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Does financial and agriculture sector development reduce unemployment rates? Evidence from Southern African countries

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Abstract: The paper examines empirically the impacts of agricultural sector value added and financial development on unemployment, using yearly data from 1995–2015. Eleven developing Southern African Development Community countries were selected for the study. The empirical analysis was carried out using second-generation econometric methods. The regression results revealed that both agricultural value added and financial development are important determinants of unemployment within the region. The results specifically show that agricultural value added is negatively associated with unemployment in both the short and long-run, although the long-run effect is many times bigger than the short-run impact. The results also show that in the long-run, both financial depth and financial efficiency are negatively associated with unemployment. Interactions between agricultural value added financial development and unemployment were further tested via panel bootstrap causality tests. The causality test results revealed the existence of significant one-way causality from agricultural value added to unemployment and from financial depth to unemployment for the region. It also showed that causality varies across individual countries within the region with different conditions, indicating the heterogeneous nature of the countries that make up the regional bloc.

Keywords: bootstrap causality; government expenditure; trade; value added

Unemployment brings about inhumane hardship and economic waste; it is a consequence of a nation's inability to effectively utilise or develop the manpower at her disposal (Baah-Boateng 2016). Unemployment is one of the leading causes of socio-economic problems faced by most nations of Africa, with the Southern African Development Community (SADC) countries experiencing their fair share (Curtain 2000).

Pagano and Pica (2012) give a theoretical framework for the effects of financial development on employment. The framework of the model mainly states that the rate of employment at the industrial level in a country is directly linked to its financial development. The model proposes that economies with well-developed financial institutions experience labour reallocation from weaker to stronger industries due to the ability of the more profitable firms to bid up wages. In addition, the framework states that in an economy with a monolithic industry, financial development helps in a total increase of labour productivity at all levels. The degree of this effect is dependent on the elasticity of supply of labour. The model states that financial development is positively related to employment growth, especially in countries that do not belong to the Organisation for Economic Cooperation and Development (OECD). Finally, they reveal a dark side to financial development, they claim that during a banking crisis, employment grows less in the financially dependent sectors of the more financially developed countries.

Steger (2000) argues that unemployment rate reduction comes under various situations with a steady increase in relative Gross Domestic Product (GDP) share of agriculture. The study shows that the in-

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crease in agricultural value added to GDP can lead to higher average economic growth by boosting GDP growth, increasing investment and lowering the unemployment rate.

A number of researchers have studied the relationship between economic variables and agriculture. For example, Tijani et al. (2015), when examining government expenditure on agriculture in Nigeria and its effects on economic growth, used time-series econometrics and correction modelling for the years 1970–2006. Their research stated that agriculture has a positive correlation with economic growth and that budgetary allocation through capital expenditure, supported by financial development, has a far-ranging pull on economic growth.

Fadeyi et al. (2015), in a recent study, evaluated the long-term and short-term linkages between macroeconomic fundamentals, agricultural value added to GDP, and the South African agricultural trade balance, using co-integration analysis and a vector error-correction model. Their findings revealed that in the long-term, the exchange rate, agricultural prices, agricultural production, and disposable income all had a significant impact on the trade balance.

A study by Bravo-Ortega and Lederman (2005) used panel data tools such as the generalized method of moment technique and Granger causality with data from the years 1960–2000 to test the effects of the agricultural growth rate of a nation. Their findings revealed that in developing countries, positive changes in GDP from agriculture contributed to non-agricultural GDP, while the scenario was the opposite in the developed countries.

Although there is general agreement that food security is key to the stability of any economy, and that agriculture can be an important factor in releasing growth miracles, the extent to which agricultural value can aid the economic growth of a nation has not yet been established (Agboola and Bacilar 2014).

Apart from the researchers mentioned above, Gardner (2005) and Dethier and Effenberger (2012) have also investigated the agricultural sector and its relation to economic variables. Other researchers have investigated unemployment in the Southern African countries (Yu 2013; Festus et al. 2016). Of these researches, the one by Festus et al. (2016) shows that events in post-apartheid South Africa have shown that the unemployment rate has been on the rise over the years 1995 to 2015 due to the fact that the employment available is insufficient relative to the numbers wishing to be gainfully employed.

