Trade Openness, Financial Development and Economic Growth in Lesotho: BVAR and Time-varying VAR Analysis

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ABSTRACT

This research paper explores the dynamic relationship between trade openness, financial development, and economic growth in Lesotho. The study utilizes quarterly time series data spanning from 1970 to 2021, obtained from the Central Bank of Lesotho. This paper makes a significant contribution to the methodological discourse by utilizing a time-varying VAR approach, in addition to the Bayesian VAR estimation approach. The empirical results indicate that there is no cointegration relationship between economic growth, financial development, and trade openness. However, the evidence shows a unidirectional causality from economic growth to trade openness in Lesotho. The Bayesian VAR and time-varying VAR estimations reveal that the variables dynamically react and adjust to shocks among the variables. The study recommends that to stimulate the opening up of the economy to the world, growth-enhancing policies such as the provision of world-class infrastructure facilities, improved healthcare facilities, and a conducive macroeconomic environment should be implemented, considering the insufficient international demand in Lesotho.

Keywords: Trade Openness, Financial Development, Economic Growth
JEL Classifications: F4, G30, O4

1. INTRODUCTION

Achieving sustainable economic growth is a critical goal for all countries, particularly developing nations like Lesotho. Several factors have been identified as essential for sustainable growth, including the level of financial development and the degree of international trade openness (Beck, 2002; Sachs and Warner, 1995). Improvements in the financial sector can stimulate economic growth by facilitating investment through the mobilization of limited financial resources. Furthermore, extensive research has examined the relationship between trade openness and economic growth, with empirical evidence generally indicating that greater openness to trade has positive implications for the growth of an economy (Baltagi et al., 2009; Kim et al., 2010a, 2010b, 2012; Awad et al., 2013; Sghaier and Abida, 2013; Menyah et al., 2014; Hussain et al., 2021; Akinwale, 2021; Fraihat et al., 2023; Sharmiladevi, 2024). Studies have also explored the links between financial development and economic growth, suggesting that trade openness

can influence financial development by increasing the market size and demand for financial services. This can potentially stimulate innovation and the emergence of new financial instruments, leading to the evolution of financial institutions (Zghidi and Abida, 2014). While the existence of a finance-trade nexus is still debated in the literature, some empirical studies have confirmed its presence (Zghidi and Abida, 2014). Menyah et al. (2014) additionally noted that countries with well-developed financial systems tend to enjoy improved trade relations with the rest of the world, highlighting the importance of finance as a determinant of trade.

The relationship between trade openness, finance, and economic growth has been extensively studied, with mixed results. While some studies, such as Kim et al. (2010b), suggest a positive long-term effect of trade on economic growth, others, such as Gries et al. (2011) and Malefane and Odhiambo (2019), could not find a significant relationship between trade openness and financial development. The impact of trade openness on the finance-growth

nexus is complex, as it can have both positive and negative effects on economic growth. The positive effects of trade openness on economic growth are often attributed to increased access to new technology and products, leading to greater macroeconomic efficiency and effective allocation of funds. This reinforces the positive impacts of financial development on economic growth. However, trade openness can also have negative effects, such as unhealthy competition for infant industries and increased vulnerability to foreign shocks, leading to macroeconomic instability and posing negative impacts on the finance-growth nexus. Belazreg and Mtar (2020) argue that trade openness and financial development are becoming increasingly important factors for national development, and this is supported by the findings of Hussain et al. (2021). Overall, the relationship between trade openness, finance, and economic growth is complex and ongoing research is necessary to fully understand the dynamics of this nexus.

The relationship between trade openness and financial development in the African continent has not been extensively studied. Wolde-Rufael (2009) found a weak causal link between financial development and trade openness in Kenya, while Menyah et al. (2014) argued that the theories of finance-led growth and trade-led growth do not apply to most Sub-Saharan African countries, in line with Gries et al. (2011). This study aims to contribute to the understanding of the relationship between trade openness, financial development, and economic growth in Lesotho, as there is limited empirical research on this topic in the country. Malefane and Odhiambo (2019) are the only known researchers who have explored this topic in Lesotho, but their study did not consider the role of financial development. Moreover, this study seeks to examine the possibility of feedback relationships between trade openness, financial development, and economic growth using Bayesian Vector Autoregressive model and time-varying VAR, which is an improvement over existing studies that assume constant parameters. The use of time-varying analysis between trade openness, financial development, and economic growth is necessary because parameters are known to change in reality.

