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The Major Determinants Of Foreign Exchange Reserve: The Promise And Perils Of Pakistan Economic Crises

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Abstract

The focus of this study is to examine the relationship between foreign exchange rate, external debt, export, inflations and foreign exchange reserve in the context of Pakistan economic crises. The data was taken over the period from 1999 to 2022. The comprehensive time series methodology was used such as fully modified ordinary least squares, dynamic ordinary least squares, canonical cointegrating regression and Johansen cointegration was used for this study analysis. All the models used for the analysis shows robust relationship between dependent variable and independent variables. The outcomes reveal an inverse relationship between the foreign exchange rate and foreign exchange reserves. Both the fully modified ordinary least squares and canonical cointegrating regression models propose a negative correlation between external debt and foreign exchange reserves. Conversely, the dynamic ordinary least squares model indicates a positive connection between external debt and foreign exchange reserves. Furthermore, the results demonstrate a positive association between a country exports and its foreign exchange reserves. The analysis also validates that an increase in domestic inflation is correlated with a reduction in foreign exchange reserves. The results of the Johansen cointegration shows two vectors at 5% significant level cointegration between foreign exchange reserve and rest of the independent variables. [1]The distinctions revealed by different models underscore the complexity of these relationships, emphasizing the need for comprehensive policy measures. Finally, it is essential for the government to consistently oversee crucial indicators and be prepared to adjust policies in response to evolving circumstances. This may require periodic revaluation of exchange rate policies, debt management strategies, and export promotion initiatives in alignment with shifting economic conditions.

Keywords: *Foreign exchange reserve; foreign exchange rate, external debt; inflation; FMOLS.*

Introduction

Researchers, policymakers, and academics are well aware of the funding difficulties faced by least developed nations. There is a common understanding that these countries lack sufficient resources to establish essential infrastructure, which is crucial for fostering capital accumulation and ensuring sustained economic growth and development (Rahaj, 2018; Saheed et al., 2015; Kabede et al., 2023). In 2008, low-and-middle income countries

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had a combined external debt of about US$3.5 trillion. By 2018, after a decade, this figure had surged, exceeding US$7.8 trillion (World Bank 2019a). The rise in external debt comes at a time when emerging and developing economies face heightened vulnerabilities compared to before the onset of the fourth debt wave in 2010. Currently, 75 percent of these economies grapple with budget deficits. Additionally, there has been a notable increase in foreign currency-denominated corporate debt, and their current account deficits have expanded to four times the size observed in 2007 (Kose et al. 2020).

Foreign exchange reserves have garnered significant attention from various scholars, in recent decades (Park and Estrada, 2009; IMF, 2011; Ghosh et al. 2012 and Akdogan, 2020). The focus has been on understanding the quantity, determination, complementarity, and causal connections between foreign exchange reserves and other macroeconomic variables. This heightened scrutiny is justified by the observation that the accumulation of foreign reserves by select emerging countries has disrupted the global economic balance (Fukuda and Kon, 2012). Consequently, monetarists advocate for intervention through diverse monetary policy tools to effectively oversee a country accumulation of foreign exchange reserves. By February 2023, Pakistan's foreign reserves had dropped to a historic low of US$ 3.19 billion, covering just two weeks of imports and well below the IMF's recommended three-month buffer. Amid political volatility, Pakistan must repay a hefty US$ 73 billion debt by 2025, with a significant US$ 126 billion owed mainly to China and Saudi Arabia (Bhowmick, 2023).

In this context, foreign exchange reserves emerge as a critical indicator of Pakistan's capacity to meet its international obligations, stabilize its currency, and safeguard against external vulnerabilities. Pakistan's economy has been marred by a series of crises, characterized by fiscal imbalances, high inflation, dwindling foreign exchange reserves, and mounting external debt (IMF, 2022). These crises have often necessitated external financial assistance and adjustment programs, highlighting the significance of robust foreign exchange reserves as a barrier against external shocks. However, the accumulation and maintenance of adequate reserves require a careful consideration of various determinants, including exports, external debt, and exchange rate dynamics (Rana, 2023). The increase in economic growth serves as a barometer of a country overall development and prosperity, reflecting increases in production, income, and standards of living. Meanwhile, emerging and developing economies were anticipated to experience a 2.5 percent contraction in GDP for 2020, registering their weakest economic performance since 1960 (World Bank 2020).

