TIME SERIES ANALYSIS OF INTERACTION BETWEEN AGGREGATE EXPENDITURE AND JOB CREATION IN SOUTH AFRICA

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Abstract

Jobs are the pillars of the economy and aggregate expenditure is among the key factor used to create an employment stimulating environment. This study scrutinizes the relationship between the component of aggregate expenditure and job creation in South Africa form 1995 to 2014. The Vector Autoregressive (VAR) model and multivariate co-integration approach were employed to examine how household consumption, government, investment and export expenditures affect job creation in South Africa. Findings of this study revealed that there is long-run relationship between aggregate expenditure and job creation with government and investment expenditure being the key determinants of job creation in South Africa. Contrary to priori expectation, consumption and exports do not improve jobs creation in South Africa. In the short-run, there are no significant interactions between components of aggregate expenditure and job creation. This study provided recommendation that may assist in boosting job creation in South Africa.

Keywords: Job Creation, Employment, Aggregate Expenditure, Household Consumption, Co-integration, South Africa

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1 Introduction

Most of countries around the world are faced high unemployment rate challenge and job creation is one of major concerns for macroeconomic policymakers. The overall view of word "employment or jobs" is that diverse people are working and earning some income in the form of wage or salary in order to satisfy their quotidian needs (Maqbool et al., 2013). Therefore, job creation is required in order to absorb unemployed people. Job creation is the provision of new chances for waged employment, principally for persons who are jobless Davis et al.,1996). The employment or job creation is the increasing global problem, according to the International Labour Organization (2015), within a single year, from 2013 to 2014 global unemployment has increased by 1.2 million. In South Africa, unemployment has been increasing before and after 1994 democracy. From 1994 to 2014, the official narrow unemployment increased from 22 percent to 25 per cent respectively and the expanded unemployment rate was 35% at the end of 2014 (Statics South Africa, 2014). This increase in joblessness affects not only those people who are unemployed but also those who are employed. Schussler (2013) stated that in South African only 60 percent of households depend on their earned income; whilst the remaining 40 percent depends on income received from government trough government supports. This proves how joblessness is a serious issue in South Africa and how job creation is a crucial need for current South African economy. Jobs creation can also be achieved using different strategies and one of them is trough boosting spending or expenditure (Cray et al., 2011). The relationship between employment and aggregate expenditure can be better understood using Keynesian expenditure model.

Keynesian aggregate expenditure plays a major role in macroeconomic growth through consumption, investment, government expenditure and net export (Dornbusch et al., 2014) and according Okun's Law (Okun, 1962), the higher economic growth is, the lower unemployment rate (or the higher employment rate). Aggregate expenditure, other things being constant, leads to higher demand for goods and services (Michaillat and Saez, 2013). Therefore, firms have to hire more labour. Hence, new jobs are created. Those jobs created contribute more to the well-being of the society and stimulate further spending which increases firm's revenues. When revenues increase, firms are likely to increase investments, consequently creating more jobs in the future. All components of aggregate expenditure tend to be linked and as they all are concomitant to job creation. On one end, demand spending from households, government and foreign markets increases firms production and investments, and in attempt to meet their increased customers' demand firms to create jobs (Adelino et al., 2014). On the other end, job losses negatively affect demand and

expenditure, lowering companies' investments and thereafter the exports (Bentolila and Ichino, 2000).

This paper aims to analyse how Keynesian aggregate expenditure model can be employed to explain the job creation in South Africa. Therefore the paper analyse the short- and long-run relationships between job creation (employment rate) and household's consumption; government expenditure gross domestic investments and exports.

