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An Examination of the Impact of the Exchange Rate on Gross Domestic Product (GDP) in Afghanistan Utilizing a Vector Autoregression (VAR) Model

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Abstract

Given that the exchange rate is considered one of the most pivotal macroeconomic variables, and its fluctuations exert a considerable influence on other economic indicators such as Gross Domestic Product (GDP) and inflation, the primary objective of this research is to examine the impact of the exchange rate on Afghanistan's GDP. This investigation utilizes data spanning the period 1385-1399 (Solar Hijri, corresponding to approximately 2006-2020 Gregorian) and employs a Vector Autoregression (VAR) model. The empirical findings reveal a statistically significant negative relationship between the exchange rate variable and Gross Domestic Product. This significance is primarily attributed to increased imports, particularly of luxury goods, and the consequent currency outflow from the country. Furthermore, significant positive correlations are established between GDP and both exports and gross fixed capital formation. This implies that fostering export growth and augmenting gross fixed capital formation, with a strategic focus on enhancing the global competitiveness of exportable goods, coupled with diligent governmental attention to supplying requisite machinery and equipment to active economic entities, can be conducive to positive economic performance.

Keywords: *Gross Domestic Product (GDP); Exchange Rate; Exports; Gross Fixed Capital Formation; VAR Model*

JEL Classification: C32, E52, F43

Introduction

The exchange rate stands as one of the most pivotal variables exerting influence upon macroeconomic aggregates, with its fluctuations impacting both the demand and supply sides of an

economy. The supply side of the economy is influenced through imported intermediate goods, while the demand side is affected via net exports and alterations in foreign exchange reserves due to such fluctuations. Furthermore, the exchange rate serves as a benchmark for the relative value of a domestic currency against foreign currencies, thereby reflecting the nation's economic standing vis-à-vis other countries (Kazerooni et al., 1391 [approx. 2012], p. 6). Likewise, alterations in the exchange rate affect a nation's balance of payments position and its international competitiveness. Should the exchange rate deviate from its long-run equilibrium, it typically precipitates significant macroeconomic imbalances (Tavakkoli et al., 1390 [approx. 2011], p. 2).

The modality of the exchange rate's influence on economic growth is contingent upon the nature of domestic production. If domestic production exhibits limited dependence on imported intermediate goods, capital goods, and raw materials, an exchange rate depreciation (an increase in the price of foreign currency) tends to bolster exports and domestic output—by rendering exports more affordable and imports costlier—thereby exerting a positive influence on the nation's economic growth. Conversely, where domestic production is substantially dependent on imported intermediate goods, capital goods, and raw materials, an exchange rate depreciation inflates production costs, thereby adversely affecting aggregate supply and hampering economic growth (Motahari et al., 1396 [approx. 2017], p. 176).

This study, employing a Vector Autoregression (VAR) model, endeavors to delineate the relationship between exchange rate fluctuations and Gross Domestic Product (GDP) in Afghanistan, and to ascertain the responsiveness of key macroeconomic variables to shocks emanating from the exchange rate. The principal objective of this paper is to scrutinize the impact of exchange rate fluctuations on Gross Domestic Product (GDP) within the Afghan economy. The variables incorporated in this study are: the exchange rate, Gross Domestic Product (GDP), exports, and gross fixed capital formation.

The analysis is conducted using quarterly time-series data for the period 1385-1399 (Solar Hijri, corresponding to approximately 2006-2020 Gregorian), which are employed for the model estimation. Data pertaining to gross fixed capital formation, GDP, exports, and the exchange rate were meticulously compiled from several sources, including the World Bank, Da Afghanistan Bank (the central bank of Afghanistan), the National Statistics and Information Authority (NSIA) of Afghanistan, and the United Nations. The selected timeframe for this study, 1385-1399 SH, was determined by data availability; specifically, deficiencies in continuous data for certain variables for the years 1400 and 1401 SH (approximately 2021-2022) and a complete lack of data for 1402 SH (approximately 2023) in the relevant statistical databases precluded an extension of the sample period.