From the literature mentioned, two conclusions arise. First, researches have revealed that there is a relationship between financial development and employment in various countries. Second, despite the fact that a number of researchers have investigated the associations between the agricultural sector and various economic variables, empirical contributions addressing the effects of financial development and agricultural value added to GDP on unemployment within a single framework in Southern African countries are missing. The objective of this article is to fill that gap.

MATERIALS AND METHODOLOGY

Panel unit-root tests with cross-sectional dependence and heterogeneous slopes

We first apply the following cross-sectional dependence (CD) tests; Breusch-Pagan (1980) Lagrange Multiplier (LM) test, Pesaran (2004) Scaled LM test, Pesaran (2004) CD test and Pesaran et al. (2008) Bias-adjusted LM test. The test statistics for the four cases are given respectively as:

$$LM = \sum_{i=1}^{N-1}\sum_{j=i+1}^{N} T_{ij}\hat{p}_{ij}^2 \rightarrow \chi^2 \frac{N(N-1)}{2} \quad (1)$$

The test is asymptotically distributed under the null of χ^2

$$LM_s = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T_{ij}\hat{p}_{ij}^2 - 1) \rightarrow N(0,1) \quad (2)$$

The test is asymptotically distributed as $N(0,1)$

$$CD_p = \sqrt{\frac{2}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N} T_{ij}\hat{p}_{ij} \rightarrow N(0,1) \quad (3)$$

$$LM_{BC} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T_{ij}\hat{p}_{ij}^2 - 1) - \\ -\frac{N}{2(T-1)} \rightarrow N(0,1) \quad (4)$$

In Equations (1–4) $\hat{p}_{ij}$ is the correlation coefficient, $i = 1, \ldots, N$ represents cross-sectional units, $t = 1, \ldots, T$ represents time series observations, $N(N - 1)/2$ degrees of freedom, χ^2 means the test is asymptotically distributed under the null of chi-square and $N(0,1)$ means the test is asymptotically distributed with mean zero and variance one.

Second, we apply the Pesaran and Yamagata (2008) standardised version of the Swamy (1970) homogeneity

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test (delta tests). Under the null of slope homogeneity, the Swamy (1970) test is firstly modified:

$$\tilde{S} = \sum_{i=1}^{N} \left(\hat{\beta}_i - \hat{\beta}_{WFE}\right)' X_I' \frac{M_\tau X_i}{\tilde{\sigma}_i^2} \left(\hat{\beta}_i - \hat{\beta}_{WFE}\right) \quad (5)$$

where $\hat{\beta}_i$ stands for pooled OLS estimator, $\hat{\beta}_{WFE}$ represents weighted fixed effect pooled estimator and $\tilde{\sigma}_i^2$ is the estimator.

Then the standard dispersion statistics is calculated:

$$\tilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{S} - k}{2k}\right) \quad (6)$$

The bias adjusted version of the standard dispersion statistics is also calculated thus:

$$\tilde{\Delta}_{Adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{S} - E(\tilde{z}_{it})}{\sqrt{\mathrm{var}\,(\tilde{z}_{it})}}\right) \quad (7)$$

where N is the cross-sectional dimension, $\tilde{S}$ is the dispersion statistic and k is the number of regressors.

$$E(\tilde{z}_{it}) = k \text{ and } \mathrm{var}(\tilde{z}_{it}) = \frac{2(T-k-1)}{T+1}$$

Next, we adopt the cross-sectionally augmented IPS (Im et al. 2003) panel unit root tests of Pesaran (2007) commonly referred to as CIPS test. This unit root test developed by Pesaran (2007) accommodates cross-sectional dependence. Asymptotic results generated are for both the individual cross-sectionally augmented Dickey Fuller (CADF) statistics and for their simple averages (CIPS).

$$\mathrm{CIPS}(N,T) = N^{-1}\sum\nolimits_{i=1}^{N} t_i(N,T) = \frac{\sum\nolimits_{i=1}^{N}\mathrm{CADF}_i}{N} \quad (8)$$

where T is time dimension and $t_i(N, T)$ represents i^{th} cross-section CADF statistic.

