Global Journal for Management and Administrative Sciences
ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

EXCHANGE RATE VOLATILITY IN PAKISTAN'S POLITICAL CONTEXT

Dr. Saghir Pervaiz Ghauri
Professor
Department of Economics
Jinnah University for Women

Anum Hayat
Lecturer
Department of Economics
Jinnah University for Women

Noman Ahsan
Research Scholar
Department of Public Administration
University of Karachi

Abstract

Exchange rates play a crucial role as economic indicators in developing nations such as Pakistan, where their instability can have profound effects on economic stability. This study investigates the dynamics of asset returns, risk factors, and exchange rate volatility under different political systems, focusing on both daily and monthly frequencies. Utilizing daily and monthly time-series data on U.S. dollar exchange rates from 1981 to 2021, the research categorizes this period into three political eras: pre-autocracy (1988-1998), autocracy (1999-2008), and post-autocracy (2009-2022). The GARCH family of models is employed to analyze exchange rate volatility within these political contexts. The results indicate that pre- and post-autocracy regimes exhibit minimal or insignificant average daily returns, while monthly returns are positive and statistically significant. In contrast, autocracy regimes show zero or insignificant average returns in both daily and monthly exchange rates. The study identifies an asymmetric impact of positive and negative news across all regimes and frequencies, except for post-autocracy's monthly exchange rate, which displays symmetry. Notably, positive news has a more pronounced influence than negative news in all regimes, highlighting an asymmetry in news impact. However, the impact of positive and negative news is symmetric in the monthly exchange rate during post-autocracy. The study suggests a direct correlation between the magnitude of democracy and autocracy and heightened exchange rate volatility. Emphasizing the lower risk and higher returns of monthly exchange rates, it recommends that governments, investors, and traders focus on monthly investments, trading strategies, and policy formulation. The observed symmetry in the impact of disruptive events within the monthly exchange rate, particularly in the current era, holds promise for informed policy and decision-making.

Keywords: Exchange Rate Volatility, GARCH Model, Political Systems of Pakistan.

This work is licensed under a Creative Commons Attribution 4.0 International License.

Introduction

Investigating the returns on financial market variables such as volatility of exchange rates and stock market indexes has been a strong area of focus for the researchers since they have a significant impact on the decision-making of an individual and the progress of an economy of a country (Sánchez-Fung, 2003). Volatility models are utilized to determine a nation's economic performance for risk management and portfolio allocation. Because it shocks domestic and foreign investment, analysis of exchange rate volatility (ERV) is a key factor in risk management, which is crucial for investors. Furthermore, it is important within bilateral trade agreements for trading nations because it catalyzes trade in positive and negative directions. Consequently, policymakers examine exchange rate volatility to plan appropriate fiscal and monetary policies.

Pakistan is a developing nation, so looking into the performance and volatility of the currency rate there and how it can impact the national economy is critical. A few contributions have been made in this regard, one of which is by Mahmood et al. (2011), who use the GARCH model to highlight exchange rate volatility and macroeconomic variables in Pakistan and investigate the possibility that exchange rate volatility influences trade openness, GDP, and growth rate favourably while adversely affecting foreign direct investment. Shah et al. (2009) conducted a noteworthy study on Pakistan in which the author examines the high exchange rate volatility in developing nations and the role played by central banks in controlling these fluctuations to stabilize economic performance. Furthermore, the central banks can increase exchange rate volatilities if the central bank's intervention is continuous and persistent.

A few political scientists have also investigated the relationships between international financial markets, namely currency markets and national politics. They used various research methods to do this, and the findings provide valuable information on how currency traders respond to politics in developing democracies. For example, Bernhard and Leblang (2002) demonstrate that politics influences the link between spot and forward currency prices during election campaigns, cabinet discussions, and government dissolutions. The following researchers have studied the political economics of developing nations:

Haggard and Macintyre claim that exchange rate volatility and democratization in developing market nations are skewed indicators of future exchange rates. Frieden (2002) found that average yearly depreciation rates and coefficient variation in currency rates in fourteen OECD nations are influenced by electoral times and measures of the relative size of specific economic sectors. Research on security markets and politics complement each other.

Regarding exchange rate volatility, there is a wealth of work on generalized autoregressive conditional heteroscedasticity (GARCH) and autoregressive conditional heteroskedasticity (ARCH). Exchange rate data is subjected to symmetrical effects analysis using GARCH and ARCH models. Additional GARCH variants are employed for comprehensive analysis. These include Nelson's (1991) exponential GARCH (EGARCH), ZakoЮan's (1994) and Glosten, Jagannathan, and Runkle's (1993) threshold

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

GARCH (TGARCH), and Engle, Lilien, and Robins' (1987) GARCH in a mean (MGARCH), which can be utilized to investigate asymmetric effects and leverage effects (Y. et al., 2014). These variations have been used to examine the volatility of currency rates in different nations. These GARCH model extensions enhance the study as bad news tends to have a stronger or larger impact than good news.

The studies have adopted several different econometric techniques to explore the volatility of exchange rates during autocracy and democracy. This research thesis will focus on GARCH models to investigate the influence of autocracy and democracy (pre- and post-autocracy) on the exchange rate of Pakistan.

Importance Of Study

Many studies have been conducted on the research topic internationally, but no published research was found with context to Pakistan. This paper made a unique contribution to the literature regarding Pakistan, being a unique attempt to explore the volatility of the exchange rate and risk associated with this asset daily and monthly in scenarios of different political systems.

