



Impact of North West agricultural output on Economic Growth: Application of VAR Analysis

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Macro-Economic Analysis Unit: FEED



Background



The Agricultural sector is known to be a significant of employment and basic food provider. The sector is divided into commercial farming and farming in the rural areas. It provides employment mostly in the rural areas and benefits the economy largely in foreign exchange markets through commercial farming.

These researchers note that growth in the agricultural sector could be a catalyst for national output growth through (i) providing labour for an urbanized industrial work force; (ii) producing food for expanding populations with higher incomes; (iii) supplying savings for investment in industry; (iv) enlarging markets for industrial output; (v) providing export earnings to pay for imported capital goods; and (vi) producing primary materials for agro-processing industries (Johnston and Mellor, 1961; Ranis et al., 1990; Delgado et al., 1994; Timmer, 2002).

The provincial government has identified the agricultural sector as an economic driver to shift the over reliance of the economy away from mining sector and diversify the economy in an effort of growing the economy, creating employment and poverty alleviation. The provincial development plan (PDP) advocates for extensive support of small scale agricultural farmers. Small, Medium and Micro Enterprise (SMME) are widely seen as engines of economic growth. The SMME sector has the potential to address socio-economic challenges facing both developing and developed countries. In developed countries, they are credited with creating jobs, delivering innovation and raising productivity.



Background



Aims

To review the North West provincial Agricultural Sector

To investigate the relationship between North West agricultural output and North West economic growth.

To draw policy recommendations from the outcomes of the study.





NDP Overview

Indicator	Targets	
	Unemployment reduced to 14% by 2020 and 6% 2030	
Economy And Employment	GDP grow to 5.4%	
	GDP per capita grow to R110 000 in 2030	
	Exports grow to 10% in 2030	
	Savings Rate grow to 25%	
	Access to Electricity grow to 95% in 2030	
	Generate additional 40 000 MW of electricity	
	20 000MW should be renewable energy	
Economic Infrastructure	Reduce water demand to 15 % in Urban Areas	
	Broadband should be defined as 2 MB per second	
	Create 643 000 direct jobs and 326 000 indirect jobs in	
	Agriculture, agroprocessing and related sectors	
	Intra- regional trade in Southern Africa should increase	
South Africa In The Decion And The World	to 25% of trade by 2030	
South Airica in The Region And The World	Trade with regional neighbours should increase to 30%	
	of trade by 2030	

Source: National Development Plan (NDP)_ Vision 2030





NDP Overview

Sector	Historical Annual Growth % (2000 – 2010)	2030 (R billion)	Target Annual Growth % (2010 – 2030)	2030 (R billion)
Agriculture	2,0%	3,39	8,5%	17,31
Mining	0,1%	54,97	2,5%	90,08
Manufacturing	2,5%	7,18	8,7%	38,07
Electricity	1,9%	2,12	9,1%	12,09
Construction	8,2%	3,46	8,0%	16,12
Trade	3,4%	15,81	6,1%	51,67
Transport	5,0%	10,79	5,6%	32,07
Finance	6,0%	19,47	6,5%	68,23
Community Services	2,9%	28,55	6,0%	91,57
TOTAL/Average	2,7%	145,73	5,4%	417,22

Source: Provincial Development Plan (PDP)





Sector's share of regional total (%)



North West Tress index



Together moving Bokone Bophirima forward.

NW GVA Constant 2005 prices (R 1000)



Region's share of national total (%)









Data Source: Econostat 2013







1998 2013





Contra 1	Historical Annual Growth	2010	Target Annual Growth	2030
Sector	% (2000 – 2010)	(K billion)	% (2010 – 2030)	
Agriculture	2,00%	3,39	8,50%	17,31
Mining	0,10%	54,97	2,50%	90,08
Manufacturing	2,50%	7,18	8,70%	38,07
Electricity	1,90%	2,12	9,10%	12,09
Construction	8,20%	3,46	8,00%	16,12
Trade	3,40%	15,81	6,10%	51,67
Transport	5,00%	10,79	5,60%	32,07
Finance	6,00%	19,47	6,50%	68,23
Community Services	2,90%	28,55	6,00%	91,57
TOTAL/Average	2,70%	145,73	5,40%	417,22