Panel cointegration tests with cross-sectional dependence and heterogeneous slopes

Considering cross-sectional dependence, slope heterogeneity and the mixed order of integration, we introduce the Durbin-Hausman (DH) cointegration tests of Westerlund (2008) that are valid when cross-sectional dependence and slope heterogeneity are detected in the data series. The tests also provide valid estimates when variables are integrated of a mixed order, the only condition required being that the dependent variable is non-stationary. The Durbin-Hausman tests are:

$$DH_p = \hat{S}_n\left(\tilde{\phi} - \hat{\phi}\right)^2 \sum_{i=1}^{n}\sum_{t=2}^{T} \hat{e}_{it-1}^2 \text{ and}$$

$$DH_g = \hat{S}_i\left(\tilde{\phi}_i - \hat{\phi}_i\right)^2 \sum_{i=1}^{n}\sum_{t=2}^{T} \hat{e}_{it-1}^2 \quad (9)$$

where DH_p is the panel statistic and DH_g is the group mean statistic. Their null hypothesis of no cointegration $\left(H_0\text{: } \phi_i = 1, \text{ for all } I = 1\right)$ is tested against the alternative of cointegration in all n units for DH_p $\left(H_i^p\text{: } \phi_i = \phi, \text{ and } \phi < 1\right)$ and against the alternative of cointegration in some of the cross sectional units for DH_g $\left(H_i^p\text{: } \phi < 1, \text{ for at least some } i\right)$.

Error-correction based panel estimations

The effects of selected regressors on unemployment are estimated through the error-correction form of an Autoregressive Distributed Lag (ARDL) model specified thus:

$$\Delta UN_{it} = \theta_i\left(UN_{it-1} - \theta_i X_{it}\right) + \sum_{j=i}^{p-1} \lambda_{ij}^* \Delta UN_{it-j} + $$
$$+ \sum_{j=0}^{q-1} \delta_{ij}^* \,\Delta X_{it-j} + \varepsilon_{it} \quad (10)$$

where UN is unemployment, X_{it} is the vector of explanatory variables: agricultural value added (*AVA*), financial depth (*FINDEP*), financial efficiency (*FINEFF*), financial stability (*FINSTAB*), government final consumption expenditure % of GDP (*GEXP*), investment in % of GDP (*INV*), trade in % of GDP (*TRADE*). δ and λ are coefficients and γ_i is the group specific effect.

To accommodate heterogeneous slopes, we estimate Equation (10) via the Mean Group (MG) estimator of Pesaran and Smith (1995) which allows intercepts, slope coefficients and error variances to differ across cross-sections.

Panel causality tests

Finally, we apply the Emirmahmutoglu and Kose (2011) panel causality test with bootstrapping to test the causal link between unemployment and agricultural value added and between unemployment and financial development. The test does not require the underlying Vector autoregressive (VAR) system to be stationary. It may thus be applied to panels consisting of stationary, non-stationary, cointegrated and non-cointegrated series (Seyoum et al. 2014). Furthermore, the test is suitable for panel data series affected by cross-sectional dependence and slope heterogeneity.

Emirmahmutoglu and Kose (2011) show that the Fisher (1932) test statistic may be used to test for panel Granger non-causality and specified thus:

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$$\lambda = -2\sum_{i=1}^{N} \ln_{(pi)} \quad i = 1,2,\ldots,N \tag{11}$$

where pi represents the p-value for the i^{th} cross section and the test statistic has a chi-square distribution with $2N$ degrees of freedom.

Following Emirmahmutoglu and Kose (2011), we adopt the lag-augmented VAR (LA-VAR) model with $L_y + d\max_i$ lags in heterogeneous mixed panels. It is specified as follows:

$$UN_{it} = a_{1i}^{UN} + \sum_{j=1}^{L_{UN}+d\max_i} B_{1ij} UN_{it-j} + \sum_{j=1}^{L_{AVA}+d\max_i} \gamma_{1ij} AVA_{it-j} + \varepsilon_{1it} \tag{12}$$

$$AVA_{it} = a_{2i}^{AVA} + \sum_{j=1}^{L_{UN}+d\max_i} B_{2ij} UN_{it-j} + \sum_{j=1}^{L_{AVA}+d\max_i} \gamma_{2ij} AVA_{it-j} + \varepsilon_{2it} \tag{13}$$

$$UN_{it} = a_{1i}^{UN} + \sum_{j=1}^{L_{UN}+d\max_i} B_{1ij} UN_{it-j} + \sum_{j=1}^{L_{FD}+d\max_i} \gamma_{1ij} FD_{it-j} + \varepsilon_{1it} \tag{14}$$

$$FD_{it} = a_{2i}^{FD} + \sum_{j=1}^{L_{UN}+d\max_i} B_{2ij} UN_{it-j} + \sum_{j=1}^{L_{FD}+d\max_i} \gamma_{2ij} FD_{it-j} + \varepsilon_{2it} \tag{15}$$

