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Original Research Article

Exchange Rate Volatility in Response to Covid-19 in SAARC Countries

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Abstract: The Objective of this study is to check the connection of exchange rate volatility in response to COVID- 19, with the help of two different models. We used twelve variables in these two model Exchange rate volatilities, Govt Effectiveness, Unemployment, Inflation, Lending Interest rate, GDP per capita, Population, Immunization, Govt Expenditure on education, Life- Expectancy, and Hand washing. The data collected from World Development Indicator, World Health Organization, International Financial Statistics, Worldwide Governs indicators, and COVID-19 data collected from-our-world-in-data. ARCH and GARCH models are used to find out the Volatility of the Exchange rate. This study employed the Generalized Method of Moments (GMM) model because it is a versatile and effective statistical technique that permits parameter estimation in models with potential endogeneity and measurement error concerns. Panel GMM Technique is used to find the significant result. According to model one Exchange rate volatility has a positive and significant connection with the Covid-19 cases or death rate, Govt effectiveness, and Govt Expenditure on education, and negative relation with Unemployment, Inflation, Lending interest rate, Number of COVID-19 cases, Population, and GDP Per capita. According to our second model results, all the variables have a positive relation with COVID-19 except Government Effectiveness and Immunization.
Keywords: Exchange rate volatility, ARCH, GARCH, GMM, COVID-19.

1. INTRODUCTION

Since the exchange rate is a crucial macroeconomic element that influences the whole world market, it has become the subject of numerous arguments among researchers, regulators, as well as other financial players. The 1970s saw the intense debate over whether to have a stable, indexed, or floated exchange rate system; since that time, most currencies in Europe have been floated, up until just with the introduction of the Euros. The debate is still crucial since nations must once again decide which currency rate system to use nowadays. The currency rate can be conceptualized as the price of one currency concerning another. Money transfer expenses are greater in a fluctuating exchange rate system than they are in a peg or stable one. On the assessment of variables like Govt effectiveness and quality in productivity assessment, there is not yet a consensus throughout the public administration literature. If residents put in a lot of effort and perform a good job, if public workers behave in a way that achieves goals and general goals, and if the state sector operates according to protocols, then the country is successful. By guaranteeing people quality delivery and improving responsibility for government handles, government effectiveness might be shown (Rainey and Steinbauer 1999). COVID-19 is a contagious illness and this COVID-19 pandemic was the first case reported in China on 1st December 2019. In Pakistan first case of a pandemic was confirmed on 26th February 2020. This virus is spreading day by day in Pakistan and the first death was confirmed on 20th March 2020 in Pakistan. Gradually confirmed cases were an increase in Pakistan's different provinces and this resulted in the death rate in Pakistan increasing. In the current situation in Pakistan, the total number of cases of the corona is 1.53 million and the total death is 30369. This pandemic affected the world economy. Such as the Pakistan economy is discovered during these years (Kadri, Sun, *et al.*, 2021). After this situation Government adopted tight mitigation

