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Linkages between Primary Sector Value Added, Financial Development, and Economic Growth: Evidence from Vanuatu

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ABSTRACT

In the context of Vanuatu—a small island nation in the South Pacific—economic growth faces persistent challenges stemming from limited scale, heavy reliance on agriculture, and high vulnerability to natural disasters. Against this backdrop, the role of the financial system has become increasingly significant. This study employs a Vector Autoregression (VAR) model, combined with Impulse Response Function (IRF) and Variance Decomposition (VDC) analysis, to examine the dynamic relationships between economic growth, agricultural value added (AVA), and financial development (FD) from 1980 to 2022. The results reveal that: (i) shocks from AVA exert a positive but short-lived effect on GDP; (ii) financial shocks have strong and lasting impacts on both GDP and AVA, while GDP also responds substantially to FD; and (iii) variance decomposition underscores the dominant role of credit in explaining growth fluctuations, far exceeding the contribution of the primary sector. These findings suggest that although agriculture continues to play a crucial social role, Vanuatu's macroeconomic growth dynamics increasingly depend on financial development. Policy implications highlight the need to expand inclusive credit, particularly targeting rural and agricultural sectors, while simultaneously fostering non-agricultural industries to diversify the economy.

Keywords: Economic Growth; Agricultural Value Added; Financial Development; Credit and Growth

JEL Codes: O40; Q10; G20; E44

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1. Introduction

As a Small Island Developing State (SIDS), Vanuatu faces persistent challenges in achieving sustainable growth due to its limited scale, heavy reliance on the primary sector, and high vulnerability to external shocks^[1, 2]. Agriculture, forestry, and fisheries remain the backbone of the economy, employing the majority of the population and contributing significantly to national income^[3]. However, this sector continues to rely on traditional practices, exhibits low productivity, and remains highly sensitive to climate variability and international market fluctuations^[4]. Consequently, Vanuatu's economic growth has been volatile, with episodes of both deep contraction and rapid recovery depending on external conditions^[5].

In this context, the role of financial development has become increasingly important. A well-functioning financial system can mobilize resources, allocate credit efficiently, and strengthen resilience against external shocks. Empirical evidence from developing countries such as Pakistan, South Africa, and Nigeria suggests that agricultural value added and access to credit jointly contribute to GDP growth and labor market improvements^[6–8]. For small island economies like Vanuatu, where the primary sector and finance are tightly interlinked, this nexus has received little scholarly attention. Most studies to date focus on large developing economies, leaving a gap in understanding how finance influences growth in structurally fragile and climate-vulnerable states. Understanding these interlinkages is crucial for the government and policymakers to allocate and utilize credit resources more effectively. For instance, if credit growth simultaneously fosters primary sector value added and stimulates GDP growth, then expanding financial access remains a viable strategy. Conversely, if increasing credit supports GDP expansion while diminishing the relative contribution of the primary sector, strategic reallocation would be necessary—prioritizing credit toward other sectors capable of generating sustainable value added and maintaining structural balance in the economy, even if this entails temporarily overlooking the climate-induced vulnerabilities of the primary sector.

This study aims to address that gap by examin-

ing the dynamic relationship between financial development, primary sector value added, and economic growth in Vanuatu. Using annual data from 1980 to 2022, the research employs a Vector Autoregression (VAR) model to account for endogeneity and dynamic feedback effects among variables^[9, 10]. The model is complemented with Impulse Response Functions (IRF) and Variance Decomposition (VDC) to trace the propagation of shocks from credit expansion and agricultural performance to macroeconomic outcomes.

The contributions of this paper are threefold. First, it provides novel empirical evidence on the finance–growth–agriculture nexus in the context of a small island economy, thereby extending the literature that has predominantly examined larger developing countries. Second, it sheds light on the transmission mechanisms through which financial development affects both GDP and the primary sector, with a focus on the role of credit in a climate-vulnerable economy. Third, the study offers practical policy implications for small island states, emphasizing inclusive financial development as a pathway to economic resilience and sustainable structural transformation.

The remainder of this paper is structured as follows. Section 2 presents stylized facts about Vanuatu's economy, focusing on its structural characteristics, dependence on the primary sector, and exposure to external shocks. Section 3 reviews the theoretical foundations and empirical literature on the relationships between financial development, the primary sector, and economic growth. Section 4 describes the research methodology, including data, variable definitions, and the econometric framework. Section 5 reports and discusses the empirical results. Finally, Section 6 concludes the study and offers policy implications for Vanuatu and comparable small island economies.

2. Stylized Facts About Vanuatu's Economy

As a Small Island Developing State (SIDS) in the South Pacific, Vanuatu has an economy heavily dependent on natural resources, agricultural exports, and tourism-related services^[1]. However, this structure—

anchored largely in the primary sector (agriculture, forestry, and fisheries)—renders the country highly vulnerable to climate variability, international price fluctuations, and external shocks. **Figure 1** illustrates the volatility of per capita GDP growth between 1980 and 2022, ranging from -13.41% (1980) to 8.93% (1990). Periods of contraction, such as in 1980, 1988, 2002, and 2020, were associated with natural disasters, global trade disruptions, and financial crises, while recoveries in 1990, 1994, and 2006 reflect the economy's re-

silience under favorable conditions. Yet, since the early 2000s, growth has mostly fluctuated within 0–3% per year, underscoring limited potential for sustained expansion. A structural paradox further complicates this picture: nearly 88% of the population and 97% of rural households depend on agriculture for livelihoods, but the sector contributes only about 20% of GDP^[3, 5]. This productivity gap suggests that the traditional growth model, relying on labor absorption in the primary sector, may have reached its limits.