The relationship between external debt, and foreign exchange reserves is a critical aspect of macroeconomic management and policy formulation for nations across the globe. However, the pursuit of economic growth often necessitates external borrowing to finance investments in infrastructure, technology, and human capital (Kebede et al., 2023). Over the years, the external debt burden of numerous nations has grown significantly. The annual accrual of debt is a prevalent feature observed in developing countries during the initial phases of their economic advancement (Martin, 2009; Beyene and Kotosz, 2020). External debt emerges as a crucial source of growth for developing countries in Asia. This indebtedness serves as a vital means for the government to address fiscal budget gaps by injecting fresh funds. Subsequently, the government can boost household consumption, thereby fostering economic growth (Lau et al. 2022; Harsono et al. 2023).

External debt has been a prominent feature of Pakistan's economic landscape, serving as a source of financing for development projects, infrastructure upgrades, and budgetary support. While external borrowing can facilitate immediate investments and bridge fiscal gaps (GoP, 2022). It also poses significant risks, including debt servicing burdens, vulnerability to external shocks, and potential creditworthiness concerns. The management of Pakistan external debt portfolio, therefore, becomes crucial in maintaining fiscal

discipline, ensuring debt sustainability, and preserving macroeconomic stability (IMF, 2023).

Pakistan is grappling with the challenge of escalating external debt, which now stands at 41.0% of its nominal GDP, as indicated by the World Bank Development Indicators. This total external debt comprises obligations owed by the country to foreign entities, encompassing both public and publicly guaranteed long-term debts, non-guaranteed long-term debts, and utilization of IMF credit, along with short-term debts (WDI, 2020). In the fourth quarter of 2021, Pakistan's external debt rose to $130,642 million, up from $127,023 million recorded in the first quarter of the same year, marking an increase of 2.84% (GOP, 2021). Therefore, excessive reliance on external borrowing can strain a nation's fiscal position and erode investor confidence, potentially leading to debt crises and macroeconomic instability. The relationship between a country foreign exchange rate and its foreign exchange reserves is a fundamental aspect of economy (Akdogan, 2020). The foreign exchange rate, determined by market forces or managed by monetary authorities, plays a pivotal role in shaping a nation trade competitiveness, capital flows, and overall economic stability. Fluctuations in the exchange rate can have profound implications for a country's external position, affecting its trade balance, investment inflows, and external debt dynamics (Castillo, 2002; Nguyen and Do, 2020)

In the interconnected global economy, elements like foreign exchange rates and reserves are crucial for ensuring economic stability, especially for smaller open economies like Pakistan. The ebb and flow of these indicators can directly influence the profit margins of enterprises, multinational firms included, and shape supply chain dynamics and inflation patterns. Over recent years, Pakistan has experienced notable currency devaluations, which have had a pronounced impact on its foreign exchange reserves. As a result, changes in these reserves often parallel the inflation trends observed within the nation (Chaudhry et al., 2011)

Review of Literature

Limited empirical studies have explored the relationship between foreign exchange reserves and independent variables in the study. In this context, Narayan and Smyth (2006) investigated the enduring and immediate connections between the exchange rate and foreign exchange reserves in China. Their findings revealed a substantial and positive impact of the real exchange rate on foreign exchange reserves over the long term. However, in the short term, there was an absence of a consistent relationship between the real exchange rate and foreign exchange reserves. Similarly, Cifarelli and Paladino (2008) illustrated that the exchange rate exerts a positive impact on the surplus demand for foreign exchange reserves. Hoshikawa (2012) examined the determinants of Japan exchange rate in the context of foreign exchange reserve. More precisely, his research focused on scrutinizing the enduring association between the yen/dollar exchange rate and international reserves.

