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The Nexus between Trade, Financial Development, Remittances and Economic Growth: A Vector Autoregression Approach

Alexander Maune[1]

Abstract: This study examines the nexus between trade, financial development, remittances and economic growth in Zimbabwe using time-series data collected from the World Bank Worldwide Development Indicators database from 1980 to 2022. Vector autoregression models were estimated using Stata/SE 14.2 to analyse "short-run" relationships among the four variables. The results obtained showed the non-existence of cointegration equations in the series. The significant findings are the positive "short-run" causal effects of first lag *GDP* regressor on *GDP* at 0.05%, first lag *remittances* regressor on *GDP*, first lag *financial development* regressor on *financial development*, and first lag *trade* and *remittances* regressors on *remittances*, at 0.01% level of significance. Moreover, the Granger causality test showed that the remittances Granger causes *GDP* and *trade* Granger causes *remittances* in the "short-run", while the opposite is true for other variables. This study is essential to researchers and policymakers. It is recommended that the government formulate policies that promote the inflow of remittances, trade, and financial development for meaningful economic growth.

Keywords: Financial Development; Trade; Foreign Remittances; Diaspora Remittances; Economic Growth; GDP; Vector Autoregression; VAR

JEL Classification: C58; F24; O11; O16; O47; P34; P33; P45

[1] Research Associate: CEMS, UNISA, Pretoria, South Africa.
Lecturer, Department of Banking and Finance, Bindura University of Science Education, Zimbabwe, Address: 741 Chimurenga road, Bindura, Zimbabwe, Corresponding author: alexandermaune6@gmail.com.

1. Introduction

Zimbabwe's economy has experienced booms and busts since its independence from Great Britain in 1980 (Maune, 2017). The country has faced macroeconomic challenges due to colonialism and the long battle for independence. The economic history of Zimbabwe can be divided into four periods: 1980-1999, 2000-2008, 2009-2017, and 2018-present. The first phase began in 1980, following independence. Zimbabwe's economic history is characterised by ups and downs, with each period having its macroeconomic challenges. The second period in Zimbabwe's history was marked by the government's land reform program, economic sanctions, hyperinflation, and the near collapse of the financial services sector, and this period witnessed the closure of several banks (Maune, 2015). The period 2009-2017 saw the economy's dollarisation and the Mugabe regime's end. 2017 President Mnangagwa led a new administration with Vision 2030, aiming to achieve an upper middle-income economy. Zimbabwe's economy has experienced fluctuations from 1980 to 2022, with GDP per capita trends indicating these fluctuations (Figure 1). Economic factors include financial development, trade, and remittances (Figures 2 & 3). Financial development is a critical factor in economic growth (Bayraktar et al.; 2023 and Singh et al.; 2023), as are remittance inflows (Adekunle et al.; 2020; Yadeta & Hunegnaw, 2022; Golder et al.; 2023), which are closely associated with financial development (Akcay, 2020 and Bindu et al.; 2022). Trade significantly contributes to Zimbabwe's economic growth, with studies indicating a strong correlation between trade and global economic growth, with previous research supporting this positive relationship (Maune, 2018 & 2019; Sghaier, 2021; Takongmo & Toure, 2023). However, research has also shown the importance of the relationship between the variables in sustainable economic growth and development (Maune et al.; 2023; Maune & Mundonde, 2024).

