remittances as % GDP, and et = error term with zero mean and constant variance.

In Equation 2, foreign direct investment and exports are likely to have positive impacts on Foreign exchange reserves as more conversion of foreign currency into domestic currency will lead to pile up the forex. Total Debt servicing and imports are expected to have negative impacts on forex as they both cause more outflows. Workers' remittance may have both possibilities. it will affect forex negatively, if the country is suffering from Dutch Disease, otherwise positively. Similarly GDP is also expected to have positive impacts on forex.

Methods

Equation 2 will be estimated by applying Auto Regressive Distributive Lag Model (ARDL) bound test developed by Pesaran et al (2001) in order to ascertain long run co integration. If there exists a long run relationship between the variable, ECT and short run coefficients will also be generated in the model to find the speed of adjustment (convergence)once the economy is deviated from equilibrium position due to any shock. If ECT term is negative and statistically significant, the model is said to be stable and convergence will be materialized; otherwise divergence would be observed.

The main reason to use the ARDL model is because some of the variables are stationary at level while others are stationary at first difference. However, there is no any series that becomes stationary at second difference. Moreover, it is necessary to determine the lag length of the variable included in the model on the basis of various information criterion: such Aikaiki information criterion (AIC), Shwarzin Information criterion (SIC) etc. For this purpose the study will use Aikaiki information criterion (AIC) as it is believed to be more accurate, precision and authentic. Besides, the results of ARDL model are still unbiased and t-statistics are valid even though some of the variables have endogenity problem (Harris & Sollis, 2003; Kumar, 2010). Since, it is found through KPSS unit root test that the variables included in analysis have mixed order of integration which means some are stationary at level I(0) while others are stationary at first difference I(1). Therefore, the choice of using ARDL model is more appropriate and authentic.

Unit Root Test

However, before applying the ARDL bound test it is necessary to check the unit root of the series trough KPSS test to ensure that none of the variable is Integrated of order two I(2) because we cannot use the ARDL model if any of the series is I(2). It can be applied if the series are stationary at level I(0), stationary at first difference I(1) or mix of the two I(0) or I(1) but none of the series should be integrated of order two means stationary at second difference I(2).

ARDL Specification

The ARDL model specification for long run and short run with ECT generation for Equation 2 are as: Equation 3

$$\Delta FOREX = \beta_0 + \sum_{i=1}^{q} \beta_{1i} \Delta FOREX_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta EXP_{t-i}$$

$$\sum_{i=1}^{p} \beta_5 i \Delta IMP_{t-i} [+ \sum_{i=1}^{p} \beta_{6i} \Delta TDS_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta WR_{t-i} + \gamma_0 FOREX_{t-1} + \gamma_1 FDI_{t-1} +$$
$$\gamma_2 GDP_{t-1} + \gamma_3 EXP_{t-1} + \gamma_4 IMP_{t-1} + \gamma_5 TDS_{t-1} + \gamma_6 WR_{t-1} + \mu_t \quad ---eq(3)$$

ARDL Short run and ECT specification for Equation 2 is as: Equation 4

$$\Delta FOREX_t = \beta_0 + \sum_{i=1}^{q} \beta_{1i} \Delta FOREX_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta EXP_{t-i}$$

$$\sum_{i=1}^{p} \beta_5 i \Delta IMP_{t-i} [+ \sum_{i=1}^{p} \beta_{6i} \Delta TDS_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta WR_{t-i} + \pi_0 ECT_{t-1} + \upsilon_t \quad ---eq(4)$$

Hypothesis

Null Hypothesis: There is no long run and short run co-integration among the variables. Alternative Hypothesis: There is long run and short run co-integration among the Variables.

Decision rule

First of all, in order to check the long run relationship F statistic will be computed and applied in comparing it with critical lower and upper bound values developed by (Pesaran et.al., 2001). If calculated F-statistic is greater than upper bound value, the null hypothesis of no long run relationship will be rejected: meaning that there is long run relationship between the variables. Where as, if the F-statistics is less than lower bound value, the null hypothesis of no long run relationship can not be rejected. However, if the F statistics lies between the upper and lower bound values, the result will be inconclusive. Once the long run relationship is determined on the basis of F test, then the short run coefficients of variables and ECT, term are generated to check the short run relationship between the variable and speed of convergence (divergence) to the equilibrium; once the economy deviates from its equilibrium position due to any shock in the system. If the coefficient of ECT is negative and significant, the model is said to e stable and converging to its equilibrium position, otherwise, it will be unstable and divergent.