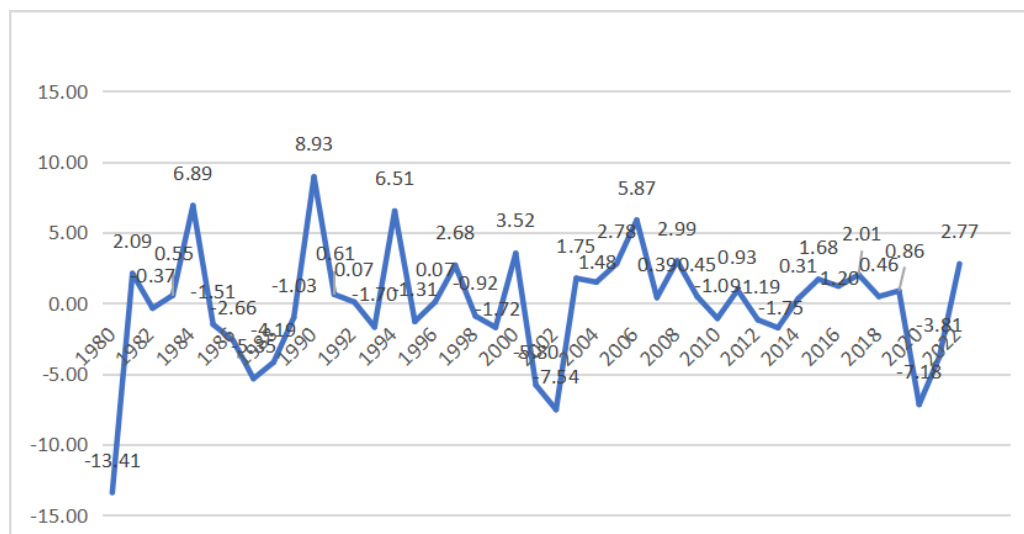


Figure 1. GDP per capita growth of Vanuatu, 1980–2022.

Source: World Bank^[5].

Building on this structural vulnerability, recent shocks have shown how fragile the primary sector remains. Agriculture continues to rely on smallholder farming, customary land tenure, and traditional practices, making it highly sensitive to external pressures^[2, 4]. Cyclone Lola in 2023, for example, caused damages exceeding USD 352 million, while the Port Vila earthquake in December 2024 inflicted losses equivalent to about 17% of GDP. These events destroyed infrastructure and crops, displaced rural workers, and reduced value added from key exports such as cocoa, kava, and beef. Such recurrent shocks highlight the dual challenge facing Vanuatu: a large share of the labor force locked in low-productivity activities, and the primary sector is persistently exposed to climate and market risks, both of which constrain sustainable economic growth.

Against this backdrop, establishing a robust and inclusive financial system is not only essential for providing stable sources of capital but also serves as a critical pillar for strengthening the economy's resilience to external shocks. In recent years, Vanuatu has introduced a series of flagship financial development strategies and programs. Most notably, the National Financial Inclusion Strategy (NFIS) 2018–2023 sought to raise the share of the adult population with formal transaction accounts from below 40% in 2017 to over 65% by 2023, through the expansion of banking networks, the promotion of mobile banking services, and partnerships with microfinance institutions^[11]. Building on this, the Inclusive Green Finance Action Plan was formulated to channel investment into environmentally friendly projects and to support small and medium-sized enterprises (SMEs) engaged in sustainable agriculture, renewable

energy, and natural resource management^[12]. In parallel, the launch of the National Real-Time Gross Settlement (RTGS) system in 2020 marked an important milestone in the modernization of financial infrastructure, enhancing the speed, transparency, and security of interbank transactions, thereby improving the overall efficiency of the financial system^[13].

3. Literature Review

3.1. Theoretical Literature

The relationship between financial development and the agricultural sector can be understood through the lens of endogenous growth theory^[14, 15], which emphasizes the role of capital, technology, and institutions in sustaining long-term growth. In economies heavily dependent on the primary sector, financial intermediation serves three critical functions. First, it mobilizes resources for investment in mechanization, improved seeds, and infrastructure, thereby raising productivity. Second, it mitigates risks and smooths consumption for smallholder farmers, reducing their vulnerability to shocks. Third, it facilitates structural transformation by reallocating capital from subsistence-based agriculture toward higher value-added activities, including agro-processing and services. In Vanuatu's context, where agriculture employs the overwhelming majority of the population but contributes modestly to GDP, financial development could be the key to addressing the productivity gap and enabling a transition toward a more balanced and resilient growth model.

3.2. The Relationship between Financial Development and Value Added in the Primary Sector

Financial development has long been regarded as a key driver of productivity and efficiency in the primary sector. According to McKinnon^[16] and Shaw^[17], a well-functioning financial system can mobilize and allocate capital more effectively, enabling farmers and small enterprises to access credit for production expansion, technological innovation, and value-added enhancement. This role is particularly critical in devel-

oping countries, where agriculture and resource extraction often account for a significant share of the economic structure.

Numerous empirical studies have examined the impact of financial inclusion on agriculture across different countries and regions, producing mixed results. For instance, Chandio et al.^[18] investigated the impact of public expenditure on agriculture on agricultural output and economic growth in Pakistan from 1983 to 2011. The study considered government spending on agriculture, agricultural output, and GDP, applying tools such as the ADF test, Johansen cointegration test, and OLS regression. The findings revealed a long-run relationship among public agricultural expenditure, agricultural output, and economic growth. Moreover, the regression results confirmed that both government spending on agriculture and agricultural output had a positive and statistically significant effect on Pakistan's GDP. In Nigeria, Igbo et al.^[19] explored the mediating role of money and agricultural production by analyzing the effect of bank credit during 1981–2014 using OLS regression. Their results indicated that bank credit exerted a positive and statistically significant impact on agricultural output, whereas bank lending rates had a negative and insignificant effect. Similarly, Victor et al.^[20] assessed the impact of agricultural financing on the contribution of agriculture to economic growth in Nigeria from 1981 to 2016. The study included variables such as agricultural GDP (AGDP), government support funds, the Agricultural Credit Guarantee Scheme Fund (ACGSF), as well as credit, loans, and advances from commercial banks to the agricultural sector (CBCA). Using the ARDL approach, the study found that government support and ACGSF had no significant effect, while credit and loans from commercial banks (CBCA) had a positive and significant impact on agriculture's contribution to GDP. Conversely, Okuma, et al.^[21] found no evidence of a relationship between the two variables in Nigeria. Their research analyzed the relationship between agricultural output and financial expansion from 1986 to 2017. Employing time-series techniques such as unit root tests, Engle–Granger cointegration, error correction models (ECM), and Granger causality tests, they examined variables including financial inclusion, the ACGSF, rural sav-