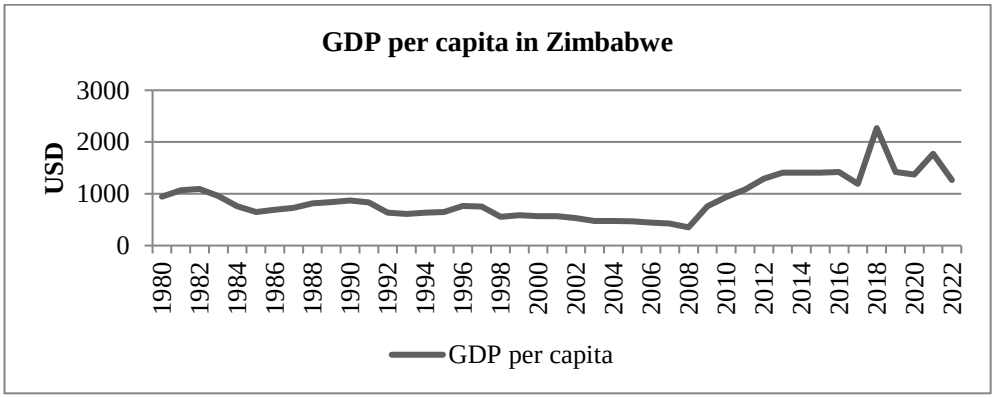

Figure 1. GDP Per Capita in Zimbabwe, 1980 to 2022

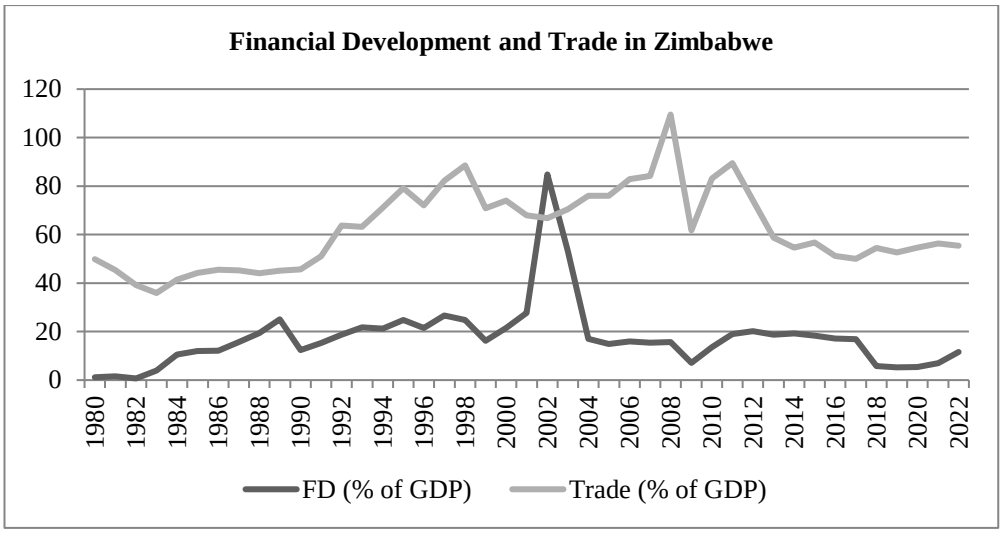

Figure 2. Financial Development and Trade in Zimbabwe, 1980 to 2022

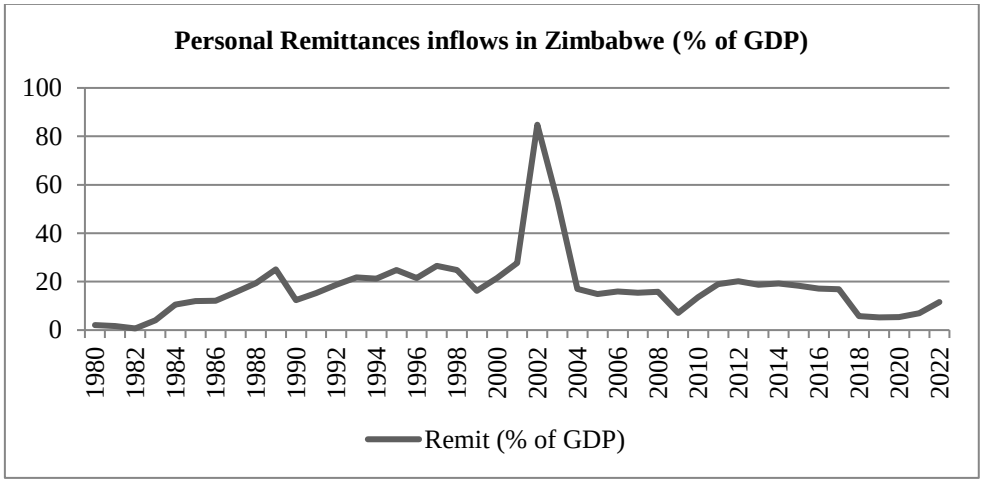

Figure 3. Personal Remittances Inflows in Zimbabwe, 1980 to 2022

Financial development and economic growth are linked through supply-leading and demand-following approaches. Growth in financial markets and institutions increases the availability of financial services and savings, leading to economic expansion (Bayraktar et al.; 2023). A solid financial system enhances economic advancement by transferring wealth from areas with lower productivity to areas with higher productivity (Singh et al.; 2023). Economic growth can be achieved by expanding credit availability and encouraging higher savings and investments, as research in developing economies demonstrates. However, standard models may need to capture the complexity of this interaction. The demand-following strategy

suggests that economic expansion leads to financial development, increasing commercial transactions and money flows. However, this growth is negatively impacted by increased bank loan usage (Ho & Saadaoui, 2022), leading to financial crises and hindering economic progress. The literature does not provide a definitive agreement on the specific outcomes, thus necessitating clarification of the situation. A conducive environment is essential to achieve a positive nexus between the two (Maune & Mundonde, 2024).