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policies, including lockdowns, internal and international in response to the COVID-19pandemic epidemic and its subsequent spread around the world. Bans on local tourism and fiscal Stimulus. The main effect or destroying the education system because in Pakistan schools were closed another side 2nd effect on the labor market many people are unemployed. According to Pakistan Bureau, the half population of Pakistan is affected by working the face unemployed due to the closure of businesses and lockdown. According to the Economics Survey before Covid-19, 55.7 million populations were working but due to the coronavirus, 20.71 million people lost their jobs. This Covid- 19 also attacks overseas employment After this Government adopts a policy of smart lockdown and control of the labor market in the face of learning the skill just like the Kamyab Jawan Programme and giving a loan with zero interest rate for business and Ehssass program(Bin-Nashwan, Sarea, *et al.*, 2022). COVID-19 also effect on inflation before COVID-19 inflation rate of 6.74% in Pakistan and due to this pandemic inflation rate increased and reach 10.74% because the Pakistan government adopts a lockdown in which all firms closed due to this problem market faced a shortage of the commodity. In the last Covid-1919 cases, government effectiveness huge effect on exchange rate volatility. The Pakistani rupee devalues by about 14% and 16% against US Dollar during COVID-19. To help alleviate the effects of the epidemic, Pakistan's government authorized a stimulation spending scheme totaling Rupees.1.2 trillion has been proposed, as well as a Supplemental Payment of ₹100 billion for the “Residual/Emergency Charity Fund” about the availability of cash to help mitigate the effects of the pandemic. For the afflicted population, COVID-19. The SBP, on the other hand, took several steps to fight the problem. The economic devastation that the epidemic has inflicted. Among them are reductions in an extension of time for payment of foreign currency loans, a 625-basis point hike in the policy rate several funding strategies that are subsidized (Akhtar, Abiad, *et al.*, 2022). The COVID-19 pandemic has had a significant impact on global financial markets, including the foreign exchange market. The uncertainty and unpredictability caused by the pandemic have led to increased volatility in exchange rates, with many currencies experiencing significant fluctuations in value. One major factor contributing to this volatility has been the economic impact of the pandemic. As countries around the world have implemented lockdowns and other measures to contain the spread of the virus, businesses have been forced to close, supply chains have been disrupted, and unemployment has risen. These factors have had a significant impact on the global economy, leading to fluctuations in currency values as investors and traders react to changing market conditions. In addition to these economic factors, government policies and actions have also played a role in exchange rate volatility. For example, central banks in many countries have implemented monetary policy measures, such as interest rate cuts and quantitative easing, to mitigate the economic impact of the pandemic. These policies can have a significant impact on currency values, as investors and traders adjust their expectations for future economic conditions. Overall, the COVID-19 pandemic has led to increased exchange rate volatility, with many currencies experiencing significant fluctuations in value as a result of economic and policy factors. The impact of COVID-19 on exchange rate volatility has been felt across the globe, with both developed and emerging market currencies experiencing fluctuations in value. As the pandemic continues to evolve, exchange rate volatility will likely remain a key feature of global financial markets.

The objective of this research "Exchange Rate Volatility in Response to COVID-19 in SAARC Countries" is to investigate the connection between exchange rate volatility and COVID-19 cases in the SAARC nations of Pakistan, India, Bangladesh, Bhutan, Nepal, Afghanistan, and the Maldives. The purpose of the study is to evaluate exchange rate volatility across a 27-month span during the COVID-19 pandemic. Specifically, the study aims to explore how exchange rate volatility and COVID-19 cases more affect each other during the COVID-19 pandemic and examine the interlink between these two dependent variables.

