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A Systematic Review of Exchange Rate Studies in the Context of Pakistan

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ABSTRACT

The exchange rate is a crucial indicator of a nation's performance in the external sector and influences key macroeconomic variables. In theory, exchange rates should be determined by market forces and reflect economic fundamentals; however, developing economies such as Pakistan often experience significant deviations due to structural weaknesses and policy interventions. This paper reviews the literature on the exchange rate in Pakistan, classifying and summarising the findings on nominal exchange rates, real exchange rates, real effective exchange rates, and foreign exchange market pressures. This review provides a comprehensive understanding of exchange rate policy in Pakistan and its economic implications. The paper concludes by identifying gaps in current research and suggesting areas of future study to address the complexities of exchange rate management in developing economies.

Keywords: Exchange Rate, Overvaluation, Exchange Rate Determinants, Nominal Exchange Rate, Real Exchange Rate, Real effective Exchange Rate.

1. INTRODUCTION

The exchange rate is a key indicator of a nation's relative success in the external sector. In a flexible exchange rate system, an appreciation of the currency suggests better performance compared to competitors, while depreciation indicates the opposite. The exchange rate policy is central to economic policy, directly and indirectly impacting macroeconomic indicators such as export growth, resource allocation, consumption patterns, foreign investment, and employment (Edwards, 1989).

Ideally, the exchange rate should be determined by market forces and reflect the actual economic conditions. However, this is often not the case due to the complex interplay of numerous factors. Central banks frequently influence exchange rate policy to align with the political motives of ruling regimes, even if the declared policy is a flexible exchange rate regime (Akthar, 2019). Developing economies, particularly vulnerable to external shocks, often struggle with overvalued currencies due to low foreign exchange reserves and structural imbalances. This overvaluation can lead to unsustainable economic conditions, culminating in exchange rate crises, capital flight, and economic instability (Boorman, et al. 2000).

Pakistan's exchange rate history reflects these challenges. It is characterised by persistent government intervention, resulting in deviations from equilibrium levels. Since the early 1980s, the country has transitioned from a fixed to a managed float and, eventually, a market-based regime (see Figure 1). However, the State Bank's continuous intervention to maintain an overvalued exchange rate has depleted foreign exchange reserves (Figure 2), even during periods of apparently market-determined exchange rates. This overvaluation is evident in the persistent premium of the parallel market exchange rate over the official rate, particularly during periods of dual exchange rate regimes (1999, 2003-2008, and 2013-2017) as depicted in Figure 3. The parallel market rate, unaffected by government intervention, serves as a benchmark for the true value of the currency.

Fig. 1. Exchange Rate Regime
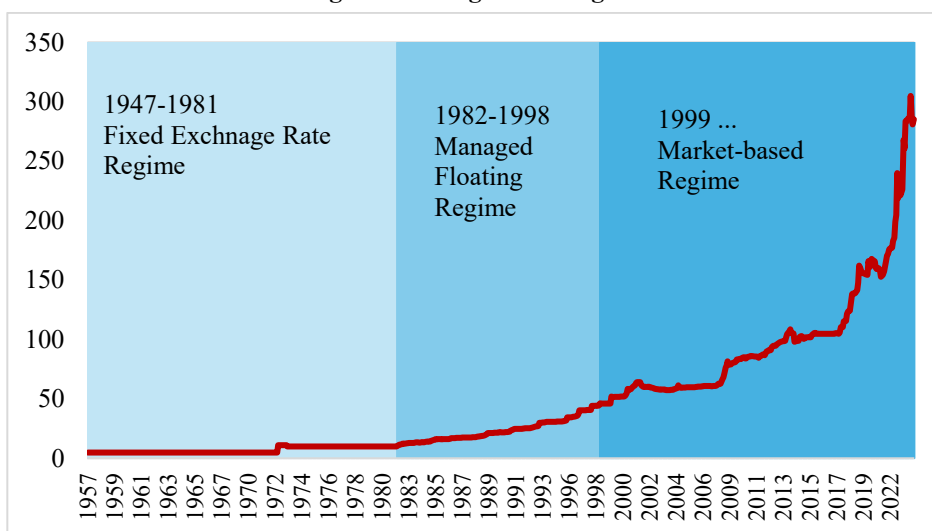
Due to the intervention of State Bank, in last thirty years we have seen five currency crisis (for details see Haque & Hina, 2020).

- In 1993, Pakistani rupee was devalued by 10 percent at the cost of 31 percent declining foreign exchange reserves.
- In 1999, Pak rupee was devalued by 12 percent at the cost of 51 percent declining foreign exchange reserves. It is known as foreign currency deposit crisis, in 1990s dollarisation increased as the SB was allowing banks to take dollar deposits and on lend to the SB with the SBP taking the exchange risk. By the end of the decade the SBP had liabilities stood at about 11 billion dollars while reserves had fallen to 2-3 weeks of imports.
- Third crisis is the fixed rate of the 2000s in the Musharraf's era, the exchange rate was fixed at 60 to the USD. But in 2006 we lost foreign exchange reserves by 31 percent and depreciated the rupees by 14 percent. At the same time, we went into IMF standby agreement 2008.
- In 2014, domestic currency appreciated by 7 percent. The reason behind this appreciation is that PML-N had relied mostly on borrowing loans from international financial institutions and friendly countries to build up foreign exchange reserves. Foreign exchange reserves increased from $ 5.67 billion as on February 2014 to $ 8.70 billion on April 2014.
- Finance Minister Dar willfully fixed the exchange rate despite much public opposition from various factions such as known economists. In defense of the rate substantial reserves were lost. By 2017, the folly of the fixed rate had become apparent and a series of depreciations were allowed as reserves continued to bleed. By the middle for 2019 the exchange rate had depreciated from 98 to the USD to 164, a depreciation of 67 percent. It finally settled at 155 to the USD after an IMF programme had been signed.

Fig. 2. Foreign Exchange Reserves
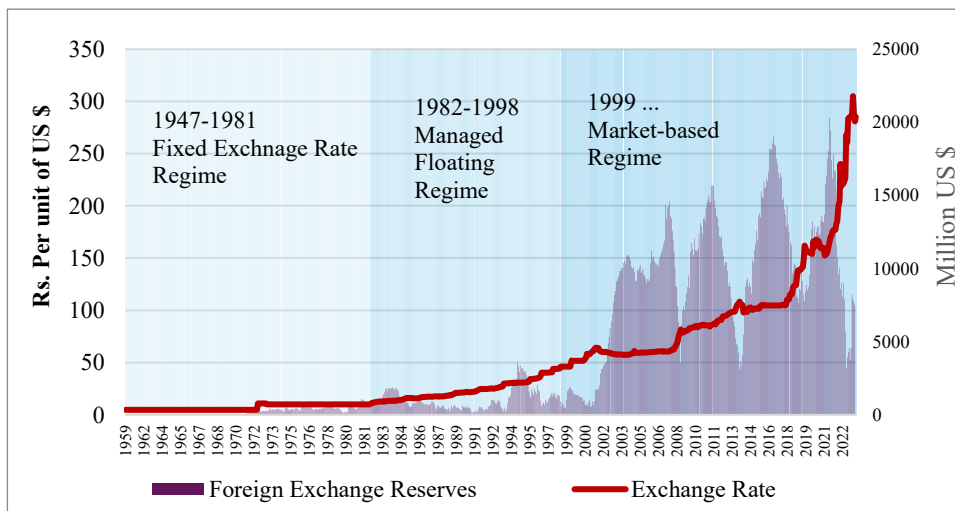
Source: Haque and Hina, (2020).

Fig. 3. Parallel and Official Exchange Rate
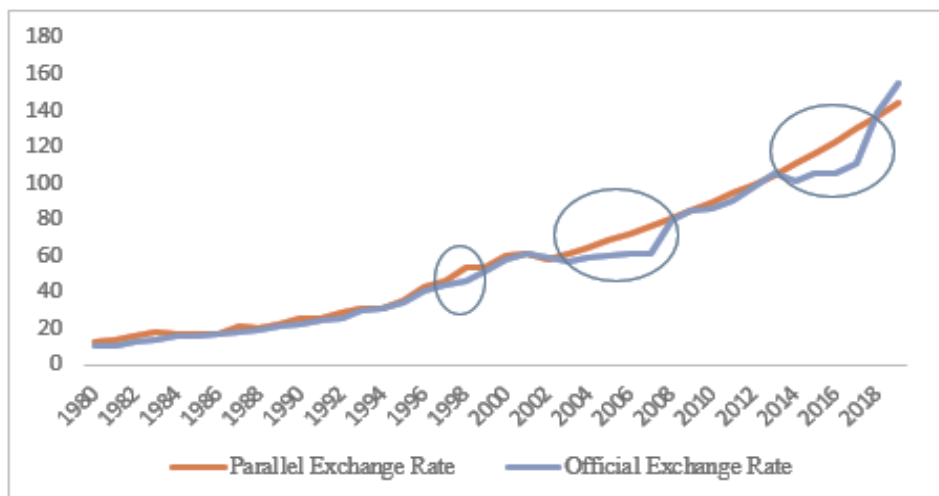
2. OBJECTIVE OF THE PAPER

This study aims to comprehensively review the existing literature on exchange rate policy of Pakistan. The objective is to identify and categorise the key issues and themes discussed in these papers, focusing on the different types of exchange rates, including Nominal Exchange Rate, Real Exchange Rate, Real Effective Exchange Rate, and other related aspects such as Exchange Market Pressure. By examining the works of various authors, this review seeks to provide a detailed understanding of the current state of research on exchange rate policy and highlight areas for future study.

Table 1

Published Articles Related to Exchange Rate Policy

Nominal Exchange Rate	Real Exchange Rate	Real Effective Exchange Rate	Other Exchange Market Pressure
31	8	6	4
Ahmed (1992)	Akhtar &	Janjua (2007)	Asad, et al. (2005)
Bhatti (1996)	Burney (1992)	Debowicz &	Khawaja & Din
Bhatti (1997)	Siddiqui, Afridi,	Saeed (2014)	(2007)
Ali & Ahmad (1999)	& Mahmood	Tiwari, Tahir &	Ahmed (2013)
Bhatti (2001)	(1996)	Shahbaz (2015)	Sarosh Mir &
Zakaria, & Ahmad (2009)	Alam Butt &	Amin, Naeem, &	Hamid (2017)
Zakaria, Ahmad & Iqbal (2007)	Iqbal (2001)	Begum (2020)	
Afzal (2010)	Kemal &	Salam & Ejaz	
Khan (2010)	Haider (2004)	(2021)	
Khan (2010)	Kemal & Qadir	Munir & Iftikhar,	
Khan & Jabeen (2014)	(2005)	(2023)	
Hina & Qayyum (2015)	Ahmed (2009)		
Ansari & Basit (2015)	Khan &		
Khan & Ali (2015)	Mohammad		
Ahmed (2015)	(2010)		

4

Ali (2016)
Nazar & Ali (2017)
Raza & Afshan (2017)
Khan & Nawaz, (2018)
Iqbal & Raziq (2018)
Khan & Bakhsh (2019)
Jabeen, Rashid & Ihsan (2020)
Omer & Aisha (2020)
Khan Mashwani, et al. (2021)
Riaz & Munir (2021)
Ditta, Ghufran & Hussain
(2022)
Khan Ahmad & Murtaza
(2022)
Aamir, et al. (2022)
Syed, Fatima & Zaheer (2022)
Lodhi, et al. (2022)
Kausar (2022)

Hussain, Junejo
& Sohu (2019)