Altruistic ideas suggest that individuals travel overseas to work to stimulate economic growth back home (Adekunle et al.; 2020). Remittance inflows stabilise the exchange rate and guarantee economic progress (Golder et al.; 2023). The Harrod-Domar two gaps concept suggests developing nations need remittances to advance their economies due to a lack of investment funds. However, there needs to be more evidence about the relationship between remittances and economic growth, with sustained remittance flows not directed towards the productive sector (Olayungbo et al.; 2020). No causal association was found in Tanzania, highlighting the need for further research (Musakwa & Odhiambo, 2022). Remittances significantly contribute to economic growth, with consistent inflows increasing real GDP (Yadeta & Hunegnaw, 2022). To add to the debate, Maune and Mundonde (2024) found convergence to long-run equilibrium that was insignificant at all levels with a p-value of 0.681. The pair additionally contends that a steady economic backdrop also contributes significantly to the influence of remittances on economic expansion. The two also found no causal effect in the short run because the coefficients are statistically insignificant. Remittances, however, foster financial development, contributing to long-term economic progress. The banking industry acts as a conduit for remittances (Bindu et al.; 2022), and the complementary theory suggests that a significant portion of remittances through financial institutions encourage savings, thereby improving financial growth (Akcay, 2020).

Trade measures a nation's position in the global economy relative to GDP (Usman, 2023). International commerce theory suggests that trade connections can lead to industrial specialisation through comparative advantages (Takongmo & Toure, 2023). Trade promotes efficient resource allocation and economic growth (Maune, 2018a and Maune, 2019). The Marshal-Leiner theory suggests that domestic economies strategically devalue their currency to increase trade balance over time (Usman, 2023).

This study provides a unique VAR approach to examine the nexus between trade, financial development, remittances and economic growth in an emerging economy. The primary aim was to establish short-run and long-run relationships between the variables. This study is relevant to economic growth and development. Researchers and policymakers will find the study significant as it provides a unique approach to examining the relationship between variables from a VAR perspective. These

variables have proven to be critical in economic growth. Vector autoregression models were estimated using Stata/SE 14.2 to analyse "short-run" relationships among the four variables. We used time-series data from the World Bank Worldwide Development Indicators database from 1980 to 2022 to examine the relationship. The study found the non-existence of cointegration equations in the series. We also found positive "short-run" causal effects of first lag *GDP* regressor on *GDP* at 0.05%, first lag *remittances* regressor on *GDP*, first lag *financial development* regressor on *financial development*, and first lag *trade* and *remittances* regressors on *remittances*, at 0.01% level of significance. This study also contributes to the body of knowledge with respect to the factors affecting economic growth.

The structure of this paper is as follows. Section 2 analyses the data source and methodology used to conduct empirical research on the nexus between trade, financial development, remittances and economic growth. Section 3 presents and discusses the study's results in relation to previous studies. Section 5 concludes the article.

2. Data Source and Methodology

The World Bank Worldwide Development Indicators (WBWDI) database was utilised to collect secondary time series data from 1980-2022, a time frame chosen due to data availability and Zimbabwe's political independence in 1980. The chosen variables are displayed in Table 1, together with their explanations. The variables were chosen in line with previous studies that examined the relationships across different jurisdictions.

Table 1. Variables, Description and Source

Variable	Indicator name	Description	Source
Remittances (rt)	Personal remittances, received (% of GDP).	Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households.	World Bank WDI (2023)
Trade	Trade (% of GDP).	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Bank WDI (2023)
GDP per capita (gdp)	GDP per capita (current US$).	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product	World Bank WDI (2023)

		taxes and minus any subsidies not included in the value of the products.	
Financial Development (fd)	Domestic credit to private sector (% of GDP).	Refers to financial resources provided to the private sector by financial corporations, such as loans, purchases of non-equity securities, trade credits and other accounts receivable, that establish a claim for repayment. For some countries, these claims include credit to public enterprises. The financial corporations include monetary authorities, deposit money banks, and other financial corporations where data are available. Other financial corporations include finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.	World Bank WDI (2023)