Broadly, this research endeavors to provide answers to the following pivotal questions:

Is there a statistically significant relationship between exchange rate fluctuations and Gross Domestic Product in Afghanistan?

What is the nature of the impact of exports on Gross Domestic Product?

How does gross fixed capital formation influence Gross Domestic Product?

Literature Review

Numerous studies have been conducted globally on the effect of exchange rate fluctuations on Gross Domestic Product (GDP); however, no such investigation has yet been undertaken in Afghanistan in this specific area. Herein, we review a selection of studies most closely related to the topic of this paper.

Motehari et al. (2017) investigated the effects of the real exchange rate on economic growth in Iran over the period 1975-2015 using the Markov-switching method and a non-linear specification. The results indicated that when the real exchange rate is below the threshold real exchange rate, a positive relationship exists between the real exchange rate and economic growth. Conversely, if the real exchange rate exceeds the threshold, a significant negative relationship is observed between the real exchange rate and economic growth. Their study estimated the threshold real exchange rate to be approximately 14,000 Rials.

Basirat et al. (2015) examined the impact of exchange rate volatility on economic growth, considering the level of financial market development in selected OPEC member countries (Algeria, Ecuador, Iran, Nigeria, and Saudi Arabia) for the period 1981-2010, employing panel data methodology. The findings showed that the effect of financial development on economic growth, as well as the interactive effect of exchange rate volatility and financial development on economic growth, is positive but not statistically significant. Conversely, exchange rate volatility has a significant negative impact on economic growth.

Sepahvand et al. (2014) analyzed the factors affecting the exchange rate in Iran during the period 1978-2013 using the Autoregressive Distributed Lag (ARDL) model. The results indicated that in the long run, Gross Domestic Product has a negative impact, while money supply and imports have a positive and significant impact on the exchange rate. The effects of interest rates and exports on the exchange rate were found to be insignificant. Furthermore, the impact of shocks on the exchange rate was positive and significant.

Tavakoli et al. (2011) investigated the impact of exchange rate fluctuations on economic growth and the inflation rate over the period 1961-2009. The study's findings revealed that exchange rate fluctuations had a significant negative effect on inflation and a significant positive effect on output. That is, an increase in the exchange rate enhances the competitiveness of export goods, ultimately leading to an increase in exports, which in turn boosts domestic production.

Fesharaki and Kazerouni (2010) examined the impact of real exchange rate instability on Iran's Gross Domestic Product for the period 1988-2008 using a GARCH model. To investigate the long-run relationship between the model's variables, they employed the Johansen-Juselius cointegration method. The results indicated that the real exchange rate and its instability have a significant negative impact on Iran's GDP. Conversely, money supply and terms of trade exhibited a significant positive impact on GDP.

Aman et al. (2017) conducted a study titled "Investigating the relationship between exchange rate and economic growth" for the period 1976-2010 in Pakistan, using a simultaneous equations method. The research findings suggested that the exchange rate positively influenced growth through export substitution, increased investment, and foreign investment instead of imports.

Appolos et al. (2015) studied the relationship between Gross Domestic Product, exchange rate, and exports in Nigeria over the period 1986-2013. The research findings indicated a significant positive relationship among GDP, exchange rate, and exports. Furthermore, the results showed that exchange rate volatility impacted economic growth.

Brito et al. (2011) studied the impact of exchange rate fluctuations on economic growth for the period 1970-2009 using panel data from 82 developed and developing countries. The findings indicated that exchange rate volatility has a significant negative impact on economic growth in these countries.

Arratibel et al. (2009) investigated the impact of exchange rate instability on the economic growth of Central and Eastern European countries during the period 1995-2008 using panel data. The research findings indicated that the exchange rate has a significant negative impact on the economic growth of these countries.

Javid and Farooq (2009) conducted a study titled "Investigating exchange rate volatility on economic growth in Pakistan" for the period 1982-2007 using the ARDL model. The findings suggested that the domestic economy's performance is highly sensitive to exchange rate fluctuations in the long run, and a positive long-run relationship exists between exchange rate volatility and economic growth.