Fig. 4. Paper Citations
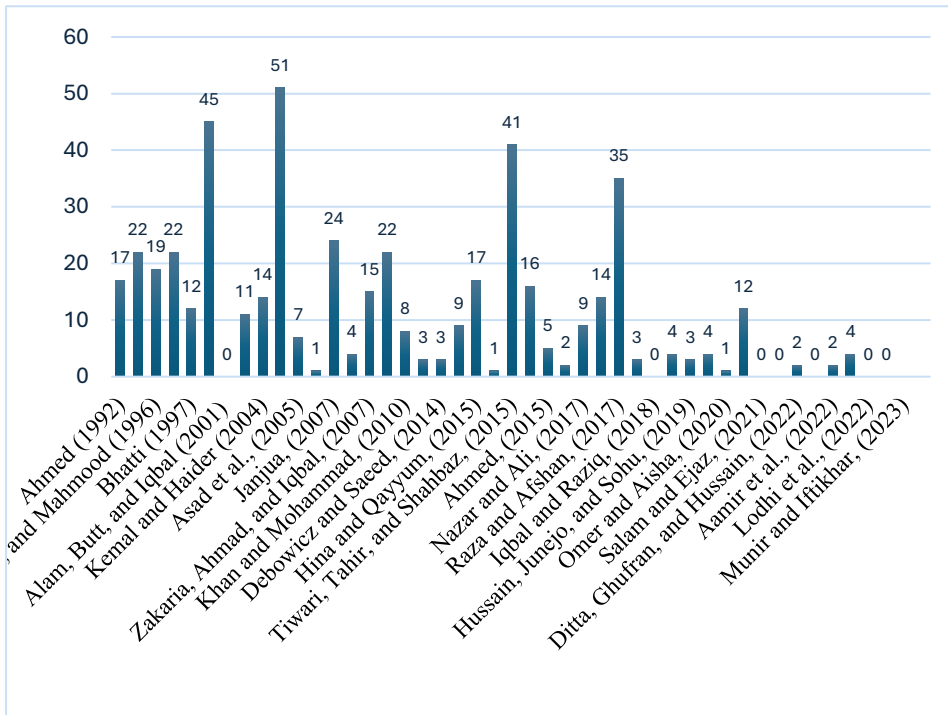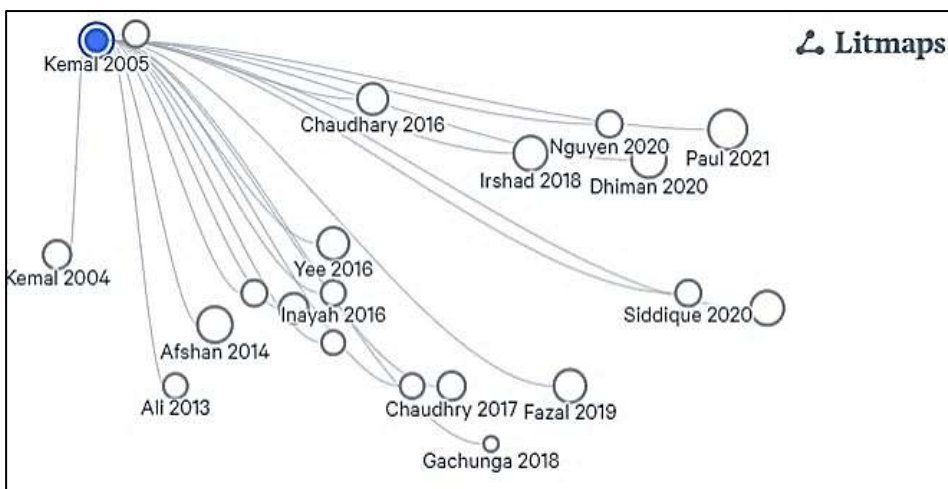
Among the 49 peer-reviewed articles, the most frequently cited is Kemal and Qadir (2005).

2.1. Nominal Exchange Rate

The study of exchange rate theories has long been a crucial area of economic research. In the literature different approaches have been developed to analyse the behaviour of nominal exchange rate. Purchasing Power Parity (PPP) is the earliest approach for exchange rate determination, introduced by Cassel (1920). It occupies a central position in many of the modern exchange rate theories and provides a point of reference for the long run exchange rate movement.

The PPP theory is based on the concept of good arbitrage and ignores the importance of capital movement in exchange rate determination. The Keynesian approach of exchange rate determination was initiated by Mundell (1962) and James Fleming (1963) to fill this gap by introducing capital flows in the current account balance of payment approach.

The asset approach to the models of exchange rate has emerged during the 1970's, with the liberalisation of the global financial market. These models enrich the Keynesian flow model by assimilating the assets stock market (that is monetary factors) in exchange rate determination. The asset approach consists of both monetary and portfolio balance models. The monetary models for exchange rate determination were initiated by Frenkel & Johnson (1978), Mussa (1976), Bilson (1978a) and Dornbush (1976a). They have developed different models such as the Flexible price, Sticky price and Frankel real interest rate differential to capture the behaviour of exchange rate through monetary variables. The monetary models have been the dominant models in determining the exchange rate dynamics through the early nineties.

The portfolio balance model (PBM) focuses on the role of asset stocks in the determination of exchange rate. The essential feature of PBM is the consideration of imperfect substitution between the domestic and foreign bond and the wealth effect of current account surplus on exchange rate determination. Both of these features are omitted in the monetarist models of exchange rate determination.

The previous models (Keynesian, Monetarist and Portfolio models) were usually partial and ignored the other important part of the system and generated contrasting results from each other. Gylfason & Helliwell (1983) & Ahtiala (1984), developed a general model of exchange rate determination by including the key features of the earlier model and it is a simple synthesis of Keynesian, monetary and portfolio approaches under the flexible exchange rate. The general model reconciled and contrasted the results of the earlier partial approaches and gave different predictions about the effects of monetary and fiscal policies on the main macroeconomic variables in the short and long term.

Since the turn of the century economists have remained engaged in intensive efforts to provide macroeconomic models with sound micro foundations. The new open macroeconomics has started with the seminal work of Obstfeld & Rogoff (1995) and since then considerable research has been carried out in this area by Obstfeld behavior Rogoff (1999, 2004) themselves and Walsh (1999), Gali & Gertler (1999), McCallum & Nelson (2000), Clarida, Gali & Gertler (2001), Gali & Monacelli (2002), Woodford (2003), Corsetti & Pesenti (2001), and many others. These studies have contributed significantly to this debate on introducing important micro-factors in the overall economic activity, on the role of intertemporal budget constraints and staggered price setting structures, and to explore the role of macroeconomic policies and the dynamic of exchange rate in the new open economy framework.

Table 2 provides a comprehensive review of the prominent exchange rate theories (Table 2, column1), empirical evidence from international literature (in column 2 of Table 2), and specific findings from studies conducted in Pakistan (provided in the last column of Table 2).

Table 2

Studies Related to Nominal Exchange Rate

Exchange Rate Theories	International Literature	Empirical Evidence from Pakistan
PPP (Cassel, 1918) Law of one price. Identical commodities must sell at same price in two different countries once the price of goods is measured in the same currency. UIP Exchange rate is determined by relative interest rate.	• Pearce, 1983, estimated the PPP model by using OLS method and oppose the results. • Helg & Serati (1996) used Johansen & Juselius (J&J) (1992) cointegration (CI) appr-oach and retain PPP, UIP condition and Dornbush relationship (combining PPP and UIP) for Italy-US, Germany-US and Italy-Germany exchange rates. • Tweneboah (2009) estimated the exchange rate model based on PPP and	• Chisti and Hasan (1993) do not support PPP model to explain exchange rate variation. • Bhatti & Moosa (1994) argued that the failure of PPP under flexible exchange rate is due to the absence of expectation i.e. expected exchange rate –ex ante PPP. • Bhatti (1997) empirically support the ex-ante version of PPP for PKR against dollar, pound and yen. • Bhatti (1996) and Qayyum *et al.* (2004) support the validity of relative form of PPP. • Ali & Ahmad (1999) does not support PPP in short run, but holds in long run. • Khan & Qayyum(2008) do not support the validity of strict form of PPP. • Hina & Qayyum (2015) support the validity of PPP with the presence of other fundamental variables such as

UIP conditions for Ghana economy but do not support o Strict form PPP, UIP o Weak for PPP, UIP However weak form PPP with strict form UIP is accepted by LR test.	unrestricted output level and interest rates. However, UIP condition holds on its own. • Omer & Aisha, (2020), UIP does not hold for short to medium term maturities. However, for the long term maturities i.e., 10-year, the result shows that the UIP holds. It means the exchange rate is better predicted by the long term interest rates. Methodology: Cointegration	

Drawback: PPP does not take into account the demand and supply of capital flows and only considers the current flows.

• Traditional Keynesian Approach (KEM) (Mundell and Fleming, 1962). o Balance of Payment approach o Consider both current and capital flows o PPP does not hold in the LR. Therefore, it portrays the SR relationship among exchange rate and its determinants. $$s = f(\overset{+}{p}, \overset{-}{p^*}, \overset{+}{y}, \overset{-}{y^*}, \overset{-}{i}, \overset{+}{i^*})$$	•Pearce (1983) do not support KEM for Canadian \$ against US \$ by employing OLS metho-dology. •However, with the development of TS literature relating to CI enables the researchers to re-estimate the economic theories and solve not only the SR results of OLS but also explain the LR CI vectors among the variables. MacDonald (1995) defines the theory of LR exchange rate modeling by relating the concept of UIP, absolute and effective market PPP with balance of payment equilibrium conditions.	•Bhatti (2001) tested the KEM and suggested that nominal exchange rate in Pakistan against six industrial countries currencies, is determined by relative price level, relative income and interest rate differentials by using J&J cointegration approach. Hina & Qayyum, (2015) Re-estimation of Keynesian Model by Considering Critical Events (1998 nuclear explosion, 9/11 war against terror, 2007 GFC) and Multiple Cointegrating Vectors. Results support the validity of PPP with the presence of other fundamental variables such as unrestricted output level and interest rates. However, UIP condition holds on its own

Drawback: KEM considers the market for flow of funds and ignore the market for stock of assets that is monetary factors in exchange rate.