2.1. VAR Model Specification

A vector autoregression model (VAR) is a model in which K variables are specified as linear functions of p of their own lags, p lags of the other K - 1 variables, and possibly additional exogenous variables. VAR, which stands for Vector Autoregression, is a statistical model that captures the linear interdependencies among multiple time series. In this model, each variable in the system is treated as a function of its own past values as well as the past values of all other variables in the system. This approach allows for the dynamic modelling of complex systems where the behaviour of each component can influence, and be influenced by, the behaviour of others. The Granger causality test examined the nexus between financial development, trade, remittances and economic growth. A VAR model was used to estimate and analyse the short-run relationship between financial development, trade, remittances and economic growth. The four VAR models were specified as follows:

$$lngdp_t = \sigma + \sum_{\boldsymbol{i=1}}^{\boldsymbol{k}} \boldsymbol{\beta_i}\, \boldsymbol{lngdp_{t-i}} + \sum_{j=1}^{k} \emptyset_j\, fd_{t-j} + \sum_{m=1}^{k} \varphi_m\, trade_{t-m} + \sum_{m=1}^{k} \theta_n\, rt_{t-n} + \mu_{1t} \quad (1)$$

$$fd_t = \alpha + \sum_{i=1}^{k} \beta_i\, lngdp_{t-i} + \sum_{\boldsymbol{j=1}}^{\boldsymbol{k}} \boldsymbol{\emptyset_j}\, \boldsymbol{fd_{t-j}} + \sum_{m=1}^{k} \varphi_m\, trade_{t-m} + \sum_{m=1}^{k} \theta_n\, rt_{t-n} + \mu_{2t} \quad (2)$$

$$trade_t = \partial + \sum_{i=1}^{k} \beta_i\, lngdp_{t-i} + \sum_{j=1}^{k} \emptyset_j\, fd_{t-j} + \sum_{\boldsymbol{m=1}}^{\boldsymbol{k}} \boldsymbol{\varphi_m}\, \boldsymbol{trade_{t-m}} + \sum_{m=1}^{k} \theta_n\, rt_{t-n} + \mu_{3t} \quad (3)$$

$$rt_t = \rho + \sum_{i=1}^{k} \beta_i \, lngdp_{t-i} + \sum_{j=1}^{k} \emptyset_j \, fd_{t-j} + \sum_{m=1}^{k} \varphi_m \, trade_{t-m} + \sum_{m=1}^{k} \boldsymbol{\theta_n} \, \boldsymbol{rt_{t-n}} + \mu_{4t} \quad (4)$$

Notes:

- **k =** the optimal lag length
- $\boldsymbol{\beta_i}, \emptyset_j, \varphi_m, \theta_n$ = short-run dynamic coefficients of the model's adjustment long-run equilibrium.
- $\sigma, \alpha, \partial, \rho =$ intercepts.
- $\boldsymbol{\mu_{it}}$ = residuals in the equations (stochastic error terms or shocks).

3. Results

3.1. Descriptive Statistics

Table 2 displays summary statistics for this study's series of numeric variables.

Table 2. Descriptive Statistics

stats	fd	trade	lngdp	rt
N	43	43	43	43
Mean	17.60942	62.43786	6.711509	3.435075
Median	16.16158	58.65649	6.640092	.2614422
IQR	9.594188	24.27212	.7112985	8.86641
SD	13.87312	16.47712	.4302424	4.974505
Skewness	2.949405	.5674205	.2150793	1.019635
Kurtosis	14.72248	2.840878	2.347395	2.3504
Range	84.12108	73.60478	1.863998	14.91536
CV	.7878239	.2638962	.0641052	1.44815
Se(mean)	2.115631	2.512737	.0656114	.7586049

Note: IQR – interquartile range, CV- coefficient of variation (sd/mean) and se(mean) – standard error of the mean (sd/sqrt(n)).

3.2. Regression Analysis

The study utilised spurious regression and data diagnostic tests before recommending VAR models, with the regression results displayed in Table 3. Diagnostic tests included Skewness and Kurtosis, Shapiro-Wilk, and Shapiro-Francia normality tests.

Table 3. Regression Lndgp Fd Trade Rt Output

Source	SS	df	MS	Number of obs	=	43
Model	5.62654798	3	1.87551599	F (3, 39)	=	34.05
Residual	2.14801111	39	.055077208	Prob > F	=	0.0000
Total	7.77455909	42	.18510855	R-squared	=	0.7237
				Adj R-squared	=	0.7025
				Root MSE	=	.23469
lngdp	Coef.	Std. Err.	t	p> ‖ t ‖	[95% Conf.	Interval]
fd	-.0041182	.0027970	-1.47	0.149	-.0097758	.0015394
trade	-.0127445	.0023190	-5.50	0.000	-.017435	-.0080539
rt	.0553729	.0074172	7.47	0.000	.0403702	.0703756
_cons	7.389556	-1437887	51.39	0.000	7.098715	7.680396

The sum squares add to 7.7746, with the model explaining 5.6265 and leaving 2.1480 unaccounted. Additionally, Table 3 shows 42 total degrees of freedom (calculated by subtracting 1 from the mean removal from 43 data observations), of which the model consumes 3, and 39 remain for the residual. The percentage of variation explained by the predictors is indicated by the R-squared in Table 3. Regression's R-squared (R^2) is 0.7237; R-squared corrected for degrees of freedom is 0.7025. The value of 0.2347 is the root mean squared error or Root MSE. Table 4 shows that R^2 is still a reliable goodness-of-fit statistic test. Except for remittances (*rt)*, which have a positive effect, all the variables—aside from financial development (*fd)*—have a substantial impact on GDP overall (Table 3). Trade and financial development *(fd)* have a negative impact (Table 4). Next, we tested the series' stationarity using the unit root test.