ings deposits, and bank loans to small businesses. The results suggested that financial expansion had no significant effect on agricultural output.

Afrin et al.^[22] examined the impact of financial expansion on the technical efficiency of rice farmers in Bangladesh, using a sample of 120 households randomly selected from four villages. Applying ordinary least squares (OLS) and quantile regression, the study found that financial inclusion through various credit sources had a positive and significant effect on technical efficiency. However, differences across the types of credit used by farmers were not statistically significant in influencing output. Similarly, Agbenyo et al.^[23] analyzed the relationship between financial inclusion and agricultural growth in Ghana, using time series data from 1980 to 2014 and applying the Johansen cointegration test and FMOLS. Their results showed that broad money supply, lending interest rates, government expenditure on agriculture, and domestic credit all had significant positive effects on agricultural development. They therefore recommended policies to organize smallholder farmers under a common framework to maximize benefits. In the case of Southern African countries, Olowu et al.^[7] highlighted that the joint development of the financial and agricultural sectors contributed to reducing unemployment and improving production capacity. Chandio et al.^[24] investigated the effect of financial development on agricultural output in China, using national time series data from 1989–2016. Employing the ARDL approach to test long-run cointegration among variables and FMOLS for robustness, they found that financial development had a strong positive effect on agricultural production in both the short and long run. Their findings suggest that the Chinese government should adopt long-term strategies to promote agricultural growth by improving the banking system, strengthening rural credit markets, and expanding banking infrastructure at the local level. In Pakistan, Zaman et al.^[6] reported that financial development facilitated agricultural growth, thereby increasing value added and contributing to GDP growth. However, Farooq et al.^[25], analyzing the long-run relationship between financial expansion and agricultural growth during 1960–2018, found mixed results: domestic credit negatively affected agricultural growth in both

the short and long run, while broad money supply and cultivated land area showed positive effects. More recently, Tekin and Shahbaz^[26] explored the determinants of the ecological footprint, focusing on financial development and value added from agriculture, forestry, and fisheries (AFF) in the BRICS-T economies (Brazil, Russia, India, China, South Africa, and Turkey). Using annual data from 1990 to 2018 and applying panel ARDL, MMQR, and Dumitrescu–Hurlin causality tests, they revealed that financial development and financial institutions increased the ecological footprint in the long run, while in the short run, financial development could help mitigate environmental degradation. These findings underline the dual role of the financial system: it may intensify environmental damage by financing carbon-intensive activities, or it can support sustainability if aligned with green finance policies. In addition, human development and energy consumption were also identified as major drivers of the ecological footprint, consistent with prior studies on urbanization and fossil fuel dependence.

3.3. The Relationship between Financial Development and Economic Growth

The link between financial development and economic growth has been emphasized since the early days of economic thought. Schumpeter^[27] argued that the financial system plays a crucial role in mobilizing savings, providing credit, allocating resources, and encouraging technological innovation, thereby fostering economic growth. Building on this perspective, McKinnon^[16] and Shaw^[17] introduced the concept of *financial deepening*, suggesting that well-developed financial markets help reduce transaction costs, improve access to capital, and enhance investment efficiency. Empirically, numerous studies have supported this argument.

Ibrahim and Alagidede^[28] analyzed the impact of financial development on economic growth, considering asymmetries between the financial and real sectors, using panel data from 29 Sub-Saharan African countries from 1980 to 2014. Applying the system GMM approach, they found that financial development generally promotes growth, but its effectiveness largely depends on the degree of synchronization between the

expansion of the real and financial sectors. Balanced growth across the two sectors yields higher elasticity of GDP, whereas rapid and poorly controlled credit expansion can have adverse consequences, such as financing risky investments, excessive consumption, and inflationary pressures. Nevertheless, the investment channel was identified as the strongest transmission mechanism through which finance influences growth. Similarly, Guru and Yadav^[29] investigated the relationship between financial development and economic growth in the BRICS economies over the period 1993–2014, using indicators of both banking and stock market development. Their study first examined key indicators of financial development and macroeconomic performance, and then applied the SYS-GMM method to test for dynamic relationships. Banking indicators included financial intermediation size, the credit-to-deposit ratio (CDR), and private sector credit (CPS), while stock market indicators comprised stock market turnover and the value of shares traded. The results showed that banking development indicators exerted a positive and significant impact on economic growth when combined with turnover, and that the value of shares traded also had a positive link when considered alongside banking indicators. However, turnover alone did not display a significant effect when included together with banking variables. Overall, the evidence suggests that banking development and stock market development are complementary, jointly contributing to sustainable economic growth. Asteriou and Spanos^[30] examined the relationship between financial development and economic growth in the context of the global financial crisis, using panel data from 26 European Union countries between 1990 and 2016. Employing an interaction dummy variable to compare pre- and post-crisis periods, they found that before the crisis, financial development positively influenced growth, whereas after the crisis, it constrained economic activity. In particular, during 2008–2009, adequate bank capitalization was identified as a crucial factor in protecting depositors and maintaining financial stability. More recently, Fengju and Wubishet^[31] emphasized the critical role of the financial sector in driving economic growth, while highlighting the unique challenges faced by East African countries compared to other regions.