During 1970s Asset approach assimilates the international financial markets stock equilibrium in exchange rate determination.
        o   Monetary Models
        o   Portfolio Balance Approach

• Flexible Price Monetary Model (FEM) (Frenkel, 1976; Mussa 1976 and Bilson 1978)
    o PPP and UIP hold continuously.
    o Domestic and foreign bond are perfect substitute.
$$s = f(\overset{+}{m}, \overset{-}{m^*}, \overset{-}{y}, \overset{+}{y^*}, \overset{+}{i}, \overset{-}{i^*})$$
	• Diamandis & Kouretas (1996) examined FEM for Greek currency against its five major trading partners.
	• With same set of currencies Kouretas and Zarages (1998) reexamined FEM for parallel (black) market exchange rate.
	• Diamandis (1998) have examined the LR properties of FEM by imposing the restrictions on the cointeg-rating vectors to identify forward looking version of monetary model and UIP conditions
		• Kemal (2004) utilised monthly data from 2000 to 2004 to estimate the monetary model for PKR against US dollar and get unsatisfactory results.
		o Reason
		o Incomplete monetary model; ignored the output differential

	but fails to accept these restrictions. • Moosa (2000) extended the FEM by incorporating the expected rate of change in the exchange rate via money demand function. Its positive and significant coefficient confirms curren-cy substitution during hyperinflation. • Wong (2004) and Abas & Yousaf (2009) tested homogeneity and symmetry restrictions on FEM. These restrictions do not hold for money supply, relative income and interest rates. Therefore, it is preferable to estimate the exchange rate model in absolute form than in relative form. Morley (2009) extended FEM w.r.t. stock prices through money demand function and empirically tested for UK pound against US dollar with help of ARDL approach.	o Data period is short. • Hina & Qayyum (2016) exchange rate function is determined by relative money supplies, output level, interest rate and rate of inflation • Khan & Nawaz, (2018) results from the SVAR show that the responses of exchange rate to shocks, originated from money supply, income, interest rate and inflation differentials. • Khan, Ahmad and Murtaza (2022) also included the external factors see table below
•Sticky Price Monetary Model (SEM) (Dornbusch, 1976) •Different speed of adjustment in good and asset markets. •PPP doesn't hold continuously •UIP hold continuously •Exchange rate expectation equation $$\Delta s^e = \theta(\bar{s} - s)$$ • Exchange rate is expected to converge toward its LR equilibrium level at rate θ • $s = f(\overset{-}{p}, \overset{+}{p^*}, \overset{+}{m}, \overset{-}{m^*}, \overset{-}{y}, \overset{+}{y^*}, \overset{+}{\bar{s}})$ • Real Interest Rate Differential Model (RIEM) (Frankel, 1979 • Modified the SEM by incorporating the expected rate of inflation in the exchange rate expectation equation • Modified the SEM by incorporating the expected rate of inflation in the exchange rate expectation equation	• Dibooglu and Enders (1995) have estimated SEM model for dollar/Franc exchange rate. • Oskooee and Kara (2000) observed the overshooting phenomena in case of Turkish lira against US dollar due to rapid increase in relative money supply. • Gebreselasie et al. (2005) uniquely identified two CI vectors of SEM as Dornbush exchange rate model and money demand function. • Zhang & Lowinger (2005), Pilbeam (2001) and Craigwell et al. (2011) among others have tested the RIEM.	• • Malik (2011) used RIEM to forecast ex-

$\Delta s^e = \theta(\bar{s} - s) + (\pi^e - \pi^{e*})$ • $\quad s = f(\overset{+}{\pi^e}, \overset{-}{\pi^{e*}}, \overset{+}{m}, \overset{-}{m^*}, \overset{-}{y}, \overset{+}{y^*}, \overset{-}{i}, \overset{+}{i^*})$ • Portfolio Balance Model (PBM) (Branson 1977 1979 1980,1985 Israd, 1978 and Kurri, 1976) • Imperfect substitution b/w the domestic and foreign bonds. • Wealth effect of current account surplus /deficit • Country that has the benefit of CA surplus increases its accumulation of foreign assets and effect the domestic wealth and exchange rate. • PBM considers the influence of financial market activities on SR dynamics of exchange rate. • $\quad s = f(\overset{+}{M}, \overset{?}{B}, \overset{-}{B^*}, \overset{+}{i^*}, \overset{+}{s^e}, \overset{-}{Y})$	• Pearce (1983) estimated PBM by using simple regression analysis and get unsatisfactory results due to the problem of autocorrelation. • Frankel (1984) addressed the problem of autocorrelation by emp-loying Cochrane- Orcutt technique but still does not support the theore-tical expectation of PBM. • Cushman (2007) have used Johansen's (1991) CI method to empirically analyse the PBM for Canadian dollar against US dollar and satisfactory results. • Nwafor (2008) investi-gated the behaviour of Mexican Peso against US \$ via PBM but the estimated parameters appears to have incorrect sign in the long run CI vector.	change rate of Pakistan. • • Hina (2013) estimated the PBM with a variable of global financial crisis. PBM holds in case of Pakistan. Increase in domestic bonds supply results into the appreciation of domestic currency.

Comparison of Partial Approaches: In the Keynesian approach the expansion of domestic output level tends to depreciate the domestic currency by increasing the demand for foreign goods (imports). In the monetary model, increase in domestic output level results in appreciation of domestic currency through monetary channel. That is, higher domestic income relative to foreign country increases the demand for money at the given money supply and interest rate. This increase is met by decrease in domestic price level which consequently appreciates the domestic currency to maintain the PPP condition. Table 2a presents the summary of conflicting predictions of Partial Keynesian, Monetary and Portfolio approaches.

Table 2a

Summary of Predictions of Partial Keynesian, Monetary and Portfolio Approaches

Model	Effect on the Exchange Rate of an Increase in :												
	y	y^*	p	p^*	i	i^*	π^e	π^{e*}	m	m^*	B	B^*	s^e
Keynesian Approach	+	-	+	-	-	+	0	0	0	0	0	0	0
Real Interest Differential	-	+	0	0	-	+	+	-	+	-	0	0	0
Portfolio Approach	-	0	0	0	0	+	0	0	+	0	?	-	+

Note: A Plus sign indicates depreciation and a minus sign stands for appreciation.
Conflicting results of the earlier approaches give different predictions about the effect of monetary and fiscal policies on the exchange rate determination in the SR and LR.

• Synthesis of Keynesian, Monetary and Portfolio Approaches (Gylfason and Helliwell , 1983).	• Hina (2013) estimated the synthesis of Keynesian, Monetary and Portfolio Approaches through cointegration methodology and did not get the satisfactory results.

• New Open Economy Macroeconomic Models o Sound microfoundation to macroeconomic models of exchange rate determination. o Obstfeld & Rogoff (1999, 2004) Walsh (1995) Gali & Gertler (1999) McCallum & Nelson (1999) Clarida, Gali & Gertler (2001) Gali & Monacelli (2002) Woodford (2003) Corsetti and Pesenti (2001) and many others.	• Haider and Khan (2008) have estimated a small open economy Dynamic Stochastic General Equilibrium model (DSGE) for Pakistan. Concludes that high inflation does not affect domestic consumption, the exchange rate appreciates due to high domestic and imported inflation, and a tight monetary policy helps to control domestic inflation as well as imported inflation, but appreciates the exchange rate significantly keeping the pass-through of the exchange rate to domestic inflation at a very low level.

2.2. Role of external factors, like terms of trade and remittances and Other Determinants

The determination of exchange rates is influenced by both internal and external factors. External factors such as terms of trade and remittances play a crucial role in shaping exchange rate dynamics, alongside other determinants like foreign exchange reserves, international oil prices, and net capital inflows. Table 3 provides a list of external factors and additional determinants considered by various empirical studies in the determination of the nominal exchange rate.

Table 3
List of External Factors

	Other Determinants
Zakaria & Ahmad, (2009)	Average productivity of labour in traded and nontraded goods sectors
Afzal(2010)	Reserves
Zakaria Ahmad & Iqbal, (2007) Determinants of NER Khan & Jabeen, (2014) Model the exchange rate volatility	Relative Price Levels (foreign price level of tradable to domestic price level of non-tradable), Terms of Trade, Technological Progress, Trade Restrictions, Net Capital Inflow, Foreign Exchange Reserves, Excess Supply of Domestic Credit
Ansari & Basit (2015)	Cost of Debt (interest payment/external debt*100)
Raza & Afshan (2017)	Investment Burden (repatriation/exports*100)
Iqbal & Raziq (2018)	International Oil Prices
Khan & Ali (2015)	Stock Market Prices
Ahmed (2015)	forward exchange
Riaz & Munir, (2021)	volatility of remittances
Nazar & Ali, (2017)	Workers' remittances, foreign aid
Khan & Bakhsh, (2019)	Gold Price
Jabeen, Rashid, & Ihsan (2020)	News announcement
Khan, Ahmad & Murtaza (2022)	trade balance , production cost gap Pakistan, Debt liabilities of the domestic country, Foreign exchange reserves of the domestic country, Net foreign assets of the domestic country, Official reserves assets of the domestic country
Aamir, et al. (2022), Syed, Fatima, and Zaheer, (2022 Lodhi, et al. (2022) Kausar (2022)	COVID-19

2.3. Exchange Rate Forecasting

The literature on exchange rate forecasting models are categorised by structural models and random walk models. Proponents of structural models argue that exchange rates are driven by fundamental economic determinants and can be forecasted using models based on these factors. Whereas, supporters of random walk models suggest that

exchange rates follow a random pattern. According to this model, the best prediction of tomorrow's exchange rate is today's exchange rate, plus a random shock and there is no need to worry about the macroeconomic variables of exchange rate determination. Table 4 presents a list of papers focusing on exchange rate forecasting, indicating whether they support structural or random walk models. The empirical evidence for structural and random walk models in Pakistan is mixed. While some studies find support for structural models, others find evidence for random walk models.

Table 4
Exchange Rate Forecasting Models

	International Literature	Literature from Pakistan
Supporters of Structural Models	• Johnston and Sun (1997), MacDonald (1997) Hwang (2001), Cheung, *et al.* (2002) Anaraki (2007), Khalid (2007) and Abbas, *et al.* (2011) among others observed that the exchange rate equation based on fundamental determinants outperforms a random walk model in out-of-sample forecast tests. • Korap (2008) found that fundamental monetary model performed well for forecasting inside a 2.5 years as compare to the random walk with and without drift models.	Khalid (2007), Abbas, *et al.* (2011) Hina & Qayyum, (2015) Hina & Qayyum (2016), Hina (2013).
Supporters of Random Walk Models	• Meese & Meese and Rogoff (1983) and Najand & Bond (2000) suggested that the poor performance of structural models is characterised by instable parameters. • It is necessary to control the outliers in order to get better forecast (Balke and Famby, 1994 and Dijk, *et al.*1999).	Rashid (2006) and Malik (2011) argued that exchange rate is a random walk phenomenon. Khan Mashwani et al., (2021), Ditta, Ghufran & Hussain (2022) used machine learning approa-ches to forecast the exchange rate.

2.4. Results of Fundamental Factors and External Factors

Table 5 presents the results of various empirical studies examining the impact of fundamental factors on exchange rates. The factors considered include domestic and foreign price levels, interest rates, income levels, output differentials, money supply, and bonds. The average values indicate that an increase in domestic price levels, domestic income, domestic money supply, foreign interest rates, and foreign bond supply tends to depreciate the domestic currency. Conversely, an increase in foreign price levels, domestic interest rates, foreign income, foreign money supply, and domestic bond supply are the leading factors contributing to the appreciation of the domestic currency.

Among the external factors and other determinants of the nominal exchange rate, labour productivity, foreign exchange reserves, trade restrictions, worker remittances, foreign direct investment, and the excess supply of domestic credit are prominent factors contributing to exchange rate appreciation. Conversely, terms of trade, trade openness, changes in oil prices, and investment burden tend to depreciate the domestic currency (for details, see Table

Table 5

Results of Fundamental Factors

	Domestic price level	Foreign price level	Price differential	Domestic interest rate	Foreign interest rate	Interest rate differential	Domestic income	Foreign income	Output differential	Domestic Money supply	Foreign money supply	Domestic bonds supply	Foreign bonds supply
Ahmed (1992)			1.59										
Bhatti (1996)			1.634										
Bhatti (1997)			1.012										
Ali and Ahmad (1999)	0.341												
Bhatti (2001)			1.13			0.05			0.69				
Zakaria & Ahmad (2009)			1.64										
Zakaria Ahmad & Iqbal, (2007)			-0.8855										
Afzal (2010)													
Khan (2010)						0.066743							
Hina (2013)					0.01		-0.21			0.06		-0.05	0.02
Hina & Qayyum, (2015)	1.06			-0.4	0.55		4.73	-26.89					
Hina & Qayyum, (2016)	0.01	-0.07		-0.1	0.02		-3.45	-3.03		2.08	-0.89		
Ansari & Basit, (2015)													
Khan & Ali, (2015)													
Ahmed, (2015)													
Nazar & Ali, (2017)										0.73			
Raza & Afshan, (2017)	0.123			-0.019						0.41			
Khan & Nawaz, (2018)			-0.01			0.06			-1.01				
Average	0.38	-0.07	1.02	-0.25	0.19	0.06	0.36	-3.03	-0.16	0.82	-0.89	-0.05	0.02

Note: Results are collected only for papers that transformed the variables into logarithms. In average, we excluded the insignificant results highlighted in red, as well as coefficients with unusually high magnitudes, indicated in bold. The + sign indicates a depreciation effect, while the – sign indicates an appreciation effect.