2. Literature Review and Hypothesis Development

Erdal, Erdal, *et al.*, (2012)examined (2012) the study effect of Exchange rate volatility on trade on agricultural export and agricultural import in Turkey by using collection data covering the Years 1995 - 2007. This Research collected data from the Turkish Statistical Institute and the Central Bank of the Republic of Turkey. This study used the “Generalized Autoregressive Conditional Heteroscedasticity” (GARCH) model. The response variable Real Effective Exchange rate (REER) and the regressor variable is Agricultural export (AGX) and Agricultural import (AGM). The results show that positive long-term connection between REERV (Real Effective Exchange rate volatility) and AGX (Agricultural export) and another side negative long-term connection between REERV (Real Effective Exchange rate volatility) and AGM (Agricultural import). Baak's (2004) this study aims to check the impression of Exchange rate volatility on exports in 14 nations in the Asia Pacific by using panel data covering the years 1980 to 2002. This study collected data from DOTS (Direction of Trade Statistics), WDI (World Development Indicator), and IFS (International Financial Statistics). This study used estimated the result with the OLS model. The response variable is Real export (EXP), the Regressor variable is real GDP, exchange rate volatility (VOL)and geographical distance between the two countries (DIST) and the dummy variable is share of a borderline (BORD), the same language (LANG), APEC membership and the last dummy variable is time trend (TREND). The result shows that significant currency rate fluctuation has a detrimental effect on the number of exports. In addition when APEC was launched. Exporters are positively impacted by speaking a similar tongue and being an APEC participant, but negatively impacted by the range of trade partners. Ponziani (2019) examined the study of the impression of exchange rate on trade in sub-Saharan Africa by using panel data covering the years 1993 to 2014. This study collected data from WDI (World Development Indicator). This study used the GARCH model to evaluate the outcome. In this study, the use-response variable is Trade (Export and Import) and the regressor variable is "Nominal exchange rate (E), real domestic income(Y), real foreign reserves(R), and Inflation rate (I), and exchange rate volatility". According to the analysis, imports are not significantly impacted by currency price fluctuation. However, it shows that volatility has a short-term unfavorable consequence for exports but a long-term favorable benefit. Feng, Yang, *et al.,* (2021) describe the study of the impression of Covid – 19 and Government intervention on Exchange rate volatility in twenty countries during the years 13 January 2020 to 21 July 2020. This article collected data from Our World in Data. This paper adopts the GMM method to approximate the result. This study used the response variable as Exchange rate volatility and the regressor variable as biweekly confirmed cases of Covid and Govt intervention. The result shows that when Covid-19 confirmed cases significantly raise so exchange rate volatility also raise and on the other hand Government intervention plays a role hold the exchange rate volatility. Gbadebo (2022) search the impression of covid 19 cases and their deaths in the United State exchange rate volatility by time series data covering the time from 1st January 2020 to 11th April 2020. This study collected data from European Centre for disease prevention and Control (ECDC) and Exchangerates.org.uk. This study applies the GARCH model to find a result. This study used the response variable as the exchange rate and the regressor variable is Covid 19 cases related to deaths. The results show that raising the number of covid 19 cases and deaths in the United States positively affects USD/EUR, USD/Yuan, and USD/Liver sterling. AYHAN and ABDULLAZADE (2021) explore the effect of oil prices, gold prices, and the cases of covid 19 on the Exchange rate by using time series data covering the time of 12th March 2020 to 06th Nov 2020. This study applies the ARDL method to find results. In this study used, the response variable is the exchange rate and the regressor variables are Oil prices, Gold Prices, and covid 19 cases. This study finds a result of that inverse connection between oil prices and exchange rate in long run. A one percent rise in oil prices causes a 0.18 percent downward in the exchange rate. Hoshikawa and Yoshimi (2021) describe the study of covid 19 effects on the stock market and exchange rate by using time series data covering the years January 2, 2019, to August 31, 2020. This research was collected from Thomson Reuter Eikon (TRE), Korea Exchange, and the World health organization. We used the GARCH model in this study. This study used endogenous variables Number of Cases (NC), Number of Death (ND), the Korean volatility index (KVI), and foreign investors' holdings (FIH). The result shows that an increasing stock price volatility index and a decrease in foreign investors' holdings and Researchers thus discover that the action had no discernible impact on the exchange rate fluctuation. Nwosa (2021) examined the study of oil price, exchange rate, and stock market performance during the years of covid 19 pandemic in Nigeria covering the years of 1st December 2019 to 31 May 2020. This Research selected a VAR model. This study collected data on oil prices and the exchange rate was collected from the central bank of Nigeria database, stock market performance collects from the fusion media Ltd database and the last variable covid-19 confirmed cases and deaths collected from covid19.ncdc.gov.ng. The finding of the study shows that covid 19 pandemic harmed the exchange rate, oil prices, and stock market performance more than the 2009 to 2016 global recession. Thaker and Sakaran (2021) interrogate the connection between the Japanese yen and the country's stock returns during COVID19 Compared to the crisis years in Japan. This study covered the time from January 2020 to August 2020. This investigation adopts the GARCH and VAR models. This study collected data from DataStream. In this research depended, a variable is the Japanese stock market and the regressor variable is the yen-Us dollar exchange rate. The finding of the study is the depreciation of the yen and the other side improved stock market during the COVID- 19 and this result shows that the connection was stronger over the covid 19 compared to the pre-crisis years. Kyereboah- Coleman and Agyire-Tettey (2008) by using time series data. This study covered the time from 1970 to 2002 was used. This study adopts the ARCH and GARCH, models. The response variable is real foreign direct investment collected from Ghana statistical service's Quarterly Digest and the regressor variable is the real exchange rate, volatility of the real exchange rate, the openness of the economy, and Size of the market (GDP per capita) collected from International financial statistics (IMF). This study found the result real exchange rate volatility is a negative connection and the size of the market does not play role in determining foreign direct investment. Kyereboah-Coleman and Agyire-Tettey (2008) examined the effect of real exchange rate volatility on the demand for money during the Covid 19 pandemic by using time series. This study covered the time from January 2018 to September 2020. The study used the GARCH Method and ARDL Methodology. This study has one response variable Real Money Balance $(M_d/P)_t$ $_{and}$ four regressor variables Real income $(RY)_{t,}$ Inflation (INF), Real Exchange rate, and Economic uncertainty Variable (EV). The data of all variables were collected from the Reserve Bank of Zimbabwe (RBZ). The result shows that exchange rate devaluation in Zimbabwe has balanced effects on real demand for money. Prabheesh and Kumar (2021) explore the dynamic connection between oil prices, Stock Returns, uncertainty shocks, and exchange rates in India. This study covered the time from 31 December 2019, to April 28, 2021. This study used variable Stock prices, Exchange rates, and the Price of Texas Intermediate proxy of oil prices, and the last variable is the Uncertainty Index. The variables stock prices were obtained from the National Stock Exchange of India Limited, the Exchange rate (Indian rupee and USD dollar) from the China Economic Information Center database, and the Price of West Texas Intermediate (Oil prices) from the U.S. Energy Information Administration. The result shows that Covid-19-induced uncertainty dampened the oil prices and stock market. Li, Wang, *et al.,* (2022) explore the study of the impression of COVID-19 on inbound tourism, Government efficiency, and also Natural disaster role. The data was collected from (UNWTO), (EM-DAT), (CRED), (WGI) and (WDI). The study was based on panel data and a fixed effect model was chosen for this study. Inbound tourism, Government efficiency, and Natural disasters are the variables of the study. This study finds a positive significant effect of Government efficiency on inbound tourism and that Natural disaster has a negative significant effect on inbound tourism. Xiao and Su (2022) explore the study of the impression of COVID- 19 on micro small and medium enterprises in Pakistan. Primary data was collected by questionnaires and the explanatory methodology was used in descriptive stats. The results of the study were that the impression of the COVID-19 outbreak was a significant effect. In this study, 94.57% of SMEs were affected by the COVID-19 outbreak 3.26% are not affected and 2.17% were not sure of the COVID-19 outbreak. Income and employment support for SMEs and planning and resilience capability were the policies recommended in this study.