Problem Statement

Exchange rate volatility is a major economic problem in developing countries like Pakistan; therefore, it is essential to investigate the volatility and risk associated with the exchange rate for U.S. dollars during the political system of democracy and autocracy, along with the daily and monthly frequencies. (Mohsin et al., 2019).

Research Questions

1. What is the extent of exchange rate volatility in Pakistan on daily and monthly frequencies, and how does it affect the attractiveness of holding this asset in international trade and investments, considering associated risks and returns?

2. How do various political systems influence the magnitude of exchange rate volatility, and can categorizing news as "bad" or "good" news help policymakers develop effective strategies for exchange rate stability, leading to balanced net exports and economic growth?

Objectives of the Study

Pakistan is a lower middle-income and labour-intensive economy and widely depends on imports. The availability of capital resources in Pakistan is highly insufficient, therefore continuously facing a budget deficit and relying on debts. On the other hand, Pakistan is also facing a current account deficit due to an oriented economy. In this scenario, the exchange rate and its volatility play a vital role in disturbing and stabilizing the economy by increasing or decreasing the country's deficits.

Therefore, the objectives of this study are:

- To investigate the volatility of the exchange rate in Pakistan during daily and monthly frequencies to discover the viability of holding this asset and its risks and returns in international trade and investments.

- To investigate the impact and magnitude of different political systems on the volatility of exchange rates as bad news or good news so that policymakers can make efficient policies for the stability of exchange rates, which leads to balanced net export and economic growth.

Hypotheses

H_1: The exchange rate during democracy is more volatile than autocracy in Pakistan.

H_2: A more risk factor is associated with daily exchange rate returns than monthly.

H_3: Autocracy has an impact on the volatility of the exchange rate as bad news, while democracy has an impact as good news.

H_4: Bad news has a greater effect than good news on the volatility of the exchange rate.

H_5: There is a relationship between the magnitude of autocracy and the exchange rate volatility.

H_6: There is a relationship between the magnitude of democracy and the exchange rate volatility.

Literature Review

In order to enhance the ability to predict outcomes and make informed future decisions, a high level of precision in handling high-frequency data is essential. The volatility of exchange rates holds significant implications for macroeconomic variables such as capital flows and international trade flows. Consequently, there is a pressing need to thoroughly examine and understand this volatility. Scholars, governments, and policymakers are keenly interested in exploring and analyzing the behavior of volatility to effectively control and manage the associated risks to economic growth.

An analysis conducted by Kantar (2021) delves into GARCH models, including GARCH, GJR, and EGARCH, which are nonlinear models, testing their validity in the context of exchange rate volatility in Turkey. The study's findings reveal that the GARCH (1,1) model successfully elucidates the volatility of the exchange rate.

A study by KUTU et al. (2021) takes a nuanced approach by decomposing oil prices into positive and negative shocks. Their results indicate that both positive and negative oil shocks exert a symmetric impact on exchange rates, while political and institutional factors introduce an asymmetric impact. The study suggests the establishment of robust political institutions to foster good governance, accountability, and transparency, ultimately preventing the negative consequences of oil price shocks on import costs.

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

Research conducted by Quinn and Weymouth (2016) identifies the degree of competitiveness in political institutions, rather than other attributes of democratic institutions, as a key factor influencing the valuation of currencies. Democratic societies with consumer-friendly policies tend to, albeit modestly, overvalue exchange rates. The study also highlights that sustained currency depreciation leads to electoral repercussions for incumbent governments, providing a disincentive for democratic governments to engage in prolonged currency wars.

Bernhard (2015) investigates the impact of democratic political events on currency markets by examining the link between forward and spot exchange rate markets. The study concludes that the forward rate often provides a misleading impression of potential future fluctuations in exchange rates, attributed to a risk premium sought by currency traders for holding the currency.

Steinberg and Malhotra (2014) shed light on exchange rate manipulation, finding it to be less frequent under civilian dictatorships compared to military and monarchical dictatorships. Abdalla's work (2012) utilizing the panel GARCH model for 19 Arab currencies captures volatility clustering and leverage impact, revealing unstable volatility for some currencies and persistent volatility for others.

The asymmetrical EGARCH (1,1) results demonstrate a leveraging effect for most currencies, indicating higher volatility in the next period following negative shocks. Additionally, research suggests that exchange rate volatility is associated with reduced de facto persistence, advocating for a more flexible exchange rate regime.

Statistical results based on the post-Bretton Woods era indicate a negative association between democratic regimes and de facto exchange rate persistence. This relationship strengthens with voter inclination toward domestic production and societal groups' influence. Hayes et al. (2003) utilize the Markov regime-switching model to show how political developments continuously alter the probability of different currency market equilibriums in young and emerging economic democracies.

The study aids in determining the compatibility of financial globalization and democratization. Domestic political institutions, as evidenced by Leblang's empirical study (1999), suggest that political preferences influence the choice of exchange rate regimes, with floating exchange rate regimes being more expected in democratic politics. Reynolds (1983) further emphasizes the role of political change as a primary driver of economic expansion, positing that consistent policies can propel Pakistan towards high economic growth.