2 Review of literature

2.1 Household consumption expenditure and job creation

In the Keynesian model employment is well driven by households' consumption. The more households consume, the more goods and services are demanded from firms and the more jobs created (Emilia, 2006). Consumer spending decisions is a key driver of economy; it plays a major role in creating employment and reducing unemployment (Toossi, 2002). All industry activities depend on consumer decisions or behaviour, whether be for short or long term production of good and services. Other things being equal, there is interdependent and positive relationship between consumption and employment (Bantolila and Ichino, 2000). Household's consumption contributes more to the economic growth and as a result, economic growth leads to job creation (Gurgul and Lach, 2011). For example, in 2006 the Chinese macroeconomic authorities chose to increase household's consumption, because a percentage growth in consumption goes hand in hand with growth a percentage growth in employment rate (Lardy, 2006). Although, numerous can be employed to create more jobs in economy, Bentolila and Ichino (2000); Toossi (2002); and Lamo et al. (2007), preconized consumption because it helps in creating employment without causing any other negative effect to the economy.

Notwithstanding, the study done by Schettkat and Salvedra (2004) proved that the relationship between household consumption and job creation depend on many factors. They argue that those factors may cause either a positive or negative relationship, or lead to no relationship between the household consumption and the job creation. Postlewaite et al. (2008) states that a person will make a decision to consume or not based on expected duration of his or her job. Henceforth, permanent jobs tend to increase the level of current consumption whilst part-time and unsecured job will influence saving for the future consumption. Beyond those affirmations of a positive relationship between consumption and the dilemma about that relationship, the study of Loku and Deda (2013) found that in most of developing countries consumption increase is due to the population growth rate. Consequaltly, in that case consumption has no positive effect on employment. Other factors that can increase consumption but reduce jobs are technological changes and increase in consumption of imported goods and services (Autor et al., 2013). There is negative relationdship between consumption and job creation in case househlds increase consumption of imported goods and servives. In this case, jobs are created within exporting country instead of domestic country (Toossi, 2002). A study by Emilia (2006) found that, due to the higher consumption of imported goods and services, consumption increase creates joblosses in demostic country.

2.2 Exports and job creation

Considering that import lead to decrease in job creation, the increasing export would stimulate job creation. The quantity of good and services exported depends on many factors such as factors of production, exchange rate and foreigner's level of demand. The more products demanded by foreign markets; the higher production is required from domestic producers (Bobeica et al., 2015). This increase in production leads to an increase in labour demand, thus creating new jobs (Dizaji and Badri, 2014). However, it has been proved by Berger and Martin (2011) that exports do not create jobs in all sectors. It creates jobs in those sectors that use labour (not machines) for production. The positive relationship between exports growth and job creation has been supported by studies by Dizaji and Badri (2014); Aswicahyono et al. (2011).

A study conducted by (Kiyota, 2014) in four OECD countries (China, Japan, Chorea and Indonesia) found that 80 percent of jobs in the manufacturing sector and 60 percent in the non-manufacturing sector in these countries resulted from exportation. Not only exports of goods and services play a major role in job creation, it also prevents job losses for existing employees.

However, it is not always the case that when exports increase, new jobs are created. The study by Kiyota (2011) proved that an increase in Japan's export increased the work-hours for existing employees instead of creating new jobs. Thus, an increase in exports may lead to wages increase instead of creation of new jobs (Said and Elshennawy, 2010) Furthermore, a study by Şeker (2010) which analysed employment protection and exports in 26 countries of Europe and Asia, found a negative relationship between exports and job creation This suggest that if exports are not well managed they can be the source of job losses. Job losses may result in additional costs of selling abroad including the quality and quantity in competitive market (Bernard and Jensen, 1999). The demad for exports can increase, but if existing employees do not have skills for required export products, they may loose their jobs. In addition, Exports being one side of trade, are not the only way to improve jobs.

2.3 Job creation and government and investment spending

Beside household consumption and exports, government spending is also linked with job creation. Government spending is one of expansionary policies that change firms and consumers' behaviours with regard to production and consumption (Dornbusch et al., 2014). To increase job creation, government can employ different strategies trough fiscal policy depending on current economic position (Mayer, 2014). A study done on OECD countries, on how government decisions affect employment, illustrated that an increase in government spending led to economic growth which thereafter increased the level of employment (Holden and Sparrmany, 2014). Nonetheless, government spending on job creation is more effective during the sluggish economic conditions than when the economy is booming (Beard et al., 2011). The positive relationship between government spending and job growth was also supported by Ramey's (2012) study on the effects of government spending and jobs growth; which found that the more government spends towards economic growth, the more jobs are created. Government spending on infrastructure and subsidies to domestic firms tend to improve investments and create more and durable jobs (Girma et al., 2007; Beard et al., 2011; Boushey and Ettlinger, 2011). This explain the link between job creation and growth in investment.