NW GVA average growth rate at constant prices





Empirical literature



Hina Safdar et al (2012) in their study of Impact of Agriculture Volatility on Economic Growth in Pakistan found the coefficient of agriculture productivity being positive and significantly associated with economic growth, due to 1 percent change in agriculture productivity there will be 1.83 percent change in the economic growth. Then concluded that agriculture and economic growth both have strong relationship and agriculture growth and rural development play an important role not only in overall economic growth but also in poverty reduction.

Anthony (2010) also in a study of the impact of agriculture credit on economic growth or the contribution of agriculture to GDP in Nigeria presented an empirical analysis and established a causal relationship between GDP and agricultural variables. The study findings revealed that agricultural variables have significant impact on economic growth and export growth.

Furthermore Matsuyama (1996) empirically tested the impact of agricultural productivity on the long-run economic growth of the contemporary developing countries. The study made use of the Ordinary Least Squares (OLS) and panel data regression Techniques. The theory predicted that the openness of economies negatively affects the gains in the economic growth with the improvement in the agricultural productivity; however, this effect is not strong enough to cause either a long-run negative relationship between economic growth and agricultural productivity.



Methodology



$$Q = A (L^{\alpha}: K^{\beta}).....$$
 (1)

 $Q = A L^{\beta_1} K^{\beta_2} Agriq^{\beta_3} U$ (2)

 $q = a + \beta_1 I + \beta_2 k + \beta_3 agric + D + u$ (3)

- Stationarity Tesy
- Estimate the production funtion
- Check for compliance of the classical regression assumptions
- Run the cointegration test using Johansen Cointegration test
- Run the impulse response model



Findings- Correlation



Correlation					
Probability	LGDP	LAGRIK	LEMPL	LAGRI	LEX
LGDP	1.000000				
LAGRIK	-0.678107	1.000000			
	0.0020				
LEMPL	0.875330	-0.826271	1.000000		
	0.0000	0.0000			
LAGRI	0.562073	-0.140196	0.287041	1.000000	
	0.0152	0.5790	0.2481		
LEX	0.798203	-0.594249	0.689539	0.341200	1.000000
	0.0001	0.0093	0.0015	0.1658	



Findings- Graphical Analysis





Together moving Bokone Bophirima forward.





Findings- Unit Root Test



Series	Model	ADF		РР			
		Lags	T Stat	Pvalue	Bandwidth	Adj T Stat	Pvalue
LGDP	Intercept	0	0,22	0,965	1	0,08	0,954
	Trend and Intercept	3	-2,68	0,256	1	-2,30	0,410
	None	0	3,29	0,999	2	2,66	0,996
DLGDP	Intercept	0	-2,89*	0,069	3	-2,86	0,072
	Trend and Intercept	0	-2,66	0,262	4	-2,59	0,287
	None	0	-1,80*	0,070	2	-1,67	0,088
LAGRIK	Intercept	1	-2,49	0,136	1	-1,55	0,486
	Trend and Intercept	1	-2,82	0,211	1	-1,59	0,754
	None	1	-1,26	0,184	1	-1,68	0,087
DLAGRIK	Intercept	0	-2,33	0,175	1	-2,40	0,157
	Trend and Intercept	0	-2,38	0,376	0	-2,38	0,376
	None	0	-1,95*	0,051	0	-1,95	0,051
LEMPL	Intercept	2	-2,69*	0,098	0	-2,57	0,118
	Trend and Intercept	2	0,12	0,994	0	-0,89	0,933
	None	2	2,49	0,994	2	1,98	0,984
DLEMPL	Intercept	2	-2,43	0,152	0	-1,59	0,467
	Trend and Intercept	1	-6,59***	0,001	0	-2,00	0,557
	None	2	-2,39**	0,021	0	-1,30	0,171
LAGRI	Intercept	2	-0,97	0,736	1	-2,68	0,098
	Trend and Intercept	0	-4,01**	0,030	16	-8,67	0,000
	None	2	0,63	0,840	12	-0,13	0,624
DLAGRI	Intercept	1	-4,82***	0,002	5	-6,08	0,000
	Trend and Intercept	1	-4,50**	0,015	4	-6,14	0,001
	None	0	-5,70***	0,000	5	-6,33	0,000
LEX	Intercept	0	-1,97	0,295	0	-1,97	0,295
	Trend and Intercept	0	-3,10	0,138	1	-3,18	0,121
	None	0	1,54	0,963	5	2,24	0,991
DLEX	Intercept	0	-5,21***	0,001	5	-6,05	0,000
	Trend and Intercept	1	-3,51*	0,075	10	-8,71	0,000
	None	0	-5,14***	0,000	1	-5,07	0,000