Methodology

The approach of this research study is carefully planned to examine the daily and monthly frequencies of fluctuations in the U.S. dollar exchange rate in Pakistan under different political regimes. The State Bank of Pakistan's historical exchange rate records, which span from 1981 to 2021 and include both authoritarian and democratic periods of Pakistan's political history, provide the basis of the core dataset used in this analysis. A

logarithmic adjustment is used to minimize possible problems with heteroskedasticity, which could potentially skew the research results and guarantee that the data is suitable for thorough examination.

Generalized Autoregressive Conditional Heteroskedasticity (GARCH) fashions, consisting of GARCH(p,q), GARCH-M(1,1), T-GARCH(1,1), and E-GARCH(1,1), form the main basis of the have a look at's framework. These GARCH models are broadly recognized in economic econometrics and provide a strong platform for dissecting volatility dynamics inside economic time collection information. These models permit us to discover the average returns and risk factors and provide a lens into the evolving nature of volatility inherent in U.S. Dollar change price returns.

The study method takes a systematic method of statistics evaluation. Initially, it entails visually identifying patterns of volatility clustering through conditional variance graphs and straightforward data visualizations. This step gives an initial glimpse into the inherent volatility shape of the facts.

The evaluation then includes a heteroskedasticity check with the Autoregressive Conditional Heteroskedasticity (ARCH) method to find any prospective Autoregressive Conditional Heteroskedasticity repercussions. This investigation is a vital phase in determining whether or not conditional volatility is the inside of the facts required to understand how the exchange rate behaves. This investigation is vital in determining whether conditional volatility is present in the information required to recognize how the exchange fee behaves.

After heteroskedasticity is set up, time-varying volatility and threat factors related to returns on U.S. Dollar change fees are also tested by estimating GARCH models. The selected models are tailor-made to analyze how unique political structures affect the volatility of change costs, presenting valuable insights into the effects of political regimes.

Both dynamic and static forecasting techniques are used to test the GARCH models' resilience and dependability to confirm their capacity to provide precise insights into exchange rate volatility throughout various political eras.

A normality check and a histogram test are used in the research's final ranges to evaluate the model residuals' distribution. Comprehending the statistical properties of the residuals is crucial, as it adds to the richness of interpretation for the study results. The research technique is a thorough and systematic approach intended to offer insightful information about the connection between political regimes and exchange rate volatility, illuminating the benefits and drawbacks of currency exchange in Pakistan.

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

Data Collection

Table 01: Data Sources				
Series	**Denoted by**	**Measure**	**Source**	**Type of variable**
Exchange Rate (daily & monthly)	E.R.	Concerning U.S. $	State Bank of Pakistan	Univariate

This study aims to identify the volatility of the exchange rate of the U.S dollar during autocracy and democracy regimes in daily and monthly frequencies for which the exchange rate of the U.S dollar's series has been taken from the State Bank of Pakistan, which spans from 1981 to 2021 as this period include both democracy and autocracy eras of Pakistan. We split this period into three political systems: autocracy (1988-1998), autocracy (1999-2008), and post-autocracy (2009-2022). Pre and post-autocracy are the period of democracy in Pakistan. The log value of the variable in this study has been used to solve the heteroskedasticity problem.

Models of Study:

General equation of the GARCH model:

$$GARCH(p,q): h^{p}\ \theta_i h_{t-i} + \sum_{j=1}^{q} \quad b_j u_{t-j}^2$$

$$GARCH - M(1,1): h^{p}\ \theta_1 h_{t-1} + \sum_{j=1}^{q} \quad b_1 u_{t-1}^2$$

$$T - GARCH(1,1): h \quad + b_1 u_{t-1}^2 + \gamma_1 u_{t-1}^2 D_{t-1}$$

$$E - GARCH(1,1): \log(h_t) = \Phi + \sum_{j=1}^{q} \quad n_j \left| \frac{u_{t-j}}{\sqrt{h_{t-j}}} \right| +$$

$$\sum_{j=1}^{q} \quad \lambda_j \frac{u_{t-j}}{\sqrt{h_{t-j}}} + \sum_{i=1}^{p} \quad \theta_i \log\left(h_{t-i}\right)$$

To explore the interplay of average returns, risk factors, and time-varying volatility concerning U.S. dollar exchange rates across varying political systems, analyses were conducted at both daily and monthly intervals. Empirical methodologies, specifically GARCH models as introduced by Bollerslev in 1986, were employed for this investigation.

Initially, the identification of volatility clustering was pursued through the examination of conditional variance graphs and the categorization of series into simple graphs. This preliminary step aimed to discern patterns indicative of volatility clustering within the exchange rate returns.

Subsequently, a crucial prerequisite for GARCH model estimation, the heteroskedasticity test ARCH, was applied using the Ordinary Least Squares (OLS) method. This served the purpose of detecting the Autoregressive Conditional Heteroskedasticity (ARCH) effect within the data, essential for subsequent GARCH modeling. Additionally, the determination of lags in the ARCH effect assisted in the decision-making process between employing ARCH and GARCH methodologies.

Thirdly, the GARCH model estimation was employed to quantify the risk factor and ascertain time-varying volatility associated with exchange rate returns. This step delved into the intricacies of the financial dynamics influencing the fluctuations in the U.S. dollar exchange rates.

The stability of the established models was rigorously assessed through the utilization of both dynamic and static forecasting methods. This comprehensive evaluation aimed to ensure the reliability and robustness of the models across different scenarios and time frames.