Their study addressed the lack of region-specific evidence by analyzing the finance–growth nexus across 18 East African countries from 1995 to 2021. Using dynamic GMM to address endogeneity and reverse causality, and incorporating institutional quality as a moderating factor, the results revealed that financial development exerts a positive effect on growth. Importantly, this effect is significantly amplified in countries with strong institutional foundations, such as political stability, rule of law, control of corruption, and limited military involvement in politics. This finding implies that robust institutions act as catalysts, maximizing the growth benefits of financial development in East Africa.

3.4. The Relationship between Primary Sector Growth and Economic Growth

The primary sector—comprising agriculture, forestry, and fisheries—often serves as the foundation of economic development, particularly in developing countries and small island economies. Growth in this sector can stimulate overall economic growth through several channels. First, agriculture and fisheries ensure food security and employ a large share of the population, thereby contributing to social stability and sustaining purchasing power within the economy. Second, primary sector products are often key export commodities, generating the foreign exchange needed to import technology and essential goods, which in turn supports the development of industry and services. Furthermore, improvements in primary sector productivity raise household incomes, leading to higher consumption demand and creating positive spillover effects across the entire economy.

According to Gollin^[32], in low-income countries, agriculture accounts for a large share of total value added (around 25%). As a result, any change in agricultural productivity can have a broad impact on overall economic growth, since it is the main source of livelihood for the rural population. When productivity in this sector rises, rural incomes improve, which in turn increases domestic consumption and facilitates structural transformation toward industry and services, creating positive spillover effects across the economy. Evidence from Mbotiji et al.^[33] in the CEMAC region (Central Africa)

shows that higher Agricultural Value Added (AVA) has a clear positive effect on economic development. In the European Union, Ceylan and Özkan (2013) applied an extended Solow model with panel data for the period 1995–2007. Their results indicate that the elasticity of per capita income with respect to AVA was 0.025 during the broader integration period and 0.22 in the high-integration phase, suggesting that agriculture remains a key source of growth. Similarly, Odero^[34] examined the causal relationship between per capita AVA and economic growth in Namibia and found bidirectional causality: AVA stimulates economic growth, while a stronger economy in turn reinforces agricultural value added. These findings confirm that growth in the primary sector not only ensures food security and export capacity but also supports overall economic growth through higher rural incomes and stronger domestic demand.

Furthermore, several studies highlight the critical role of financial development in providing capital, enhancing productivity, and increasing agricultural output in developing economies^[18–22, 24]. However, for a small and vulnerable island economy such as Vanuatu—where the primary sector is both the backbone of exports and the main livelihood for most of the population—this relationship has received little attention. This study, there-

fore, aims to fill this gap by providing empirical evidence on the impact of financial development on agricultural value added and economic growth in Vanuatu.

4. Research Methodology

4.1. Data and Sample

This study focuses on Vanuatu, a small island nation in the South Pacific whose economy is heavily dependent on the primary sector. The data are drawn from the World Development Indicators (WDI) published by the World Bank, covering the period 1980–2022. This time-frame is chosen based on the availability and completeness of the data, while also capturing significant socio-economic fluctuations—from phases of growth driven by traditional agriculture, through gradual integration into global trade, to frequent economic and financial shocks as well as natural disasters that Vanuatu regularly faces. Moreover, using a long-term horizon allows the study to reflect the dynamic nature of the economy and the lagged effects of financial development on agricultural value added and overall economic growth. The measurement and data sources of all variables are presented in **Table 1**.

Table 1. Variable description and source.

Symbol	Indicator	Measurement	Source
Endogenous Variables			
GDP	Economic growth	Measured by GDP per capita growth (annual, %). This indicator reflects the annual percentage change in the gross domestic product per capita, serving as a proxy for the overall economic performance of the country.	WB
AVA	Agricultural, Forestry, and Fishing Value Added	Measured by the share of agriculture, forestry, and fishing in GDP (% of GDP). This variable captures the contribution of the primary sector to the national economy, reflecting both productivity and structural transformation.	WB
FD	Financial Development	Proxied by domestic credit to the private sector (% of GDP). This measure reflects the degree of financial intermediation and the role of the banking sector in providing resources to private entities.	WB
Exogenous Control Variables			
RP	Rural Population	Rural population (% of total population). Refers to people living in rural areas, as defined by national statistical offices, calculated as the total population minus the urban population.	WB
FDI	Foreign direct investment	Net inflows of investment to acquire a lasting management interest in an enterprise, measured as a percentage of GDP. Includes equity capital, reinvestment of earnings, other long-term capital, and short-term capital.	WB

Source: Compiled by authors.

4.2. Model Specification and Variables Justification

The research model is developed based on prior studies by Farooq et al.^[25] and Tekin and Shahbaz^[26], which emphasize the dynamic interactions between financial development, primary sector expansion, and overall economic growth.

$$Y_{i,t} = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_k Y_{t-k} + \beta_x X_t + u_i + \varepsilon_t \quad (1)$$

where:

$Y_{i,t} = (GDP, AVA, FD)$ is a (1×3) vector of endogenous variables

$Y_{i,t-p}$ is a (1×3) lagged endogenous variables vector

$A_1, A_2, \dots, A_k$ are the estimated vectors of coefficients $(m \times m)$;

k is the optimal lag;

$X_{i,t}$ are the (1×2) the exogenous vectors, including rural population (RP) and FDI (Foreign direct investment)

The $(1 \times k)$ estimated coefficients matrix is represented by β_x

u_i is the dependent variable's fixed effect vector;

A vector of white noise errors is called $\varepsilon_{i,t}$.