Table 6

Results of External Factors and other Determinants

	Productivity of labor in traded and nontraded goods domestic sectors	Foreign exchange reserve	Terms of trade	Trade Openness	Trade restrictions	Change in oil price	Investment Burden	workers' remittances	Foreign direct investment	Foreign aid	Cost of Debt	Excess supply of domestic credit
Ahmed (1992)			-0.22									
Ali and Ahmad (1999)		-0.013	-0.18									
Zakaria and Ahmad, (2009)	-0.4064											
Zakaria, Ahmad, and Iqbal, (2007)			3.5547		-1.1855							-1.9568
Ansari and Basit, (2015)							0.1769				0.088	
Nazar and Ali, (2017)				0.341				-0.45	-0.1	-0.2		
Raza and Afshan, (2017)			-0.278									
Iqbal and Raziq, (2018)						0.0055						
Average	-0.41	-0.01	1.69	0.34	-0.59	0.01	0.18	-0.45	-0.10	-0.20	-0.09	-1.96

Note: Results are collected only for papers that transformed the variables into logarithms. In average, we excluded the insignificant results highlighted in red. The + sign indicates a depreciation effect, while the – sign indicates an appreciation effect.

Based on the results of Table 5 and Table 6, Table 7 presents the factors that contribute to the depreciation of the nominal exchange rate, while Table 8 presents the factors that contribute to its appreciation. The results indicate that improvements in terms of trade and an increase in money supply are the primary drivers of exchange rate depreciation. Domestic factors such as price levels, income, and trade openness also play a significant role. Foreign factors like interest rates, investment burden, foreign bond supply, and oil prices have relatively smaller impacts on nominal exchange rate depreciation.

Table 8 indicates that foreign income and the excess supply of domestic credit are the primary drivers of nominal exchange rate appreciation. Other factors like foreign money supply, trade restrictions, workers' remittances, and labour productivity also play a significant role. Factors like foreign exchange reserves and changes in oil prices have minimal impacts on nominal exchange rate appreciation.

Table 7

Factors That Depreciate NER

Factors that Depreciate NER	Average Effect	Proportion
Terms of Trade	1.69	42.35
Money Supply	0.82	20.58
Domestic Price Level	0.38	9.62
Domestic Income	0.36	8.95
Trade Openness	0.34	8.56
Foreign Interest Rate	0.19	4.85
Investment Burden	0.18	4.44
Foreign Bonds Supply	0.02	0.50
Change in Oil Price	0.01	0.15
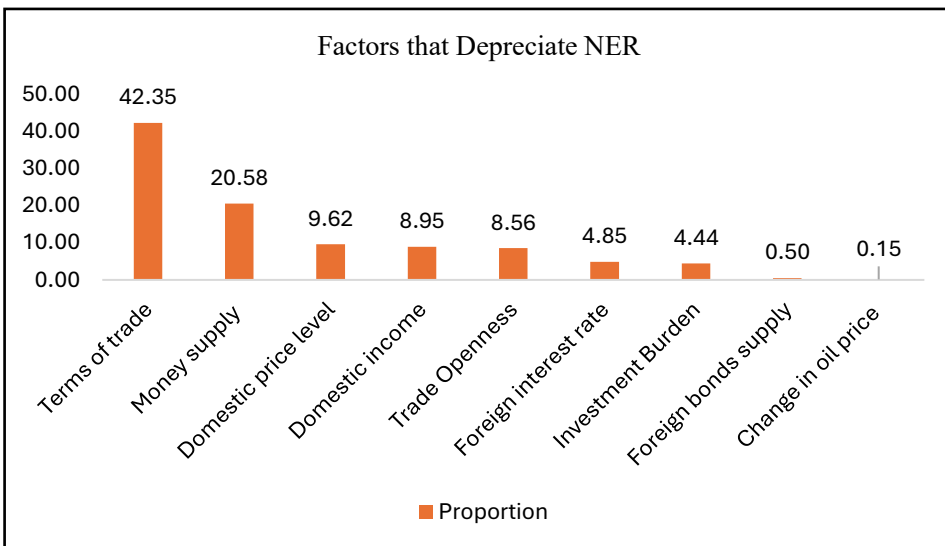
Table 8
Factors That Appreciate NER

Factors that Appreciate NER	Average effect	Proportion
Foreign exchange reserve	-0.01	0.16
Domestic bonds supply	-0.05	0.62
Foreign price level	-0.07	0.86
Cost of Debt	-0.09	1.08
Foreign direct investment	-0.10	1.23
Foreign aid	-0.20	2.47
Domestic interest rate	-0.25	3.09
Productivity of labour	-0.41	5.02
workers' remittances	-0.45	5.56
Trade restrictions	-0.59	7.33
Foreign money supply	-0.89	10.99
Excess supply of domestic credit	-1.96	24.17
Foreign income	-3.03	37.42

Factors that Appreciate NER
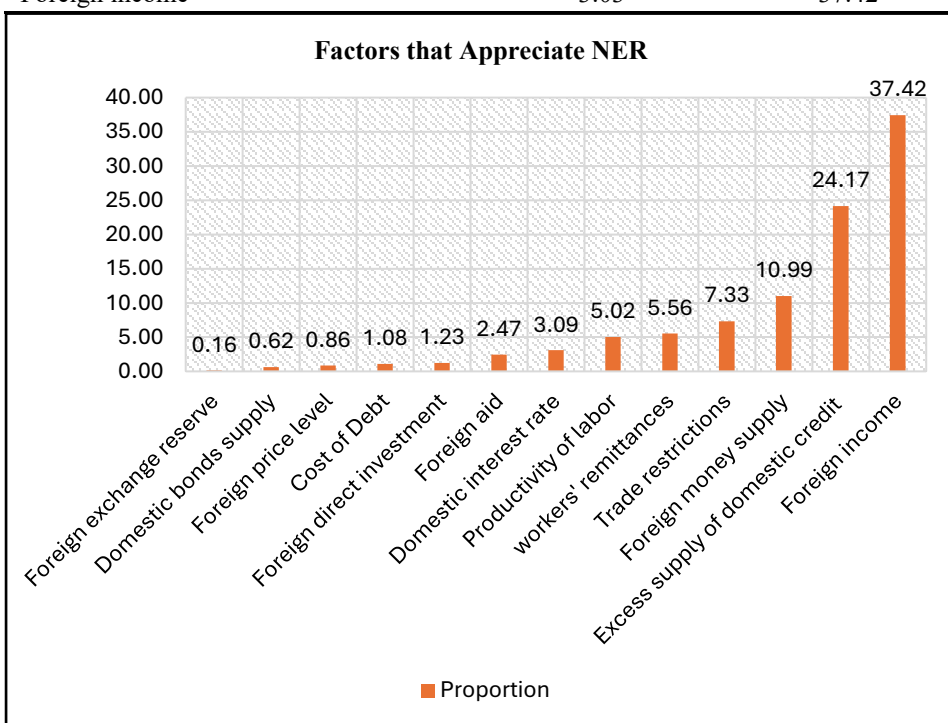
2.5. Recommendations on Exchange Rate Management in Pakistan

For effective exchange rate management in Pakistan, these paper proposes several key recommendations. These recommendations focus on managing inflation, addressing exchange rate fluctuations, incorporating demand-side factors, and achieving long-term economic stability.

Exchange Rate and Inflation Management

1. **Tight Monetary Policy**

Ali and Ahmad (1999) emphasize that managing the exchange rate independently is unsustainable in the presence of inflation. A consistently followed tight monetary policy is crucial for maintaining stability.

Bhatti (2001) suggests that to strengthen the Pak rupee against industrial currencies, monetary authorities must adopt policies aimed at lowering prices and real growth while raising interest rates relative to those of the industrial countries.

Khan and Nawaz (2018) advocate for a tight monetary policy to stabilize the Pak rupee exchange rate in the short-to-medium term, emphasizing the need for disciplined coordination between fiscal and monetary authorities.

Addressing Exchange Rate Fluctuations

Intervention in Unofficial Markets
Ahmed (2015) recommends that the central bank should intervene in the unofficial (KERB) markets to regulate activities and stabilize fluctuations caused by these markets. This includes reducing dependency on donor financing by increasing export activities and tax revenue.
Incorporating Demand-Side Factors

Demand-Side Considerations

Zakaria and Ahmad (2009) highlight the importance of considering demand-side factors such as currency convertibility, central banks' ability to sterilize capital inflows, and the use of the exchange rate for macroeconomic stabilization or trade balance developments.
Long-Term Economic Stability

Achieving Macro-Economic Goals

Nazar and Ali, (2017) and **Afzal (2010)** suggest that a stable exchange rate can help achieve macro-economic stability through trade, foreign direct investment (FDI), and other macro-economic goals.

Conclusion

To achieve a stable and competitive exchange rate, Pakistan must adopt a comprehensive approach that includes tight monetary policies, market interventions, and integration of demand-side factors. Coordination between fiscal and monetary policies and considering both goods and capital market dynamics are essential for sustainable economic growth and external competitiveness.

2.6.   Limitations of Nominal Exchange Rate Studies

The literature on exchange rate management in Pakistan exhibits several critical issues. Many studies are primarily empirical exercises lacking sufficient theoretical backing or policy implications. Methodological issues are evident, data limitations also affect the robustness of findings, with some studies using very limited datasets. The detail is as follow;

- **Empirical in Nature**

  Afzal (2010), Khan (2010), Khan and Jabeen (2014), Ahmed (2015), Raza and Afshan (2017), Iqbal and Raziq (2018), Jabeen, Rashid, and Ihsan (2020), Omer and Aisha (2020), Khan Mashwani et al. (2021), Riaz and Munir (2021), Aamir et al. (2022), Syed, Fatima, and Zaheer (2022), Lodhi et al. (2022). These studies are primarily empirical exercises without sufficient theoretical backing or policy implications.

- **Methodological Issues**

  Few studies implement OLS, 2SLS without addressing non-stationarity issues, such as, Ali and Ahmad (1999), Ansari and Basit (2015), Nazar and Ali (2017)

- **Data Limitations**

  The data set used in the study of Ahmed (1992) is very limited, which may affect the robustness and generalizability of the results.

- **Exchange Rate Regimes**

  The study's application of the PPP theory requires a completely flexible exchange rate regime. However, Pakistan's managed floating system, where rates are partly managed by the government, raises questions about the appropriateness of PPP testing under such conditions.

2.7. Way Forward for Future Research

1. **Investigate the Trade-offs Between Inflation Management, Currency Depreciation, and External Competitiveness in Pakistan**

   Explore how higher anticipated inflation rates erode the gains from currency devaluation in terms of enhancing export competitiveness, attracting foreign investment, and improving trade balance, and identify policy measures to mitigate these effects.

2. Research could examine **how changes in exchange rates affect the effectiveness of monetary policy transmission channels,** and vice versa, and identify optimal policy strategies for achieving both exchange rate stability and price stability objectives.