Finally, a histogram test was applied to assess the normality of the data, providing insights into the distributional characteristics of the exchange rate returns. This final step contributed to the overall understanding of the statistical properties of the data, offering a holistic perspective on the empirical findings derived from the analyses conducted throughout the study.

Results and Discussion

Table 1 reviews the descriptive information of exchange rate returns for the 31 years 1981-2022 on a daily and monthly basis. Regarding the daily exchange rate, the mean of the log is 69.92. The standard deviation enlightens how distant observations are from the average. However, skewness measures the degree of asymmetry of the series. In our case, the skewness of the exchange rate is greater than 0, which means the data is positively skewed, while the kurtosis measures the peakedness or flatness of the sample distribution. The kurtosis value is more than 3 in our data, meaning the series is leptokurtic. In addition, the Jarque-Bera test is used for testing the normality of each variable with H0 of series to be normally distributed, and Table 1 shows that the p-value of Jarque-Bera statistics for series is less than 0.05 (95% confidence), we may reject our Ho means the series is not normally distributed. However, for monthly exchange rate data, the mean of the log is 73.02. The skewness of the monthly exchange rate is greater than 0, which means data is positively skewed, while the kurtosis in monthly data is less than three, meaning the series is leptokurtic. In addition, the Jarque-Bera test is used for testing the normality of each variable with H0 of series to be normally distributed, and Table 1 shows that the p-value of Jarque-Bera statistics for series is less than 0.05 (95% confidence), we may reject our H0 means the series is not normally distributed.

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

Table 2: Descriptive Statistics for Exchange Rate			
Daily Exchange Rate		**Monthly Exchange Rate**	
Mean	69.90	Mean	73.02
Median	60.16	Median	60.20
Maximum	168.21	Maximum	216.82
Minimum	17.79	Minimum	18.26
Std. Dev.	36.16	Std. Dev.	42.48
Skewness	0.80	Skewness	0.91
Kurtosis	3.17	Kurtosis	3.28
Jarque-Bera	920.64	Jarque-Bera	57.84
Probability	0.00	Probability	0.00
Observations	8499.00	Observations	409.00

Figure 1

The phenomenon referred to as the ARCH effect in Figure 1 is discerned through the identification of clusters. This effect manifests when substantial additional changes amplify already existing large changes. Conditional variance operates at various stages within the time series model, aligning with the plotted series. This observation holds true on both a daily and monthly basis.

The outcomes of the Augmented Dickey-Fuller (ADF) test and Phillips Perron unit root test for assessing the stationarity of daily and monthly exchange rates are detailed in Table 2. The ADF test's p-value, being less than 0.05, signifies that daily and monthly exchange rate returns exhibit stationarity at a 5% confidence interval, leading to the rejection of the existence of a unit root. The Phillips Perron unit root test corroborates these results for both frequencies, underscoring the robustness of the conclusions drawn.

Heteroscedasticity, or the ARCH effect, is observed at 1, 3, and 6 lags in autocracy, as well as in both pre- and post-autocracy (democracy), as indicated by the results of the ARCH test of heteroskedasticity in Table 3. The study establishes that significant heteroskedasticity exists with a 5% confidence level, leading to the rejection of the null hypothesis of no heteroscedasticity. The coefficients increase when using the ARCH model at lag six, rendering the model economically impractical. Consequently, the GARCH (1,1) model is deemed more appropriate due to its greater economic efficiency compared to the ARCH (6) model.

The GARCH-M model's conditional mean is contingent on its own conditional variance, depending on whether conditional variance or volatility better captures risk. This model examines the risk behavior of exchange rate return and volatility. The conditional mean function of the series may exhibit conditional variance (Engle, 1993). Table 4 presents two equations reflecting the model's output. The mean equation elucidates the constant term C's coefficient, representing the average returns associated with exchange

rate returns. In this context, daily exchange rate average returns for all political systems are zero, but significant p-values imply the potential for increased returns.

Significantly, lag variables R-LPREAUTOCRACY (-1), R-LAUTOCRACY (-1), and R-LPOSTAUTOCRACY (-1) illustrate how historical exchange rate values influence current exchange rate values. The variance equation delineates the relationship between risk volatility and the past square residual term. Both past conditional variance terms (GARCH (-1)) and past square residual term (RESID (-1) 2) terms are statistically significant at 5%, indicating that the volatility of past exchange rate returns significantly impacts present volatility, and past square residual terms significantly affect risk volatility.

Additionally, under democratic political systems, monthly exchange rates yield zero average gains. However, a statistically negligible p-value in autocracy suggests the possibility of an increase in returns. The present exchange rate, larger than daily exchange rate returns but statistically significant across all political systems, is influenced by the previous month's exchange rates, as indicated by lag terms. The variance equation reveals that the term representing the past square residual (RESID (-1) 2) is statistically significant at a 5% confidence level. This study suggests that past square residual terms exert a noteworthy influence on risk volatility, with a greater impact in monthly data than in daily data. Despite statistically significant past conditional variance terms (GARCH (-1)) at 5%, monthly data show smaller past square residual terms during and after autocracy, suggesting that past square residual terms significantly affect risk volatility. With a 5% significance level, the conclusion can be drawn that H2 has a higher risk component associated with daily exchange rate returns, time variables, and time-correlating volatility than monthly frequency.