The structure of the study unfolds as follows: Section two provides a concise overview of key stylized facts concerning Lesotho's macroeconomic performance, complemented by a review of pertinent empirical research in this area. Section three reviews the existing empirical efforts on the relationship between trade openness, financial development, and economic growth in Africa, with a focus on Lesotho. The empirical approach is detailed in section four, where the Bayesian Vector Autoregressive model and time-varying VAR are introduced to analyze the feedback relationships between trade openness, financial development, and economic growth. The empirical results are discussed in section five, and the concluding remarks are presented in the final section.

2. SOME STYLIZED FACTS AND EMPIRICAL REVIEW

2.1 Lesotho's macroeconomic performance

Lesotho is a small landlocked country surrounded by South Africa, and it is one of the world's poorest countries. The country's economy

is heavily reliant on textile exports and diamond mining, which together account for more than 80% of export earnings (World Bank, 2021). The World Bank estimated that the country's population was around 2.1 million in 2020 (World Bank, 2021). The country's economy has experienced some fluctuations in recent years. After a period of rapid growth in the early 2000s, the economy contracted in 2008 due to the global financial crisis. Since then, the economy has been gradually recovering. In 2019, the real GDP growth rate was 0.7%, while inflation was around 3.6% (IMF, 2021). Despite some progress in human development indicators, such as a literacy rate of 79.4% and a life expectancy at birth of around 54 years in 2018, poverty remains a significant challenge. Around 57% of the population was living below the poverty line in 2019 (World Bank, 2021). The government has implemented several policy initiatives to address these challenges, including efforts to diversify the economy, improve access to education and healthcare, and promote private sector growth. However, the economy remains vulnerable to external shocks, particularly fluctuations in commodity prices and demand for exports, and progress on these fronts has been slow (IMF, 2021).

In 2022, the economy experienced a 2.5% expansion, an upturn from the 1.6% growth in 2021, despite global disruptions from Russia's invasion of Ukraine. This growth was propelled by the services sector, which saw a 2.6% increase, and the construction sector, which surged by 8.1%, alongside fiscal stimulus and COVID-19 related expenditures. However, inflation escalated to 8.3% in 2022, up from 6.1% in 2021, largely due to rising inflation in South Africa, a key trade partner. The fiscal deficit narrowed to 4.3% of GDP, down from 4.8% in 2021, bolstered by expected revenue hikes from the Southern African Customs Union and financed through borrowing and government savings within the banking sector. The current account deficit widened to 6.8% of GDP in 2022 from 4.2% in 2021, driven by increased imports, with capital transfers from South Africa providing the necessary funds.

Despite setting an annual growth target of 5% to meet its development objectives, Lesotho's economic expansion in 2023 only slightly exceeded 2%, mirroring the previous year's rate rather than a significant leap. The country's economy continued to feel the adverse effects of South Africa's economic downturn, given its reliance on South Africa for 85% of its basic consumer goods, remittances, and half of its export revenue in 2022. The IMF projects a modest growth of 2.3% for 2024, while the World Bank is more optimistic, forecasting an uptick to 3.1% driven by developments in the construction (notably Phase II of the Lesotho Highlands Water Project), mining, agriculture, and service sectors.

Inflation, which climbed from 6% in 2021 to 8.2% in 2022, moderated to approximately 6.8% in 2023 and is anticipated to further decrease to 5.5% in 2024. The newly formed coalition government aims to transform the economy from consumer-based to one focused on production and exports to boost growth and enhance economic resilience. This strategy includes consolidating public financial management, enacting structural reforms to achieve macro-fiscal stability, and practicing fiscal prudence

2.2. Empirical review

There have been various empirical research studies conducted to explore the link between financial development and economic

growth, as well as the link between trade openness and economic growth. However, few studies have investigated the interplay between financial development, trade openness, and economic growth. According to Hussain et al. (2021), financial development and economic openness can enhance the current living standards while safeguarding future generations' prosperity. The authors utilized time series data from 1975 to 2018 and employed Autoregressive Distributed Lag (ARDL) co-integration tests to examine the impact of trade openness and economic development on monetary success. The results indicated a long-term correlation between openness to trade, economic development, and economic advancement. The study also revealed that economic openness and financial development jointly drive economic progress. Therefore, the authors suggested promoting measures that support financial development and economic openness as a way of encouraging long-term growth in emerging economies.