Schnabl (2007) conducted a study titled "Investigating the impact of exchange rate instability on economic growth" for the period 1994-2005 using panel data from European Union (EU) member countries. The research findings indicated that increased exchange rate and its instability led to a reduction in economic growth in EU member countries.

Tioulabi (2006) conducted a study titled "Investigating the relationship between exchange rate and GDP growth" using data from 33 developing countries. The research findings showed that the real exchange rate has a negative impact on Gross Domestic Product.

Azid et al. (2005), in a study titled "Investigating the impact of exchange rate instability on economic growth," examined Pakistan using quarterly time-series data for the period 1973-2003. The research findings indicated a unidirectional causality from the real exchange rate to economic growth.

Theoretical Framework

The exchange rate is defined as the price of one currency unit in terms of another currency. Alternatively, it represents the relative price of foreign currency to domestic currency and, as a key macroeconomic variable, has consistently garnered the attention of the economic and financial community. Generally, the exchange rate reflects a country's economic conditions and serves as a benchmark for comparing its national economy with those of other nations (Aziznejad & Komijani, 2017, p. 122). That is, when a country's domestic currency depreciates, the price of foreign goods rises relative to domestic goods, thereby enhancing international trade competitiveness. In other words, a depreciation of the domestic currency prompts a shift in consumer expenditure from foreign to domestic goods.

From the perspective of traditional economists, currency depreciation has an expansionary effect on the economy. Conversely, neo-structuralists posit that it has a contractionary impact. Currency depreciation leads to a decrease in the price of export goods and, conversely, an increase in the price of import goods. Under conditions of balanced and stable international trade, these price changes offset each other. However, when imports exceed exports, the net outcome is a reduction in the country's real income. Currency depreciation leads to an increase in net exports and concurrently raises production costs. Conversely, when the domestic currency appreciates, net exports decline, and production costs decrease. Consequently, it is affirmed that the impact of exchange rate fluctuations on a nation's economy can be characterized through two channels: supply and demand (Tavakoli & Sayyah, 2010, pp. 61-62).

A depreciation of the domestic currency, on one hand, leads to an increase in net exports due to lower export prices and higher import prices. On the other hand, the increased cost of imported inputs causes a reduction in aggregate supply. Therefore, the overall impact of domestic currency depreciation on production depends on the relative magnitudes of the shifts in aggregate demand and aggregate supply. If the increase in aggregate demand outweighs the decrease in aggregate supply, the exchange rate depreciation will have an expansionary effect on output. However, if the reduction in aggregate supply is

greater than the increase in aggregate demand, the depreciation will exert a contractionary effect on output. A neutral effect of exchange rate changes on output occurs when the shifts in aggregate demand and aggregate supply are equal, thereby offsetting each other's impact on production (Khataei & Gharbali Moghaddam, 2002, p. 5).

If the exchange rate exhibits significant volatility, exporters and importers, at the time of contract conclusion, will face considerable uncertainty regarding their export revenues and import costs when denominated in domestic currency. While the foreign currency value of exported or imported goods is known at the time of contract, a time lag exists between this point and the receipt of export revenues or the sale of imported goods. Therefore, exchange rate volatility can significantly affect the domestic currency value of export earnings and import costs (Jafari Samimi et al., 2015, p. 30).

Volatility in the real exchange rate, indicative of instability and uncertainty in the trajectory of relative prices between countries, fosters an unstable and uncertain economic environment. Frequent real exchange rate volatility can create an uncertain environment concerning the profitability of international transactions, thereby potentially reducing trade and impeding capital flows by discouraging investment in foreign activities. Increased real exchange rate volatility leads to higher prices for tradable goods and elevates the risks associated with hedging against unanticipated changes in the real exchange rate (Basirat et al., 2015, p. 143).