GDP per capita growth is widely used as an indicator of overall economic performance^[35, 36]. For Vanuatu, a country with a small population and limited resources, achieving sustainable economic growth is crucial for improving income levels and overall quality of life. This indicator not only reflects the productive capacity of the economy but also illustrates its ability to absorb both domestic and foreign capital.

AVA is an important indicator for assessing the role of the primary sector within the economic structure. Previous studies have consistently emphasized the significance of agriculture, forestry, and fisheries in driving growth, particularly in developing countries^[37, 38]. In the case of Vanuatu, the economy still relies heavily on agriculture, forestry, and fisheries for employment and exports, including products such as kava, coconut, timber, and seafood^[3]. Incorporating this variable into the model allows us to evaluate the relationship between the primary sector and economic

growth, while also capturing the process of structural transformation. Therefore, we propose the following hypothesis:

H1. *Agricultural, Forestry, and fishing value-added positively influences economic growth in Vanuatu.*

Financial Development (FD) is measured by domestic credit to the private sector (% of GDP), which reflects the role of the financial system in mobilizing and allocating capital for production. The financial deepening theory^[16, 17] and several empirical studies^[29] have demonstrated that financial development contributes to economic growth. For Vanuatu, financial development can serve as a bridge to stimulate investment, improve productivity, and foster growth.

H2. *Financial development has a positive impact on economic growth in Vanuatu.*

In the agricultural, forestry, and fisheries sector, the availability of credit plays a crucial role in technological innovation, infrastructure improvement, production expansion, and value addition. Empirical studies have also confirmed the positive linkage between financial development and agricultural value added^[29, 31].

H3. *Financial development has a positive impact on the agricultural, forestry, and fishing value added in Vanuatu.*

In addition to the three endogenous variables, the study incorporates two exogenous control variables: Rural Population (RP) and Foreign Direct Investment (FDI). The Rural Population (RP) ratio reflects the demographic structure and labor resources of Vanuatu, where the majority of the population still resides in rural areas and agriculture continues to play a dominant role. This indicator may influence productivity, sectoral composition, and the value added of the primary sector, thereby necessitating its inclusion as a control variable in the model. The second control variable, Foreign Direct Investment (FDI), represents a critical channel for promoting growth in small and open economies such as Vanuatu. Beyond capital inflows, FDI is often accompanied by technology transfer, managerial skills, and deeper integration into global markets, which collectively enhance the country's growth potential.

4.3. Research Methodology

Conventional regression approaches such as OLS, FEM, or REM generally assume a unidirectional causal relationship, treating explanatory variables as fully exogenous^[39, 40]. Such assumptions are problematic in small and developing economies, where macroeconomic variables typically interact in a bidirectional manner. For instance, financial development may stimulate agricultural value added, while changes in agricultural performance may in turn reshape the financial system. Relying on the exogeneity assumption in traditional models therefore risks endogeneity bias, overlooks dynamic interactions, and reduces explanatory power^[9]. To address issues of endogeneity in small samples, Bayesian methods have gained increasing popularity. By incorporating prior information and generating full posterior distributions of parameters, Bayesian approaches can deliver more robust inference than classical techniques^[41–44]. Recent applications also confirm their effectiveness in analyzing inequality, financial crises, sustainability, and the role of financial instruments such as green credit in promoting sustainable development^[45–51]. However, while Bayesian regression frameworks are well-suited for mitigating endogeneity and small-sample bias, they may not fully capture the dynamic feedback loops and lagged interdependencies inherent in macroeconomic systems. To address these limitations, this study employs the Vector Autoregression (VAR) model for two main reasons. First, VAR treats all variables in the system as potentially endogenous, thereby overcoming the restrictive assumptions of linear regression models^[10, 52]. Second, VAR captures the dynamic interdependencies among variables, accounting not only for contemporaneous effects but also for short- and long-term lagged impacts^[53]. This makes VAR particularly suitable for analyzing the bidirectional relationship between financial development and primary sector value added in a small island economy, where shocks are prone

to spillovers and feedback effects.

5. Research Findings

5.1. Overview of Descriptive Statistics

Table 2 presents the descriptive statistics of the study variables for the period 1980–2022. For GDP growth, the mean value is -0.1084 with a standard deviation of 4.0094 , ranging from -13.4068 to 8.9271 . This wide dispersion underscores the volatility of Vanuatu's economic growth, reflecting the country's vulnerability as a small island economy to external shocks, such as natural disasters and global crises. The variable AVA records a mean of 20.7926 with a standard deviation of 3.0870 , spanning from 15.1968 to 26.0997 . This indicates that agriculture remains the backbone of the economy, providing relative stability, although its contribution fluctuates significantly across periods due to variations in climatic conditions and international market dynamics. Meanwhile, FD (financial development) exhibits a mean of 44.7151 with a relatively large standard deviation of 15.9477 , with values ranging from 27.3457 to 75.5565 . This reflects the uneven trajectory of Vanuatu's financial system development, transitioning from a heavy reliance on informal credit arrangements to progressively deeper integration into regional financial markets.

5.2. PVAR Results

5.2.1. Unit Root Test Results

The Augmented Dickey–Fuller (ADF) test was conducted to assess the stationarity properties of the variables (**Table 3**). The results show that GDP and RP are stationary at level, $I(0)$, while AVA, FD, and FDI are stationary after first differencing, $I(1)$. Next, we performed the lag length selection test for the VAR model.

Table 2. Descriptive statistical results.