The study performed by Senibi et al. (2016) focusing on Nigeria explored the impact of public debt on foreign exchange reserves from 1981 to 2013. The author found that there is positive and statistically significant relationship between these two variables. However, in contrast, Peter and Dumani (2020), utilizing an error correction model with data spanning from 1981 to 2018, found that foreign debt stock exerted a negative and statistically significant impact on Nigeria's foreign exchange reserves portfolios. These varied results underscore the complexity of the relationship between public debt and foreign exchange reserves, emphasizing the need for context-specific analyses and careful consideration of economic conditions and policies. An investigation into the causal connections between foreign debt, foreign exchange reserves, and economic growth in Bangladesh determined that, according to the Granger-causality results, a unidirectional causation exists from foreign debt to foreign exchange reserves (Shariful et al., 2018).

The presence of foreign exchange reserves serves as a crucial indicator for assessing a country's capacity to engage in international trade and reflects the underlying strength (Purnamawati & Fatmawati 2013). Accumulating empirical evidence indicates that the buildup of foreign exchange reserves plays a role in fostering economic growth in developing economies. Furthermore, it is suggested that, at a specific stage of development, trade protection and exchange rate protectionism can serve as interchangeable approaches, both capable of yielding positive outcomes for promoting growth (Polterovich and Popov, 2002).
A nation primarily maintains foreign exchange reserves to fund global commitments and mitigate unforeseen international payment challenges, such as those arising from the activities of international speculators. Various factors, including export and import activities, contribute to determining the volume of foreign exchange reserves (Juniantara, 2011).

In the similar vein of study, Chaudhry et al. (2011) study the foreign exchange reserve and inflation relationship in the case of Pakistan. The authors of the used ARDL techniques to examined the long-term relationship between the variables under consideration. The authors found that elevation in the foreign exchange reserve cause depression in the inflation. In a study by Zhou (2014) focusing on the People's Republic of China and utilizing monthly data from January 2008 to December 2011. The author of the study found that the growth of China's foreign exchange reserves is associated with an elevation in the consumer price index. This influence extends to monetary policy, as the expansion of foreign exchange reserves contributes to an increase in the money supply. The theory asserts that an unmitigated increase in reserves, without thorough sterilization, leads to a growth in the monetary base. When combined with the money multiplier, this expansion of the overall money supply can trigger inflation. Steiner (2017) empirically observed that Heller's global inflation model does not hold true in the context of floating exchange rates. Steiner (2009, 2010, 2017) extensively examined the theoretical foundations and empirical evidence concerning the relationship between inflation and reserves, particularly in the context of stability concerns. Steiner's substantial influence in this field is pivotal, and this study stands as a testament to its significance.

Research on various Asian and East Asian economies (Lin & Wang, 2005) and specifically on Vietnam (Phung Nguyen et al., 2019) attributes to Steiner's model, which incorporates Heller's engagement with the Quantity Theory of Money (QTM). African economies, in a general sense, have adopted measures to accumulate funds as a defensive strategy, serving as a robust safeguard during global economic downturns when international crisis management is either weak or absent (Akpan, 2016; Drama, 2016). Empirical studies using autoregressive distributed lag (ARDL) measures have been conducted for Pakistan (Chaudhry et al., 2011), Tunisia (Bellamy, 2014), and Nigeria (Akpan, 2016).

Methodology

In this study the specification of the variables and data sources are presented in Table 1. This study uses the time series data of Pakistan over the period from 1999 to 2022. The foreign exchange reserve and foreign exchange rate data were collected from state bank of Pakistan (SBP) (SBP, 2023). However, the rest of the variables data were collected from Word Development Indicators (WDI) (World Bank, 2023). The foreign exchange reserve is measured in million US dollar. The GDP per capita is measured in constant 2015 US dollar. The external debt is taken in US dollar. The foreign exchange rate is taken in local currency unit per US dollar. The export of goods and services is taken in constant 2015 US dollar. The inflation is taken in consumer prices of annual percentage.