*(**)[***] Statistically significant at a 10(5)[1] % level Together moving Bokone Bophirima forward.





Dependent Variable: DLGDP Method: Least Squares Date: 11/26/14 Time: 08:07 Sample (adjusted): 1997 2013 Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLEMPL DLAGRIK DLAGRI DUM C	0.043667 1.471150 0.042158 -0.049047 0.029538	0.212550 0.992508 0.038314 0.023882 0.009309	0.205442 1.482255 1.100329 -2.053735 3.173142	0.8407 0.1641 0.2928 0.0625 0.0080
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.317045 Mea 0.089393 S.D 0.022602 Aka 0.006130 Sch 43.26417 Han 1.392675 Dur 0.294504	an dependent var . dependent var ike info criterion warz criterion man-Quinn criter. bin-Watson stat		0.018880 0.023685 -4.501667 -4.256604 -4.477307 1.206785







Test	H _o	T Statistic	P Value	Conclusion
Jarque-Bera	Residual is normally distributed	JB= 1.638	0.440	Fail to reject H _o : Residual is normally distributed
Breusch-Godfrey	Residual has no 2 nd - order auto- correlation	nR ² (2)= 1.709	0.425	Fail to reject H ₀ : Residual has no 2 nd - order auto- correlation
ARCH LM	Residual has no heteroskedasticity	nR²(2)= 1.020	0.312	Fail to reject H _o : Residual has no heteroskedasticity
Remsey RESET	No misspecification	LR(2)= 1.020	0.312	No misspecification



Findings- Cointegration



Date: 11/26/14 Time: 09:57 Sample (adjusted): 1998 2013 Included observations: 16 after adjustments Trend assumption: Linear deterministic trend Series: LGDP LAGRIK LEMPL LAGRI Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.931448	75.06691	47.85613	0.0000
At most 1 *	0.786100	32.18440	29.79707	0.0261
At most 2	0.345778	7.508466	15.49471	0.5193
At most 3	0.043974	0.719518	3.841466	0.3963

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values



Findings-Impulse Response

Response to Cholesky One S.D. Innovations ± 2 S.E.





North West Economic Overview Interpretation of Empirical Result



Findings

- 1. Given current status que agriculture has insignificant impact on provincial GDP.
- 2. Impulse response functions shows:
 - a positive impact of increase in GDP on employment rate
 - Output productivity in the agricultural sectors has a significant impact on employment rate (i.e. lowers unemployment)
- 3. Evidence of low capital stock in agricultural sector, verifying the prevailing high unemployment rate in NW since large number (about 70%) of unskilled and obsolete labours can be absorbed by the agricultural sector in NW.
 - Lack of agrarian skill, technical-know, constrained access to funding for commercial farming negatively influence the aggregate performance of agriculture sector in NW.
 - Low export market opportunities due to unexploited comparative advantages





Policy Recommendation

- To increase the contribution of agricultural sector to Provincial GDP, the government must intensify labour-intensive programmes focusing on revitalising and/or expanding this shrinking sector
- Given the considerably large capacity of the agriculture sector to absorb large pool
 of obsolete/unskilled in NW, to alleviate unemployment problem. There is a need
 for macroeconomic policy to facilitate adequate training, access to funding and
 subsidy initiatives to new/emerging farmers. Indirect effect, provides food security
 for the Province





Thank you