Table 03: GARCH M (1,1)

Mean equation			Variance Equation	
	Average Returns	Impact of past exchange rate on present exchange rate	Impact of Past square residual term on present risk volatility	Impact of Past volatility on present volatility
Daily Exchange Rate				
During Pre Autocracy (1988-1998)	zero but significant	Insignificant	Positive and significant (14.8%)	Positive and significant (69%)
During Autocracy (1999-2008)	zero but significant	Negative and significant (6%)	Positive and significant (157%)	Positive and significant (51.4%)
During Post Autocracy (2009-2022)	zero but significant	Positive and significant (31.8%)	Positive and significant (22.1%)	Positive and significant (66%)
Monthly Exchange Rate				
During Pre Autocracy (1988-1998)	Significant (0.3%)	Positive and significant (39.9%)	Positive and significant (137.6%)	Negative and significant (7.1%)
During Autocracy (1999-2008)	insignificant	Positive and significant (48.4%)	Positive and significant (115.2%)	Positive and significant (49.5%)
During Post Autocracy (2009-2022)	Significant (0.3%)	Positive and significant (25.1%)	Positive and significant (43.6%)	Positive and significant (65.6%)

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

The T-GARCH model has been employed to assess the asymmetries associated with positive and negative news, as well as the differential impact of autocracy and democracy on news. Given the substantial repercussions of these events on assets and the behavior of asset holders, hypothesis H3, which explores the effects of autocracy and democracy, has been subjected to empirical testing. Nevertheless, the central aim of the T-GARCH model is to capture asymmetries related to positive shocks (good news) and negative shocks (bad news) (R. Rabemananjara, 1993). Analogous to other GARCH models, the T-GARCH model comprises two equations. The mean equation from Table 5 of the T-GARCH model indicates that the risk factor/conditional variance (GARCH (-1)) associated with the Pakistani exchange rate for the United States is statistically significant. This implies that the exchange rate of the previous day and month has an impact on the exchange rate of the current day and month, or that the risk factor influences the mean exchange rate returns, except for monthly exchange rate returns during the pre-autocracy period. Despite the positive but inconsequential coefficient of autocracy in both the pre and post-autocracy (democracy) regimes, except for the daily exchange rate during the pre-autocracy period, it is evident that autocracy benefits investors without influencing the exchange rate during democracy. At the 5% or 10% significance level, H3 (which posits that autocracy affects exchange rate volatility as bad news, while democracy has an impact as good news) has been rejected. However, the coefficient of democracy in an autocratic government is significant and positive, signifying that democracy is considered good news for investors. Notably, past square residual terms exert a substantial influence on risk volatility under all conditions, as both the past conditional variance term and the past square residual term (RESID (-1) 2) are statistically significant at 5% and 10%, respectively. Except for monthly exchange rate returns during pre-autocracy (democracy), GARCH (-1) reveals that past exchange rate return volatility significantly affects current exchange rate volatility in both daily and monthly exchange rate returns during autocracy and post-autocratic democracy. Furthermore, the monthly exchange rate returns during the post-autocracy period exhibit an asymmetric term with a statistically insignificant coefficient, indicating symmetry in the impact of good and bad news. Conversely, the coefficient of RESID (-1) 2*(RESID (-1) 0) for daily and monthly exchange rate returns is statistically significant at the 5% level, illustrating asymmetries in the impact of positive and negative news.

Table 04: TGARCH (1,1)

	Mean equation		Variance Equation		
	Average Returns	Impact of past exchange rate on present exchange rate	Impact of Past square residual term on present risk volatility	Impact of Past volatility on present volatility	The impact of good and bad news is asymmetric /symmetric
Daily Exchange Rate					
During Pre-Autocracy (1988-1998)	Insignificant	Negative and significant (15.5%)	Positive and significant (7%)	Positive and significant (71.9%)	Asymmetric
During Autocracy (1999-2008)	Negative and significant (0.4%)	Negative and significant (6%)	positive and significant (18.7%)	Positive and significant (50.9%)	Asymmetric
During Post Autocracy (2009-2022)	Insignificant	Positive and significant (27%)	Positive and significant (5.4%)	Positive and significant (92.2%)	Asymmetric
Monthly Exchange Rate					
During Pre-Autocracy (1988-1998)	Insignificant	Positive and significant (39.9%)	Positive and significant (13.2%)	Positive and significant (41.4%)	Asymmetric
During Autocracy (1999-2008)	Negative and significant (0.8%)	Positive and significant (51%)	Positive and significant (59.2%)	Positive and significant (61%)	Asymmetric
During Post Autocracy (2009-2022)	Insignificant	Positive and significant (25.1%)	Positive and significant (24.1%)	Positive and significant (61.8%)	Symmetric

The E-GARCH model, serving as an asymmetric variant of the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model, is designed to capture conditional heteroscedasticity and account for the leverage effects stemming from unsettling events. A detailed examination of the E-GARCH variables presented in Table 6 reveals their statistical significance in the variance equation at a 5% significance level. Notably, the constant term C(4) attains significance at this level.

Within the model, the coefficient associated with the ARCH term, denoted as C(5), is found to be statistically significant at the 10% significance level across all political systems. This suggests that the nature and scale of autocracy and democracy exert a considerable influence on exchange rate volatility. Consequently, hypotheses H5 and H6 are validated. It is crucial to note that the positive sign of the coefficient C(5) indicates a proportional relationship: as the magnitude of autocracy and democracy increases, so does the volatility.