Investment is used to create jobs and in return jobs create investment (Heintz, 2000). The theory of interdependence between investment and employment is explained by tight cause-effect relationship between investment and employment; where the change in one side directly affects the other. This was supported by the study of Psaltopoulos et al. (2011) which found that in the EU rural regions more jobs were crated troughout growth in private investment. The study conducted by Iacovoiu (2012) in Romania also found that the result of fluctuation in investment in Romania between year 2004 and 2012 was oscillation in employment rate. Thus, one of the best way to create more and durable jobs, is to stimulate firm's investment including new or starting-up firms (Bogliacino and Vivarelli, 2010; Adelino et al., 2014). Growth in firms' investments lead to increase provison of good and services in business or service markets and this would increase the demand for more labour. However, However, this is only possible if firms' investments favour labour employment rather than technology production oriented, as in some instance technology destroys jobs (Rotman, 2013); implying that increased investment may sometimes lead to decline in job creation.

3 Methodology

3.1 Data and description of the variables

The study is focusing on the relationship between job creation (employment) and aggregate expenditure in South African contest. The study is based on 76 quarterly observations from the first quarter of 1995 to fourth quarter of 2014. The sample period starts from 1995 in order to exclude the effect of economic embargo against apartheid regime before 1994, especially on export's data. Variables selected are employment rate (which represent job creation) (EMP) and four component of real aggregate expenditure namely household consumption (CONS), total government expenditure (GOVS), gross fixed capital investments (INVES), and total exports (EXPO). Data of all used variables were accessed from the South African Reserve Bank (SARB).

3.2 Model specification

In the context of this study, the relationship between employment and the various component of total aggregate expenditure can be expressed by following model:

$$EMP_t = \text{f (CONS, GOVS, INVES, EXPO)} \qquad (1)$$

Where: EMP is the employment rate, CONS is households consumption, GOVS is the government spending, INVES is the gross domestic investment and EXPO is the total export.

Considering the model over time, there is a possibility that the dependent variable can be related to its own past values (lags) and to the values of independent variables. The multivariate relationships between employment and aggregate expenditure variables have been determined through a Vector auto regressive (VAR) model. Chan (2010) and Maddala (2001) stated that Vector Autoregressive should be the first step for such multivariate analysis so that other analyses such as co-integration, vector error correction, causality test, impulse response can follow. The VAR model from the function described in Equation 1 is as follows:

$$EMP_t = \propto_1 + \sum_{j=1}^{k} \beta_{1j}\, EMP_{t-j} + \sum_{j=1}^{k} \lambda_{1j} CONS_{t-j} + \sum_{j=1}^{k} \gamma_{1j}\, GOVS_{t-j} + \sum_{j=1}^{k} \delta_{1j} INVES_{t-j} + \sum_{j=1}^{k} \theta_{1j} EXPO_{t-j} + u_{1t}. \qquad (2)$$

$$CONS_t = \propto_2 + \sum_{j=1}^{k} \beta_{2j}\, EMP_{t-j} + \sum_{j=1}^{k} \lambda_{2j} CONS_{t-j} + \sum_{j=1}^{k} \gamma_{2j}\, GOVS_{t-j} + \sum_{j=1}^{k} \delta_{2j} INVES_{t-j} + \sum_{j=1}^{k} \theta_{2j} EXPO_{t-j} + u_{2t}. \qquad (3)$$