The absence of earlier research on the relationship between exchange rate volatility and COVID-19 is addressed in this study. Furthermore, it appears that earlier research may not have particularly looked at the relationship between COVID- 19 instances and exchange rate volatility in SAARC nations using monthly data. By examining the correlation between these factors and offering insights into the possible impacts of COVID-19 on exchange rate volatility in SAARC nations, this study seeks to close this gap.

2.1 Hypothesis

H1: COVID-19 impact the exchange volatility in the SAARC Countries

H2: Government Effectiveness Impact the exchange volatility in the SAARC Countries

H3: Exchange rate volatility impacts the COVID-19 number of cases

H4: Government effectiveness impact the COVID-19 number of cases

3. DATA AND METHODOLOGY

Data from the World Bank has been gathered to help with the research topic. Panel data are the type of data used in this inquiry. Panel data is a multidimensional dataset since it combines the traits of cross-sectional and time-series data into one. As a result, key characteristics of panel data include the quantity (n) of observations (T) on various people (varying from I=1..., n) recorded during the same years at similar intervals. Unfortunately, some nations' data on some of the factors included in this research is missing, which throws off the balance of the panel. To overcome these problems, some factors have been left out of the evaluation and some information gaps have been filled in using the initial year's figures. This has prevented the EVIEWS from leaving out a nominal variable or nation from the assessment because it was incomplete by filling in a gap with one or multiple pieces of data. This database also has the feature of being a static panel because it tracks the same people (countries) across time. As a result, the sample under consideration is an approximated, fixed, and balanced collection of panel data (Greene 2011). This specific dataset includes information for the eight SAARC nations during the years of 27 months, from October 2019 to December 2021. As this research also looks into. Because not all nations have data for the many indicators necessary for this inquiry, this requirement restricts the nations that may be examined. As a result, the choice of nations is mostly determined by the accessibility of pertinent information. Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Afghanistan, and the Maldives are the eight nations that this study evaluates. This chapter covers the indicators we utilized in the methodology, which are covered in more detail below, as well as the regression analysis modeling, we used to evaluate the method and determine the factors that influence the analysis of exchange rate volatility in response to COVID-19. For our investigation, we employed the SAARC nations—Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Afghanistan, and the Maldives.

3.1 Data Source and Description of Variables

Our research is based on panel data from OCT 2019 to DEC 2021 of SAARC Countries which consists of Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Afghanistan, and the Maldives. Data is collected from the World Development Indicator (GDP per capita, Population, Lending interest rate, Immunization, unemployment, Population, Govt Expenditure on education, nd Life- Expectancy), International Financial Statistics (Exchange rate), WHO (Handwashing), Worldwide Governs indicators (Government Effectiveness), https://ourworldindata.org/ (Covid- 19).