Furthermore, the asymmetric term C(6) demonstrates significance at a 5% level, with the exception of the monthly exchange rate during post-autocracy. This implies that the impact of negative news differs from positive news, except in the specified circumstance. The positive sign of C(6) implies that positive news has a more substantial effect on volatility compared to negative news of the same magnitude. Conversely, the

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

negative sign signifies that negative news has a more pronounced impact on volatility than positive news. In summary, our findings suggest that, aside from the specified scenario, positive news tends to influence volatility more than negative news in daily and monthly exchange rates across all regimes. Consequently, hypothesis H4, positing that negative news has a greater effect on exchange rate volatility than positive news, is rejected.

Additionally, the C(7) terms indicate that the influence of past volatility on present volatility is statistically significant in all political regimes, except in the monthly exchange rate during pre-autocracy and the daily exchange rate during autocracy. This underscores the nuanced interplay of historical volatility in shaping current volatility dynamics across different political contexts.

Table 05: EGARCH (1,1)

	Mean equation		Variance Equation		
	Average Returns	Impact of past exchange rate on present exchange rate	Impact of Past square residual term on present risk volatility	Impact of Past volatility on present volatility	Leverage effect
Daily Exchange Rate					
During Pre Autocracy (1988-1998)	zero but significant	Positive and significant (1.3%)	Negative and significant (32.4%)	Negative and significant (32.8%)	Good news has more impact
During Autocracy (1999-2008)	zero but significant	Negative and significant (31.5 %)	Positive and significant (4.7%)	Negative and significant (1.2%)	Good news has more impact
During Post Autocracy (2009-2022)	zero but significant	Positive and significant (6.7%)	Positive and significant (86%)	Positive and significant (62.9%)	Good news has more impact
Monthly Exchange Rate					
During Pre Autocracy (1988-1998)	0.30%	Positive and significant (43.1%)	Positive and significant (46.3%)	Positive and significant (11.4%)	Good news has more impact
During Autocracy (1999-2008)	insignificant	Positive and significant (54.5%)	Positive and significant (48.4%)	Positive and significant (92.8%)	Good news has more impact
During Post Autocracy (2009-2022)	0.30%	Positive and significant (37.8%)	Positive and significant (25.1%)	Positive and significant (85%)	Good news and bad news have the same impact

Stability Test

The table presented in the Annexure provides a comprehensive illustration of both dynamic and static forecasting, as well as volatility stability within GARCH models. Notably, the presence of volatility within the standard error bands is evident. The dynamic forecasting technique assesses predictions for periods subsequent to the initial sample period. It achieves this by utilizing prior fitted values derived from the lags of the

dependent variable. Conversely, the static analysis relies on the actual values of the regressand variable. This dichotomy in approach instills confidence among investors and asset holders, fostering a sense of assurance in holding the asset, particularly in the context of exchange rates, on a daily and monthly basis.

A significant study focused on Pakistan conducted by Shah et al. (2009) emphasizes the prevalence of high exchange rate volatilities in developing countries. The study underscores the pivotal role played by central banks in managing and controlling these volatilities to stabilize the overall economic performance. Interestingly, the study posits that continuous and persistent intervention by central banks could, counterintuitively, contribute to an increase in exchange rate volatilities. Building upon this insight, our own research identifies the volatility of the exchange rate against the U.S. dollar. This volatility is attributed to a combination of managed and market-based flexible exchange rate mechanisms.

Normality test

The results of the histogram normality test of the GARCH models shown in Table **7** suggest that the null hypothesis of Jarque-bera is rejected and that there is no normality because the p-value is less than 0.05. As a result, **hypothesis H1** (The exchange rate is fluctuating in Pakistan) can be accepted, implying that the dollar exchange rate is volatile.

Table 06: Results Normality test: Histogram

	(Pre-Autocracy)		(Autocracy)		(Post Autocracy)	
Models	Jarque-Bera	p-value	Jarque-Bera	p-value	Jarque-Bera	p-value
GARCH M (1,1)	642.669	0.000	127.301	0.000	85.104	0.000
T-GARCH (1,1)	237.868	0.000	127.872	0.000	96.964	0.000
E-GARCH (1,1)	1019.878	0.000	84.189	0.000	64.944	0.000
At Confidence intervel : 5%						

Comparative Analysis:

Table 07: Comparative Analysis

	Daily Exchange Rate				**Monthly Exchange Rate**		
Pre-Autocracy *(1988-1998)*		**GARCH-M**	**T-GARCH-**	**E-GARCH**	**GARCH-M**	**T-GARCH**	**E-GARCH**
	Average Returns	zero but significant	Insignificant	zero but significant	Positive and Significant (0.3%)	Insignificant	Positive and Significant (0.3%)
	Impact of	Insignificant	Negative	Positive	Positive and	Positive and	Positive and