$$GOVS_t = \propto_3 + \sum_{j=1}^{k} \beta_{3j} EMP_{t-j} + \sum_{j=1}^{k} \lambda_{3j} CONS_{t-j} + \sum_{j=1}^{k} \gamma_{3j} GOVS_{t-j} + \sum_{j=1}^{k} \delta_{3j} INVES_{t-j} + \sum_{j=1}^{k} \theta_{3j} EXPO_{t-j} + u_{3t}. \quad (4)$$

$$INVES_t = \propto_4 + \sum_{j=1}^{k} \beta_{4j} EMP_{t-j} + \sum_{j=1}^{k} \lambda_{4j} CONS_{t-j} + \sum_{j=1}^{k} \gamma_{4j} GOVS_{t-j} + \sum_{j=1}^{k} \delta_{4j} INVES_{t-j} + \sum_{j=1}^{k} \theta_{4j} EXPO_{t-j} + u_{4t}. \quad (5)$$

$$EXPO_t = \propto_5 + \sum_{j=1}^{k} \beta_{5j} EMP_{t-j} + \sum_{j=1}^{k} \lambda_{5j} CONS_{t-j} + \sum_{j=1}^{k} \gamma_{5j} GOVS_{t-j} + \sum_{j=1}^{k} \delta_{5j} INVES_{t-j} + \sum_{j=1}^{k} \theta_{5j} EXPO_{t-j} + u_{5t}. \quad (6)$$

Where: α_n is the constant; $\beta_n, \lambda_n, \gamma_n$ δ_n and θ_n are the coefficients; k is number of lags and $u_{1t}, \dots, u_{5t}$ are the stochastic error terms (known as shocks in a VAR model). Before the estimation these above equations, the unit root test is done to check whether each variable are stationary or not. This test was conducted using the Augmented Dickey-Fuller test. If variables are stationary at the level, I (0), we continues with VAR and if they are not stationary and have a unit root, I (1), then the co-integration test is conducted to establish whether the variables are integrated. This study used the multivariate co-integration test by Johansen (1988). If variables are not co-integrated, the Vector Autoregressive is estimated in first difference. However, if there is exists a co-integration among variables, then the VECM is estimated. For this study VECM's equations derived from VAR model, in equations 2 to 6, are as follows:

$$\Delta EMP_t = \propto_1 + \sum_{j=1}^{k} \beta_{1j} \Delta EMP_{t-j} + \sum_{j=1}^{k} \lambda_{1j} \Delta CONS_{t-j} + \sum_{j=1}^{k} \gamma_{1j} \Delta GOVS_{t-j} + \sum_{j=1}^{k} \delta_{1j} \Delta INVES_{t-j} + \sum_{j=1}^{k} \theta_{1j} \Delta EXPO_{t-j} + \varphi_1 u_{1t-1} + e_{t1}. \quad (7)$$

$$\Delta CONS_t = \propto_2 + \sum_{j=1}^{k} \beta_{2j} \Delta EMP_{t-j} + \sum_{j=1}^{k} \lambda_{2j} \Delta CONS_{t-j} + \sum_{j=1}^{k} \gamma_{2j} \Delta GOVS_{t-j} + \sum_{j=1}^{k} \delta_{2j} \Delta INVES_{t-j} + \sum_{j=1}^{k} \theta_{2j} \Delta EXPO_{t-j} + \varphi_2 u_{2t-1} + e_{2t}. \quad (8)$$

$$\Delta GOVS_t = \propto_3 + \sum_{j=1}^{k} \beta_{3j} EMP_{t-j} + \sum_{j=1}^{k} \lambda_{3j} CONS_{t-j} + \sum_{j=1}^{k} \gamma_{3j} GOVS_{t-j} + \sum_{j=1}^{k} \delta_{3j} INVES_{t-j} + \sum_{j=1}^{k} \theta_{3j} EXPO_{t-j} + \varphi_3 u_{3t-1} + u_{3t}. \quad (9)$$

$$\Delta INVES_t = \propto_4 \sum_{j=1}^{k} \beta_{4j} \Delta EMP_{t-j} + \sum_{j=1}^{k} \lambda_{4j} \Delta CONS_{t-j} + \sum_{j=1}^{k} \gamma_{4j} \Delta GOVS_{t-j} + \sum_{j=1}^{k} \delta_{4j} \Delta INVES_{t-j} + \sum_{j=1}^{k} \theta_{4j} \Delta EXPO_{t-j} + \varphi_4 u_{4t-1} + e_4. \quad (10)$$