Table 1: Selection of Variables

Abbreviation	Variables	Measure	Data Source
ERm GE	"Exchange rate Government Effectiveness	National Currency Per U.S. Dollar, End of Years, Rate" Percentile rank (0-100)	International Financial Statistics Worldwide Governs Indicators (WGI)
COVID-19(CASES+DEATH)	Number of cases+ Death rate	Number of patients	Our world of data
GDP	GDP per capita	Percentage %	World Development Index
POP	Population Rate	Percentage %	World Development Index
UNEMP	Unemployment	% Of the total labor force	World Development Index
INF	Inflation	Annual %	World Development Index
LEN	Lending Interest rate	Percentage %	World Development Index
HW	Hand washing	Percentage %	WHO
IMMU	Immunization	% Of children ages	World Development Index
LIFE-EXP	Life- Expectancy	Total (years) %	World Development Index
GEXPE	Govt Expenditure on education	%Of Government expenditure	World Development Index

3.2 Econometrics Specification

When working with panel data, it is important to recognize that accurately capturing the complex interrelationships involved requires diagnostic tools that account for the dynamic, causal nature of these links. To address this challenge, researchers must leverage advances in panel modeling methodologies and adopt a sequential approach that accounts for the specific intricacies of the data

MODEL-1

EV=f (GE, COVID-19 Cases, UNEMP, GEXE, LEN, POP, GDP)

Where; EV means Exchange rate volatility; GE; Government Effectiveness, Covid-19 means the number of cases + death rate, Unemp; Unemployment, GEXE: Government expenditure on education, LEN: Lending interest rate, Pop: Population rate, GDP: and GDP per capita.

MODEL-2

COVID-19 =f (GE, EV, IMMU, LIFE-EXP, POP, HW,)

Were

Covid-19= number of cases
GE=Govt Effectiveness
EV=Exchange rate volatility
IMMU=Immunization
LIFE-EXP= Life Expectancy
POP= Population
HW= Hand washing

4. RESULTS AND DISCUSSION

The main objective of this research is to evaluate and analyzes the Exchange rate volatility in response to COVID- 19cases in SARCH Countries In this chapter, we will discuss results obtained by the methodology of our panel data analysis; we have applied the ADF unit root test, and GMM technique. We present the results for 27 Months.

Table 2: Summary Statistics of Model 1

Variable	Mean	Median	Max	Minim	STD
Ervol	2.92196	0.000252	199.8895	3.40E-05	22.08090
GE	53.46039	62.50000	75.48077	22.11539	18.38815
DR	3.738318	1.217009	25.31928	0.00000	6.1089444
NC	3.738318	1.633109	27.72134	0.00000	5.228789
GDP	3.45323	2.04434	2.60032	1.61543	2.34834
GEXEDU	13.87564	12.05595	20.38316	9.273750	2.674921
UNEMP	5.503570	5.410000	7.9970000	2.500000	1.271013
LEN	10.65786	11.52264	14.00000	7.324167	2.372678
POP	3.50023	1.74034	2.09572	1.90029	5.70015

The exchange rate volatility mean value is 2.921969 of Model 1 which is used in this research and the Standard Deviation value is 22.08090 the skewness value of exchange rate volatility is 0.000034 and the kurtosis value is 199.8895. The death rate mean value is 3.738318 of Model 1 which is used in this research and the std value is 6.108944. The skewness value of the Death rate is 0.000000 and the kurtosis value is 25.31928. The number of cases means the value is 3.738318 of Model 1 which is used in this research and the Standard Deviation is 5.228789. The skewness value of the Number of cases is 0.000000 and the kurtosis value is 27.72134. The government Effectiveness mean value is 53.46039 of Model one which is used in this research and the Standard Deviation is 18.38815. The skewness value of Government Effectiveness is 22.11539 and the kurtosis value is 75.48077. The GDP per capita mean value of Model one is 3.45323 and the value of the Standard Deviation is 2.34834. The minimum value of GDP per capita is 1.61543 and the maximum value is 2.60032. Government expenditure on education means a value of a full sample is 13.87564 and the value of the Standard Deviation is 2.674921. The minimum value of Government expenditure on education is 9.273750 and the maximum value is 20.38316.