Results Discussion

Unit Root

Table 1 shows the unit test results of KPSS test. According to results, the foreign reserves, total external debt servicing and GDP growth rate are stationary at first differences means they integrated of order one I(1). However, the remittances, foreign direct investment, imports and exports are stationary at level which means that they are integrated of order zero I(0). Since the included variables are integrated of mix order, applying ARDL model is justified.

Long Run Coefficients and bound test results

The dependent variable here is the foreign reserves to external debt ratio and the independent variables are the remittances, foreign direct investment to GDP ratio, GDP growth rate, exports to GDP ratio, imports to GDP ratio and external debt servicing to GDP ratio. The ARDL (p,q)
= (1, 1, 1, 0, 1, 1, 0) is selected on the basis of minimum value of AIC after evaluating 64 models. The maximum lag length determined on the basis of various information criterion is one.
Table 2 shows the ARDL bound test results for long run, short run coefficients and ECT. F-statistic 7.885 is higher than upper bound values for K=6 at 1% level of significance. It implies that there is long run co integration among the dependent and independent variables. More specifically, the remittances, exports, GDP growth rate and foreign direct investment are positively and significantly contributing in building foreign exchange reserves in the long run. These results are as per expectation according to theory. They match with the findings of Mahidud et al (2021); Ahmad et al (2020); ANDRIYANI et al (2020) but are in contrast with the findings of (Khan et al., 2005; Elbadawi, 1990; Mijiyawa & Oloufade, 2022). This means that Pakistan is not suffering from the negative impacts of foreign currency inflows like remittances and foreign direct investment in the form of so called Dutch disease.

Table 1
KPSS Unit Root Test

Variable	level	1st difference	Conclusion
FOREX	0.3493*	0.1965	I(1)
	significant	insignificant	
REM	0.1871		I(0)
	insignificant		
FDI	0.2997		I(0)
	insignificant		
TDS	0.3858*	0.1318	I(1)
	significant	insignificant	
GDPG	0.4488*	0.2363	I(1)
	significant	insignificant	
IMP	0.2416		I(0)
	insignificant		
XP	0.2472		I(0)
	insignificant		

*,** & *** show the significance level at 10%, 5% and 5% respectively.

However, the imports and external debt servicing are significantly putting pressure over the foreign reserves of Pakistan leading to their time and again depletion and dwindling. These results are also as per expectations according to theory. These findings are opposite to that of the findings of (Khan et al., 2005; Elbadawi, 1990)

More specifically, Keeping other things constant, if remittances to GDP ratio increases by one point percentage, the foreign reserves to external debt ratio soars by 5.063 point percentages and vice versa.
Similarly, if exports to GDP ratio augments by one point percentage, the foreign reserves to external debt ratio will also enhance by 4.692 point percentages and vice versa.
Likewise, if GDP growth rate increases by one point percentage, the foreign reserves to external debt ratio will also augment by 1.23 point percentage and versa.
Besides, if foreign direct investment to GDP ratio goes up by one point percentage, the foreign reserves to external debt ratio will also surge by 6.36 point percentage and vice versa.
Conversely, if imports to GDP ratio increases by one point percentage, the foreign reserves will plume by 3.37 point percentage and vice versa; *cetrisperibas*. In additions, if external debt service to GDP ratio hikes by one point percentage, the foreign reserves to external debt ratio will decline by 4.996 point percentages and vice versa in long run.
So far as the short run impacts are concerned, the remittances and exports affect foreign reserves positively and significantly. However, the external debt servicing is inversely and significantly associated with foreign reserves. The GDP growth rate has positive but insignificant effects over the foreign reserves in the short run. The negative and significant ECT term implies that speed of adjustment is very strong. Almost 54.89 percent adjustment occurs in one year if the system is deviated from equilibrium level.
The Durbin Watson value of 1.997 guarantees that there is no any auto correlation problem in the model. R-square and adjusted R square's respective values show that dependent variable is explained by 70% and 67% respectively by the independent variables included in the model.