Bojanic (2012) found that there is a relationship between economic growth, financial development and trade openness in Bolivia. Using annual time-series data from 1940 to 2010 and cointegration technique and ECM, the study confirmed the presence of a long-run equilibrium relationship. Additionally, the study revealed that unidirectional Granger causality runs from financial development and trade openness to economic growth. Pradhan et al. (2017) found a general long-run equilibrium relationship among trade openness, banking sector depth and economic growth in ASEAN regional countries by employing a panel data from 1961 to 2012. They also established a short-run relationship between the variables.

Bandura et al. (2021) conducted a study on the impact of financial openness and trade openness on financial development in 26 Sub-Saharan African countries using time series data from 1982 to 2016. They employed a system of Generalized Method of Moments approach with 5-year averaged data. The study found no evidence of a combined or joint impact of trade and financial openness on financial development in the region. However, trade and financial openness were found to be mutually beneficial. The study suggested that institutional quality in the region should be strengthened to fully benefit from international trade, particularly through investor protection.

Sghaier (2021) conducted a study on the relationship between economic development, trade openness, and economic growth over 5 years from 1991 to 2015 in four North African countries (Tunisia, Morocco, Algeria, and Egypt). Using panel data analysis and the generalized method, the study found compelling evidence of a link between trade liberalization and financial progress. Additionally, the study found that openness to trade acts as a complement to financial development, with the latter having a stronger effect in the presence of the former. The study recommended local-level changes to protect the domestic financial system's development and to fully exploit the technological transfer generated by international commerce.

Ho et al. (2021) examined the interplay between financial development, trade openness, and economic growth in Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam

using a panel analysis. Their empirical results indicated that trade openness has a positive influence on economic growth, while financial development has an insignificant positive impact on growth. The causality test revealed a bidirectional positive relationship between financial development and economic growth.

Belazreg and Mtar (2020) used the panel-VAR technique to investigate the relationships between economic transformation, trade openness, economic upturn, and economic development for 11 European nations. Their research found that economic development and economic upturn, openness to trade and economic upturn, and economic development and economic transformation all have a one-way relationship. They also discovered a negative association between economic transformation and growth, and a negative correlation between openness and economic upturn. The study highlighted the importance of financial systems and financing quality in promoting economic growth and suggested investment growth and financial arrangement modifications to foster financial development. Furthermore, the authors recommended that European governments should improve their governmental quality and monitoring of their environment to fully benefit from openness to trade, and use innovative incentives for local firms to mitigate the negative effects of trade openness.

Arif et al. (2020) conducted a study to investigate the relationship between trade openness, economic development, and sustainable economic growth among South Asian countries using panel data from 1980 to 2018. The study found that economic development had a positive and significant impact on both short and long-run dynamics of sustainable economic growth in South Asian economies. The authors argued that progress in finance and trade openness had a long-term impact on sustainable economic growth in South Asian economies as financial and economic progress are mutually reinforcing. The study confirmed the complementary hypotheses. Arif et al. (2020) documented cross-country effects based on the region's variability and recommended that their findings be used to develop certain essential policies. They also mentioned that policymakers needed to address cross-sectional dependencies in the region regarding country-specific issues.

To summarize, Shreezal (2020) found that financial development and trade openness have a significant positive impact on economic growth in Nepal. This finding is consistent with Bowale et al. (2019), who found a long-term relationship between financial development, trade liberalization, and economic growth in Nigeria. However, in Nigeria, financial development did not significantly influence Gross Domestic Product, which is consistent with the findings of Zghidi and Abida (2014) and Chandio et al. (2017), among others. Overall, these studies highlight the importance of financial development and trade openness in promoting economic growth, while also acknowledging the complexity of the relationship between these factors and economic outcomes.