Table 3: Summary Statistics of Model 2

Variable	Mean	Median	Max	Minim	STD
GE	41.1675	49.04000	75.48077	1.923077	23.81961
NC	3.868196	1.634952	29.61742	0.00000	5.638053
DR	3.846154	1.185498	31.70439	0.00000	6.175039
ERVOL	1.754820	0.000228	199.8895	0.00000716	16.95574
GEXEDU	12.96181	11.87625	20.3831	9.273750	2.557181
UNEMP	6.700066	5.978000	13.28000	2.500000	2.620755
GDP	3.45323	2.04434	1.61543	1.61543	2.34834

The government Effectiveness mean value is 41.16975 of Model 2 which is used in this research and the Standard Deviation value is 23.81961. The skewness value of Government Effectiveness is 1.923077 and the kurtosis value is 75.48077. The death rate mean value is 3.846154 of Model 2 which is used in this research and the Standard Deviation value is 6.175039. The skewness value of the Death rate is 0.000000 and the kurtosis value is 31.70439. The number of cases means the value is 3.868196 of Model 2 which is used in this research and the Standard Deviation value is 5.638053. The skewness value of the Number of cases is 0.000000 and the kurtosis value is 29.61742. The exchange rate volatility mean value is 1.754820 of Model Two which is used in this research and the Standard Deviation value is 16.95574 the skewness value of exchange rate volatility is 0.00000716 and the kurtosis value is 199.8895.

Table 4: Result of ADF Test

	At Level		At First difference	
VARIABLES	**Critical value**	**Table value**	**Critical value**	**Table value**
ERVOL	15.2935 0.0537	11.3249 0.1840	34.9761 0.0000	24.3359 0.0000
GE	34.0886 0.0053	29.5505 0.0205	63.7566 0.0000	52.5084 0.00000
NC	51.3396 0.0000	41.6353 0.0004	134.865 0.0000	109.109 0.00000
DR	49.2127 0.00000	40.4907 0.0007	122.119 0.00000	96.6476 0.00000
GDP	25.3087 0.0646	28.9685 0.0241	61.2889 0.00000	49.5879 0.0000
GEXDU	40.1881 0.0002	36.0639 0.0010	51.4084 0.0000	47.1749 0.0000
HW	2.88691 0.2361	4.81134 0.0902	7.0942 0.0288	6.25644 0.0438
IMMU	31.5457 0.0046	28.3734 0.0127	53.4881 0.0000	45.2722 0.0000
INF	34.8907 0.0041	38.1263 0.0015	60.6780 0.0000	54.9936 0.0000
LEN	12.5793 0.1272	12.8836 0.1159	34.7107 0.0000	28.9153 0.0003
LIFE-EXP	37.7828 0.0016	43.7246 0.0002	52.5905 0.0000	53.7066 0.0000
POP	26.0211 0.0537	23.4123 0.1031	72.9737 0.0000	61.3177 0.0000
UNEMP	42.9981 0.0003	37.2781 0.0019	63.5494 0.0000	57.4189 0.0000

According to Table one, variables are stationary at 1st Difference which IS LEN and ERVOL, GE, NC, DR, UNEMP, INF, LIFE-EXP, IMMU, HW, and GEXEDU at a level.

Durbin-WU-Huisman Test

It is used to detect the endogeneity in the model. Contingent factors have values that are detected by another variable in the system.

Durbin-WU-Huisman Test Probe-value
Chi-Square 0.0000

The probe value of Chi-Square is less than 0.05. It means that there exists an endogeneity problem. Therefore, we use GMM due to Endogeneity.

3.4 Estimation of Models through Panel GMM

Table 5: Model Estimation of Exchange Rate Volatility

Variable Coefficient Standard Error
GE 0.000125*** 0.000651
DR 0.000259*** 0.000992
NC -0.0000311*** 0.000391
GDP -0.00000238*** 3.58E-06
GEXEDU 0.000390 *** 0.009227
UNEMP -0.0000872*** 0.001417
LEN -0.002104*** 0.002198
POP -0.0000904 *** 1.73E-11
INF -0.001358*** 0.004151