3. **Evaluate the effectiveness of policy interventions**, such as central bank sterilization measures or exchange rate management strategies, in mitigating the impact of demand-side shocks on nominal exchange rates.

4. **Role of Non-Official Exchange Rate Markets**: Conduct in-depth research on the functioning and impact of non-official exchange rate markets (e.g., KERB markets) in Pakistan. Explore their prevalence, trading volumes, and influence on official exchange rates, as well as the effectiveness of regulatory interventions in managing these markets.

5. **Market Sentiment and Exchange Rate Expectations**: Explore the role of market sentiment and investor expectations in shaping exchange rate dynamics in Pakistan. Utilize survey data or sentiment analysis techniques to gauge market sentiment and its impact on exchange rate movements.

6. **Policy Interventions and Exchange Rate Volatility**: Analyse the effectiveness of central bank interventions and other policy measures in reducing exchange rate volatility and aligning exchange rates with economic

fundamentals. Evaluate the impact of specific policy interventions, such as capital controls or exchange rate pegs, on market stability.

3. REAL EXCHANGE RATE

The review of articles related to real exchange rate management in Pakistan reveals several key findings with overlapping conclusions. Akhtar and Burney (1992) and Ahmed (2007) both found that interest rates do not significantly influence the real exchange rate due to controlled money markets and restrictions on foreign bonds ownership. Both studies also highlighted that terms of trade do not impact the real exchange rate, with Akhtar & Burney noting remittance inflows limit rupee depreciation, and Ahmed identifying that increased capital flows and government spending on non-tradable goods appreciate the RER while increased openness depreciates it.

Siddiqui, Afridi, and Mahmood (1996) and Khan & Mohammad (2010) highlighted the significant impact of both

> **Real Exchange Rate Vs Nominal Exchange Rate**
> **Real exchange rate** is an important indicator of how the nominal exchange rate will evolve over the long term. The price of a country's currency in terms of another currency is known as its **nominal exchange rate**, whereas the real exchange rate—considered to be the real counterpart of the nominal exchange rate—is a comparison of price levels between nations represented in a single numeraire. As a result, unlike the nominal exchange rate, it is unaffected by nominal variables like interest rates, inflation rates, money growth rates, and expectations regarding these rates.

monetary and real variables on the equilibrium path of the real exchange rate (RER), noting that nominal shocks, particularly monetary policy shocks, are primary drivers of real exchange rate fluctuations.

Kemal & Haider (2004) and Kemal & Qadir (2005) both emphasized the substantial impact of monetary variables on the exchange rate, suggesting that exchange rate policy alone cannot address current account imbalances and sudden exchange rate movements do not affect exports; devaluation may improve trade balance.

Alam, Butt & Iqbal (2001) and Ahmed (2007) identified a long-run relationship between the real exchange rate and real interest rate differentials, though they noted theoretical and empirical validity issues. Both studies underscored that increased foreign direct investment (FDI) and remittances contribute to the appreciation of the RER.

Finally, Hussain, Junejo, & Sohu (2019) found a positive and significant impact of the Corruption Perception Index and foreign borrowing on the real exchange rate, adding another layer to the understanding of how external factors influence RER dynamics in Pakistan.

The detail of these studies are presented in Table 9.

Table 9

Studies related to Real Exchange Rate

Author(s)	Data Period	Methodology	Findings	Limitations
Akhtar & Burney (1992)	1972-90	OLS	• Interest rates do not influence the real exchange rate due to controlled money markets and restrictions on owning foreign bonds. • Remittance inflows limit rupee deprecia-tion. • Terms of trade have no effect on the real exchange rate. Government budget deficits significantly impact the real exchan-ge rate.	• Data set is limited (1972-1990) • This Paper has taken the Relative inflation index as a regressor which is the part of dependent variable. • exchange rate regimes are ignored. real exchange rate variability is greater under flexible exchange rates than under fixed exchange rates and that real and nominal exchange rate movements are positively related under flexible exchange rate. It is claimed in the paper that government budget deficits have influenced the real exchange rate directly as well as indirectly through the price level. However, the indirect channel is not explored at all.
Siddiqui Afridi & Mahmood (1996)	1960–94	2SLS	• 2SLS technique provides reliable coefficient estimates. • Both monetary and real variables signi-ficantly affect the equilibrium path of the real exchange rate (RER). • Controlling domestic prices, rather than repeated currency deva-lu-etions, may stabil-ize the RER.	• Non-stationarity affects applica-bility of OLS and 2SLS methods, rendering conventional test statistics inappro-pri-ate.
Alam Butt & Iqbal (2001)	1971–2000	Johansen Cointegra-tion (Johansen,1988 Im, Pesaran, & Shin Panel Cointegrati	• Identified a long-run relation-ship between the real exchange rate and real interest rate differentials.	• Theoretical and empiri-cal validity lacking for the belief that real exchange rates equal real interest differentials across country-es. • Moosa & Bhatti (1997) were able to find overwhelming evidence

Author(s)	Data Period	Methodology	Findings	Limitations
		on (IPS, 2003)		that real interest differentials are stationary in most of industrial countries as well as in Asia. but in this paper it is non stationary.
Kemal Haider (2004)	July 2000:M7-2004:M8	Structural Vector Autoregression (SVAR) model (Blanchard and Quah, 1989)	• Monetary variables impact the exchange rate more than other factors. • Exchange rate policy alone cannot address current account imbalances.	• Short data period (2000:M7-2004:M8); inaccurate implementation of SVAR model. • Bias in coefficients due to different models used (real exchange rate, trade, forex, monetary). • Policy implications not discussed adequately. • Free float is not the only reason for exchange rate appreciation after 9/11 it is due to softening of eco sanctions imposed by US after 9/11 and being a partner in war on terror, inflows of Pakistani asset transfers from US to Pakistan.
Kemal & Qadir (2005)	1981:M12 -2003:M1	Johansen & Juselius (1990) cointegrateon	• Found a long-run relationship between real exchange rate, exports, and imports. • Sudden exchange rate movements do not affect exports; devaluation may improve trade balance.	• Purely empirical exerci-se; lacks exploration of policy-oriented questions. • Correlation among non-station-ary variables is nonsensical.
Ahmed, (2009)	1972–2007	VECM	• Increased capital flows, government spending on non-tradable goods, and improved terms of trade appreciate the RER. • Increased openness depreciates the RER. • Chronic overvaluation of the RER identified, with contributing factors being FDI and remittances.	
Khan & Moham-	1982:Q1-2007:Q1	SVAR	• Empirical support for the sticky price model (Dornbusch,	

Author(s)	Data Period	Methodology	Findings	Limitations
mad, (2010)			1976) of exchange rate dynamics indicates that real exchange rate fluctuations are caused by nominal shocks, particularly monetary policy shocks.	
Hussain, Junejo, & Sohu, (2019)	2002-2016	OLS Panel Regression	• Positive and significant impact of the Corruption Perception Index and foreign borrowing on the real exchange rate.	

3.1. Results of RER Determinants

Table 10 presents the results of the studies that examining the impact of various determinants on the real exchange rate. The coefficients represent the elasticity of the RER with respect to each determinant. A positive coefficient indicates that an increase in the determinant leads to a depreciation of the RER, while a negative coefficient suggests an appreciation. The average results indicate that trade-related factors, especially trade openness significantly influence the RER. Financial factors, such as capital flows, and government policies, also play a crucial role. However, the impact of domestic income factors is less significant.

Table 10

Results of RER Determinants

Variables	Akhtar & Burney (1992)	Siddiqui, Afridi, & Mahmood (1996)	Kemal and Qadir (2005)	Ahmed, (2009)	Average
Terms of Trade	0.061	0.03		-0.0596	-0.06
Trade openness		0.397		0.998	0.7
Import			-2.52		–
Export			1.97		–
Relative inflation index	0.127				–
Interest rate differential	0.625				–
Domestic income	0.077				0.08
Technological change (use the growth rate of GDP per capita as a proxy)		0.0152			–
Capital flows—remittances, project lending, and FDI		0.222		-3.53	-1.65
Workers' remittances				-2.412	–
Foreign direct investment				-30.0756	–
Government consumption		0.6971		-0.345	0.18
Fiscal deficit	0.705				0.71
Excess domestic credit creation		-0.004			-0.004

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3.2. Conclusion

- The literature highlights several key factors affecting the real exchange rate in Pakistan. Interest rates have limited influence due to market controls, while remittances and government budget deficits play significant roles.
- The importance of controlling domestic prices over frequent devaluation is emphasized for maintaining stability.
- Both monetary and real variables need to be considered for effective policy-making.
- Furthermore, corruption and foreign borrowing are significant determinants, and
- Predictive models based on these variables can help anticipate future exchange rate movements.

Real Effective Exchange Rate (REER) Index

In international markets, where a nation engages in trade with several other nations, the real exchange rate is calculated as an effective index called the real effective exchange rate (REER) index. A nation's overall level of international competitiveness is indicated by its REER. REER measures how nominal exchange rates adjusted for price differentials between the country and its trading partners.

$$REER = NEER * RPI$$

$NEER = \prod_{i=1}^{N}(e_i)^{w_i}$ and $RPI = \frac{P}{\prod_{i=1}^{N}(P_i)^{w_i}}$

where e_i is the nominal exchange rates of domestic currency against the currency of trading country *i*, *P* is the index of domestic prices; P_i represent price indices of competitor countries; and w_i is the relative weight of the trading country i in the index.

3.3. Way forward for Future Research

Explore Indirect Channels: Investigate how government budget deficits influence the real exchange rate indirectly, especially through the price level.

Conduct Policy Simulations: Evaluate the potential impact of exchange rate policies on trade balances and economic outcomes. Use econometric models to simulate effects of different exchange rate regimes, devaluation episodes, or trade policy interventions on export/import levels, trade balances, and overall macroeconomic performance.

4. REAL EFFECTIVE EXCHANGE RATE

The literature on the real effective exchange rate (REER) in Pakistan highlights the influence of various economic fundamentals and policy measures. Janjua (2007) identifies terms of trade, trade openness, net capital inflows, relative productivity differential, government consumption, and workers' remittances as key determinants of REER. The study underscores the variability of REER and the importance of fiscal policy for exchange rate stability, noting significant exchange rate misalignment. Debowicz and Saeed (2014) further explore this theme, revealing a significant overvaluation of the Pakistan rupee from 2006 to 2010 and advocating for a devalued exchange rate to boost

economic development and benefit urban poor and rural households. Tiwari, Tahir, and Shahbaz (2015) find that exchange rates exhibit anti-cyclical effects on oil price shocks. Amin, Naeem, and Begum (2020) establish a long-term relationship between interest rate, trade balance, foreign exchange reserve, net foreign capital inflow, and the exchange rate, with these variables positively affecting the exchange rate. Salam and Ejaz (2021) also identify misalignment in exchange rates. Finally, Munir and Iftikhar (2023) highlight money supply, trade openness, workers' remittances, and productivity as long-term determinants of the real exchange rate in Pakistan. The detail review of these studies are presented in Table 11.