On the contrary, Menyah et al. (2014) conducted a study to investigate the causal relationship between financial development and economic growth in 21 African countries by applying a panel-bootstrapped approach to Granger causality. Their empirical results did not provide robust support for either the finance-led

growth or the trade-led growth hypotheses. They concluded that ongoing financial development and trade liberalization could not be seen to have had a noticeable impact on growth in the African countries they studied.

3. RESEARCH DATA AND METHODOLOGY

Bayesian vector autoregressive (BVAR) is an advanced version of the traditional VAR model, which utilizes Bayesian techniques to carry out VAR methodology (Koop and Korobilis, 2010; Gefang, 2014). BVAR considers parameters as stochastic, and it assigns prior probability values to the model during estimation, as opposed to the traditional VAR model (Gefang, 2014). BVAR addresses issues of collinearity and over-parameterization, which are often associated with conventional VAR models, by enforcing priors on the autoregressive parameters.

Given an autoregressive VAR (p) model of order p:

$$Y_t = C + B_1 Y_{t-1} + B_2 Y_{t-2} + \ldots + B_p Y_{t-p} + \varepsilon_t \tag{1}$$

Where $Y_t = (Y_{it-1}, Y_{it-2}, Y_{it-3}, \ldots \ldots Y_{it-p})$ is a 3×1 matrix, which means the number of observations multiplied by the number of endogenous variables (trade openness, credit allocated to the private sector, and growth of the economy).

Equation (1) can be restated as:

$$Y_t = Z_t B + \varepsilon_t \tag{2}$$

Where $Y_t = (c_t, Y_{it-1}, Y_{it-2}, Y_{it-3}), \ldots \ldots Y_{it-p})$ is a T by $(1+N*P)$ matrix. ε is a stochastic term with nil and non-negative definite covariance matrix $\sum$. In other words, $\varepsilon \sim iidN(0,\sum)$. The ε_t is assumed to be multivariate normal. The Bayesian framework of the econometric approach consists of the derivation of the likelihood function, among others. To construct the likelihood function, consider the 3-dimensional Var(p) model,

$$Y_{T \times m} = Z_{T \times K} \Gamma_{k \times m} + U_{T \times m} \tag{3}$$

Where k=mp+1 and is the number of parameters to be estimated while T is the number of observations. If we stack the VAR coefficients into a vector, equation (3) could be written as follows:

$$y_{mT \times 1} = (I_m \otimes Z)\gamma_{q \times 1} + u_{mT \times 1} \tag{4}$$

And q=mk. If we assume that $u \sim N(0, \sum \otimes I_T)$, the likelihood function can be written as

$$p\left(\frac{y}{\gamma}, \sum\right) \propto \left|\sum \otimes I_T\right|^{-\frac{1}{2}} exp\left[-\frac{1}{2}\left\{\begin{array}{c}\left(y-\left(I_m \otimes Z\right)\gamma\right) \\ \left(\sum \otimes I_T\right)^{-1} \\ \left(y-\left(I_m \otimes Z\right)\gamma\right)\end{array}\right\}\right] \tag{5}$$

The final form of the likelihood function after solving for γ and $\sum$ can be written as follows:

$$p\left(\frac{y}{\gamma}, \sum\right) \propto \left|\sum\right|^{-\frac{k}{2}} exp\left[-\frac{1}{2}\left\{(y-\hat{\gamma})\left(\sum{}^{-1} \otimes \dot{Z}Z\right)\left(y-\hat{\gamma}\right)\right\}\right]$$

$$\times \sum{}^{\frac{(T-k-m-1)+m+1}{2}} \bar{exp}\left[-\frac{1}{2}tr\left(\sum{}^{-1}\right)\right]$$

$$p\left(\frac{y}{\gamma}, \sum\right) \propto MN\left(\hat{\gamma}, \sum \otimes (ZZ)^{-1}\right) \times IW(S, T-k-m-1)$$

$$\tag{6}$$

$\otimes$ is a Kronecker product and $\hat{\gamma}$ is $vec(\Gamma)$

In the estimation of BVAR, there are different types of prior probability distributions. According to (Koop, 2013). The present study employed a steady state prior.