Table 1 Specification of the variables and data sources

Variables Code	Variables	Unit of the variables	Sources of data

FER	Foreign exchange reserve	Million US$	SBP
FGR	Foreign exchange rate	LCU per US$	WDI
EXD	External debt	US$	SBP
EXP	Export	Constant 2015 US$	WDI
INF	Inflation	Consumer prices (annual %)	WDI

Source: Author Compilation

In this study, we develop an econometric framework based on the methodologies outlined in (Tang and Tan, 2013; Merlin and Chen, 2021). We expand upon their model by integrating additional factors, namely foreign exchange reserves, external debt, foreign exchange rates, exports of goods and services, and inflation. Equation (1) delineates the econometric structure utilized in our investigation.

$$\mathrm{FER} = \mathrm{f}(\mathrm{FGR}, \mathrm{EXD}, \mathrm{EXP}, \mathrm{INF}) \quad (1)$$

We convert Equation (1) into its logarithmic form to facilitate time series analysis, as illustrated below.

$$\ln\mathrm{FER}_t = \beta_0 + \beta_1 \ln\mathrm{FGR}_t + \beta_2 \ln\mathrm{EXD}_t + \beta_3 \ln\mathrm{EXP}_t + \beta_4 \ln\mathrm{INF}_t + \epsilon_t \quad (2)$$

In this context, "Ln" denotes the natural logarithm, with "β" representing the coefficient value. The time series, spanning 23 years from 1999 to 2022, is denoted by "t." The term "ε_t" signifies the stochastic error component.

This research employed two primary estimation techniques. The Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) methods. The FMOLS method, initially formulated by Pedroni (2000), is a residual-based approach known for yielding efficient outcomes with cointegrated variables. Notably, FMOLS is often preferred for smaller sample sizes as it addresses issues of endogeneity and serial correlation among variables, as highlighted by Hamit-Haggar, (Hamit-Haggar, 2011). Conversely, the DOLS technique, introduced by Stock and Watson (1993), is recognized for producing superior results compared to FMOLS and effectively mitigates correlation among regressors, as noted by Kao and Chiang (2000).

Additionally, we adopted Canonical Cointegrating Regression (CCR) as a robust estimation method to corroborate the findings derived from FMOLS and DOLS. Figure 3 delineates the methodological framework employed in this study. The initial phase involved conducting a unit root test to ascertain the stationarity of the data under examination. Subsequently, a cointegration test was executed to determine the long-term associations among the variables. In the ensuing step, both FMOLS and DOLS techniques were employed to scrutinize the impact of various determinants on foreign exchange reserve.

Results

The presented Table 2 provides statistical summary measures and correlations for the variables such as foreign exchange reserve, foreign exchange rate, external debt, export and inflation of the Pakistan, covering the period from 1999 to 2022. In the upper section of Table 2, presents the statistical summary for each variable. Descriptive statistics play a crucial role in delineating the essential features of the data. Skewness, which gauges the concentration of data points around the mean. the negative skewness in foreign exchange rate and external debt a skewness toward lower values. kurtosis measures the tails of the distribution. high kurtosis in external debt suggests heavy tails. The Jarque-Bera test evaluates the normality of the data, indicating that all the variables in the dataset follow a normal distribution. The lower section of Table 2 illustrates the statistical summary, which are statistical measures quantifying the degree to which two variables exhibit simultaneous changes. Essentially, these coefficients offer insights into the relationships between pairs

of variables, helping to characterize the extent to which they are associated with each other. The foreign exchange reserve has strong positive correlation with eexports and moderate positive correlation with foreign exchange rate. However, foreign exchange reserve has moderate positive correlation with inflation.

Table 2. Statistical summary and correlation analysis

	LnFER	LnFGR	LnEXD	LnEXP	LnINF
Mean	4.46	9.38	24.21	24.07	1.95
Median	4.45	9.57	24.79	24.15	2.03
Maximum	5.32	10.10	25.59	24.52	3.01
Minimum	3.90	7.59	11.75	23.26	0.93
Std. Dev.	0.40	0.67	2.69	0.32	0.60
Skewness	0.49	-1.62	-4.39	-1.11	-0.03
Kurtosis	2.24	4.65	20.91	3.58	2.04
Jarque-Bera	1.52	13.23	397.80	5.25	0.92
Probability	0.47	0.00	0.00	0.07	0.63
Sum	107.11	225.00	581.15	577.58	46.72
Sum Sq. Dev.	3.67	10.45	166.59	2.35	8.20
Observations	24	24	24	24	24
Correlation					
LnFER	1.00	0.62	-0.31	0.79	0.37
LnFGR	0.62	1.00	0.03	0.90	0.36
LnEXD	-0.31	0.03	1.00	-0.18	-0.33
LnEXP	0.79	0.90	-0.18	1.00	0.60
LnINF	0.37	0.36	-0.33	0.60	1.00