Table 11

Studies Related to Real Effective Exchange Rate

Author(s)	Data Period	Methodology	Findings
Janjua, (2007)	1978-2006	Engle Granger cointegration technique	• REER is determined by terms of trade, trade openness, net capital inflows, relative productivity differential, government consumption, and workers' remittances. • REER is variable, influenced by economic fundamentals; fiscal policy is crucial for exchange rate stability in Pakistan. • Exchange rate misalignment ranged from -12.1 percent to 25.2 percent, indicating the current exchange rate deviates from the ERER.
Debowicz, & Saeed, (2014)	1982-2010	Johansen cointegration , CGE to stimulate the results of misalignment	• The Pakistan rupee was significantly overvalued from 2005, averaging 10 percent overvaluation from 2006 to 2010, peaking at 25 percent in 2010. • Realignment could increase the size of the tradable sector (e.g., cotton and textiles) and redistribute income in favor of urban poor and rural households. • Supporting a devalued exchange rate is suggested for boosting economic development.
Tiwari, Tahir & Shahbaz, (2015)	1986:M2-2009:M3	Continuous wavelet approach, ARDL cointegration	• Exchange rate leads to anti-cyclical effects on oil price shocks.
Amin, Naeem & Begum, (2020)	1972-2014	Johansen and Juselius (1990) cointegration,Granger Causality	• Long-term relationship found between interest rate, trade balance, foreign exchange reserve, net foreign capital inflow, and exchange rate.These variables positively affect the exchange rate.

| Salam & Ejaz (2021) | 1972:M1-2019:M12 | Johansen & Juselius (1990) cointegration | • Misalignment in exchange rates is identified |
| Munir & Iftikhar (2023) | 1980:Q1-2020:Q4 | Pesaran, et al (1996, 2001) ARDL cointegration test | • Money supply, trade openness, workers' remittances, and productivity are long-term determinants of the real exchange rate in Pakistan. |

Table 12 presents the results of factors impacting real effective exchange rates, categorized into economic indicators (terms of trade, inflation rate, interest rate, interest rate differential, productivity, and money supply), trade and financial flows (trade openness, trade balance, capital inflows, foreign exchange reserves, value of net foreign assets, workers' remittances, and foreign direct investment), and investment and fiscal factors (investment, government consumption, and fiscal deficit). The average values indicate that variables related to trade and financial flows, such as terms of trade, interest rate differential, productivity, and value of net foreign assets, have a significant impact on the improvement of REER.

Table 12

Results of REER Determinants

Variables	Janjua, (2007)	Debowicz & Saeed, (2014)	Tiwari, Tahir & Shahbaz (2015)	*Amin, Naeem & Begum, (2020)	Salam & Ejaz, (2021)	Munir & Iftikhar (2023)	Average
Terms of Trade	0.34	1.019			-0.41	0.3018	0.32
Trade Openness	-0.61				-1.28	-1.6453	-1.18
Trade Balance				6.8976			-
Inflation Rate				-7.7862			-
Interest rate				-6.6745			-
Interest rate differential		0.022					0.02
Capital Inflows	-0.03			36.678			-0.03
Productivity	0.03	-1.209			1.71	5.4424	1.49
Foreign Exchange Reserves				-8.6098			-8.61
Value of Net foreign Assets		0.097					0.1
Money Supply						-0.8492	-0.85
Investment					-2.79		-2.79
Workers Remittances	0.17				0.62	0.2818	0.36
FDI					0.52	-0.0046	0.52
Government consumption	-0.94				-3.3	0.1874	-3.3
Fiscal deficit		0.243					0.24

Note: Results are collected only for papers that transformed the variables into logarithms. In average, we excluded the insignificant results highlighted in red. In case of REER, the - sign indicates a depreciation effect, while the +sign indicates an appreciation effect.

*Coefficients are too high are excluded from average calculation

4.1. Conclusion

The reviewed studies collectively highlight that exchange rate dynamics in Pakistan are influenced by a range of factors including terms of trade, trade openness, capital inflows, productivity differentials, government consumption, and remittances.

Significant overvaluation and persistent misalignments of the Pakistani rupee have been identified, with fiscal and monetary policies being crucial for exchange rate stability.

Exchange rates have anti-cyclical effects on oil price shocks and maintain long-term relationships with key economic variables like interest rates and trade balance. Sustaining a devalued exchange rate is suggested to enhance economic development, emphasizing the need for comprehensive policy measures to address these complex dynamics.

5. OTHER STUDIES

Effective exchange rate management is a critical aspect of monetary policy, influencing economic stability and growth. This section reviews the studies that explore various issues related to exchange rate management, focusing on the complexities and challenges faced by Pakistan's economy. Asad et al. (2005) provide insights into the sterilization practices employed between July 2000 and December 2003, revealing a significant sterilization coefficient of -0.87, indicating that 87 percent of the increase in net foreign assets was offset through government securities sales. This underscores the impact of sterilization policies on exchange rate management. Khawaja and Din (2007) offer detailed analysis by employing the composite variable of exchange market pressure rather than traditional metrics like foreign reserves or exchange rates. Their study highlights shifting causality patterns from exchange market pressure to interest rates during periods of active Foreign Currency Deposits (FCDs), and vice versa post-FCD freeze and post-9/11. They also examine the effects of dollarization and the management of exchange market pressure through money supply and foreign inflows. Ahmed (2013) further examines foreign exchange market disequilibrium in Pakistan, linking it significantly to domestic money market conditions and noting the constraints imposed by a fixed exchange rate regime. This review also includes findings from Sarosh Mir and Hamid (2017), who report notable exchange rate overvaluations in the years 2008, 2013, and 2016. The further details are presented in Table 13.

Table 13
PIDE Thesis on Exchange Rate Management

Author(s)	Objective	Data Period	Methodology	Findings
Asad, et al. (2005)	Estimate the sterilization coefficient for the period between July 2000 and December 2003.	2000:M7-2003:M12	OLS	Sterilization coefficient for Pakistan (July 2000 - December 2003) was -0.87. Indicates 87 percent of the increase in net foreign asset (NFA) was sterilized through government securityies sales.
Khawaja and Din, (2007)	This study uses the composite variable exchange market Pressure rather	1991:M4-2005:M12.	Granger Causality test	During active Foreign Currency Deposits (FCDs), causality observed from

Author(s)	Objective	Data Period	Methodology	Findings
	than foreign reserves or exchange rate, to examine the interaction between monetary variables and external account.			exchange market pressure to interest rates. Post-FCD freeze and post-9/11, causality shifts from interest rates to exchange market pressure. Dollarization during FCD period led to rupee depreciation and inflation, countered by interest rate hikes. After freeze, managing exchange market pressure shifted to money supply due to low reserves. Post-9/11, foreign inflows prompted currency purchases to maintain export competitiveness. Interest rate adjustments respond mainly to FCDs and dollarization; money supply manages exchange market pressure.
Ahmed, (2013)	Analyze the foreign exchange market disequilibrium in Pakistan's economy in terms of its money market conditions and the effectiveness of authorities' sterilization policies.	1975:Q2-2009: Q1	Toda and Yamamoto (1995) Causality Methodology	Disequilibrium in Pakistan's foreign exchange markets linked significantly to domestic money market. Fixing exchange rate limits control over domestic money supply. Attempts to increase money circulation result in losses of foreign reserves.
Sarosh Mir & Hamid, (2017)	Measure exchange rate misalignment	2000-2014	R-JOS methodology for calculating overvaluation	Exchange rate overvaluations reported: 20 percent in 2016 48 percent in 2008 52 percent in 2013

Besides the peer-reviewed articles, we also reviewed the PIDE thesis that discussed the problems of exchange rate policy in Pakistan, such as the management of exchange rates and foreign exchange reserves (see Table 14). This is a critical aspect of economic policy for developing countries like Pakistan. Various studies have investigated into the optimal levels of foreign reserves and the effectiveness of monetary policy in maintaining exchange rate stability, revealing significant insights and findings.

Kaleem (2014) examined the optimal level of foreign exchange reserves and discovered that Pakistan's actual reserves were consistently higher than the optimal level,

suggesting a conservative approach by the authorities to safeguard against external shocks. Mudassar (2017) highlighted a shift where actual reserves exceeded optimal levels post-2004-05, despite a decline after the global financial crisis. This indicates that while the reserves were initially insufficient, efforts to accumulate reserves eventually surpassed the optimal threshold, even during economic downturns.

Akhtar (2019) explored the political economy factors affecting exchange rates and found that political regimes in Pakistan often maintained an overvalued exchange rate by borrowing foreign exchange. This overvaluation was driven by political motives to present an artificially strong currency, which could have adverse long-term economic consequences.

Rao (2019) assessed the effectiveness of monetary policy in controlling foreign exchange market pressures and concluded that while monetary policy was effective in the short run, it became counterproductive in the medium run. The study highlighted that significant costs were associated with central bank interventions, which often led to reserve depletion and exchange rate overshooting, indicating inefficiencies in the intervention strategies.

Khan (2007) validated the monetary model of exchange rate determination and emphasized the importance of both monetary and real factors in determining exchange rate behavior. The study suggested that trade and financial liberalization policies play a crucial role in maintaining exchange rate stability, highlighting the interconnectedness of various economic policies.

Waheed (2007) found that the State Bank of Pakistan only partially neutralized its foreign exchange interventions, with a sterilization coefficient indicating limited monetary independence under a managed floating exchange rate regime. This partial sterilization suggested that the central bank's efforts to control monetary conditions were often constrained by external factors.

Khawaja (2007) noted limited monetary autonomy for the State Bank of Pakistan in managing exchange market pressure, identifying domestic credit and interest rates as dominant tools of monetary policy. The study underscored the challenges faced by the central bank in exerting full control over monetary policy due to external pressures and structural limitations.

Table 14

PIDE Thesis on Exchange Rate Management

Author	Objective	Methodology	Sample	Findings
Kaleem (2014)	to check the optimal level of foreign exchange reserves	Buffer stock model by Frankel Jovanovic (1982)	2000:Q1 to 2015:Q4	Pakistan's actual level of foreign reserves is higher than the optimal level.
Mudassar (2017)	To determine the optimal level of international reserves for Pakistan, including the sovereign risk associated with default on external debt.	Ben-Bassat & Gottlieb, 1992	1982-2017	•Optimal reserves remained higher than actual reserves until 2004-05; thereafter, actual reserves exceeded optimal levels. •Although the level of actual reserve holdings declined after the global crisis, it still re-

Author	Objective	Methodology	Sample	Findings
				mained higher than the optimal level.
Akhtar (2019)	To estimate the misalignment of REER, adjusted for political economy factors, going beyond economic fundamentals.	Extended the BEER Model by introducing political economy variables like central bank independence and the election effect.	1980 to 2017	Political regimes in Pakistan have attempted to maintain an overvalued exchange rate by borrowing foreign exchange.
Rao (2019)	To construct an Exchange Market Pressure Index and assess the effectiveness of monetary policy in controlling foreign exchange market pressures.	SVAR	January 1991 to April 2019	Monetary policy is effective in the short run, neutral in the long run, and counter-productive in the medium run. Pakistan spent around USD 112 billion to support the exchange market, achieving only a Rs. 35.92 adjustment. Without intervention, the exchange rate would be Rs. 177.43 per dollar instead of Rs. 141.51.Central bank interventions failed, leading to reserve depletion and exchange rate overshooting.
Khan (2007)	To examine the validity of the monetary model of exchange rate for Pakistan.	cointegration and vector error-correction modelling	1982Q2 to 2005Q4.	The monetary approach remains a valid representation for determining long-run exchange rate behavior. Besides monetary factors, real factors play a significant and dominant role in determining the exchange rate in Pakistan. Trade and financial liberalization policies are useful for maintaining exchange rate stability.
Waheed (2007)	To analyze the State Bank of Pakistan's response to foreign exchange inflows from January 2001 to June 2007, using a reaction function to test the hypothesis that SBP fully sterilized its foreign exchange interventions. To test the hypothesis that the 1-month forward premium is an unbiased predictor of the 1-month forward spot rate. To measure the misalignment in REER.	GMM, Cointegration, SVAR	2001:01 to 2007:06, 1980Q1 to 2006Q4 for third objective	The SBP only partially neutralized its foreign exchange interventions, with a sterilization coefficient of -0.699, indicating limited monetary independence under a managed floating exchange rate regime. Tests indicate a cointegration relationship between forward and spot rate but fail to support the forward rate unbiasedness hypothesis. Nominal shocks like monetary policy temporarily impact the long-run equilibrium real exchange rate. Long-term related variables include terms of trade, real interest rate differential, government spending, and the tradable to nontradable goods ratio.