3.1. TVP-VAR model

The multivariate time series model which permits time variation in the coefficients and the variance-covariance matrix was advanced by Primiceri (2005). The TVP-VAR model can be stated as follow:

$$y_t = c_t + B_{i.t} y_{t-1} + \ldots + B_{s.t} y_{t-s} + A_t^{-1} \sum{}_t \varepsilon_t \tag{7}$$

Where y_t is a column matrix of the observed variables, while $B_{i,t}$ are the square matrix of time-varying coefficients; ε_t is independently and identically distributed with $(0, I_k)$; A_t is the lower triangular matrix

$$A_t = \begin{pmatrix} 0 & 0 & \cdots & 0 \\ a_{21.t} & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ a_{k1.t} & \cdots & a_{kk-1.t} & 1 \end{pmatrix}$$

And $\sum_t$ is the diagonal matrix

$$\sum_t \begin{pmatrix} \sigma_{1.t} & 0 & \cdots & 0 \\ 0 & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \cdots & 0 & \sigma_{k.t} \end{pmatrix}$$

The model can be restated as

$$y_t = X_t \beta_t + A_t^{-1} \sum{}_t \varepsilon_t \quad t = s+1, \ldots \ldots, n \tag{8}$$

Where the parameters β_t, A_t and $\sum_t$ are all time-varying, a_t is assumed to be a stacked vector of the lower triangular elements in A_t, and $h_t = (h_{1t}, \ldots \ldots \ldots, h_{kt})$ with $h_{jt} = \log \sigma_{jt}^2$ for $j = 1, \ldots \ldots, k$ and $t = s + 1, \ldots \ldots, n$. The parameters follow a random walk process and they are specified as follow:

$$\beta_{t+1} = \beta_t + \mu_{\beta t}$$

$$a_{t+1} = a_t + \mu_{at}$$
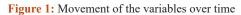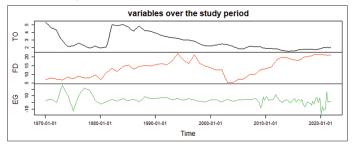
$$h_{t+1} = h_t + \mu_{ht}$$

$$\beta_{s+1} \sim N\left(\mu_{\beta 0}, \sum_{\beta_0}\right)$$

$$\beta_{s+1} \sim N\left(\mu_{a0}, \sum_{a_0}\right)$$

4. EMPIRICAL RESULTS

4.1. Statistics and Time Series Properties

Table 1 displays the descriptive statistics of the variables of interest, including trade openness (TO), credit allocated to the private sector as an indicator of financial development (FD), and the economic growth rate (EG). The results indicate that the variables have a consistent range between their maximum and minimum values. The standard deviation of the variables is low,
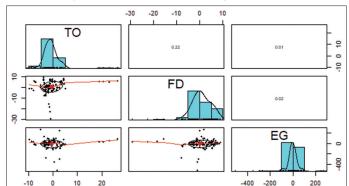
Figure 1: Movement of the variables over time

Figure 2: Correlation chart among the variables

Table 1: Summary statistics of variables

Statistics	Variables		
	TO	**FD**	**EG**
Mean	4.079	3.507	4.584
Median	3.995	3.453	4.594
Maximum	4.391	3.843	4.628
Minimum	3.817	3.0982	4.504
Std. Dev.	0.174	0.225	0.032
Skewness	0.456	0.141	-0.763
Kurtosis	1.718	1.843	2.962
Jarque-Bera	3.711	2.125	3.499
Probability	0.156	0.345	0.173
Sum	146.8	126.2	165.0
Sum Sq. Dev.	1.061	1.779	0.036
Observations	208	208	208

Source: Author's computation

indicating that the variances are within the normal range. The skewness and kurtosis values are also minimal, further supporting the notion of minimal variability in the variables. The normality assumption is supported by the Jarque-Bera statistics. Therefore, the normality assumption is accepted for all variables based on the Jarque-Bera statistics.

The movement of the variables is presented in Figure 1. The graphical picture shows that all the variables have been oscillating over the period.

Figure 2 presents a correlation chart depicting the relationships among the variables. The coefficients suggest that there is only a weak correlation between the variables.