Table 2
ARDL long run, short run and ECT coefficients

Long-Run results Variable	Coefficient	Probability	Short Run results and ECT Variable	Coefficient	Probability
REM	5.06348*	0	D(REM)	4.314718*	0
XP	4.62935*	0	D(XP)	1.873052*	0.0002
IMP	-3.373038*	0.0001	D(GDPG)	0.157859	0.411
GDPG	1.239658***	0.074	D(TDS)	-1.142801**	0.0511
TDS	-4.99654*	0.0001			
FDI	6.360969*	0.0011			
F-statistic	7.885884				
k	6		ECT	-0.548979*	0
R-squared	0.700485				
Adjusted R-squared	0.671264		DW	1.997643	

*, ** and *** indicate significance level at 1%, 5% and 10% respectively.

Post Estimation Diagnostic, Validity and Reliability Tests

The results of post estimation diagnostic, validity, reliability and model specification are presented in Table 3. The probability of JB statistic is greater than 5% level of significance. It implies that the residuals are normally distributed. Moreover, the probability value of F-

statistics for BG LM test is also insignificant; indicating that error terms are free from the serial correlation issues. Likewise, the probability values of BPG hetroscedasticity test is greater than 5% level of significance. It also indicates that the error terms are not suffering from hetroscedasticity problems. Similarly, the insignificant F statistic of Ramsey model specification demonstrates that model is correctly specified. The CUSUME and CUSUME square in Figure 4.3 and Figure 4.4 respectively show that the model is stable at 5% level of significance. They show that there are no any structural breaks in the model as the blue lines are with in boundaries of red lines.

Table 3
Reliability and Validity Test

Test	JB- Statistic	Probability	F-Statistic	Probability
Normality JB	4.109776	0.128107	NA	NA
Serial correlation BG LM	NA		1.350816	0.273
Hetroscedasticity BPG	NA		1.129557	0.37
Model specification Ramsey	NA		1.081720	0.3057