3.3. Unit Root Test

After performing the regression analysis, we used Stata's Dickey-Fuller and Phillips-Perron tests to check the series for stationarity. At the level, all variables were nonstationary. Following that, we ran the tests at first difference, and as Table 4 illustrates, we discovered that every series was stationary at first difference. Every series remained stable and trending at the same time. We then carried out the optimal lag length.

Table 4. Test for Unit Root at 1st Difference

Variable	Dickey-Fuller			Phillips-Perron test		
	T-Statistic	MacKinnon p-value	Critical value	T-Statistic	MacKinnon p-value	Critical value
Dlngdp	-3.041	0.0312	-3.655*** -2.961** -2.613*	-7.208	0.0000	-3.641*** -2.955** -2.611*
Dfd	-5.304	0.0000	-3.655*** -2.961** -2.613*	-6.877	0.0000	-3.641*** -2.955** -2.611*
Dtrade	-4.000	0.0014	-3.655*** -2.961** -2.613*	-9.647	0.0000	-3.641*** -2.955** -2.611*
Drt	-3.010	0.0340	-3.655*** -2.961** -2.613*	-6.529	0.0000	-3.641*** -2.955** -2.611*
Notes: *, **, and * denotes critical values at 10%, 5%, and 1%.**						

3.4. Optimal Lag Length

The optimum lag length for the series was determined through an optimum lag length study using the information criteria AIC, HQIC, and SBIC (Table 5). The model with one (1) lag was chosen through likelihood-ratio tests, indicating the ideal lag duration.

Table 5. Selection-Order Criteria

Sample: 1984 - 2022						Number of obs =		39
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-433.649				65648.1	22.4435	22.5047	22.6141
1	-353.593	160.11	16	0.000	2472.05*	19.1586*	19.4647*	20.0117*
2	-342.139	22.908	16	0.116	3210.3	19.3918	19.9427	20.9274
3	-336.062	12.155	16	0.733	5738.93	19.9006	20.6964	22.1187
4	-318.918	34.287*	16	0.005	6251.17	19.842	20.8827	22.7425

Endogenous: lngdp fd trade rt
Exogenous: _cons

After the optimal lag length was determined, the Johansen Cointegration test in Stata was conducted to verify cointegration within the series.

3.5. Johansen Cointegration Test

The Johansen Cointegration test results indicate no cointegration in the series (Table 6), with r = 0 as the estimated number of cointegrating equations. The "*" in Table 6 shows the value of r. The VAR Models were estimated, revealing no cointegration equations between the four variables (Johansen, 1995). The trace and max statistics showed no long-term relationships in the series, with all less than 5% critical value. However, short-term relationships were observed among variables. The VAR Models were specified at levels.

Table 6. Johansen Tests for Cointegration

Trend: Constant			Number of Obs =		41
Sample 1982-2022			Lags =		2
maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	20	-378.64104	.	39.4322*	47.21
1	27	-369.39136	0.36314	20.9328	29.68
2	32	-363.01502	0.26732	8.1801	15.41
3	35	-359.4701	0.15880	1.0903	3.76
4	36	-358.92494	0.02624		
maximum rank	parms	LL	eigenvalue	max statistic	5% critical value
0	20	-378.64104	.	18.4994	27.07
1	27	-369.39136	0.36314	12.7527	20.97
2	32	-363.01502	0.26732	7.0898	14.07
3	35	-359.4701	0.15880	1.0903	3.76
4	36	-358.92494	0.02624		

3.6. VAR Models Estimation

After the Johansen Cointegration test results showed no cointegration in the series, we then estimated the VAR models in Stata/SE 14.2 and the output in Table 7 was obtained. The output has a header and the standard Stata output table for the coefficients, standard errors, and confidence intervals. The header contains summary statistics for each equation in the VAR and statistics used to select the lag order of the VAR.