4.2. Unit Root Test and Cointegration Test

Table 2 presents the results of the investigation into the time series properties of trade openness, credit allocated to the private sector as a measure of financial development, and economic growth. It was found that the variables were not stationary in their level form, but they became stationary after differencing once. Consequently, proceeded to examine the cointegration nature of the series to confirm whether or not there existed a long-term relationship between the variables.

4.3. BVAR Lag Length Selection Criteria

The lag selection results for the BVAR model are presented in Table 2, indicating that the optimal lag order is one based on the minimum value of the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC) as shown in Table 3. Therefore, we chose a lag of one in our BVAR estimation process.

The results of the cointegration analysis are presented in Table 4. Prior to the analysis, lag selection was performed to determine the optimal lag length. Based on the Akaike Information Criterion (AIC) and Schwarz information criterion (SC), the test suggested an optimal lag order of one. Since the parameter values of both the Trace statistic and Eigen Value Statistic are less than the 5% significance level, we can conclude that there are no long-term relationships among the variables. Therefore, the variables were modelled using Bayesian VAR at their differenced form.

Table 5 presents the results of the linear Granger causality test. The findings indicate that there is no significant causality between the variables, except for a unidirectional causality from economic growth to trade openness. Specifically, the results show that

Table 2: Stationary test results

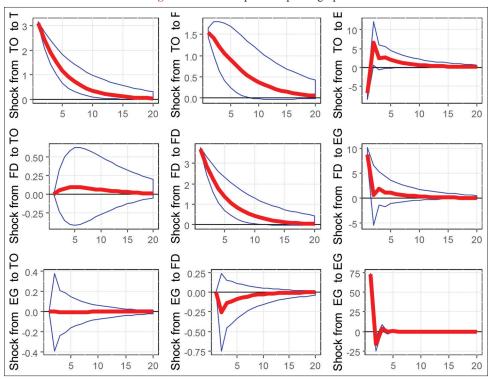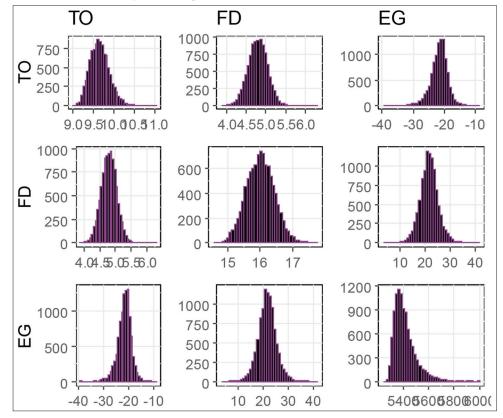| Variable	ADF test (Trend)	ADF test (No Trend)	PP (Trend)	PP (No Trend)
TO	0.3070	0.6070	0.1245	0.3640
FD	0.2091	0.5021	0.3562	0.2578
EG	0.4234	0.3126	0.4131	0.3726
D (TO)	0.0012	0.0034	0.0013	0.000
D (FD)	0.000	0.001	0.0001	0.002
D (EG)	0.002	0.000	0.002	0.000

Source: Author's computation

Figure 3: BVAR impulse response graph

Figure 4: The posterior distribution of BVAR estimates

changes in economic growth significantly cause changes in trade openness, but the reverse is not true. Therefore, it can be concluded that in Lesotho, economic growth has a positive influence on trade openness, but there is no evidence to suggest that trade openness affects economic growth.

4.4. Impulse Response Analysis

The results of Bayesian vector autoregressive modelling are expressed in the literature by the analysis of impulse response. Impulse response analysis is used to evaluate the dynamic interactions between trade openness, financial development and

Table 3: BVAR lag selection order criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	28.70	NA	2.06e−05	−2.278534	−2.151869	−2.232736
1	65.369	211.2592	9.14e-08*	−7.696844*	−7.190180*	−7.513651*
2	16.015	5.079479	1.24e-07	−7.400768	−6.514106	−7.080179
3	14.36	8.431325	1.50e-07	−7.231812	−5.965152	−6.773828
4	10.35	21.21421*	1.12e-07	−7.567524	−5.920866	−6.972144
5	19.90	4.607406	1.55e-07	−7.309499	−5.282844	−6.576724