Author	Objective	Methodology	Sample	Findings
Khawaja (2007)	To analyze the relationship between exchange market pressure and monetary variables, such as domestic credit and interest rates. To identify the monetary tools used to manage exchange market pressure. To determine the degree of monetary autonomy enjoyed by the State Bank of Pakistan (SBP).	Cointegration	2001:01 to 2007:06	Domestic credit and interest rate have been the dominant tools of monetary policy. The State Bank of Pakistan has had highly restricted monetary autonomy.

6. CONCLUSION

This review highlights the complexities of exchange rate management and the optimal level of foreign reserves in Pakistan. The findings indicate that while actual reserves have often exceeded optimal levels, political and economic factors significantly influence exchange rate behavior. The effectiveness of monetary policy varies over different time horizons, with interventions often leading to significant costs and limited long-term success. These insights underscore the need for a balanced approach that considers both economic fundamentals and political dynamics to achieve sustainable exchange rate stability and optimal reserve levels. The studies collectively suggest that a detailed understanding of the interplay between monetary policy, political factors, and external economic conditions is essential for effective exchange rate management in Pakistan.

REFERENCES

Aamir, M., Khan, D. M., Mashwani, W. K., Abiad, M., Akhtar, A., & Naeem, M. (2022). implications of COVID-19 Pandemic on Dollar Exchange Rate of Pakistan. *Frontiers in Applied Mathematics and Statistics, 8*(1), 1–15.

Abas, K. H. and Yusof, Z. (2009), "Exchange Rate and Monetary Fundamentals: Evidence from Malaysia and Japan", International Conference on Business and Information (BAI2009).

Abbas, Z. Khan, S. & Rizvi. S.T. (2011), "Exchange Rates and Macroeconomic Fundamentals: Linear Regression and Cointegration Analysis on Emerging Asian Economies". *International Review of Business Research* Papers, 7, 250–263.

Abbas, Z. Khan, S. & Rizvi. S.T. (2011). "Exchange Rates and Macroeconomic Fundamentals: Linear Regression and Cointegration Analysis on Emerging Asian Economies". *International Review of Business Research Papers*, 7, 250–263.

Afzal, M. (2010). Exchange Rate and Reserves in Asian Countries: Causality Test. *Global Economic Review, 39*(2), 215–223.

Ahmed, H. (2009). Capital Flows and Real Exchange Rate Overvaluation – A Chronic Ailment: Evidence from Pakistan. *The Lahore Journal of Economics, 14*(Special Issue Part 1).

Ahmed, M. (1992). Pakistan's Exchange Rate Policy: An Econometric Investigation. *The Pakistan Development Review*, *31*.49–74

Ahmed, Z. I. (2015). The Efficiency of Exchange Rate Market: A Case Study on Pakistan. *International Journal of Economics, Finance and Management Sciences, 3*(2), 125–127.

Akhtar, M, J. (2019),The Political Economy of Exchange Rate Policy in Pakistan, MPhil Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Akhtar, N., & Burney, N. A. (1992). Government Budget Deficits and Exchange Rate Determination: Evidence from Pakistan. *The Pakistan Development Review, 31*(4), 871–882.

Alam, S., Butt, M. S., & Iqbal, A. (2001a). The Long-run Relationship between Real Exchange Rate and Real Interest Rate in Asian Countries: An Application of Panel Cointegration. *The Pakistan Development Review*, *40*(4), 577–602.

Ali, S. (2016). How does interest rate effect exchange rate of Pakistan: Evidence of ARDL bound testing approach. *Journal of Finance & Economics Research, 1*(1), 1–10.

Ali, S. A., & Ahmad, E. (1999). Exchange Rate and Inflation Dynamics. *The Pakistan Development Review*, *38*(3), 235–251.

Amin, A., Naeem, M., & Begum, S. (2020). Exchange Rate Fluctuations in Pakistan, Causes and Remedies. *International Review of Management and Business Research, 9*(4), 12–25.

Anaraki, N.K. (2007), "Meese and Rogoff's Puzzle Revisited", *International Review of Business Research Papers*, *3* (2), 278– 304.

Ansari, I. A., & Basit, A. (2015). Role of foreign investment and external debt in determination of exchange rate. *Quarterly Journal of Econometrics Research, 1*(2), 23–31.

Balke, N.S. and Famby, T. B. (1994), "Large Shocks, Small Shocks and Economic Fluctuations: Outliers in Macroeconomic Time Series", Journal of Applied Econometrics, 9, 181–200.

Bhatti, R. H. (1996). A Correct Test of Purchasing Power Parity: The Case of Pak-Rupee Exchange Rates. *The Pakistan Development Review*, *35*(4II), 671–682.

Bhatti, R. H. (1997). Do Expectations Play Any Role in Determining Pak Rupee Exchange Rates? *The Pakistan Development Review*, *36*(3), 263–273.

Bhatti, R. H. (2001). Determining Pak Rupee Exchange Rates vis-à-vis Six Currencies of the Industrial World: Some Evidence Based on the Traditional Flow Model. *The Pakistan Development Review*, *40*(4II), 885–897.

Bhatti, R. H. & I. A. Moosa (1994) A New Approach to Testing Ex Ante Purchasing Power Parity. Applied Economics Letters 1, 148–151.

Bilson,J.F.O. (l978a), "The Monetary Approach to the Exchange Rate: Some Empirical Evidence", IMF Staff Papers, *25*(3), 48–75.

Boorman, J., Lane, T., Schulze-Ghattas, M., Bulir, A., Ghosh, A., Hamann, J., Mourmouras, A., Phillips,S. (2000), "Managing financial crises: The experience in East Asia", *IMF Working Paper* WP/00/107

Branson, W. H. (1980). Asset markets and relative prices in exchange rate determination. Princeton Studies in International Finance, No. 46. *Princeton University Press*.

Branson, W. H. and Handerson, D. W. (1985), "The Specification and Influence of Assets Markets", In R. W. Jones, & P.B. Kene (Eds.), Handbook of International economic, Vol. 2, Amsterdam: Elsevier.

Branson, W.H. (1979), "Exchange Rate Dynamics & Monetary Policy", Lindbeck, A. (ed.) (1979), Inflatiøn and Employment in Open Economies, Amsterdam: North Holland, 189–224.

Branson, W.H., (1977), "Asset Markets and Relative Prices in Exchange Rate Determination", SozialWissenschaftlicheAnnalen, 1.

Cassel, G. (1918), "Abnormal Deviations of International Exchanges," *Economic Journal, 28*: 413–415.

Cheung, YW. Chinn, M.D. and Pascual, A.G. (2002), "*Empirical Exchange Rate Models of the Nineties: Are any Fit to Survive?*", National Bureau of Economic Research, Working Paper 9393.

Chishti, S. and M. A. Hasan (1993). What determines the behaviour of real exchange rate in Pakistan? *The Pakistan Development Review, 32*(4), 1015–1028.

Clarida, R., Gali, J. & Gertler, M. (2001)," Optimal Monetary Policy in Open versus Closed Economies: An Integrated Approach", *American Economic Review (Papers and Proceedings), 91*, 248–52.

Corsetti, G. and Pesenti, P. (2001), "Welfare and Macroeconomic Interdependence", *Quarterly Journal of Economics,* Vol. *116* (2), 421–45.

Cushman, D.O. (2007), "A Portfolio Balance Approach to the Canadian–U.S. Exchange Rate", *Review of Financial Economics*, 16, 305–320.

Debowicz, D., & Saeed, W. (2014). Exchange Rate Misalignment and Economic Development: The Case of Pakistan. *SSRN Electronic Journal*.

Diamandis, P.F, Georgoutsos, D.A. and Kouretas, G.P. (1998), "The Monetary Approach to exchange Rate: Long Run Relationships, Identification and Temporal Stability", Journal of Macroeconomics, 20(4), 741–766.

Diamandis, P.F. & Kouretas, G.P. (1996), "Exchange Rate Determination: Empirical Evidence for the Greek Drachma", Managerial and Decision Economics, 17, 277–290.

Dijk, D.V, Franses, H.S. & Lucas. A. (1999), "Testing for Smooth Transition Nonlinearity in the Presence of Outliers", *Journal of Business & Economic Statistics, 17*(2), 217–235.

Ditta, A., Ghufran, B., & Hussain, L. (2022). Forecasting Inflation, Exchange Rate, and GDP using ANN and ARIMA Models: Evidence from Pakistan. *Sustainable Business and Society in Emerging Economies, 4*(1), 25–32.

Dornbusch, R. (1976b), "Expectations and Exchange Rate Dynamics", *Journal of Political Economy,84(*12), 116–176.

Edwards, S (1989). 'Real Exchange Rates, Devaluation, and Adjustment', Cambridge, Mass: MIT Press.

Frankel (1984), "Tests of Monetary and Portfolio Balance Models of Exchange Rate Determination", Chapter 7, Exchange Rate Theory and Practice, University of Chicago Press.

Frankel, J.A. (1979), "On the Mark :A Theory of Floating Exchange Rate Based on Real Interest Differentials", *American Economic Review, 69*(4), 610–22.

Gali, J. and M. Gertler, (1999), "Inflation dynamics: A Structural Econometric Analysis", *Journal of Monetary Economics, 44*, 195–222.

Gali, J. and Monacelli, T. (2002), "*Optimal Monetary Policy and Exchange Rate volatility in a Small Open Economy*", NBER Working Paper No. 8905.

Gebreselasie, T.G, Akanbi, O.A. and Siche, M. (2005), "*Estimating an Econometric Model of the Rand–USD Nominal Exchange Rate*", Department of Economics Working Paper Series, University of Pretoria.

Gylfason, T. & Helliwell, J.F. (1983), "A Synthesis of Keynesian, Monetary and Portfolio Approaches to Flexible Exchange Rates", *Economic Journal, 93*(372), 820–831.

Haider, A. and Khan S.U. (2008), "A Small Open Economy DSGE Model for Pakistan," *The Pakistan Development Review, 47*(4), 963–1008.

Haque, N.U, Hina, H. 2020. (2020).Pakistan Five Currency Crises, *PIDE Knowledge Brief* 2020:7, Pakistan Institute of Development Economics.

Helg, R., & Serati, M. (1996). Does the PPP need the UIP? IGIER Working Paper No. 97.

Hina, H. (2013). Effects of Global Financial Crisis on Exchange Rate Dynamics Using Various Theoretical Models: An Econometric Investigation. PhD Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Hina, H., & Qayyum, A. (2015). Re-estimation of Keynesian Model by Considering Critical Events and Multiple Cointegrating Vectors. *The Pakistan Development Review, 54*(2), 123–145.

Hussain, F., Junejo, I., & Sohu, J. M. (2019). Impact of Corruption on Exchange Rate: Empirical Evidence from Panel Data.

Hwang, JK. (2001), "Dynamic Forecasting of Monetary Exchange Rate Models: Evidence from Cointegration", International Advances in Economics Research, 7(1), 51–64.