The null hypotheses for each pair of bivariate Granger causality tests are:

H_0: $\gamma_{1i1} = \gamma_{1i2} = \ldots = \gamma_{1ik_i} = 0$ for $i = 1,2,\ldots,N$ and

H_0: $\beta_{2i1} = \beta_{2i2} = \ldots = \beta_{2ik_i} = 0$ for $i = 1,2,\ldots,N$

where *FD* stands for financial development and generally represents *FINDEP*, *FINEFF* and *FINSTAB*.

EMPERICAL RESULTS

Data and panel unit-root test results

This paper employs panel data covering 11 selected SADC countries for the period 1995–2015. Annual data on unemployment, agricultural value added, and trade openness is taken from World Development Indicators (World Bank 2018a). Data on government expenditure and investment is collected from World Economic Outlook database (IMF 2016). We use the global financial development variables provided by the World Bank (World Bank 2018b). The database provides measures for financial development on the basis of financial access, depth, efficiency and stability. We, however, exclude financial access because of insufficient data. The choice of sample period is dependent on the availability of data. All the variables except the financial development variables are log-transformed.

When data-series contain cross-sectional dependence and cross-country heterogeneity, the first generation panel unit root and cointegration tests results are distorted. We thus apply the following cross-sectional dependence tests: Breusch-Pagan (1980) LM test, Pesaran (2004) Scaled LM test, Pesaran (2004) CD test and Pesaran et al. (2008) Bias-adjusted LM test. We also apply the Pesaran and Yamagata (2008) homogeneity tests. Table 1 shows that the null

Table 1. Cross-sectional dependence and slope homogeneity test results

	Cross-sectional dependence test results				Slope homogeneity test results	
	LM	LM_s	CD_p	LM_{bc}	$\hat{\Delta}$	$\hat{\Delta}_{adj}$
UN	72.704*	1.688**	–1.673**	–0.147*	4.735***	5.115***
AVA	57.657	0.253	–2.242**	5.501***	2.782***	3.005***
FINDEP	65.470	0.998	–2.150**	2.270**	4.577***	4.944***
FINEFF	63.094**	0.772**	–2.202**	1.428*	2.169**	2.343***
FINSTAB	106.706***	4.930***	–2.059**	2.124**	3.907***	4.220***
GEXP	81.612**	2.537***	–2.918***	2.341***	–0.948	–1.024
INV	102.046***	4.486***	–2.493***	4.407***	5.131***	5.542***
TRADE	85.092***	2.869***	–2.066**	9.384***	0.950	1.027

***,**,* denote significance at the 1, 5, and 10% levels, respectively; *LM* – Lagrange Multiplier test, *LMs* – Pesaran (2004) Scaled LM test, CD_p – Pesaran (2004) CD test, LM_{bc} – Pesaran et al. (2008) Bias-adjusted LM test; $\hat{\Delta}$ – Delta test, $\hat{\Delta}_{adj}$ – Bias-adjusted delta test; *UN* – unemployment, *AVA* – agricultural value added, *FINDEP* – financial depth, *FINEFF* – financial efficiency, *FINSTAB* – financial stability, *GEXP* – government final consumption expenditure % of GDP, *INV* – investment in % of GDP, *TRADE* – trade in % of GDP

Source: authors' computation

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Table 2. Results from cross-sectionally augmented IPS unit root tests

	Intercept only		Intercept and trend	
	level	first difference	level	first difference
UN	–2.724	–3.116***	–2.688	–2.785***
AVA	–3.350***	–4.030***	–3.323***	–3.830***
FINDEP	–2.289*	–2.703***	–2.604	–3.303***
FINEFF	–2.051	–3.790***	–2.896	–3.781***
FINSTAB	–4.465***	–5.542***	–4.469***	–5.345***
GEXP	–2.802	–3.467***	–2.905	–3.656***
INV	–2.115	–3.237***	–2.121	–3.181***
TRADE	–2.221	–3.518***	–2.555	–3.182***