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

	past exchange rate on present exchange rate		and significant (15.5%)	and significant (1.3%)	significant (39.9%)	significant (39.9%)	significant (43.1%)
	Impact of Past square residual term on present risk volatility	Positive and significant (14.8%)	Positive and significant (7%)	Negative and significant (32.4%)	Negative and significant (7.1%)	Positive and significant (13.2%)	Positive and significant (46.3%)
	Impact of Past volatility on present volatility	Positive and significant (69%)	Positive and significant (71.9%)	Negative and significant (32.8%)	Positive and significant (137.6%)	Positive and significant (41.4%)	Positive and significant (11.4%)
	The impact of good and bad news is asymmetric /symmetric.	-	Asymmetric	-	-	Asymmetric	-
	Leverage effect	-	-	Good news has more impact.	-	-	Good news has more impact.
		GARCH-M	**T-GARCH**	**E-GARCH**	**GARCH-M**	**T-GARCH**	**E-GARCH**
Autocracy *(1999-2008)*	**Average Returns**	zero but significant	Negative and significant (0.4)	zero but significant	Insignificant	Negative and significant (0.8%)	Insignificant
	Impact of past exchange rate on present exchange rate	Negative and significant (6%)	Negative and significant (6%)	Negative and significant (31.5 %)	Positive and significant (48.4%)	Positive and significant (51%)	Positive and significant (54.5%)
	Impact of Past square residual term on present risk volatility	Positive and significant (157%)	Negative and significant (18.7%)	Positive and significant (4.7%)	Positive and significant (115.2%)	Positive and significant (59.2%)	Positive and significant (48.4%)
	Impact of Past volatility on present volatility	Positive and significant (51.4%)	Positive and significant (50.9%)	Negative and significant (1.2%)	Positive and significant (49.5%)	Positive and significant (61%)	Positive and significant (92.8%)
	The impact of good and	-	Asymmetric	-	-	Asymmetric	-

	bad news is asymmetric /symmetric.						
	Leverage effect	-		Good news has more impact.	-	-	Good news has more impact.
		GARCH-M	**T-GARCH**	**E-GARCH**	**GARCH-M**	**T-GARCH**	**E-GARCH**
Post-Autocracy *(2008-2022)*	**Average Returns**	zero but significant	Insignificant	zero but significant	Positive and significant (0.3%)	Insignificant	Positive and significant (0.30%)
	Impact of past exchange rate on present exchange rate	Positive and significant (31.8%)	Positive and significant (27%)	Positive and significant (6.7%)	Positive and significant (25.1%)	Positive and significant (25.1%)	Positive and significant (37.8%)
	Impact of Past square residual term on present risk volatility	Positive and significant (22.1%)	Positive and significant (5.4%)	Positive and significant (86%)	Positive and significant (43.6%)	Positive and significant (24.1%)	Positive and significant (25.1%)
	Impact of Past volatility on present volatility	Positive and significant (66%)	Positive and significant (92.2%)	Positive and significant (62.9%)	Positive and significant (65.6%)	Positive and significant (61.8%)	Positive and significant (85%)
	The impact of good and bad news is asymmetric /symmetric.	-	Asymmetric	-	-	Symmetric	-
	Leverage effect	-	-	Good news has more impact.	-	-	Good news and bad news have the same impact.

During daily frequency, zero or insignificant average returns are associated with pre and post-autocracy regimes. In contrast, positive and statistically significant average returns are associated with pre and post-autocracy during monthly frequency. However, zero or insignificant average returns are associated with autocracy regimes in daily and monthly exchange rates.

Moreover, the impact of the past exchange rate on the present exchange rate during pre-autocracy is ambiguous during the daily exchange rate while positive and

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

statistically significant during the monthly exchange rate. However, during autocracy, most of the GARCH models show the past exchange rate's positive and statistically significant impact on the present exchange rate in daily and monthly frequencies. On the other hand, during post-autocracy, all the GARCH models show the positive and statistically significant impact of the past exchange rate on the present exchange rate in both daily and monthly frequencies. Hence, it is concluded that the impact of the past exchange rate on the present exchange rate during monthly data is more significant. At the same time, if we compare political regimes, then in all regimes, a positive impact has been identified.

Furthermore, the impact of past square residual term on present risk volatility during pre-autocracy and autocracy is statistically significant and positive according to the outcomes of most of the GARCH models; however, during post-autocracy, it is statistically significant and positive according to the outcomes of all the GARCH models.

On the other hand, the impact of past volatility on present volatility is also statistically significant and positive during all regimes and outcomes of GARCH models are in the same pattern.

Moreover, this study found that the impact of good and bad news is asymmetric in all regimes and frequencies except during post-autocracy in the monthly exchange rate, which is symmetric. On the other hand, it is also found that good news has a greater impact than bad news in all the regimes with an asymmetry in news impact. In contrast, during post autocracy in the monthly exchange rate, the impact of good and bad news is the same as it is symmetric.

Conclusion and Implication

In this research, symmetric and asymmetric models GARCH-M (1, 1), T-GARCH and E-GARCH have been applied to analyze the volatility and risk associated with daily and monthly exchange rate returns of Pakistani rupees against U.S. dollars, and the conclusions are as follows.

According to the outcomes of GARCH-M, T-GARCH and E-GARCH, the exchange rate is volatile in all political regimes and frequencies. There are zero or insignificant asset returns, and fewer risks are associated with the daily exchange rate, while small returns and higher risks are associated with the monthly exchange rate. However, asset returns are significant during pre and post-autocracy as compared to autocracy, and varying volatility is higher in pre and post-autocracy (democracy) as compared to autocracy. Moreover, in past regimes of autocracy and autocracy, the impact of good news is greater. In contrast, in the current political regime (post-autocracy), the impact of both events is the same during the monthly exchange rate. On the other hand, it is also concluded that the larger the magnitude of both autocracy and democracy, the larger the volatility.