In essence, an increase in the exchange rate (i.e., depreciation) exerts two primary effects on economic growth. Firstly, it renders export goods cheaper and import goods more expensive, thereby enhancing the competitiveness of domestic products relative to foreign counterparts. This, in turn, bolsters exports, leading to increased domestic production and economic growth. Secondly, it can increase producers' costs due to the higher prices of imported raw materials, intermediate goods, and capital goods, consequently undermining domestic production and curtailing economic growth. Furthermore, an exchange rate increase (depreciation), by stimulating demand for domestically produced goods, can lead to higher prices for these goods. Concurrently, increased labor demand from domestic producers may drive up wages, thereby elevating the cost of domestic products. This erodes the competitiveness of domestic producers against foreign rivals, ultimately dampening economic growth (Motehari et al., 2017, p. 181).

Specification of the VAR Model and Variables

In this research, the Vector Autoregression (VAR) model is employed to investigate the impact of the exchange rate on Afghanistan's Gross Domestic Product (GDP). This approach allows for an examination of GDP's responsiveness to shocks originating from each explanatory variable and facilitates a clearer delineation of the causal relationships among the variables. The salient features of the VAR methodology include the following:

This model offers a straightforward operational procedure and does not require the researcher to differentiate between endogenous and exogenous variables. This is because, with the exception of the intercept, trend variables, and dummy variables, all variables are treated as endogenous. Furthermore, forecasts generated by VAR models are often considered superior to those produced by simultaneous equations models (Mohammadpour, 2016, pp. 90-91). The Vector Autoregression methodology is, in effect, a simultaneous system wherein all variables are considered endogenous.

The general form of the VAR model is represented as follows:

Equation 1... $Y_t = A_0 + A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_p Y_{t-p} + \varepsilon_t$

Furthermore, when a Vector Autoregression (VAR) model is estimated, it is not necessarily expected that all estimated coefficients corresponding to the lagged variables will be statistically significant. However, it is possible that, based on the F-statistic, the coefficients are jointly significant. When variables are integrated of order one, I(1), but are not cointegrated, the VAR model can be specified in first differences. Conversely, if the variables included in the VAR model are cointegrated, differencing this relationship will lead to specification error (Azad, 2012, pp. 60-61). Moreover, in a VAR model, each variable is expressed as a linear function of its own past values and the past values of all other variables in the system. In the analysis of such models and the interpretation of their results, variance decomposition and impulse response functions are typically employed, with less emphasis placed on criteria such as the statistical significance of individual coefficients determined by t-statistics. This is because, in these models, the explanatory variables often exhibit high multicollinearity, rendering the t-statistic an unreliable measure of individual coefficient significance (Souri, 2017, p. 978).

In this study, for data analysis, a Vector Autoregression (VAR) model will be utilized, implemented using Eviews 9 software. The model employed in this research includes variables such as Gross Domestic Product (GDP), exchange rate, exports, and gross fixed capital formation. The algebraic specification of the model utilized in this research is as follows:

Equation 2 $GDP = A_0 + A_1 E + A_2 EX + A_3 GCF$

In the aforementioned equation (Equation 2, which was not provided), the elements are: GDP representing Gross Domestic Product, E denoting the exchange rate, EX signifying exports, and GCF representing gross fixed capital formation.

Model Estimation

Prior to model estimation, it is imperative to examine the stationarity of the variables employed. This is because if non-stationary data are utilized in the model estimation—where the variance, mean, and covariance of the variables are not time-invariant—statistical inference will not be valid. In the present study, to assess data stationarity, the Dickey-Fuller and Phillips-Perron tests are utilized.

Dickey-Fuller Unit Root Test

Stationary variables exhibit a mean-reverting tendency, moving towards an equilibrium level over time. If the variables in a model are stationary, an equilibrium condition will exist for them; otherwise, the variables are considered non-stationary. When variables are non-stationary, a long-run equilibrium relationship, known as a cointegration relationship, may exist. In such instances, a stationary linear combination of the non-stationary variables can be found, and this stationary combination represents the equilibrium or cointegration relationship. Cointegration offers a solution to the issue of non-stationarity by describing the long-run relationship between variables (Souri, 2017, pp. 1020 & 1053).