***,**,* denote significance at the 1, 5, and 10% levels, respectively; *UN* – unemployment; *AVA* – agricultural value added; *FINDEP* – financial depth; *FINEFF* – financial efficiency; *FINSTAB* – financial stability; *GEXP* – government final consumption expenditure % of GDP; *INV* – investment in % of GDP; *TRADE* – trade in % of GDP

Source: authors' computation

hypothesis of cross-sectional independence is rejected across variables. The significant test statistics for all the delta and adjusted delta tests except government expenditure and trade openness also confirm cross-country heterogeneity.

Table 2 reports the panel unit-root tests. The CIPS test results suggest that while agricultural value added and financial stability follow *I* (0) processes, all other variables follow *I* (1) processes. Thus, the variables are integrated of a mixed order.

The Durbin-Hausman cointegration tests which help us deal with the challenges posed by cross-sectional dependence, slope heterogeneity and mixed order of integration [*I* (0) and *I* (1)] are carried out. The results of the DH_p and DH_g tests are reported in Table 3. The rejection of null hypothesis at 10% for DH_p and at 1% for DH_g indicates that there is a long-run relationship between the variables.

In situations where the null hypothesis of homogeneous slopes is rejected in favor of heterogeneous slopes, the MG estimator provides consistent estimates. Table 4 reports the MG results. The estimated speed-of-adjustment coefficient is negative and significant at ($p < 0.01$). This confirms a long-run relationship

Table 3. Westerlund (2008) panel cointegration test results

	UN
DH_g	3.774***
DH_p	3.020*

***,**,* denote significance at the 1, 5, and 10% levels, respectively; *UN* – unemployment; DH_g – Durbin-Hausman group mean statistic; DH_p – Durbin-Hausman panel statistic

Source: authors' computation

Table 4. Mean Group (MG) estimation results (number of observations = 220, number of countries = 11)

	MG
Adjustment coefficient	–0.838***
Long-term coefficients	
AVA	–0.762***
FINDEP	–1.125***
FINEFF	–0.156*
FINSTAB	–0.287
GEXP	–0.180
INV	–0.122***
TRADE	–1.165**
Short-term coefficients	
Δ*AVA*	–0.023**
Δ*FINDEP*	–0.906
Δ*FINEFF*	0.033
Δ*FINSTAB*	–0.148
Δ*GEXP*	–0.404**
Δ*INV*	–0.029*
Δ*TRADE*	–0.150

***,**,* denote significance at the 1, 5, and 10% levels, respectively; *AVA* – Agricultural value added, *FINDEP* – financial depth, *FINEFF* – financial efficiency, *FINSTAB* – financial stability, *GEXP* – government final consumption expenditure in % of GDP, *INV* – investment in % of GDP, *TRADE* – trade in % of GDP; Δ represents short-run coefficients

Source: authors' computation

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between the selected variables detected through cointegration tests.

Agricultural value added is negatively associated with unemployment in the short and long-run although the long-run effect is many times bigger than the short-run impact. In the short-term, one period-lagged effect of a percentage increase in *AVA* results in 0.023% decline in *UN* in the following period whereas, in the long-term, a percentage increase in *AVA* causes *UN* to fall by 0.762. The coefficients are significant at ($p < 0.05$) and ($p < 0.01$) respectively. These findings support the conclusions reached by Bein and Ciftcioglu (2017).

All three measures of financial development do not cause significant changes in unemployment in the short-run. In the long-run, both financial depth and financial efficiency have negative impacts on unemployment. Specifically, a percentage point increase in *FINDEP* causes a 1.125% decrease in *UN* and a percentage point increase in *FINEFF* leads to 0.156% decrease in *UN*. The results are significant at ($p < 0.01$) and ($p < 0.1$) respectively. These findings align with those of Shabbir et al. (2012). Also, our findings suggest that efficient financial systems are more important for reducing unemployment than financial depth.