Variable	Mean	Std. dev.	Min	Max
GDP	-0.1084	4.0094	-13.4068	8.9271
AVA	20.7926	3.0870	15.1968	26.0997
FD	44.7151	15.9477	27.3457	75.5565
FDI	6.7963	3.1761	1.0377	12.9521
RP	78.5683	3.4022	74.1840	85.2600

Source: Calculations by the authors.

Table 3. Stationarity test result.

Variables	ADF Test				Order of Integration
	I(0)		I(1)		
	t-Statistic	Probability	t-Statistic	Probability	
GDP	−6.9806	0.0000***	x	x	I(0)
AVA	−2.6596	0.0896*	x	x	I(0)
FD	−0.7048	0.8345	−4.7863	0.0004***	I(1)
RP	−2.6789	0.0865*	x	x	I(0)
FDI	−2.6037	0.1002	−8.1635	0.0000***	I(1)

Source: Calculations by the authors.

5.2.2. Optimal Lag Selection

The optimal lag length for the VAR model was determined using several selection criteria, including the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn Criterion (HQ). As reported in **Table 4**, most of these criteria (FPE, AIC, SC, and HQ) consistently indicate lag 1 as the optimal choice. From an economic perspective, this result is particularly relevant for Vanuatu. As a small island developing economy, Vanuatu faces rapid transmission of shocks due to its limited diversification and strong interdependence between agriculture, financial development, and economic growth. Choosing a one-period lag implies that changes in financial development have almost immediate spillover effects on GDP and agricultural value added in the following period.

5.2.3. The Result of the Autocorrelation Test

Table 5 presents the results of the autocorrelation test for the VAR model. The p -values across different lags are all greater than 0.05, indicating that the null hypothesis of no serial correlation cannot be rejected. This confirms that the residuals are free from autocorrelation, suggesting that the VAR specification is appropriate and the estimated results are reliable. From an economic perspective, Vanuatu is highly vulnerable to external shocks (e.g., natural disasters, global commodity price volatility, and fluctuations in foreign aid). If autocorrelation were present, it would suggest that such shocks persist systematically in the error structure, potentially biasing the estimates of how financial development influences agricultural value-added and economic growth.

Table 4. Optimal lag selection results.

Lags	LogL	LR	FPE	AIC	SC	HQ
0	−305.6729	NA	1754.3730	15.9832	16.2392	16.0751
1	−281.5083	42.13319*	809.3084*	15.2043*	15.84539*	15.43512*
2	−272.4849	14.3449	819.2886	15.2056	16.2281	15.5717
3	−269.7410	3.9400	1162.9290	15.5252	16.9328	16.0302

Note: * Indicates the best lag order according to this criterion.

Source: Calculations by the authors.

Table 5. The result of the autocorrelation test.

Lags	Rao F-Stat	Prob	LRE*Stat	Prob
1	0.3757	0.9427	3.4728	0.9426
2	0.5204	0.8546	4.7652	0.8543

Source: Calculations by the authors.

5.2.4. Test for Model Stability Condition

Figure 2 illustrates the inverse roots of the AR characteristic polynomial. The stability condition requires that all roots lie strictly inside the unit circle. As shown

in the figure, all the inverse roots are located within the unit circle, confirming that the estimated VAR model is stable. This result implies that the dynamic interactions among GDP growth, agricultural value added, and finan-

cial development in Vanuatu are well-specified, and the model can be reliably used for impulse response analysis and variance decomposition. In other words, the responses of the variables to shocks are stationary and converge over time, rather than diverging or producing explosive patterns.

5.2.5. Impulse-Response Function (IRF) Results

Figure 3 presents the IRF derived from the VAR model, which traces the dynamic reactions of the key variables—GDP, AVA, and FD—to one standard deviation shocks over a ten-period horizon.

Response of GDP: A shock to GDP produces a strong, immediate effect that gradually decays over approximately 2–3 periods. This indicates that growth shocks in Vanuatu tend to be short-lived and that the economy quickly converges back to equilibrium.

Response of AVA: A shock to AVA initially generates noticeable fluctuations, with a moderate positive impact peaking around the second period before stabilizing. This pattern suggests that shocks in the agricultural sector affect economic activity in the short run, but their influence diminishes over time.

Response of FD: Financial development responds strongly to its own shocks but gradually stabilizes, reflecting the domestic financial system's adjustment capacity. Moreover, shocks to FD also have meaningful impacts on both GDP and AVA, underscoring the role of financial intermediation as a transmission channel in Vanuatu's economy.

5.2.6. Variance Decomposition Results

Table 6 reports the variance decomposition results for GDP, AVA, and FD, illustrating the relative contributions of shocks from each variable over a four-period horizon.

In the first period, GDP shocks are entirely explained by their own innovations (100%). However, the explanatory power of GDP's own shocks gradually declines to about 83% by period 4. Over time, FD emerges as the most influential external driver, accounting for nearly 14% of GDP variation by the fourth period, while AVA contributes modestly (around 3%). This finding suggests that fluctuations in Vanuatu's growth are increas-

ingly shaped by the dynamics of the financial sector.

The results show that AVA is largely explained by its own shocks, with over 97% in period 1 and still nearly 89% by period 4. Nonetheless, the role of FD grows steadily, contributing over 10% to AVA's variation by the fourth period, while GDP's influence remains small (just above 1%). This highlights that financial development is a key channel influencing the performance of agriculture, forestry, and fisheries in the medium term.

In the case of FD, its own shocks dominate in the short run, explaining more than 96% of the variation in period 1. However, this proportion decreases over time to about 87% by period 4. Meanwhile, GDP's contribution rises significantly, from 3% in the first period to more than 12% in the fourth period, whereas AVA's role remains negligible. This indicates that financial sector dynamics in Vanuatu are strongly influenced by macroeconomic performance rather than agricultural shocks.