Since less risk and more returns are associated with the monthly exchange rate,

the government, investors and traders should focus on investing, trading and policymaking monthly. Moreover, in the current era, the impact of disturbing events is symmetric in the monthly exchange rate, which is convenient for policy and decision-making.

The findings of this study and various other studies suggest that the exchange rate is volatile in developing countries like Pakistan, where political and economic instability exists. Therefore, it is important to know about exchange rate volatility as the country faces various external and internal structural shocks. The government needs to manage the volatility of the exchange rate to boost the trust of investors and traders. Furthermore, future studies can determine the factors affecting the exchange rate volatility in Pakistan.

References

Abdalla, S. Z. S. (2012). Modelling Exchange Rate Volatility Using GARCH Models: Empirical Evidence From Arab Countries. *International Journal Of Economics And Finance*, *4*(3), 216–229. Https://Doi.Org/10.5539/Ijef.V4n3p216

Abdullah, S. M., Siddiqua, S., Siddiquee, M. S. H., & Hossain, N. (2017). Modelling And Forecasting Exchange Rate Volatility In Bangladesh Using GARCH Models: A Comparison Based On Normal And Student's T-Error Distribution. *Financial Innovation*, *3*(18), 1–19Https://Doi.Org/10.1186/S40854-017-0071-Z

Bearce, D. H., & Hallerberg, M. (2011). Democracy and de facto exchange rate regimes. *Economics and Politics*, *23*(2), 172–194. https://doi.org/10.1111/j.1468-0343.2011.00381.x

Breusch, T. S., & Godfrey, L. G. (1981). A review of recent work on testing for autocorrelation in dynamic simultaneous models. In *Macroeconomic Analysis, Essays in Macroeconomics and Economics* (Vol. 1).

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for Testing the Constancy of Regression Relationships Over Time. *Journal of the Royal Statistical Society: Series B (Methodological)*, *37*(2), 149–163. https://doi.org/10.1111/j.2517-6161.1975.tb01532.x

Ciurean-Moldovan, P.-C. (2021). Essays on the relationships between political indicators, and real exchange rate and inflation.

Elhussein, N. H. A., & Ahmed, A. E. I. (2019). Exchange Rate Volatility in Sudan: Does the Exchange Rate System Matter? *Journal of Finance and Bank Management*, *7*(2). https://doi.org/10.15640/jfbm.v7n2a1

Hays, J. C., Freeman, J. R., & Nesseth, H. (2003). Exchange rate volatility and democratization in emerging market countries. *International Studies Quarterly*, *47*(2), 203–228. https://doi.org/10.1111/1468-2478.4702003

ISSN (Print): 2788-4821 ISSN (Online): 2788-483X
Volume 4, Issue 1, Page 113-131, June 30, 2023

Jean Marie Viaene and Casper G.de Vries. (1992). International trade and exchange rate volatility. *European Economic Review*, 36(September 1989), 1311–1321.

Kutu, A. A., Alori, D. A., & Ngalawa, H. (2021). Exchange Rate Response To Oil Price and Political Shocks: What Can Nigeria Do? *Journal of Life Economics*, *8*(2), 237–246. https://doi.org/10.15637/jlecon.8.2.08

Leblang, D. A. (1999). Domestic political institutions and exchange rate commitments in the developing world. *International Studies Quarterly*, *43*(4), 599–620. https://doi.org/10.1111/0020-8833.00138

Leblang, D. and, & Bernhard, W. (2015). Democratic Processes, Political Risk, and Foreign Exchange Markets. *American Journal of Political Science,46*(2), 316–333.

Mohsin, M., Muneer, D. S., & Salamat, S. (2019). The Volatility of Exchange Rate Using GARCH Type Models with Normal Distribution: Evidence from Pakistan. *Pacific Business Review*, *11*(12), 124–129. www.pbr.co.inwww.pbr.co.in

Quinn, D. P., & Weymouth, S. (2016). *The Political Origins of Exchange Rate Valuations *. 2017*(July).

Reynolds, L. G. (1983). The Spread of Economic Growth to the Third World: 1850-1980. *Journal of Economic Literature*, *21*(3), 941–980.

Sánchez-Fung, J. R. (2003). Nonlinear modelling of daily exchange rate returns, volatility, and "news" in a small developing economy. *Applied Economics Letters*, *10*(4), 247–250. https://doi.org/10.1080/1350485032000050635

Shah, M. K. A., Hyder, Z., & Pervaiz, M. K. (2009). Central bank intervention and exchange rate volatility in Pakistan: An analysis using GARCH-X model. *Applied Financial Economics*, *19*(18), 1497–1508. https://doi.org/10.1080/09603100902967553

Sharma, C., & Pal, D. (2019). Does Exchange Rate Volatility Dampen Imports? Commodity-Level Evidence From India. *International Economic Journal*, *33*(4), 696–718. https://doi.org/10.1080/10168737.2019.1630467

Steinberg, D. A., & Malhotra, K. (2014). The effect of authorita rian regime type on exchange rate policy. *World Politics*, *66*(3), 491–529. https://doi.org/10.1017/S0043887114000136

Y., M., M, T., & Bello, A. (2014). Forecasting of Exchange Rate Volatility between Naira and U.S. Dollar Using GARCH Models. *International Journal of Academic Research in Business and Social Sciences*, *4*(7). https://doi.org/10.6007/ijarbss/v4-i7/1029