Concerning the control variables, expenditure significantly impacts unemployment negatively in the short-term. No significant long-run changes are found in unemployment in the long-run effect. In the short-term, one period-lagged effect of a percentage increase in *GEXP* leads to 0.404% fall in the *UN* in the following periods. The result is significant at ($p < 0.05$). This finding strongly confirms the Keynesian theory. The keynesian theory claims that increases in government expenditure could provide short-term stimulus to help end recessions/depressions in which GDP growth remains low, and unemployment remains high by injecting purchasing power in the economy.

Investment has a negative and significant effect on unemployment in both short and long-terms. One period-lagged effect of a percentage increase in *INV* results in 0.029% decrease in *UN* in the following period. Also, if *INV* increases by 1%, the *UN* is expected to fall by 0.122% in the long-term. Results are significant at ($p < 0.1$) and ($p < 0.01$) respectively. This conforms to the economic theory, which suggests that investment is a key driver of economic growth. The outcome also aligns with the findings of Bayar Yilmaz (2016). We may also infer that the ability of the investment to reduce unemployment is stronger in the long-run than the short-run.

Trade openness only significantly affects unemployment in the long-term. For every percentage rise in *TRADE*, *UN* declines by 1.165% in the long-term. The result is significant at ($p < 0.05$).

Finally, to ascertain the direction of causality between unemployment and agricultural value added and between unemployment and financial develop-

Table 5. Granger causality between unemployment (*UN*) and agricultural value added (*AVA*) for SADC countries

Country	Null hypothesis		
	UN does not Granger cause *AVA*	*AVA* does not Granger cause *UN*	result
Botswana	0.465	0.532	NO
Congo	9.448**	48.700***	*UN* ⇔ *AVA*
Lesotho	0.483	3.836**	*AVA* => *UN*
Madagascar	11.691***	0.205	*AVA* => *UN*
Malawi	4.523	5.636	NO
Mauritius	51.750***	88.031***	*UN* ⇔ *AVA*
Mozambique	4.248	0.240	NO
Namibia	5.136**	0.899	*UN* => *AVA*
Swaziland	1.843	46.929***	*AVA* => *UN*
Tanzania	0.574	2.490	NO
Zambia	10.245***	6.557**	*UN* ⇔ *AVA*
Panel	99.603	195.557***	*AVA* => *UN*

***,**,* denote significance at the 1, 5, and 10% levels, respectively; ⇔ represents bidirectional causality and => represents one-way causality

Source: authors' computation

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Table 6. Granger causality between unemployment (*UN*) and financial depth (*FINDEP*) for SADC countries

Country	Null hypothesis		
	UN does not Granger cause *FINDEP*	*FINDEP* does not Granger cause *UN*	result
Botswana	0.759	2.966**	*FINDEP* => *UN*
Congo	0.203	4.696*	*FINDEP* => *UN*
Lesotho	0.637	1.497**	*FINDEP* => *UN*
Madagascar	1.546	2.005**	*FINDEP* => *UN*
Malawi	0.684	2.332	NO
Mauritius	3.119	1.213	NO
Mozambique	0.942	4.630**	*FINDEP* => *UN*
Namibia	0.272	0.958	NO
Swaziland	0.806	6.545**	*FINDEP* => *UN*
Tanzania	3.060	3.618	NO
Zambia	4.268	11.120**	*FINDEP* => *UN*
Panel	36.984	44.363***	*FINDEP* => *UN*

***,**,* denote significance at the 1, 5, and 10% levels, respectively; ⇔ represents bidirectional causality and => represents one-way causality

Source: authors' computation

ment in the presence of cross-sectional dependence, heterogeneous slopes and variables of mixed order, we perform the Emirmahmutoglu and Kose (2011) panel causality tests.

In Table 5, at country level, the results confirm a significant feedback relationship between unemployment and agricultural value added in Congo, Mauritius and Zambia. Significant unidirectional causality running from agricultural value added to unemployment is detected in Lesotho, Madagascar, Namibia and Swaziland. No causal relationships are detected in Botswana, Malawi, Mozambique and Tanzania. For the entire panel, however, a significant one-way causality from agricultural value added to unemployment is detected.