According to this table's estimates for the Panel GMM co-integration, the regressor variable. Government Effectiveness is Statistical Significance at 0.000125, indicating that a 1% increase in Government Effectiveness Causes a 0.0001% increase in Exchange Rate Volatility. The positive correlation between Exchange Rate Volatility and Government Effectiveness is indicated by the +vie coefficient sign. This result is similar to this study (Li and Rengifo 2018) and (Meyer and Hassan 2020). The death rate is Statistically Significant results at 0.000259, implying that an increment of 1% in Covid-19 deaths leads to a rise of 0.0002% in exchange rate volatility. The +vie coefficient sign denotes a positive correlation between exchange rate volatility and the Covid-19 rate of death. This outcome is related to this research (Benzid and Chebbi 2020) and (Feng, Yang, *et al.,* 2021). The number of cases is statistically significant Findings are at -0.000259, which means that a 1% increase in Covid-19 causes a 0.00002% Decrease in exchange rate volatility. The significant Negative connection between exchange rate volatility and the Covid-19 Number of Cases is denoted by the - vie coefficient sign. This result is connected to this investigation (Feng, Yang, *et al.*, 2021) and (Benzid and Chebbi 2020). GDP per capita stands at -0.00000238, which suggests that a 1% rise in GDP per capita results in a 0.000002% reduction in exchange rate volatility. The -vie coefficient sign indicates a substantial Negative association between exchange rate volatility and the GDP per capita. This outcome is associated with this experiment(Barguellil, Ben-Salha, *et al.,* 2018), (Schnabl 2009), (Doğanlar 2002), (Barguellil, Ben-Salha, *et al.,* 2018) and (Barguellil, Ben-Salha, *et al.,* 2018). Government Expenditure on Education is statistically significant results are at 0.000390 which means that a 1% increase in Government Expenditure on Education causes a 0.0003% Increase in exchange rate volatility. The significant Positive connection-between exchange rate volatility and the Government Expenditure on Education are denoted by the +vie coefficient sign. This result is connected to this investigation (Barguellil, Ben-Salha, *et al.,* 2018) and (Bleaney and Greenaway 2001). Unemployment stands at -0.0000872, which suggests that a 1% rise in Unemployment results in a 0.00008% reduction in exchange rate volatility. The -vie coefficient sign indicates a substantial Negative association between exchange rate volatility and Unemployment. This outcome is associated with this study (Bakhshi and Ebrahimi 2016), (Farajalla, Haddad, *et al.,* 2018), (Mpofu and Nikolaidou 2013) and (Nyahokwe and Ncwadi 2013). The statistical significance of the lending interest rate is -0.002104, which means that a 1% rise in the lending interest rate results in a 0.0001% reduction in exchange rate volatility. The -vie coefficient sign denotes a negative correlation between exchange rate volatility and lending interest rate. This finding is consistent with research by (Osinubi and Amaghionyeodiwe 2009) and. (Liu and Lee 2022) The population is -0.0000904, which means that a 1% rise in the Population results in a 0.00009% reduction in exchange rate volatility. The -vie coefficient sign denotes a negative correlation between exchange rate volatility and Population. This finding is consistent with research by (Danmola 2013) Inflation is that are statistically significant at -0.001358 which means that a 1% increase in Inflation causes a 0.001% decrease in exchange rate volatility. The significant Negative connection between exchange rate volatility and Inflation is denoted by the -vie coefficient sign. This result is connected to this investigation (Danmola 2013), and (Asari, Baharuddin, *et al.,* 2011). This table shows the result of Model 2.

Table 6: Model Estimations of COVID-19 Number of cases

Variable Coefficient Standard Error
GE -0.000556*** 0.109344
ERVOL 0.270350 *** 0.358051
HW 0.016509*** 0.112288
IMMU -0.028053*** 0.201483
LIFE-EXP 0.285270 *** 0.578534
POP 0.0000209*** 2.53E-09

Government Effectiveness is Statistical Significance at -0.000556, indicating that a 1% increase in Government Effectiveness Causes a 0.0005% decrease in COVID-19 Cases. The Negative Correlation between Government Effectiveness and Covid-19 cases is indicated by the -vie coefficient sign. More aggressive reactions to the epidemic can reduce but more extreme interventions can boost the number of people infected. This result is similar to this study (Hodzic, Ravselj, *et al.*, 2021) and (Serikbayeva, Abdulla, *et al.,* 2021).