5.2.7. Discussion

IRF Analysis indicates that economic shocks in Vanuatu typically generate immediate but short-lived effects on growth. GDP shocks persist only for about 2–3 periods before the economy returns to equilibrium, reflecting both the vulnerability and resilience of a small island economy.

For the primary sector, AVA shocks initially stimulate positive fluctuations, but their impact diminishes over time. This suggests that although agriculture, forestry, and fisheries remain crucial for employment and food security, their spillover effects on the broader economy are limited due to small-scale production, outdated technology, and heavy dependence on climatic conditions.

In contrast, financial shocks exert stronger and more persistent effects. Credit expansion produces a clear boost to GDP that lasts across subsequent periods. FD also positively influences AVA, albeit with a lag, often peaking between the 2nd and 4th periods. This dynamic reflects the real conditions of Vanuatu, where smallholder farmers require time for loans to translate into investments in crops, livestock, and production infrastructure. Hence, the financial system functions not only as a capital provider but also as a key transmission channel linking agriculture to overall economic growth.

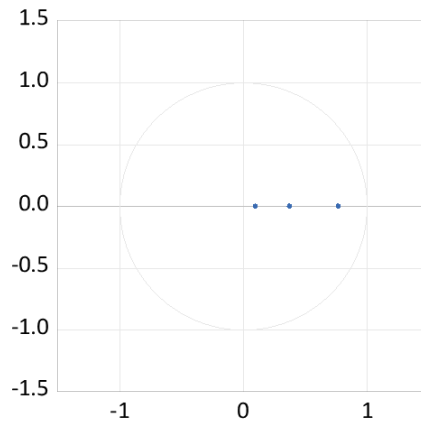


Figure 2. The inverse roots of the AR characteristic polynomial.

Source: Calculations by the authors.

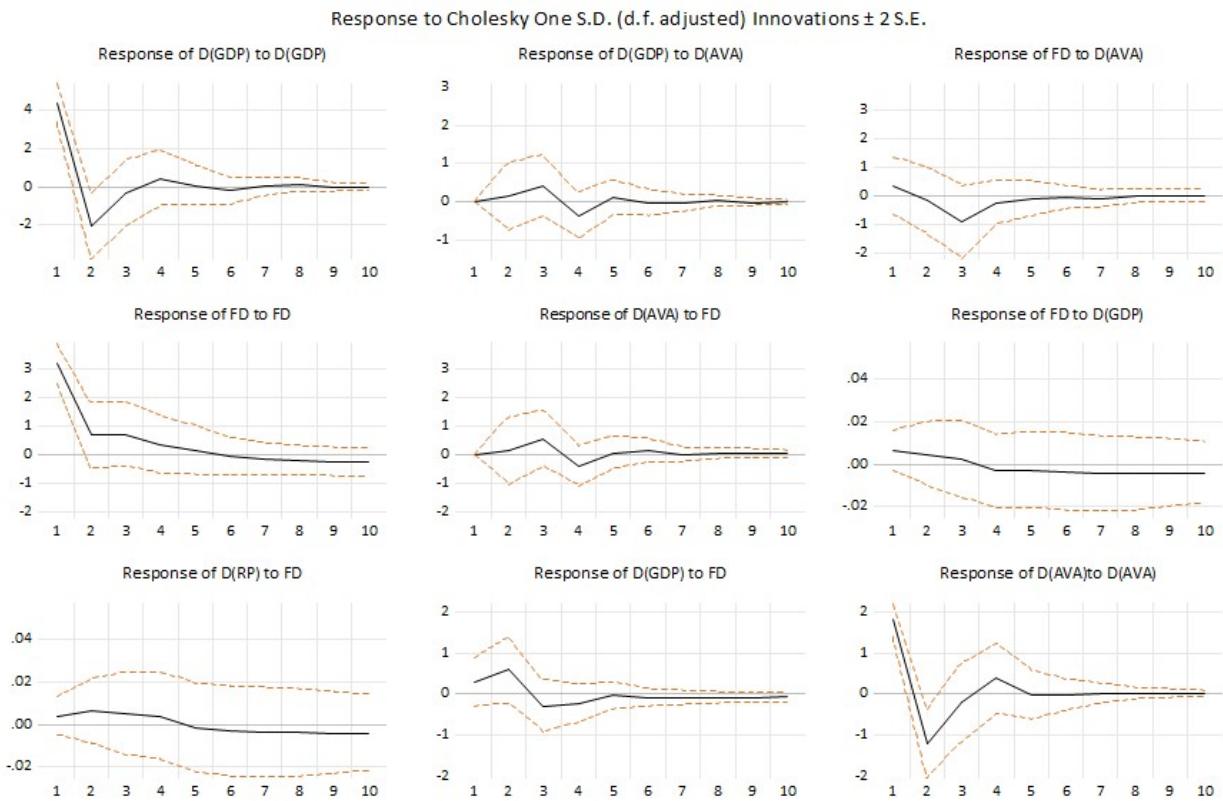


Figure 3. Impulse response functions result.

Source: Calculations by the authors

Table 6. Results of variance decomposition.

Variance Decomposition of GDP			
Period	GDP	AVA	FD
1	100.0000	0.0000	0.0000
2	95.1644	2.8556	1.9800
3	89.1644	3.2791	7.5565
4	83.1464	3.3210	13.5326

Table 6. *Cont.*

Variance Decomposition of AVA			
Period	GDP	AVA	FD
1	0.3364	97.1311	2.5325
2	0.6440	95.6643	3.6917
3	0.9644	91.1310	7.9046
4	1.1311	88.6540	10.2149
Variance Decomposition of FD			
Period	GDP	AVA	FD
1	3.2045	0.6189	96.1765
2	11.5503	0.3868	88.0629
3	12.0245	0.4843	87.4913
4	12.6706	0.4613	86.8680

Source: Calculations by the authors.