*Indicates lag order selected by the criterion LR: Sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Table 4: Cointegration test results

	Trace stat	10%	5%	1%	Eig. Val. Stat	10%	5%	1%
r≤2	3.87	6.65	8.18	11.6	3.87	6.50	8.18	11.65
r≤1	12.02	15.66	17.95	23.52	8.15	12.91	14.90	19.19
r=0	40.01	28.71	31.52	37.22	27.99	18.90	21.07	25.75

Source: Author's computation

Table 5: Linear granger causality test results

	F-test	P-value
FD→TO	2.015	0.423
TO→FD	0.308	0.788
EG→TO	0.415	0.666
TO→EG	201.0	0.0092*
FD→EG	2.015	0.282
EG→FD	0.613	0.542

the growth of the economy in Lesotho. The impulse response graph is contained in Figure 3 while the posterior distribution of BVAR estimation is shown in Figure 4. The discussions of the results are presented as follows:
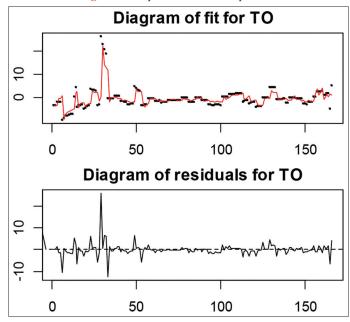
4.4.1. Response of the variables to trade openness shocks
Trade openness exhibits a rapid response to its own shock, while the effects of the shock take a while to subside. Financial development responds significantly to shocks in trade openness, and the impact of the shock is long-lasting, as it does not dissipate within the time horizon. This finding suggests that trade liberalization policies could have a sustained contribution to the development of the financial sector in Lesotho. The response of economic growth to a trade openness shock is observed to oscillate between negative and positive regions. Although the initial response is negative and short-lived, the subsequent positive response lasts longer in the economy. This implies that while exposure to trade may have a temporary negative impact on economic growth, the subsequent positive response outweighs the initial negative impact.

4.4.2. Response of the variables to financial development shocks
According to the impulse response analysis, a positive shock to financial development leads to a positive response in the openness of the economy in Lesotho, indicating that an improvement in the financial market can stimulate trade openness. However, the magnitude of this response is not significant. Additionally, a positive shock to financial development also leads to a significant positive response from the growth of the economy in Lesotho. The impact of the financial market on economic growth is observed to be substantial, but the effects of the shock dissipate over time. The response of financial development to its own shock is found to be sharp and significant, but the effects of the shock take some time to dissipate.

Figure 5: Graph of fit for trade openness

4.4.3. Response of the variables to growth shocks
A positive shock to the growth of the economy does not result in any response from trade openness, suggesting that trade openness is independent of the growth of the economy in Lesotho. However, a positive shock to economic growth unexpectedly generates a negative response from financial development, indicating an inverse relationship between these variables. This means that an increase in economic growth could have a detrimental effect on financial development in Lesotho. The response of economic growth to its own shock is observed to be significant and immediate, but it takes some time for the economy to return to its equilibrium state.

4.5. TVP-VAR Results
The study utilized TVP-VAR analysis to assess the dynamic relationship between trade openness, financial development, and economic growth. The coefficient values, bandwidth(s), and a measure of goodness-of-fit, pseudo-R2, are summarized in Figures 5-7 for the entire period. The results indicate that the
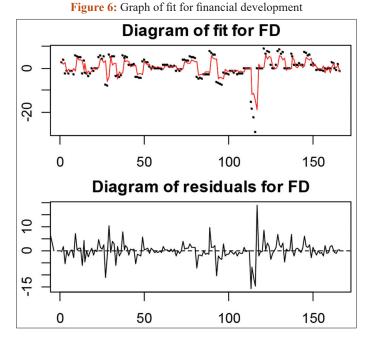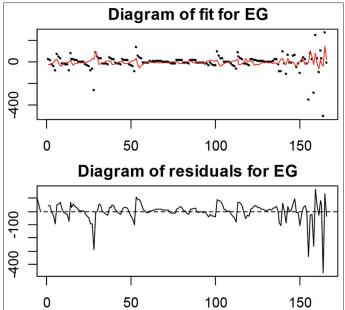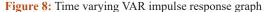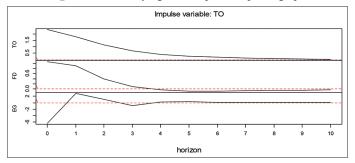
Figure 6: Graph of fit for financial development

Figure 7: Graph of fit for the growth of the economy

Figure 8: Time varying VAR impulse response graph

variables exhibit stable behaviour prior to being incorporated into the TVP-VAR model.