Table 7. VAR Model Output

Sample: 1982-2022			Number of obs	=	41
Log-likelihood	=	-358.9249	AIC	=	19.26463
FPE	=	2813.47	HQIC	=	19.81252
Det(Sigma_ml)	=	472.022	SBIC	=	20.76923

Equation	Parms	RMSE	R-sq	chi2	P>chi2
Lngdp	9	0.191145	0.8478	228.3924	0.0000
Fd	9	11.468	0.4413	32.37865	0.0001
Trade	9	10.4469	0.6805	87.3296	0.0000
Rt	9	2.23798	0.8427	219.6048	0.0000

	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
Lngdp						
lngdp						
L1.	0.4429718	0.1955137	2.27	0.023	0.059772	0.8261715
L2.	0.1736855	0.1581022	1.10	0.272	0.136189	0.4835601
fd						
L1.	-0.002201	0.0025036	-0.88	0.379	0.007108	0.002705
L2.	-4.54E-06	0.0024844	0.00	0.999	0.004873	0.004864
trade						
L1.	0.0022276	0.0036686	0.61	0.544	0.004962	0.009418
L2.	-0.004153	0.003608	-1.15	0.250	0.011225	0.0029177
rt						
L1.	0.0497224	0.0156733	3.17	0.002	0.019003	0.0804416

L2.	-0.013364	0.0183194	-0.73	0.466	0.0492693	0.0225413
_cons	2.614454	1.19683	2.18	0.029	0.2687103	4.960197
Fd						
lngdp						
L1.	-1.89374	11.73006	-0.16	0.872	24.88423	21.09675
L2.	-5.487574	9.485517	-0.58	0.563	24.07885	13.1037
fd						
L1.	0.6582174	0.1502067	4.38	0.000	0.3638176	0.9526172
L2.	-0.295051	0.1490566	-1.98	0.048	0.5871967	-0.002905
trade						
L1.	-0.251523	0.2201044	-1.14	0.253	0.6829199	0.1798734
L2.	0.322235	0.2164645	1.49	0.137	0.1020277	0.7464977
rt						
L1.	-1.15586	0.9403387	-1.23	0.219	-2.99889	0.6871699
L2.	1.115185	1.099091	1.01	0.310	1.038994	3.269363
_cons	57.0899	71.80513	0.80	0.427	83.64557	197.8254
Trade						
lngdp						
L1.	5.127841	10.68568	0.48	0.631	15.81571	26.07139
L2.	-11.13895	8.640981	-1.29	0.197	28.07497	5.797059
fd						
L1.	0.0505081	0.1368332	0.37	0.712	-0.21768	0.3186963
L2.	0.0801304	0.1357855	0.59	0.555	0.1860042	0.3462651

trade						
L1.	0.5803369	0.2005075	2.89	0.004	0.1873493	0.9733244
L2.	0.0937467	0.1971918	0.48	0.634	0.2927421	0.4802355
rt						
L1.	0.8244098	0.8566164	0.96	0.336	0.8545274	2.503347
L2.	-0.855246	1.001234	-0.85	0.393	-2.81763	1.107136
_cons	58.41093	65.41202	0.89	0.372	69.79427	186.6161
Rt						
lngdp						
L1.	3.94531	2.28913	1.72	0.085	0.5413033	8.431923
L2.	-1.769687	1.851106	-0.96	0.339	5.397789	1.858414
fd						
L1.	-0.018129	0.029313	-0.62	0.536	0.0755813	0.0393234
L2.	-0.019113	0.0290885	-0.66	0.511	-0.076125	0.0378999
trade						
L1.	0.1554874	0.0429535	3.62	0.000	0.0713	0.2396748
L2.	-0.085418	0.0422432	-2.02	0.043	0.1682134	-0.002623
rt						
L1.	1.013984	0.1835079	5.53	0.000	0.6543151	1.373653
L2.	-0.233525	0.2144885	-1.09	0.276	0.6539142	0.1868652
_cons	-17.33176	14.01283	-1.24	0.216	-44.7964	10.13288

The VAR Models employed the t-statistics of the regressors in Table 7 to deduce "short-run" causation. According to the lngdp equation, the first lag of lngdp has a causal influence on lngdp in the "short-run" since it is significant at 5% and the second lag is insignificant. The fd variable's lag regressors are insignificant, which contradicts Olayungbo and Quadri's (2019) findings. In the "short-run," neither has any causal influence on lngdp. Since they are both insignificant, there is no causal relationship between the trade variable lag regressors and lngdp. This is in line with research by Metu and Chinedua (2015) and Nzotta et al. (2013), who discovered an insignificant "short-run" link between GDP and trade. The first lag of rt is significant at 1%, while the second lag of rt is insignificant. Therefore, the first lag of rt has a causal effect on lngdp, which is consistent with the findings of several previous studies (Nyamongo et al.; 2012; Adarkwa, 2015; Karikari et al.; 2016 and Olayungbo and Quadri (2019).