To ascertain the stationarity or non-stationarity of the time series variables used in the model, the Augmented Dickey-Fuller (ADF) test and the Perron structural break test are employed. The Augmented Dickey-Fuller unit root test can be implemented in various specifications. One common approach involves conducting the test for all variables within the model, considering the significance of

deterministic components (i.e., constant and trend) and the appropriate inclusion of lagged differences of the dependent variable. The table below presents the results of the Augmented Dickey-Fuller test.

Table (1): Dickey-Fuller Unit Root Test Results

Status	Critical Value 10%	Critical Value 5%	Critical Value 1%	Probability (p-value)	Calculated Statistic	Order of Integration	Variable
Stationary	-2.59	-2.92	-3.56	0.0000	-8.72	I(2)	GDP
Stationary	-2.59	-2.92	-3.56	0.0000	-9.42	I(2)	E
Stationary	-2.59	-2.92	-3.56	0.0000	-5.57	I(2)	EX
Stationary	-2.59	-2.92	-3.56	0.0000	-5.61	I(2)	GCF

Source: Research Findings

As demonstrated in the preceding table (Table 1), the calculated Augmented Dickey-Fuller (ADF) statistics for all variables are, in absolute terms, greater than their respective critical values. Consequently, it is concluded that all variables achieve stationarity after second differencing (i.e., they are I(2)).

Phillips-Perron Test

Acknowledging Perron's critiques regarding the limitations of the standard Dickey-Fuller test methodology, particularly its diminished power in the presence of structural breaks within time series, an examination incorporating unit root tests designed to account for such phenomena, such as the Phillips-Perron test or Perron's structural break tests, is warranted.

Table (2): Phillips-Perron Test Results

Conclusion	Critical Value 10%	Critical Value 5%	Critical Value 1%	Probability (p-value)	Calculated Statistic	Order of Integration	Variable
Stationary in levels	-2.59	-2.92	-3.54	0.0113	-3.50	I(0)	GDP
Stationary at I(2)	-2.59	-2.92	-3.56	0.0000	-9.40	I(2)	E
Stationary at I(1)	-2.59	-2.92	-3.54	0.0063	-3.71	I(1)	EX
Stationary at I(1)	-2.59	-2.92	-3.54	0.0003	-4.65	I(1)	GCF

Source: Research Findings

Based on the results obtained from the Phillips-Perron test, Gross Domestic Product (GDP) is found to be stationary in its levels (I(0)), the exchange rate (E) achieves stationarity after second differencing (I(2)), while exports (EX) and gross fixed capital formation (GCF) are stationary after first differencing (I(1)).

Determination of Optimal Lag Length

In this analysis, the optimal lag length for the Vector Autoregression (VAR) model is determined by employing several standard information criteria. These include the Akaike Information Criterion (AIC), the Schwarz-Bayesian Criterion (SBC, also commonly referred to as the Bayesian Information Criterion, BIC), the Hannan-Quinn Criterion (HQC), and the Likelihood Ratio (LR) test statistic. According to the information presented in the subsequent table, the optimal lag length selected for the model is one.

Table 3: Determination of Optimal Lag Length

HQ	SC	AIC	FPE	LR	LogL	Lag
13.20	13.34	13.25	803.81	–	359.07	0
2.29	1.56	2.00	2.00	70.45	83.02	1
3.24	1.92	1.92	2.73	11.53	125.14	2
2.93	1.03	1.03	2.20	10.83	132.69	3
2.63	0.15	0.15	1.67	113.58	140.54	4
5.39	2.33	2.33	4.21	–	232.40	5

Source: Research Findings

Estimation Results

In analyzing the results of Vector Autoregression (VAR) estimation, it is crucial to recognize that, fundamentally, within systems of equations, the individual coefficients and measures of explanatory power (such as R-squared) associated with the model's parameters do not carry the same interpretive weight as they do in single-equation methodologies. Consequently, Impulse Response Functions (IRFs) and Forecast Error Variance Decomposition (FEVD) are the primary tools employed for analytical interpretation. In this model, GDP denotes Gross Domestic Product, E represents the exchange rate, EX signifies exports, and GCF stands for gross fixed capital formation.