Figure 9: Time Varying VAR impulse response graph
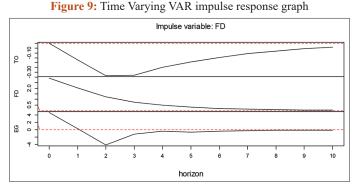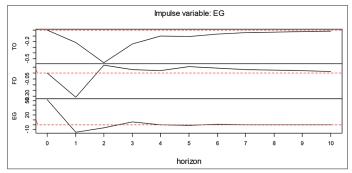

Figure 10: Time varying VAR impulse response graph

The impulse response analysis in Figure 8 reveals that a shock to trade openness has a significant impact on the variables in the system. Trade openness responds positively to its shock and the effect persists for some time before eventually dissipating. Similarly, financial development responds significantly and positively to a shock in trade openness, indicating that trade liberalization policies could contribute to the development of the financial sector in Lesotho in the long run. The response of economic growth to a shock in trade openness is initially negative but fades away quickly, and the resulting positive response lasts longer. This suggests that while trade openness may have a short-term negative impact on economic growth, the long-term benefits outweigh the costs. Overall, the TVP-VAR results are consistent with the BVAR findings, and both analyses provide evidence of the complex dynamic relationship between trade openness, financial development, and economic growth in Lesotho.

The impulse response diagram presented in Figure 9 indicates that a shock to financial development elicits a positive response from trade openness. The effect of the shock on trade openness is more evident compared to what was obtained using the BVAR technique. Additionally, a positive shock to financial development triggers positive responses in economic growth. The response of Lesotho's economy to an improved financial market is largely positive, but the effects of the shocks gradually dissipate over time. Similarly, the response of financial development to its own shock is sharp and substantial, which is consistent with the findings of the BVAR analysis.

A positive shock to the growth of the economy results in a minimal response from trade openness, in contrast to our BVAR estimation where trade openness did not react to a shock in economic growth. However, time-varying VAR results indicate that trade openness

does respond, but the response is relatively insignificant and quickly fades away (Figure 10). As demonstrated in the BVAR results, time-varying analysis also reveals that a positive shock to the growth of the economy produces a negative response from financial development. In other words, although a positive shock to economic growth prvokes a response from financial development, it is in the opposite direction.

5. CONCLUDING REMARKS

This study explores the dynamic relationship between trade openness, financial development, and economic growth in Lesotho, utilizing quarterly time series data spanning from 1970 to 2021 from the Central Bank of Lesotho. The study employs both the Bayesian VAR estimation approach and the time-varying VAR approach, making a methodological contribution to the literature. Additionally, the study contributes to the literature by examining this issue in the context of Lesotho, as no country-specific study has been conducted on this subject matter.

The Johansen and Juselius (1990) test indicates that there is no long-run relationship between economic growth, financial development, and trade openness. The Granger causality test shows a unidirectional causality from economic growth to trade openness in Lesotho. The results from both the Bayesian VAR estimation and the time-varying VAR approach demonstrate that financial development responds significantly to shocks in trade openness, with the impact of the shock lasting beyond the time horizon. The response of economic growth to trade openness shock is observed to oscillate between negative and positive regions. Moreover, a positive shock to the financial development indicator results in a positive response from trade openness and economic growth. However, a positive shock to economic growth generates a negligible response from trade openness but surprisingly generates a negative response from financial development.

The study recommends the implementation of growth-enhancing policies such as the provision of world-class infrastructure, improved healthcare facilities, and the provision of a conducive macroeconomic environment to stimulate the opening up of the economy to the world, given the insufficient international demand in Lesotho.

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