Since lngdp's lags in the fd equation are insignificant, lngdp has no causal relationship with fd. The lagged fd regressors on fd are significant at 1% and 5%, indicating that fd is causally related to lagged fd. Trade's lag regressors are insignificant and have no causal impact on FDI. The same is true for the lag regressors of rt, which support Olayungbo and Quadri's (2019) findings but contradict those of Fromentin (2017) and Kim (2021), who discovered a substantial positive "short-run" association between remittances and financial growth.

Only the first lag regressor of trade in the trade equation is significant at 1%, suggesting a causal influence on trade; the other lag variable regressors are insignificant and do not suggest a causal effect on trade.

While the other lag variable regressors are insignificant, suggesting no causality on rt, the lag regressors of trade and the first lag regressor of rt are significant at 1% and 5% (Table 7) in the rt equation, suggesting a causal influence on rt.

3.7. VAR Diagnostics and Tests

Several diagnostic tests were performed, including Granger causality tests, Lagrange-multiplier tests, and stability condition tests, after the VAR Models were estimated in Stata/SE 14.2. In contrast to the t-statistics previously stated, which only show the "short-run" causal effect, the Granger causality test was performed to determine the direction of causation in the "short-run." Only rt granger causes lngdp in the lngdp equation (Table 8). This contradicts research by Sibindi (2014), which demonstrates that GDP is caused by financial development. When the variables are combined, they Granger cause lngdp. Even when combined, none of the variables in the fd equation granger causes fd. This also applies to the trade equation, wherein, even when all the variables are considered jointly, no Granger causes trade. Only trade granger causes rt in the rt equation; rt is not Granger caused by the other two

variables, lngdp and fd. The findings of Sibindi (2014), who demonstrated a causal link between financial development and remittances, are at odds with the study results. Nevertheless, when the variables are combined, they Granger cause rt.

Table 8. Granger Causality Wald Tests

Equation	Excluded	chi2	Df	Prob > chi2
lngdp	fd	1.0139	2	0.602
lngdp	trade	1.4014	2	0.496
lngdp	rt	16.341	2	0.000
lngdp	ALL	22.135	6	0.001
fd	lngdp	0.74161	2	0.690
fd	trade	2.2366	2	0.327
fd	rt	1.53	2	0.465
fd	ALL	5.4179	6	0.491
trade	lngdp	1.7988	2	0.407
trade	fd	0.91089	2	0.634
trade	rt	0.96575	2	0.617
trade	ALL	5.9192	6	0.432
rt	lngdp	2.9807	2	0.225
rt	fd	1.582	2	0.453
rt	trade	13.606	2	0.001
rt	ALL	17.798	6	0.007

Table 9. Lagrange-Multiplier Test

lag	chi2	df	Prob > chi2
1	7.665	16	0.95822
2	10.5454	16	0.83664

H0: No autocorrelation at lag order

Since there is no evidence of model misspecification according to Table 9's Lagrange multiplier test, the null hypothesis of no autocorrelation in the residuals cannot be rejected.

We used the eigenvalue stability requirement (Table 10) to verify the stability of the VAR Models after we had estimated them in Stata. The modulus of each eigenvalue demonstrates the stability of the calculated VAR in the matrix being strictly smaller than one (1) (Hamilton, 1994; Lutkepohl, 2005). The eigenvalue plot (Figure 4) demonstrates that none of the remaining eigenvalues are near the unit circle. The

estimates meet the eigenvalue stability criteria since each eigenvalue modulus is smaller than one. The eigenvalues are visible inside the unit circle in Figure 4's graphical depiction, indicating VAR stability.

Table 10. Eigenvalue Stability Condition

Eigenvalue	Modulus
.8979225 + .1055737i	0.904108
.8979225 - .1055737i	0.904108
.6140639	0.614064
.2959498 + .4449001i	0.534343
.2959498 - .4449001i	0.534343
.4188461	0.418846
-.3625724 + .0906231i	0.373726
-.3625724 - .0906231i	0.373726

Figure 4 shows that all the eigenvalues lie inside the unit circle, satisfying the VAR stability condition.