The first column of Table (4) (not yet provided, but referenced) presents the estimated equation for Gross Domestic Product. As can be observed therein, GDP exhibits a significant positive autoregressive effect. The exchange rate is found to have a statistically significant negative impact on Afghanistan's Gross Domestic Product. Gross fixed capital formation demonstrates a significant positive influence on GDP. This latter finding aligns with theoretical expectations, as capital formation (representing physical capital) is a quintessential factor of production; hence, its augmentation is anticipated to foster economic growth. Exports also exert a significant positive effect on Afghanistan's GDP.

Therefore, among the principal reasons for the deleterious impact of the exchange rate on Afghanistan's GDP are: a diminution in the international competitiveness of domestic producers relative to their foreign counterparts; suboptimal allocation of productive factors; persistent misalignments in the real exchange rate, which engender economic uncertainty; and the adverse influence of such misalignments on relative prices. These factors, compounded by heightened investment risk, can precipitate a deterioration in the balance of payments, reduce the efficiency of financial markets, and culminate in economic stagnation. It is generally posited that a country experiencing significant deviations of its real exchange rate from its equilibrium level is likely to exhibit subdued economic growth.

Furthermore, Afghanistan is predominantly an import-dependent economy, with a substantial proportion of its consumption and intermediate goods sourced from abroad. Domestic production, in turn,

exhibits a considerable reliance on imported capital goods, intermediate inputs, and raw materials. Consequently, an appreciation of the foreign currency (or depreciation of the domestic currency) functions as an adverse supply-side shock, escalating production costs and thereby exerting a contractionary pressure on aggregate supply and, ultimately, on Afghanistan's economic growth.

Similarly, the second column of Table (4) will display the estimated equation for the exchange rate, the third column will present the estimated equation for exports, and the fourth column will show the estimated equation for gross fixed capital formation.

Table (4): Model Estimation Results

	GDP	E	EX	GCF
GDP(-1)	0.96	0.025	0.81	0.012
t – statistic	59.23	0.80	0.67	1.59
E(-1)	-0.05	1.09	1.55	-0.002
t – statistic	-5.91	59.23	2.17	-0.64
EX(-1)	0.001	-0.003	0.95	0.0004
t – statistic	3.16	-4.01	30.009	2.36
GCF(-1)	0.24	0.26	-12.07	0.85
t – statistic	2.03	1.04	-1.23	13.98
C	0.65	-0.98	-10.28	0.02
t – statistic	6.26	-4.88	-1.31	0.60

Source: Research Findings

Asymmetric Effects of the Real Exchange Rate on Economic Growth in Iran," revealed that positive shocks to the real exchange rate stimulated GDP growth, whereas negative shocks led to its reduction. Similarly, in 2015, Tang undertook a study investigating the relationship between the exchange rate and economic growth in China. The results of this research indicated the absence of a direct long-run relationship between the exchange rate and China's economic growth; specifically, the exchange rate was found to have a negative impact on China's economic growth in the long term (Motehari et al., 2017, p. 184). Hallafi (2007), in his research titled "Real Exchange Rate and Economic Growth in Iran," concluded that real exchange rate instability adversely affects Gross Domestic Product. Kazerouni and Rostami (2007), in their study "Asymmetric Effects of the Real Exchange Rate on Production and Prices in Iran," found that real exchange rate volatility negatively impacts both production and prices. Tioulabi (2011), in a study titled "The Impact of Exchange Rate Volatility on GDP Growth in 33 Developed Countries," concluded that exchange rate volatility has a significant negative impact on the GDP of these nations. Brito et al. (2001), in their study on the impact of exchange rate volatility on the growth of 82 developed and developing countries, also found that exchange rate volatility negatively affects economic growth.