Source: Author (s) computation

In our research, we initially focused on examining the stationarity of the data. Time series data often exhibit trends or non-stationary characteristics. Dealing with non-stationary data poses a challenge because traditional ordinary least squares (OLS) techniques may produce misleading results, a phenomenon known as spurious regression (Granger and Newbold, 1974). Therefore, it is crucial to investigate the stationarity of the data. To achieve this, we employed a unit root test. A time series dataset is considered stationary when its mean, variance, and covariance remain consistent over time. We utilized both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test to examine each series for the presence of a unit root Table 3, which indicates non-stationarity. Both the ADF and PP tests are widely recognized methodologies for formally assessing stationarity.

Table 3 Unit root tests

	ADF			PP		
Variables	Intercept	Difference	Integration	Intercept	Difference	Integration
LnFER	-0.88(0.94)	-4.87(0.00)*	I(1)	1.72(0.99)	-2.99(0.05)**	I(1)
LnFGR	-4.70(0.20)	-3.83((0.00)*	I(1)	-5.54(0.21)	-3.03(0.00)*	I(1)
LnEXD	-1.46(0.81)	0.27(0.00)*	I(1)	-2.01(0.27)	-2.7(0.04)**	I(1)
LnEXP	-3.02(0.14)	-4.11(0.00)*	I(1)	-3.13(0.34)	-4.10(0.00)*	I(1)

LnINF	-1.59(0.46)	-4.87(0.00)*	I(1)	-1.59(0.46)	-4.87(0.00)*	I(1)

Source: Author (s) computation

The Table 4 provided output presents the results of a Fully Modified Least Squares (FMOLS) regression analysis with the dependent variable foreign exchange reserve and several independent variables such as external debt, foreign exchange rate, export, and inflation. The FMOLS method is particularly useful when dealing with non-stationary time series data, as it provides efficient estimates by accounting for potential endogeneity and autocorrelation issues. The results of FMOLS model shows that foreign exchange rate has negative relationship with foreign exchange reserve. Results suggests that a 1% increase in foreign exchange rate the foreign exchange reserve is expected to decrease by 0.60%, holding other variables constant. This relationship is statistically significant at the 5% level. The variable external debt does not have a statistically significant relationship with foreign exchange reserve at conventional significance levels ($p = 0.57$). This suggests that changes in external debt may not be reliably associated with changes in foreign exchange reserve when other variables are considered. This relationship is statistically significant at the 1% level. This suggests that 1% increase in external debt decrease foreign reserve by 1%. The export has positive association with the foreign exchange reserve. This suggest that 1% increase in export has 2.69% increase in foreign exchange reserve, all else being equal. The inflation has negative relationship with foreign exchange reserve and statistically significant at the 1% level. This result suggest that 1% increase inflations correspond to decrease 0.43% foreign exchange reserve, holding other variables constant. The R-squared value of FMOLS models is 0.75 indicates that approximately 75% of the variability in foreign exchange reserve is explained by the independent variables included in the model.

Table 4 Fully Modified Least Squares (FMOLS)

Dependent Variable: LNFRESE				
Method: Fully Modified Least Squares (FMOLS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFGR	-0.60	0.23	-2.61	0.01**
LNED	-0.01	0.02	-0.56	0.57
LNEXP	2.69	0.58	4.62	0.00*
LNINF	-0.43	0.13	-3.18	0.00*
C	-53.48	12.11	-4.41	0.00*
R-squared	0.75			