$$\Delta EXPO_t = \propto_5 \sum_{j=}^{k} \beta_{5j} \Delta EMP_{t-j} + \sum_{j=1}^{k} \lambda_{5j} \Delta CONS_{t-j} + \sum_{j=1}^{k} \gamma_{5j} \Delta GOVS_{t-j} + \sum_{j=1}^{k} \delta_{5j} \Delta INVES_{t-j} + \sum_{j=1}^{k} \theta_{5j} \Delta EXPO_{t-j} + \varphi_5 u_{5t-1} + e_5. \quad (11)$$

Where: Δ is representing the first difference, $u_{1t-1,} \dots u_{5t-1}$ are error correction terms; whilst $\varphi_{1,} \dots, \varphi_5$ are error correction coefficients to capture the adjustments of change in the variables to long-run equilibrium. The coefficients, $\beta_n, \lambda_n, \gamma_n, \delta_n$ and θ_n capture the short-run changes of the model. The selection of lags (k) number are selected based on Akaike Information Criterion (AIC) on Schwarz-Boyesian Information Criterion (SBIC) (Brooks, 2008). The interpretation of VCM results is preceded by some diagnostic tests such as normality, parameter stability, autocorrelation, and heteroscedasticity tests to ensure the reliability of obtained results (Maddala, 2001). Lastly, impulse response analysis and variance decompositions are employed to determine how employment rate (job creation) responds to changes of aggregate expenditure over time.

4 Empirical results and discussion

4.1 Correlation analysis and unit root tests

Table 1 presents the outcome of the Pearson correlation coefficients and the all significant at the 5% level of significance. There is strong positive correlation between dependent (EMP) and independent variables (CONS, GOVS, INVES, and EXPO) and independent variables are positively correlated to one another. This confirm the theoretical explanation of the interdependence among the components of the aggregate expenditure.

Results of Augmented Dickey Fuller unit root test with and without trend are summarized in Table 2, at the level, the p-values are greater 0.5; implying there is a presence of unit root at level without and with a trend. Thus, all variables are non-stationary at the level. However, at the first difference without trend all variables become stationary at the 1 percent level of significance (p-value < 0.1). Thus, all variable are I (1); suggesting the co-integration test should be conducted to test if they integrate in the long-run. Having the stationary variables, we need to determine the number of lags to be used in this study.

Table 1. Pairwise correlations

	EMP	*CONS*	*GOVS*	*INVES*	*XPO*
EMP	1.000				
CONS	0.937369	1.0000			
GOVS	0.94327	0.973404	1.0000		
INVES	0.96279	0.97225	0.973873	1.0000	
EXPO	0.878207	0.93172	0.863138	0.907069	1.0000

Note: All coefficient are statistically significant at the 5% level of significance

Table 2. ADF unit root test results

	Level				*1st Difference*	
	Without trends		*With trend*		*Without trend*	
	t-statistics	P-value	t-statistics	P-value	t-statistics	P-value
EMP	-2.898623	0.9177	-3.467703	0.5018	-2.899115	0.0000**
CONS	-2.901779	0.9648	-3.471693	0.1537	-2.901779	0.0038**
GOVS	-2.899115	0.9965	-3.468459	0.6257	-2.899115	0.0001**
INVES	-2.900137	0.9405	-3.470851	0.2658	-2.899619	0.0000**
EXPO	-2.900670	0.5537	-3.470851	0.0925	-2.900670	0.0012**

Note: ** denotes the rejection of the null hypothesis of unit root at the 1% significance level of significance

4.2 Lag-length selection criteria

Since all the variables are I(1), the next step is to determine the number of lags that will be used for Johansen co-integration test and the vector error correction model. The results from the information criteria for leg lengths, summarized in Table 3, show that all criteria reach the same conclusion of 5 lags as the optimum number of lags. Thus, 5 lags were used.