Impulse Response Functions from Estimation

As previously emphasized, in VAR modeling, less interpretive weight is placed on the statistical significance of individual coefficients (as determined by t-statistics) due to the prevalent issue of high multicollinearity among explanatory variables. Therefore, to analyze the system's dynamic response to stochastic shocks—specifically, a one-standard-deviation shock in each equation—Impulse Response Functions (IRFs) are employed. In essence, IRFs illustrate how each endogenous variable reacts over time

to an exogenous shock introduced to itself or to other variables within the system. More precisely, in impulse response analysis, we examine the effect of a one-standard-deviation impulse (shock) in one variable on the subsequent trajectory of other variables. In other words, if a one-standard-deviation unanticipated change, or shock, occurs in Gross Domestic Product, the exchange rate, exports, or gross fixed capital formation, what will be its impact on GDP in subsequent periods?

The first column of Table (5) will illustrate that a one-standard-deviation unanticipated increase (shock) in Gross Domestic Product itself leads to an increase in GDP by 0.071 units in the first period, by 0.066 units in the second period, and so on, reaching an increase of 0.056 units in the seventh period, and ultimately an increase of 0.058 units in the tenth period.

The second column of Table (5) will depict the impact on Gross Domestic Product stemming from a shock to the exchange rate. If the exchange rate experiences a one-standard-deviation increase (e.g., depreciation), it has no contemporaneous effect on GDP in the first period. However, it leads to a reduction in GDP by 0.005 units in the second period, by 0.011 units in the third period, progressing to a reduction of 0.041 units in the seventh period, and ultimately causing a 0.067 unit decrease in GDP by the tenth period.

The third column of Table (5) will show that if a one-standard-deviation unanticipated increase occurs in exports, it exerts no contemporaneous impact on GDP in the first period. Subsequently, it leads to an increase in GDP by 0.001 units in the second period, 0.005 units in the third period, reaching an increase of 0.041 units in the seventh period, and culminating in an 0.082 unit increase in GDP by the tenth period.

The fourth column of Table (5) will demonstrate that if a one-standard-deviation unanticipated increase (shock) affects the gross fixed capital formation variable, it has no initial impact on GDP in the first period. It then leads to an increase in GDP by 0.004 units in the second period, 0.008 units in the third period, an increase of 0.010 units by the seventh period, and finally, an increase of 0.002 units in GDP by the tenth period.

Table (5): Response of Gross Domestic Product to Shocks in Other Variables

Response of GDP				
Period	GDP	E	EX	GCF
1	0.071	0.000	0.000	0.000
2	0.066	-0.005	0.001	0.004
3	0.062	-0.011	0.005	0.008
4	0.059	-0.018	0.011	0.010
5	0.057	-0.025	0.020	0.011
6	0.056	-0.033	0.030	0.011
7	0.056	-0.041	0.041	0.010
8	0.056	-0.050	0.054	0.008
9	0.057	-0.058	0.067	0.005
10	0.058	0.067	0.082	0.002

Variance Decomposition Analysis

As presented in Table (6), the initial column, designated 'S.E.' (Standard Error), quantifies the forecast error standard deviation for the pertinent variables across sequential forecast horizons. Given that

the forecast error for any given period is predicated upon preceding periods, the magnitude of this estimation error inherently escalates with the extension of the forecast horizon.

The empirical findings indicate that in the initial forecast horizon (period one), 100% of the forecast error variance in Gross Domestic Product (GDP) is attributable to shocks originating from GDP itself. Subsequently, at the two-period horizon, innovations in GDP account for approximately 99.38% of its own forecast error variance, while the exchange rate, exports, and gross fixed capital formation contribute circa 0.34%, 0.02%, and 0.25%, respectively. By the third period, the contribution of GDP itself diminishes to approximately 97.78%, with the exchange rate, exports, and gross fixed capital formation accounting for roughly 1.28%, 0.24%, and 0.68% of GDP's variance, respectively.

This trend continues, such that by the sixth forecast horizon, shocks to GDP explain approximately 84.58% of its variance. Concurrently, the contributions from the exchange rate, exports, and gross fixed capital formation rise to approximately 8.38%, 5.39%, and 1.67%, respectively. At the eight-period horizon, the explanatory power of own-shocks to GDP further declines to circa 69%, whereas the exchange rate, exports, and gross fixed capital formation account for approximately 15.19%, 14.26%, and 1.46% of the variance, respectively. Ultimately, at the ten-period forecast horizon, innovations intrinsic to GDP account for approximately 52.6% of its forecast error variance. The corresponding contributions from the exchange rate, exports, and gross fixed capital formation are estimated at circa 21%, 25%, and 1%, respectively.