Exchange rate volatility is Statistically Significant results at 0.270350, implying that an increment of 1% in Covid-19 cases leads to a rise of 0.2% in exchange rate volatility. The +vie coefficient sign denotes a positive correlation between Bridging exchange rate volatility and the Covid-19 cases. This outcome is related to this research (Benzid and Chebbi 2020) and (Feng, Yang, *et al.*, 2021). Hand washing is Statistically Significant results at 0.016509, implying that an increment of 1% in Covid-19 cases leads to a rise of 0.01% in Hand washing. The +vie coefficient sign denotes a positive correlation between Bridging exchange rate volatility and the Covid-19 cases. This outcome is related to this research (Keller, Kwasnicka, *et al.*, 2021) and (Zhang, Graf-Vlachy, *et al.*, 2020). Immunization Statistically Significant results at -0.028053, implying that an increment of 1% in Immunization leads to a decrease of 0.02% in Covid-19. The -vie coefficient sign denotes a Negative correlation between Bridging exchange rate volatility and the Covid-19 cases. This outcome is related to this research (Marín-Hernández, Schwartz, *et al.*, 2021), and (Ng, Betzler, *et al.*, 2021). Life expectancy is Statistically Significant results at 0.285270, implying that an increment of 1% in Life expectancy leads to a rise of 0.2% in COVID-19. The +vie coefficient sign denotes a positive correlation between Life expectancy and Covid-19 cases. This finding is related to(Alhassan, Adedoyin, *et al.*, 2021), and (Wang, Song, *et al.*, 2020). The population is Statistically Significant results at 0.0000209, implying that an increment of 1% in population leads to a rise of 0.00002% in COVID-19. The +vie coefficient sign denotes a positive correlation between population and Covid-19 cases. This finding is related to (Bendau, Petzold, *et al.*, 2021) and (Hashim, Alsuwaidi, *et al.*, 2020).

5. CONCLUSION

This study focuses on understanding how exchange rate volatility has been affected by the Covid-19 pandemic in SAARC countries, which include Pakistan, India, Bangladesh, Bhutan, Nepal, Afghanistan, and Maldives. The study utilizes monthly data and panel data from October 2019 to December 2021 and examines the relationship between exchange rate volatility and Covid-19 using two different models. In total, 12 variables were used in the study, including exchange rate, government effectiveness, Covid-19 cases and death rate, unemployment, inflation, lending interest rate, GDP per capita, population, and immunization, government expenditure on education, life expectancy, and hand washing. The world Development Indicator, World Health Organization, International Financial Statistics, Worldwide Governs indicators, and Covid-19 data acquired from the our world in data were only a few of the sources from which data for the study was gathered. The ARCH and GARCH models were used to calculate the exchange rate's volatility. The Panel GMM Technique was used in the study to provide meaningful findings. The first model's findings demonstrate a positive and substantial relationship between exchange rate volatility and the Covid-19 mortality rate, government effectiveness, and government spending on education. On the other hand, it has a negative correlation with GDP per capita, population, lending interest rates, inflation, unemployment, and inflation. According to the final model's findings, every variable has a positive relationship with Covid-19, with the exception of the effectiveness of the government and vaccination rates. Overall, the analysis offers insightful information on how the Covid-19 epidemic affects the volatility of currency rates in SAARC nations. Overall, the analysis offers insightful information on how the Covid-19 epidemic affects the volatility of currency rates in SAARC nations. Policymakers and investors may reduce the pandemic's damaging effects on the economy by making well-informed decisions by understanding the link between these elements.

5.1 Policy Recommendation

The influence of alternative approaches on exchange rate volatility is then discussed after doing regression analyses on a variety of particular regulations and strategies under distinct groups. School and college closings, transportation shutdowns, stay-at-home mandates, and internal movement limitations all contribute to reducing fluctuation in exchange rates for certain confinement and shutdown subcategories. On either hand, the outcomes of various actions taken under the heading of "economic reaction" demonstrate that international assistance, fiscal and monetary policy, and income support policies all play a part in regulating exchange rate volatility. Consequently, only publicly available campaign policy—and not other measures—has a statistical significance inhibitory influence on fluctuations in exchange rates for the health system group**.** Based on the findings of the conceptual and provable evaluations in this Scrutiny, an administration can efficiently reduce the apprehension and anxiety engendered by COVID-19, send encouraging impulses to the shareholders and financial sectors, and thus constrain fluctuations in exchange rates. Examples of such non-pharmaceutical initiatives include limitations on moving furniture and publicity campaigns. Additionally, budgetary and financial assistance policies can reduce exchange rate volatility, boost consumer spending, and influence the movement of capital.

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