Table 3. Lag order section results

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
1	-3071.358	NA	1.56e+31	86.00993	86.80044	86.32464
2	-3015.769	95.73657	6.70e+30	85.16024	86.74126	85.78965
3	-2987.119	45.36200	6.19e+30	85.05886	87.43039	86.00297
4	-2929.881	82.67764	2.64e+30	84.16335	87.32538	85.42216
5	-2850.356	103.8238*	6.27e+29*	82.64878*	86.60132*	84.22230*
6	-2834.311	18.71885	9.05e+29	82.89753	87.64059	84.78576
7	-2819.074	15.66068	1.42e+30	83.16872	88.70228	85.37164
8	-2793.378	22.84087	1.81e+30	83.14938	89.47346	85.66702

Note: * indicates lag order selected by the criteria

4.3 Long run relationship

Results of Johansen co-integration, in Table 4, show that the null hypothesis that there is no co-integrating equation (r=0) is rejected as the p-values for Trace statistic and Max-Eigenvalue are lower than 5%. From the hypothesis that there is at least one co-integrating equation (r ≤1), Trace and Max-Eigen statistics are greater than 5%, henceforth, the null hypothesis is accepted. Thus, there one co-integration equation; implying that there is a long-run relationship between job creation and the components of aggregate expenditure. This long-run relationship is explained by Equation 12.

Table 4. Johansen co-integration results

H0	*H1*	*Trace*			*Maximum Eigenvalue*		
		Trace statistic	*t-critical value*	*P-value*	*Max-Eigen Statistic*	*t-critical value*	*P-value*
r=o	r>0	76.51401	69.81889	0.0132*	35.83948	33.87687	0.0288*
r ≤ 1	r>1	40.67453	47.85613	0.1993	19.044	27.58434	0.4111
r≤ 2	r>2	21.63053	29.79707	0.3195	11.28173	21.13162	0.6192
r≤ 3	r>3	10.3488	15.49471	0.2548	9.456023	14.2646	0.2502
r<4	r>4	0.892778	3.841466	0.3447	0.892778	3.841466	0.3447

* denotes the rejection of the null hypothesis of unit root at 5% significance levels and the rank of co-integration is denoted by "r ".

$$EMP_{t-1} = 38.94303 - 0.000604CONS_{t-1} + 0.001019GOVS_{t-1} + 0.000916INVES_{t-1} + 0.000223EXPO_{t-1} \quad (12)$$

[T-start] [3.73855] [-2.77795] [-8.16325] [-1.45981]

From the Equation 12, we have all expected signs for independent variable coefficients except the one for consumption. In long run there is a negative relationship between employment and consumption. The increase in household's consumption leads to a decline in employment. This negative relationship between employment and household consumption is supported by the study by Autor et al. (2013) which found that if households consume imported goods and services, job creation is negatively affected. This negative effect of household consumption on job creation in South Africa might suggested South African household consumption may linked with high level of imported products. This may be explained absence of a significant the long-run relationship between exports and job creation as shown by the results in Equation 12. This finding is not surprising considering that South Africa is more open to global trade and may not be competitive or stand against the cheap products from other BRICS countries such as China and Russia Recently, South Africa has increased the consumption of Chinese products which caused a decline in consumption of local (Yang, 2014).

Notwithstanding, investment and government spending have significant and positive long-run effect on employment; implying that increase in both government and investment expenditure can create jobs. These finding are consistent with previous studies (Barry, 1986; Girma et al. 2008; Kitao et al., 2010; Boushey and Ettlinger, 2011; Psaltopoulos et al., 2011; Ramey, 2012; Adelino et al., 2014; Holden and Sparrmany, 2014) which found a positive relationship between govevenment expenditure, investment and job creation. Thus, in the South African context, the increase in government expenditure and investment can lead to job creation, in the long-run. These findings are the same as the outcome of the study of Faulkner et al. (2013) on South African job creation which revealed that the strategy to raise employment rate in South Africa should be boosting saving and investment.