Variance Decomposition further underscores the pivotal role of finance. While GDP fluctuations are initially self-driven, by the fourth period nearly 14% of its variation is explained by FD—far exceeding the 3% contribution of AVA. This highlights the growing reliance of Vanuatu's economy on the financial sector rather than the primary sector. For AVA, its own dynamics dominate, yet the influence of FD gradually rises to over 10% by the fourth period, underscoring that agricultural development is inseparable from access to formal credit—particularly critical under frequent natural disasters. Conversely, the financial sector itself reacts strongly to macroeconomic cycles: GDP explains more than 12% of FD fluctuations after four periods, whereas AVA exerts almost no effect. This indicates that Vanuatu's financial system is tightly coupled with the business cycle, but only weakly connected to agricultural shocks.

Based on the results, it can be affirmed that credit plays a central role in promoting economic growth and stability in Vanuatu. In a country where 88% of the population depends on agriculture and frequently suffers severe losses from cyclones and earthquakes, financial development is not merely a tool for mobilizing capital but also a mechanism for safeguarding livelihoods and enhancing the resilience of the entire economy. This provides clear evidence that Vanuatu should prioritize expanding formal credit, modernizing financial services, and closely linking them to the development of the primary sector to generate sustainable value-added.

Compared with the initial research hypotheses, the

empirical findings indicate that H1 (AVA has a positive effect on GDP) is only partially supported, as the impact of AVA is limited and primarily short-term. In contrast, H2 (FD has a positive effect on GDP) is strongly confirmed, demonstrating that finance is a decisive factor for growth. H3 (FD has a positive effect on AVA) is also validated, highlighting the increasing role of credit in enhancing productivity and agricultural value added.

These results are consistent with previous studies in Pakistan, Nigeria, and Ghana, which have also emphasized that credit is a crucial channel for supporting agricultural development and economic growth. However, a notable difference is that the effect of AVA on GDP in Vanuatu is weaker compared with other countries, reflecting the particular characteristics of a small island economy that is highly dependent on international trade and vulnerable to natural disasters.

6. Conclusion and Policy Implications

6.1. Conclusion

In the context of Vanuatu—a small developing island nation in the South Pacific—economic growth has always been accompanied by major challenges arising from its limited scale, high dependence on the primary sector, and vulnerability to natural disasters. Although the financial system has made certain progress, its level of inclusiveness remains low, particularly for agricultural households. This asymmetry raises critical ques-

tions regarding the true role of credit in driving economic growth and the primary sector in Vanuatu. This study employs a Vector Autoregression (VAR) model, combined with IRF and VDC analyses, to examine the dynamic relationship between GDP growth, agricultural value added (AVA), and financial development (FD) over the study period. The empirical results reveal that: (i) shocks from AVA exert a positive but limited and short-term effect on GDP; (ii) financial shocks have a strong and persistent impact on both GDP and AVA, while GDP also responds significantly back to FD; and (iii) variance decomposition confirms the increasing importance of credit in explaining growth fluctuations, far exceeding the contribution of the primary sector. These findings suggest that, while agriculture continues to play a vital social role, the macroeconomic dynamics of Vanuatu are more closely tied to the financial system.

6.2. Policy Implications

The findings confirm the central role of the financial system in fostering economic growth and transmitting its effects to the agricultural sector. This suggests that Vanuatu should prioritize policies aimed at credit development and expanding access to finance, particularly in rural areas and for smallholder farmers. When credit is allocated efficiently, farmers can invest in machinery, improved seeds, and productivity-enhancing techniques, thereby increasing the value added of the primary sector.

Second, although the direct contribution of agriculture to GDP is limited and short-term, it continues to hold a unique social importance in Vanuatu, where the majority of the population relies on subsistence farming. Therefore, agricultural policies should not be overlooked but rather positioned as a foundation for livelihoods and social welfare, while being closely linked to the financial system to generate spillover effects. A practical approach would be to develop sustainable agriculture in connection with microfinance, agricultural insurance, and green credit programs.

Third, to fully leverage the increasing role of credit in economic growth, the government should implement policies that diversify the economic structure. This does not mean abandoning agriculture, but rather promoting

complementary and substitute industries such as ecotourism, financial services, and agro-processing. These sectors can capitalize on natural resources and local labor advantages, while reducing the risks associated with overreliance on pure agriculture. Finally, development policies should place strong emphasis on strengthening financial system stability. Since financial shocks exert strong and persistent effects on GDP, ensuring capital adequacy, controlling non-performing loans, and enhancing resilience to external shocks will help Vanuatu maintain long-term growth.

This study has several limitations. First, it considers only three core macroeconomic variables—GDP, agricultural value added, and financial development—while excluding other relevant factors such as climate variability, sectoral productivity, and tourism, which may also influence Vanuatu's growth dynamics. Second, the VAR framework assumes linear interdependencies and does not capture non-linearities or structural breaks arising from natural disasters or policy shocks. Future research should therefore incorporate climatic and productivity indicators and apply more advanced methods such as Markov Switching VAR, Threshold VAR, or Bayesian VAR. These approaches could better account for regime shifts and crisis–stability transitions, offering deeper insights into resilience and sustainable growth for Vanuatu and similar small island economies.

Author Contributions

Conceptualization, H.N.Q. and D.L.Q.; methodology, D.L.Q.; formal analysis, D.L.Q.; investigation, H.N.Q.; resources, H.N.Q.; data curation, H.N.Q.; writing—original draft preparation, D.L.Q.; writing—review and editing, H.N.Q. and D.L.Q.; supervision, D.L.Q.; project administration, D.L.Q. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

The data supporting the findings of this study are publicly available from the World Bank Open Data portal (<https://data.worldbank.org>).

Conflicts of Interest

The authors declare that there is no conflict of interest.

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