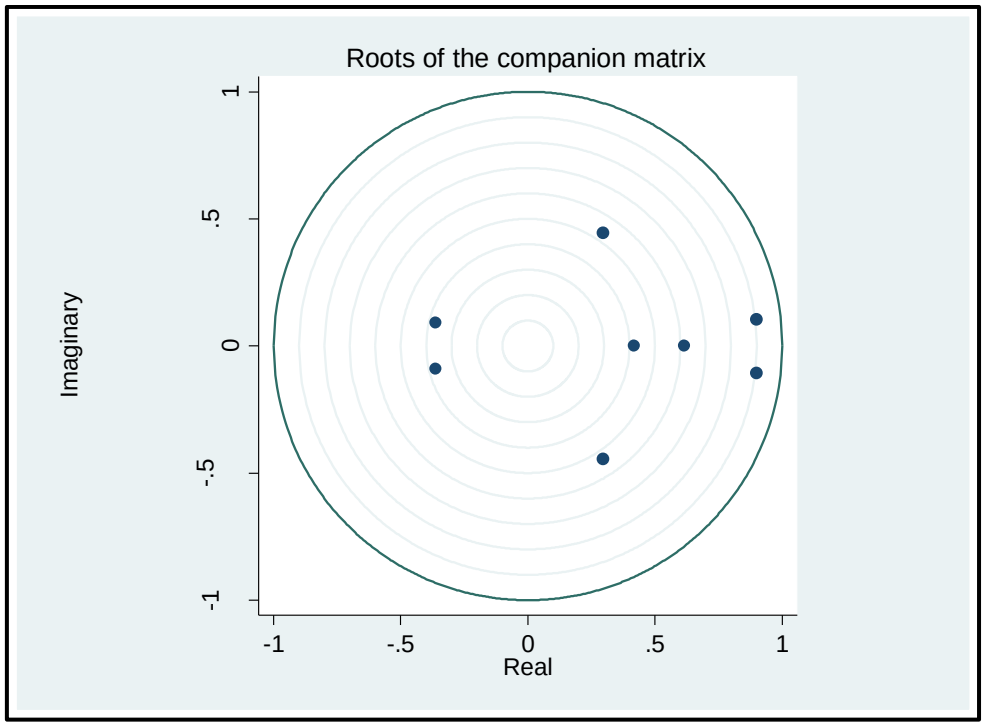

Figure 4. Eigenvalues of the Companion Matrix graph

4. Conclusion

The study examined the relationship between Zimbabwe's financial development, trade, remittances, and economic growth using the World Bank Worldwide Development Indicators database data from 1980 to 2022.

The study used spurious regression and data diagnostic tests before specifying VAR models. The analysis revealed a total sum square of 7.7746, with 5.6265 accounted for by the model and 2.1480 left unexplained. There were 42 degrees of freedom, with 3 consumed by the model and 39 for the residual. The R-squared, representing the per cent of variance explained by the predictors, was 0.7237 for the regression and 0.7025 adjusted for degrees of freedom. The Root MSE is 0.2347, and R^2 is a valid goodness-of-fit test. All variables except financial development (fd) have a significant influence on GDP, except for rt, which has a positive influence (Table 4). Financial development and trade have a negative influence (Table 4).

The study tested data for stationarity using Dickey-Fuller and Phillips-Perron tests, revealing variables as stationary at the first difference. The Johansen cointegration test in Stata showed no cointegration equations in the series. Significant findings revealed positive short-run causal effects of first lag lngdp, rt, fd, and trade and rt regressors at a 0.01% significance level (Table 8).

The Granger causality test was used to examine the direction of causality in the short-run, unlike the t-statistics that only indicate the short-run causal effect. The results showed that only remittance granger causes GDP, contradicting Sibindi's (2014) findings that financial development granger causes GDP. All variables in the financial development equation do not guarantee financial development even when taken together. In the remittance equation, only trade granger causes remittance, while the other variables (GDP and financial development) do not. The study contradicts Sibindi's (2014) findings on a causal relationship between financial development and remittances, but when combined, they significantly increase the cause of remittances.

Policymakers are advised to develop policies and create a conducive environment encouraging remittance inflows since the findings show that Granger causes GDP. It is also vital to have policy intervention concerning trade and financial development as they are also significant players in economic growth. More exports will generate inflows in the country that are critical for economic growth. Policies and incentives that encourage and promote exports must be implemented. Financial development is also directly linked to remittances and export inflows as it creates a platform for the smooth flow of funds. This is critical for economic growth. For Zimbabwe to achieve Vision 2030, policymakers need to be aware of the importance of these variables, as discussed in the sections above. Financial stability, trade and remittances are essential in this endeavour. There is also a need to appreciate the importance of

governance and regulation in all this, as previous studies found them to be critical for sustainable growth and development (Maune et al.; 2023; Maune & Mundonde, 2024). Future studies need to consider governance and regulation to see their impact on economic growth together with the variables in this study.

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