4.4 Short-run relationships

Having our variables co-integrated, then the VECM was estimated next and only error corrector rems in each are in Tale 5. Considering that the error correction term has to be negative, the employment equation is the only equation that explain the adjustment to the long-run equilibrium. However, this ECT is not statically significant; meaning that short-run changes are not significant in restoring the long-run equilibrium. This may suggest that there is no short-run relationship between job creation and the four components of the aggregate expenditure as shown by non-significant coefficients of most the lags[34] in VECM.

The absence of the short-run relationship is confirmed by the results of Granger causality test, in Table 6, which show that there is no causal relationship between the variables. This means that short-run changes in components of aggregate expenditure (consumption, government expenditure, investment and exports) do not cause changes in job creation. The results of Granger causality test are supported by the variance decomposition results, in Table 7, which showed that shocks in employment rate are mostly its own shock. At the fourth quarter (period 04), the employment rate explains 90% of its own shocks; while other variables explain about 10% of changes in employment rate. At the 10th period (quarter) the employment still explain about 64% percent of its own shock while other variables jointly explain about 36%. At period 10, the movement spending seem to be the highest (15.44%) in explaining the variance in employment rate; while export is only explain about 6.17% of variance in employment rate.

4.5 Impulse responses

The impulse response test has been conducted to describe the reaction of variables to the shock caused by exogenous changes. The results, in Figure 1, show that the higher changes in employment rate are due to its own shocks. The responsiveness of employment to consumption's shock is not very significant; it rises from the first quarter to the fifth quarter, then it becomes constant. However, the responsiveness of employment to the change in government spending is very significant, it rises from first to the fourth quarter, the slow down and restarts from the sixth quarter upwards. This result confirms the outcome of variance decomposition. The response of employment to investment shows that from fifth quarter employment declines due to the change in investment. Finally, when exports change there is a fluctuation in employment up to seventh period, then it became constant, meaning that the is no long-run relationship between employment and exports.

In short-run, all coefficients of the independent variables are not significant. Meaning that in short-term changes in CONS, GOVS, INVES, and EXPO have no explanatory power on current fluctuation of EMP. This can make sense because it not easy to create jobs in short term.

[34] Results of coefficient for lags in VECM are not reported in the paper but can be accessed from the authors

Table 5. Results of error correction terms

Error Correction:	*D(EMP)*	*D(CONS)*	*D(GOVS)*	*D(INVES)*	*D(EXPO)*
ECT	-0.172027	213.3084	315.5114	273.2690	241.6270
S.E	(0.17566)	(194.365)	(118.890)	(108.403)	(386.466)
T-Value	[-0.97935]	[1.09746]	[2.65381]	[2.52087]	[0.62522]

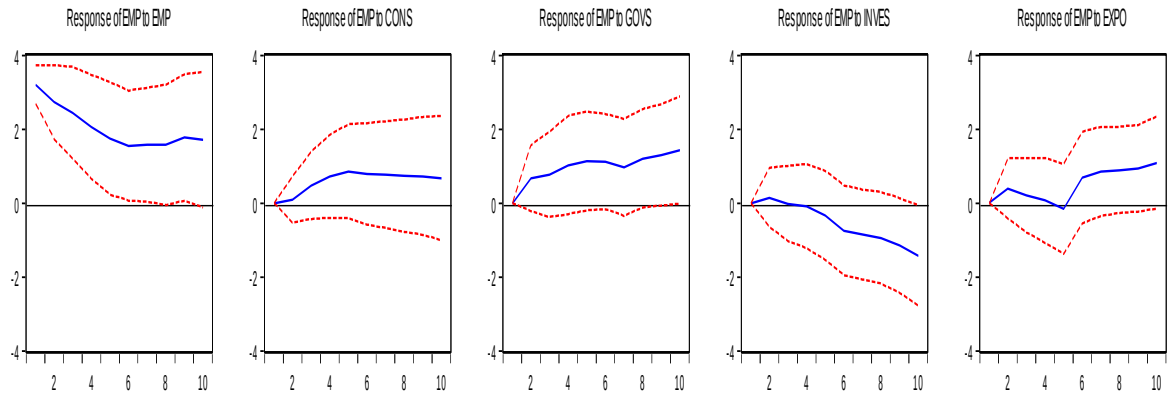
Table 6. Pairwise Granger Causality Tests