In Table 6, at country level, we detect a significant one-way causal relationship from financial depth to unem-

Table 7. Granger causality between unemployment (*UN*) and financial efficiency (*FINEFF*) for SADC countries

Country	Null hypothesis		
	UN does not Granger cause *FINEFF*	*FINEFF* does not Granger cause *UN*	result
Botswana	1.892	1.341*	*FINEFF* => *UN*
Congo	0.246	0.496	NO
Lesotho	1.247	20.046***	*FINEFF* => *UN*
Madagascar	2.959	0.144	NO
Malawi	2.336	1.355*	*FINEFF* => *UN*
Mauritius	0.089	1.947*	*FINEFF* => *UN*
Mozambique	2.980	1.212*	*FINEFF* => *UN*
Namibia	2.493	9.657***	*FINEFF* => *UN*
Swaziland	0.377	2.090**	*FINEFF* => *UN*
Tanzania	1.318	1.884	NO
Zambia	2.270	0.555	NO
Panel	25.757	46.409***	*FINEFF* => *UN*

***,**,* denote significance at the 1, 5, and 10% levels, respectively; ⇔ represents bidirectional causality and => represents one-way causality

Source: authors' computation

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Table 8. Granger causality between unemployment (*UN*) and financial stability (*FINSTAB*) for SADC countries

Country	Null hypothesis		
	UN does not Granger cause *FINSTAB*	*FINSTAB* does not Granger cause *UN*	result
Botswana	6.436**	2.031	*UN* => *FINSTAB*
Congo	22.835***	10.577**	*UN* ⇔ *FINSTAB*
Lesotho	2.679	0.517	NO
Madagascar	1.835	4.465**	*FINSTAB* => *UN*
Malawi	9.573**	1.496	*UN* => *FINSTAB*
Mauritius	4.705	4.601	NO
Mozambique	5.868**	0.082	*UN* => *FINSTAB*
Namibia	0.399	0.806	NO
Swaziland	0.139	5.334**	*FINSTAB* => *UN*
Tanzania	2.680	2.165	NO
Zambia	2.681	1.034	NO
Panel	64.877	39.209	NO

***,**,* denote significance at the 1, 5, and 10% levels, respectively; ⇔ represents bidirectional causality and => represents one-way causality

Source: authors' computation

ployment in all the countries except Malawi, Mauritius, Namibia and Tanzania where no significant causality is found. At the panel level, unidirectional causality from financial depth to unemployment is also detected in the region. In Table 7, significant one-way causality from financial efficiency to unemployment is found in all countries except Congo, Madagascar, Tanzania and Zambia where no causality is found.

Table 8 reports significant unidirectional causality from unemployment to financial stability in Botswana, Congo, Malawi and Mozambique, significant unidirectional causality in the other direction is recorded in Madagascar and Swaziland, whereas no causality is detected in Lesotho, Namibia, Mauritius, Tanzania and Zambia. In addition, no causality is detected at the panel level.

CONCLUSION

The contributions of this research to the existing literature on the relationship between financial development, agricultural development and unemployment are detailed below.

First, concerning the measurement of financial development, most past studies have measured it with variables such as domestic credit to private sector, banking sector domestic credit and financial sector domestic credit, which are only measures of financial depth. However, the financial sector has evolved with time and become multifaceted. The contribution of the financial sector in an economy would be insignificant if it is inefficient, unstable or lacks depth. We thus made use of the global financial development variables provided by the World Bank on the basis of financial efficiency, financial stability and financial depth.

Second, the emphasis on the importance of agricultural value added to the economic growth through reduction of unemployment in SADC countries, which are mostly developing countries with relatively high unemployment rates and growing financial and agricultural sectors, is of utmost relevance.

Third, this study highlights specific patterns of relationships between various measures of financial development and unemployment, and between agricultural value added and unemployment in each of the SADC countries.

In summary, the findings show the following; first, a long-term relationship exists between agricultural value added, financial development and unemployment. Second, improvements in agricultural value added cause reduction in unemployment both in the short and long-run, the effect is however felt more greatly in the long-run. Third, increases in financial depth and improvements in financial efficiency lower unemployment in the long-run. Fourth, a significant one-way causal effect from agricultural value added to unemployment, and from financial depth to unemployment, exists in the SADC bloc,

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indicating that both variables are significant predictors of unemployment. Fifth, causality varies across SADC countries with different conditions, indicating the heterogeneous nature of SADC countries. Sixth, the significant causal effect of unemployment on financial stability reported in some SADC countries indicate that under certain conditions, increases in unemployment can cause financial instability in such economies.

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