Source: Author (s) computation

The provided output displays the results of a Dynamic Least Squares (DOLS) regression analysis, which is a method used for estimating the relationships between variables in the context of cointegrated time series. DOLS is particularly suited for situations where variables are integrated and exhibit long-run relationships. The coefficient of foreign exchange rate is significant at a 1% significance level. A 1% increase in foreign exchange rate is associated with a decrease of approximately 0.13% in foreign exchange reserve, holding other variables constant. The relationship between external debt and foreign exchange reserve is highly significant with a 1% significance level. Further, the coefficient for external debt is 0.79, indicating that a 1% change in external debt is associated with an increase of approximately 0.79% in foreign exchange reserve, all else being equal. An increase of 1% in export corresponds to an increase of approximately 41% in foreign exchange reserve, holding other variables constant. This relationship is statistically significant at the 1% level. The coefficient suggests that a 1% increase in inflation is associated with a decrease of approximately 5% foreign exchange reserve, all else being equal. This relationship is significant at the 5% level. The DOLS model seems to fit the

data well as high R^2, and the coefficients of the independent variables are statistically significant.

Dependent Variable: LNFRESE				
Method: Dynamic Least Squares (DOLS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFGR	-0.13	0.02	-5.66	0.00***
LNED	0.79	0.01	50.47	0.00**
LNEXP	0.41	0.07	5.85	0.00***
LNINF	-0.05	0.01	-4.41	0.01**
C	-23.90	1.16	-20.46	0.00***
R-squared	0.99			

Source: Author (s) computation

Next, we have performed Canonical Cointegrating Regression (CCR) model which as a robust estimation technique. The foreign exchange rate has negative and statistically significant relationship with foreign exchange reserve. This means that 1% increase in foreign exchange rate would decrease of 48% foreign exchange reserve in the country. The external debt variable and foreign exchange reserve are statistically significant but have negative relationship. This result suggests that 1% in increase in external debt decrease foreign exchange reserve by 47%.

Further, export variable in the study has positive and highly significant impact on foreign exchange reserve. This suggest that 1% increase in export would enhance approximately 2.33% foreign exchange reserve. The inflation variable is negatively associated with the foreign exchange reserve. This suggest that 1% increase in inflation would decrease 26% foreign exchange reserve. Moreover, The R^2 value CCR model explains a considerable portion of the variance in foreign exchange reserve.

Dependent Variable: LNFRESE				
Method: Canonical Cointegrating Regression (CCR)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFGR	-0.47	0.25	-1.86	0.07*
LNED	-1.00	0.45	-2.19	0.04**
LNEXP	2.32	0.65	3.57	0.00***
LNINF	-0.26	0.16	-1.55	0.13
C	-21.79	20.41	-1.06	0.29
R-squared	49.39	Mean dependent var		4.487131
Adjusted R-squared	-60.59	S.D. dependent var		0.389638
S.E. of regression	3.058044	Sum squared resid		168.3294
Long-run variance	0.076942			

Source: Author (s) computation

Table 6 shows the results of a Johansen cointegration test, which helps determine the number of cointegrating equations in a system. This cointegration test is often used in time series analysis, particularly for assessing the long-run relationships between variables. The long run relationship for the both the Trace test and the Maximum Eigenvalue test, indicate that two cointegrating equation exists at 1% level of significance. Consequently, the study analysis rejecting the null hypothesis and accepting the alternative hypothesis. Therefore, we conclude that there is long relationship between foreign exchange reserve and rest of the independent variables.

Table 6 Johansen Cointegration Test

Trace				
Hypothesized		Trace	0.05	

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.88	111.24	69.81	0.00*
At most 1	0.80	63.12	47.85	0.00*
At most 2	0.53	27.17	29.79	0.09
At most 3	0.31	10.24	15.49	0.26
Maximum Eigenvalue				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.88	48.12	33.87	0.00**
At most 1	0.80	35.95	27.58	0.00**
At most 2	0.53	16.92	21.13	0.17
At most 3	0.31	8.34	14.26	0.34

Source: Author (s) computation

Discussions

The results present that foreign exchange rate has negative association with the foreign exchange reserve. This means that with the increase of foreign exchange rate the foreign exchange reserve decrease. This result is similar to the study performed by Akdogan (2020). The observed negative connection between the foreign exchange rate and foreign exchange reserves suggests that as the value of the national currency decreases, the level of foreign exchange reserves tends to increase. This may be indicative of efforts to stabilize the currency or build a barrier against economic uncertainties associated with currency fluctuations.