Null Hypothesis	*F-Statistic*	*Prob.*
D(CONS) does not Granger Cause D(EMP)	0.83201	0.5318
D(EMP) does not Granger Cause D(CONS)	0.28568	0.9193
D(GOVS) does not Granger Cause D(EMP)	0.48722	0.7845
D(EMP) does not Granger Cause D(GOVS)	0.30423	0.9086
D(INVES) does not Granger Cause D(EMP)	0.30901	0.9058
D(EMP) does not Granger Cause D(INVES)	0.82617	0.5358
D(EXPO) does not Granger Cause D(EMP)	0.04283	0.9989
D(EMP) does not Granger Cause D(EXPO)	0.36119	0.8731

Table 7. Variance decomposition of employment

Period	*S.E.*	*EMP*	*CONS*	*GOVS*	*INVES*	*EXPO*
1	3.201578	100.0000	0.000000	0.000000	0.000000	0.000000
2	4.281441	96.58844	0.046845	2.420523	0.120300	0.823889
3	5.012783	94.08092	0.894692	4.158618	0.089200	0.776566
4	5.562655	90.08660	2.415245	6.752936	0.100056	0.645163
5	6.009442	85.59783	4.076307	9.299373	0.398321	0.628165
6	6.433229	80.46665	5.047628	11.11577	1.691516	1.678441
7	6.842095	76.41996	5.697545	11.79052	3.058183	3.033800
8	7.277966	72.19705	6.068627	13.13390	4.419038	4.181383
9	7.777862	68.38910	6.176870	14.26534	6.078166	5.090522
10	8.316671	64.08020	6.047956	15.44051	8.259448	6.171887

Figure 1. Response of employment to innovation in other variables



4.6 Residual diagnostic tests

Diagnostic test on VECM results include Lagrange Multiplier to detect the presence of auto-correlation, the Jarque-Bera to test the normality of series and the White Heteroscedasticity test to verify whether variables are homoscedastic. Results of these tests, summarized in Table 8, show that the VECM does not violate econometric assumptions.

Table 8. Results of diagnostic tests

Test	*Ho*	*P-value*	*Decision*
Jarque-Bera	Residuals are normally distributed	0.52251	Since P-value is greater than 5%, we fail to reject H0. Henceforth, residuals are normally distributed.
L M Test	No Serial correlation	0.9899	Since P-value is greater than 5%, we fail to reject H0. Henceforth, there is no serial correlation in the model.
White (CT)	No Heteroscedasticity	0.7789	Since P-value is greater than 5%, we fail to reject H0. Henceforth, there is no heteroscedasticity in the model.

6 Concussion and recommendations

Job creation is one of the factors that sustain economic growth and economic development for the lack or shortage in jobs results in social and economic problems. The aim of this study was to establish the effect of aggregate expenditure on jobs creation in the South Africa. Based on Keynesian aggregate expenditure model, the co-integration test, vector error correction approach, and causality test were employed to determine how employment (job creation) responds to the change in aggregate expenditure components. The findings from Johansen co-integration attested the long-run relationship between government and investment expenditures. Nevertheless, consumption and exports do not improve jobs creation in South Africa. In the short-run, there are no significant interaction between components of aggregate expenditure and job creation. The overall conclusion is that the aggregate expenditure, in long- run, plays an important role in creating jobs in South Africa and there is no short-term macroeconomic solution to job creation. Considering that government and investment expenditures determinant of job creation in South Africa, policy makers should create a conducive environment for investment and channel government spending to durable goods such as infrastructure. South African government may also consider boosting consumption of local product by finding ways of helping domestic firms to compete with cheaper imported products.

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