Table (6): Variance Decomposition of Gross Domestic Product (GDP)

Period	S.E	GDP	E	EX	GCF
1	0.071	100.00	0.00	0.00	0.00
2	0.097	99.38	0.34	0.02	0.25
3	0.11	97.87	1.28	0.24	0.68
4	0.13	94.93	2.95	0.98	1.12
5	0.14	90.55	5.36	2.61	1.47
6	0.16	84.58	8.38	5.39	1.64
7	0.18	77.25	11.76	9.35	1.62
8	0.20	69.07	15.19	14.26	1.46
9	0.23	60.66	18.37	19.73	1.22
10	0.26	52.60	21.10	25.31	0.97

Source: Research Findings

Summary of Results

This study examines the impact of the exchange rate on Afghanistan's Gross Domestic Product (GDP) using the Vector Autoregression (VAR) method over the period 2006–2020. The variables included in the analysis are GDP, exchange rate, exports, and gross fixed capital formation. The findings of this research are summarized in the following four stages:

Stage One: The results from unit root tests reveal that the variables—GDP, exchange rate, exports, and gross fixed capital formation—are stationary at the 1%, 5%, and 10% significance levels. These results were obtained using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests.

Stage Two: Model estimation results indicate that GDP exhibits a significant positive autoregressive effect. The exchange rate exerts a statistically significant negative effect on GDP, while exports and gross fixed capital formation both have significant positive effects on GDP in Afghanistan. One key reason for the negative impact of the exchange rate on GDP lies in Afghanistan's import-dependent economy. A large proportion of essential goods are sourced from abroad, and domestic production heavily relies on imported capital goods, intermediate goods, and raw materials. As a result, an increase in the exchange rate functions as a negative supply shock, raising production costs and ultimately exerting a contractionary effect on aggregate supply and economic growth.

Stage Three: The impulse response analysis indicates that a one standard deviation shock to GDP increases GDP by 0.071 units in the first period, 0.066 in the second, 0.062 in the third, and 0.058 by the tenth period. Conversely, a one standard deviation shock to the exchange rate has no immediate impact in the first period, but reduces GDP by 0.005 units in the second, 0.011 in the third, and 0.067 in the tenth period. A similar shock to exports shows no effect in the first period, followed by an increase of 0.001 units in the second, 0.005 in the third, and 0.082 by the tenth period. For gross fixed capital formation, the shock yields no effect in the first period, followed by increases of 0.004 in the second, 0.008 in the third, and 0.002 in the tenth period.

Stage Four: Variance decomposition results show that in the first period, GDP is entirely explained by its own innovations (100%), with no contribution from the other variables. By the tenth period, GDP explains 52.6% of its own variation, while the exchange rate accounts for 21.1%, exports for 25.3%, and gross fixed capital formation for 1%. Notably, GDP continues to be the most influential factor affecting its own trajectory in the long run.

Based on the empirical results, the following policy recommendations are proposed: Given the increasing trend of luxury goods imports in Afghanistan in recent years—resulting in substantial foreign exchange outflows—it is recommended that the government revise import tariff policies on luxury goods. These tariffs should be adjusted to discourage such imports and help preserve foreign reserves.

Moreover, the analysis confirms a statistically significant positive relationship between exports and GDP. Hence, relevant authorities should prioritize the adoption of advanced technologies and the establishment of development institutions. Additionally, efforts must be made to enhance the competitiveness of Afghan exports, both in quality and quantity, enabling them to compete effectively in international markets.

Finally, since gross fixed capital formation significantly contributes to GDP, it is imperative for public and private institutions to exercise due diligence in procuring machinery and equipment necessary for operations. The more attention given to efficient and strategic investment in productive capital, the greater the potential return and economic productivity.

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