Iqbal, F., & Raziq, A. (2018). Crude oil price-exchange rate nexus in Pakistan. *Financial Statistical Journal, 3*(1), 1–15.

Israd, P. (1978) 'Exchange Rate Determination: A Survey of Popular Views and Recent Models', Princeton Studies in International Finance, No. 42.

Jabeen, M., Rashid, A., & Ihsan, H. (2020). The news effects on exchange rate returns and volatility: Evidence from Pakistan. *International Journal of Finance & Economics, 27*(2), 115–132.

Janjua, M. A. (2007). Pakistan's External Trade: Does Exchange Rate Misalignment Matter for Pakistan? *The Lahore Journal of Economics, 12*(Special E), 126–152.

Johansen, S. (1995a), "Likelihood-based Inference in Cointegrated Vector Autoregressive Models,Oxford, Oxford University Press.

Johansen, S. and Juselius, K. (1992), "Testing Structural Hypothesis in a Multivariate CointegrationAnalysis of the PPP and UIP for UK", Journal of Econometrics, 53, 211–44.

Johnston, B., & Sun, Y. (1997). Some Evidence on Exchange Rate Determination in Major Industrial Countries. IMF, Monetary and Exchange Affairs Department, Working Paper 97/98.

Kaleem, Z. (2014). Demand for Foreign Exchange Reserves in Pakistan: Finding the Optimal Level. MPhil Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Kausar, R. (2022). Covid-19 Uncertainty Impact on Exchange Rate: The Case of Pakistan. *Journal of Development and Social Sciences, 3*(4), 339–344.

Kemal, M. A. & Haider, R. M. (2004). Exchange Rate Behaviour after Recent Float: The Experience of Pakistan. *The Pakistan Development Review*, *43*, 829-852.

Kemal, M. A., & Qadir, U. (2005). Real Exchange Rate, Exports, and Imports Movements: A Trivariate Analysis. *The Pakistan Development Review*, *44*(2), 177–195.

Khalid, Syed Mohammad Abdullah, Empirical Exchange Rate Models for Developing Economies: A Study on Pakistan, China and India. http://dx.doi.org/10.2139/ssrn.1097638

Khan Mashwani, W., Jamal, F., Mahmoud, M., Ali, A., Irfan Uddin, M., Naeem, S., & Chesneau, C. (2021). Machine Learning-based USD/PKR Exchange Rate

Forecasting Using Sentiment Analysis of Twitter Data. *Computers, Materials & Continua, 67*(3), 3451–3461.

Khan, A. J., Ahmad, H. R., & Murtaza, F. (2022). Do monetary models really matter to determine the exchange rate behavior: A case for Pakistan. *Forman Journal of Economic Studies, 18*(1), 23–50.

Khan, B., & Bakhsh, R. P. (2019). Interdependencies of Stock Index, Oil Price, Gold Price and Exchange Rate: A Case Study of Pakistan. *International Journal of Experiential Learning & Case Studies, 4*(2), 318–339

Khan, M, A. (2007). Testing The Monetary Approach to Exchange Rate Determination: The Case of Pakistan. PhD Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Khan, M. (2010). Impact of Per Capita Income on Exchange Rate with Regression Tool. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1699683

Khan, M. A., & Nawaz, S. (2018). Does Pak-Rupee Exchange Rate Respond to Monetary Fundamentals? A Structural Analysis. *The Pakistan Development Review, 57*(2), 175–202.

Khan, M. L., Qara, A., & Muhammad, S. D. (2010). The sources of real exchange rate fluctuations in Pakistan. *European Journal of Social Sciences*, *14*(1), 34.

Khan, M.A. and Qayyum,A.(2008), "Long-Run and Short-Run Dynamics of the Exchange Rate in Pakistan: Evidence From Unrestricted Purchasing Power Parity theory", *The Lahore Journal of Economics, 13*(1), 29–56.

Khan, R. E. A., & Ali, R. (2015). Causality Analysis of Volatility in Exchange Rate and Stock Market Prices: A Case Study of Pakistan. *Asian Economic and Financial Review, 5*(5), 805–815.

Khan, S. (2010). Empirical Study on Impact of Interest Rate on Exchange Rate. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1625492

Khan, S. A., & Jabeen, M. (2014). Modelling Exchange Rate Volatility by Macroeconomic Fundamentals in Pakistan. *International Econometric Review, 6*(2), 58–76.

Khawaja, I, M. (2007). Exchange Market Pressure and Monetary Policy: Pakistan's Experience. PhD Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Korap, L.(2008), "Exchange Rate Determination of Tl/Us$:A Co-Integration Approach", Econometrics and Statistics, 7, 24–50.

Kouretas, G., & Zarangas, L. (1998). A cointegration analysis of the official and parallel foreign exchange markets for dollars in Greece. *International Journal of Finance & Economics*, 3(3), 261–276

Kouri, P. J. K. (1976). The exchange rate and the balance of payments in the short run and in the long run: A monetary approach. *Scandinavian Journal of Economics*, 78(2), 280–304.

Lodhi, K. S., Hayat, A., Aijaz, U., Mazhar, M., & Ghauri, S. P. (2022). Post-Covid-19 Volatility of Exchange Rate Returns: A Case Study of Pakistan. *Global Management Journal for Academy of Sciences (GMJACS), 12*(1), 1–15.

MacDonald, R. (1995), Long-Run Exchange Rate Modelling, International Monetary Fund, Staff Paper , 42(3), 437–489.

MacDonald, R. (1997), "*What determines real exchange rates? The long run and short of it*", International Monetary Fund, Research Department, Working Paper 21.

Malik.K.S. (2011), "Exchange Rate Forecasting and Model Selection in Pakistan (2000-2010)", *Journal of Business and Economics, 3*(1), 77–101.

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Malik.K.S. (2011), "Exchange Rate Forecasting and Model Selectionin Pakistan (2000–2010)", *Journal of Business and Economics, 3*(1), 77–101.

McCallum, B. T. and Nelson, E. (1999), "Nominal Income Targeting in an Open-Economy Optimizing Model", Journal of Monetary Economics, 43, 553–78.

Meese, R.A. and Rogoff, K. (1983a) , "Empirical Exchange Rate Models of the Seventies: Do they Fit Out of Sample?", *Journal of International Economics, 14*, 3–24.

Moosa, I.A. (2000), "A structural time series test of the monetarymodel of exchange rates under the German hyperinflation", *Journal of International Financial Markets, Institutions and Money, 10*, 213–223.

Morley, B. (2009), "A Comparison of Two Alternative Monetary Approaches to Exchange Rate Determination over the Long-Run," *International Econometric Review (IER), Econometric Research Association, 1*(2), 63–76.

Mudassar, A. (2017). Measuring the Optimal Level of Foreign Reserves and Sovereign Risk in Pakistan. MPhil Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Mundell, R.A. (1962), 'The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability", *IMF Staff Papers, 9* (3), 70–76.

Munir, K., & Iftikhar, M. (2023). Macroeconomic determinants of the real exchange rate in Pakistan. *International Journal of Advanced and Applied Sciences, 10*(1), 12–25.

Mussa M., 1976, 'The Exchange Rate, the Balance of Payments, and Monetary and Fiscal Policy under a Regime of Controlled Floating', S*candinavian Journal of Economics, 78*, 229–48.

Najand, M. and Bond, C. (2000), "Structural Models of Exchange Rate Determination", *Journal of Multinational Finance Management, 10*, 15–27.

Nazar, R., & Ali, S. (2017). Impact of Foreign Capital Inflows and Money Supply on Exchange Rate: A Case Study of Pakistan. *Review of Economics and Development Studies, 3*(1), 1–15.

Nwafor, F. (2008). Portfolio Balance Model of Exchange Rate Behavior: A Peso-Dollar Example. *The IUP Journal of Financial Economics, Vol. VI, No. 2*, pp. 41–47.

Obstfeld, M. and Rogoff, K. (1999),"*New Directions for Stochastic Open Economy Models*", NBER Working Papers 7313.

Obstfeld, M. and Rogoff, K. (2004),"*The Unsustainable US Current Account Position Revisited*", NBER Working Papers 10869.

Omer, M., & Aisha, Z. (2020). Testing Uncovered Interest Rate Parity for Pakistan. *International Review of Management and Business Research, 9*(4), 56–70.

Oskooee, M. B. and Kara, O. (2000), "Exchange rate overshooting in Turkey", *Economics Letters 68*, 89–93.

Pearce, D.K. (1983) Alternative views of exchange rate determination, Economic Review, Federal Reserve Bank of Kansas City, February, 16–31.

Qayyum,A. Khan, M.A. and Zaman,K.U., (2004) , "Exchange Rate Misalignment in Pakistan: Evidence from Purchasing Power Parity Theory", *The Pakistan Development Review, 43*(4), 721–735.

Rao, N,H. (2017). Effectiveness of Monetary Policy in Controlling Exchange Market Pressures in Pakistan. MPhil Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Rashid, A. (2006), "Do Exchange Rates Follow Random Walks? An Application of Variance- Ration Test", *Pakistan Economic and Social Review, 44*(1), 57–79.

Raza, S. A., & Afshan, S. (2017). Determinants of Exchange Rate in Pakistan: Revisited with Structural Break Testing. *Global Business Review, 18*(4), 825–848.

References

Riaz, N., & Munir, K. (2021). Remittances-Exchange Rate Nexus: Evidence from Pakistan. *Audit and Accounting Review, 1*(1), 12–29.

Salam, S., & Ejaz, M. (2021). Determining The Real Exchange Rate Equilibrium for Pakistan. *JISR Management and Social Sciences & Economics, 19*(1), 127–147.

Siddiqui, R., Afridi, U., & Mahmood, Z. (1996). Exchange Rate Determination in Pakistan: A Simultaneous Equation Model. *The Pakistan Development Review*, *35*(4), 683–692.

Sukkur IBA Journal of Management and Business, 6(1), 34–44.

Syed, A. A. S., Fatima, K., & Zaheer, M. (2022). The Impact of COVID-19 on Stock Market and Exchange Rate Uncertainty in Pakistan. *Business Review, 16*(2), 96–108.

Tiwari, A. K., Tahir, M. I., & Shahbaz, M. (2015). Analyzing time–frequency relationship between oil price and exchange rate in Pakistan through wavelets. *Journal of Applied Statistics, 42*(1), 1–25.

Tweneboah, G. (2009). Relevance of financial markets for exchange rate modeling in Ghana. *The IUP *Journal of Financial Economics, 7*(3&4), 24–36. Available at SSRN: https://ssrn.com/abstract=1524703

Waheed, M. (2007). Foreign Exchange Intervention, Sterilization and Exchange Rate Issues: A Case of Pakistan. PhD Thesis, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Walsh, C. (1995), "Optimal Contracts for Central Bankers'', *American Economic Review, 85*, 150–167.

Wong, M. (2004), "A Monetary Approach to the Sterling-US Dollar Exchange Rate", Middlesex University Business School.

Woodford, M. (2003), "Interest and Prices: Foundations of a Theory of Monetary Policy ", Princeton, NJ: Princeton University Press.

Zakaria, M., & Ahmad, E. (2009). Productivity Shocks and Nominal Exchange Rate Variability: A Case Study of Pakistan. *Journal of Economic Integration, 24*(1), 175–89.

Zakaria, M., Ahmad, E., & Iqbal, M. M. (2007). Nominal exchange rate variability: A case study of Pakistan. *Journal of Economic Cooperation, 28*(1), 73–98.

Zhang, S. and Lowinger, T.C. (2005), "Cointegration in a Monetary Model of exchange Rate Determination",ASBBS E-J