The FMOLS model results and CCR model conclude that external debt has negative linkages with foreign exchange reserve. Conversely, DMOLS model conclude that external debit has positive relationship with foreign exchange reserve. Our finding is in line with the result of Kebede et al. (2023); their study also found that external debit has positive impact on foreign exchange reserve. The result of our study has been supported by Juniantara, 2011, who argued that various factors, including export and import activities, contribute to determining the volume of foreign exchange reserves. Countries may face difficulties in managing international payments and meeting financial obligations, potentially leading to a decrease in foreign exchange reserves. This implies that, in certain circumstances, external debt may contribute positively to the accumulation of foreign exchange reserves. Understanding the specific conditions and factors driving this relationship would require further exploration. Further, result shows that export of the country has positive relationship with the foreign exchange reserve. This suggest that export is the key determinants for accumulation of foreign exchange reserves of a country's capacity (Purnamawati & Fatmawati 2013). Moreover, acumulating foreign exchange reserves plays a role in fostering economic growth in developing economies. Therefore, trade protection and exchange rate protectionism can serve as interchangeable approaches (Polterovich and Popov, 2002). The positive link identified between a country's exports and its foreign exchange reserves aligns with the conventional wisdom that successful export activities contribute to a favourable balance of payments, potentially leading to increased reserves. This finding underscores the importance of a robust export sector in supporting a country's external financial position.

Result of the analysis confirmed that with the increase of inflation in the country the foreign exchange reserve would be decrease. However, our result is not corroborated with the findings of Herve (2016). Moreover, inflation can lead to a decrease in the real value of foreign exchange reserves, the specific impact depends on the broader economic context and the actions taken by policymakers, including central banks, to manage the effects of inflation on the country's currency and trade balance. The confirmation that an increase in inflation correlates with a decrease in foreign exchange reserves highlights the challenges posed by inflationary pressures on a nation's economic stability. Inflation may erode the

real value of reserves and impact the overall economic health, necessitating careful monetary and fiscal policies to maintain adequate reserves.

Conclusions

The focus of this study is to conduct the determinants of foreign exchange reserve in the context of Pakistan economic crises. The data was taken over the period from 1999 to 2022. The FMOLS, DOLS, CCR regression and Johansen cointegration was used for this study analysis. All the models used for the analysis shows robust relationship between dependent variable and independent variables. The results of the Johansen cointegration shows two vectors at 5% significant level cointegration between foreign exchange reserve and rest of the independent variables. The results indicate a negative link between the foreign exchange rate and foreign exchange reserves. Both the FMOLS and CCR models suggest that external debt is negatively associated with foreign exchange reserves. In contrast, the DMOLS model implies a positive relationship between external debt and foreign exchange reserves. Additionally, the findings reveal a positive link between the country's exports and its foreign exchange reserves. The analysis further confirms that an escalation in inflation within the country is linked to a decrease in foreign exchange reserves.

The results of the analysis shed light on various dynamics influencing a country's foreign exchange reserves. The distinctions revealed by different models underscore the complexity of these relationships, emphasizing the need for comprehensive policy measures that consider multiple factors, including exchange rates, external debt, export performance, and inflation, in managing and optimizing foreign exchange reserves.

Based on the finding the study some policy implication emerged. The policymakers may need to consider strategies to stabilize or enhance the value of the national currency. This could involve measures to address factors contributing to currency depreciation and enhance exchange rate stability. Further, policymakers may prioritize initiatives that promote and support the growth of the country's export sector. This could include trade facilitation measures, export promotion policies, and efforts to enhance the competitiveness of domestic industries in the global market. Moreover, policymakers may need to adopt prudent monetary policies, such as interest rate adjustments and fiscal measures, to manage inflation and preserve the real value of reserves. The government should adopt a comprehensive and integrated approach. This involves balancing the objectives of exchange rate stability, external debt management, export promotion, and inflation control to ensure overall economic resilience. Lastly, government should regularly monitor key indicators and be ready to adapt policies as circumstances evolve. This could involve periodic reassessment of exchange rate policies, debt management strategies, and export promotion initiatives based on changing economic conditions.

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