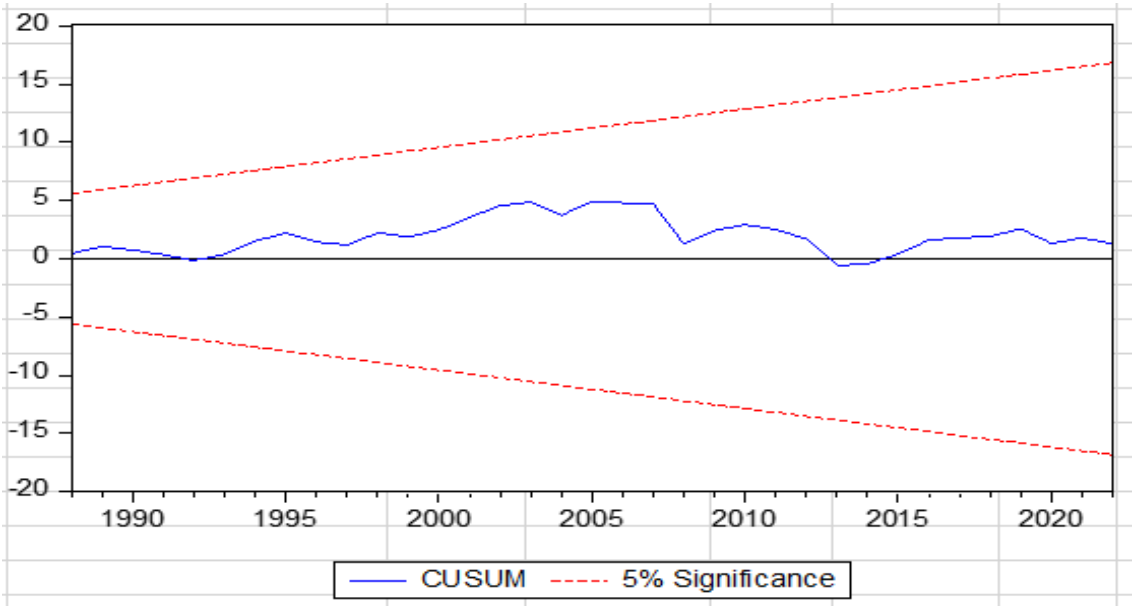

Figure 4.3: CUSUM

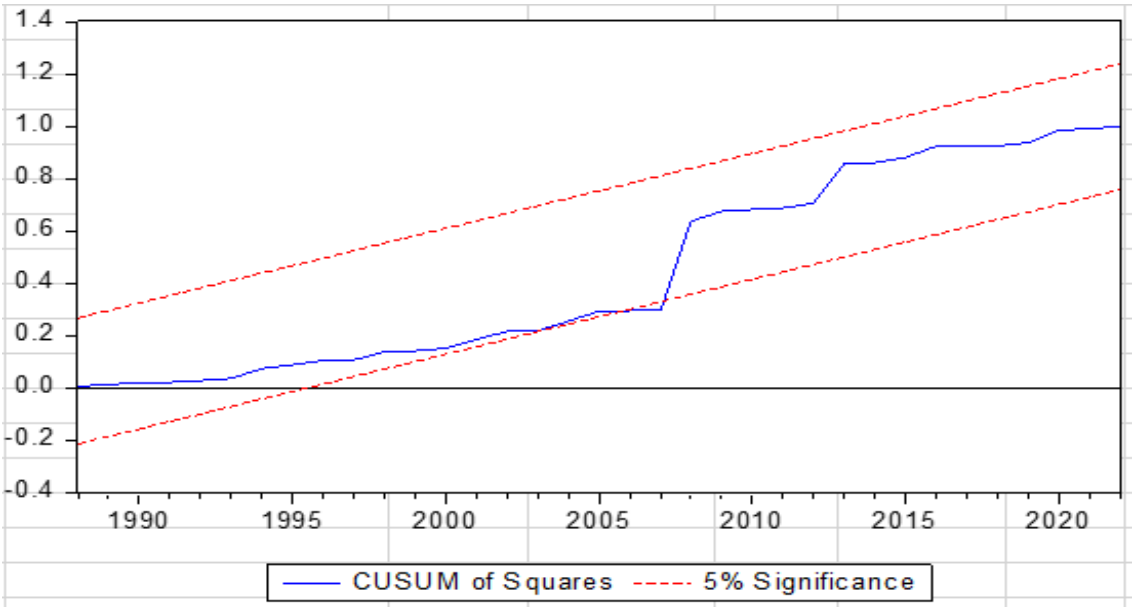

Figure 4.4: CUSUM square

Policy Recommendation and Contribution of the Study

Policy Recommendation

The main objective of this study was to ascertain the impacts of workers' remittances and some other control variables on foreign reserves of Pakistan from 1976 to 2022 so as to offer appropriate policy recommendation to architect the timely, suitable and viable policy to use the remittance for maintaining foreign reserves and decrease the dependence on external borrowing of the country. On the basis of our findings, it is recommended that Government should focus on enhancing exports and containing imports of luxurious products by increased productivity of input factors such as land, labor and capital. This can be done by prioritizing the human capital formation by imparting quality education, health services and skill development training to youth along with developing the culture of research and development in the educational and research institutions. Besides, Government should endeavour to minimize the external debt servicing burden by negotiating with international creditors to reschedule and restructure her external debt liabilities. Moreover, there is drastic need to appropriately manage the foreign reserves through non debt creating financial inflows such as foreign direct investment, portfolio investment, workers' remittances and ODA grants. For this, the country needs to improve the law and order situation, political stability and performance of the institutions. Ministry of labor force and overseas employment needs to improve the performance of overseas Pakistanis foundation and emigration bureau. They should be given the targets to develop appropriate investment projects for the overseas workers to effectively utilize the received funds in productive manner. The Government needs to devise such policies that offer incentives to emigrants; directing them to send funds through formal channels and invest them in high return oriented projects.

This study concludes that workers' remittances, foreign direct investment, GDP and exports are significantly contributing factors in building foreign reserves. While imports and external debt servicing are depleting factors of foreign reserves in Pakistan in long run. Negative relationship of foreign reserves with imports and external debt servicing suggests that the foreign reserves in Pakistan are maintained for the precautionary motive. Moreover, the positive relationship between foreign reserves, workers remittances, GDP and exports indicate that Pakistan is not suffering from Dutch disease. Therefore the country should strive

to augment the export earnings, remittances inflows through formal channel and foreign direct investment improving political stability, law and order situation and energy crisis.

Contribution of the Study

This study holds significant importance in augmenting the existing knowledge in this domain, being the first of its kind conducted in Pakistan using the distinctive methodology. Furthermore, it stands to serve as a guideline for policymakers in crafting strategies aimed at revitalizing the Pakistani economy in specific and potentially similar nations in general. Moreover, it is likely to stimulate further research avenues in diverse contexts by various researchers and research organizations.

The conclusions drawn from our study can serve as valuable guidance for policymakers, implementer and practitioners in formulating effective and efficient strategies for managing foreign workers and their remittances, foreign reserves, and overall economic affairs in Pakistan. Additionally, academics, students, and future researchers in this field can leverage these findings to enhance the effectiveness of their responsibilities and services.

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