

Hirschman [11] provide pioneer theoretical literature on the dynamic relationship between agricultural growth and industrial growth of an economy. They argued that growth in agriculture sector has a direct stimulating impact on industrial growth through its forward and backward supply-demand linkages in terms of resource outflow (e.g. capital, labour and raw material). On the other side, the industrial growth can also foster agriculture production demand indirectly through its higher wages and directly through its products related to agriculture production such as irrigation technology, chemical and biochemical technology. Hence, two-way feedback linkages (i.e. a bidirectional causal relationship) between these two sectors which in turns leading to greater productivity in the use of resources, and sustainable economic growth. The law of comparative advantage, however, implies a negative link between agricultural growth and industrial growth [12]-[13]. According to this view, the industrial sector has to compete with the agricultural sector for labour. Low productivity in agriculture implies an abundant supply of 'cheap labour' which the industrial sector can exploit. Adding to that, rising labour wages in industrial sector is a direct cause of labour force decline in agriculture sector. More recently, however, some researchers have acknowledged the prominent role of services in the development process [14], [15], [16], [17].

On the empirical base, however, Katircioglu [18] examined the link between economic growth and sectoral growth in a case study of North Cyprus; using co-integration and granger causality model. He has found a long-run relationship between economic growth and sectoral growth in the country. The causality result of his investigation indicates unidirectional causality running from GDP growth to agricultural sector growth and also concludes that GDP growth gives unidirectional causation to industry and services sector growth. In another study, Katircioglu [19] investigated the impact of agricultural sector growth on the overall economic growth in the case of North Cyprus. He has found bidirectional relationship between agricultural output growth and economic growth. Hye [20] investigated the link between agricultural and industrial output growth in the case of Pakistan; using the data of autoregressive distributed lag model. The author found bidirectional long-run relationship between agriculture and industrial output growth. Chebbi [21] examines the link between agriculture growth and other sectors growth of economy in the case of Tunisia; using co-integration and granger causality model. The author concluded the existence of long-run association between agricultural growth and other sectoral growth of the economy. In another research, Sepehrdoust and Hye [22] investigated the inter-sectoral linkages and economic growth in the case of Iranian economy; using time series date of 1959-2010. The authors found that the long run relationship exists between sectors growth and economic growth. They also concluded that the long run elasticity shows that one percent increase in value added of industrial, agriculture, services and oil and gas sectors will cause the GDP to increase by 0.219, 0.091, 0.431 and 0.156 percent respectively. Recently, Alhowaish [23] examines the dynamic inter-sectoral relationship between economic growth and sectoral growth in eight Arab countries; using multivariate econometric model. The author found that the

incomes of most Arab economies depend largely on income generated from growth in either the industrial or services sectors, while the agricultural sector has a neutral effect in most cases. He also concludes that the interaction between growth of the industrial and services sectors appears to be much stronger than the interaction between other sectoral pairs.

Researchers argued that the linkages between the economic sectors of an economy are more complicated and multi-directional in nature and not an easy task to be predicted. They also argued that the contribution of these sectors to economic growth are varies markedly from country to country as well as from one time period to another within the same economy.

3. Data and Methodological Approach

The main objective of this research is to examine the dynamic relationship between economic sectors growth (i.e. agricultural, oil and gas, industrial and services sector growth) and economic growth of Saudi Arabia; using the advanced multivariate econometric technique for the period of 1970-2012. Real GDP is used as proxy for economic growth; value added for agriculture, oil, industry and services sectors is used as proxy for inter-sectoral development. The dataset employed in this paper consisted of annual data (in local currency – Saudi Riyal) on inter-sectoral development and real GDP from 1970 to 2012. The Data is obtained directly from the Saudi Arabian Monetary Agency (SAMA) database and various secondary database sources such as Ministry of Economic and Planning, Central Statistics for Information agencies [24]. All variables are expressed in natural logarithms, allowing the estimated coefficients to be considered as the elasticity of the relevant variables. The natural logarithm does not change the original co-integration relationship of variables under investigation, but can linearize the data trend and eliminate time-series heteroscedasticity.

To explore dynamic relationship between sectoral growth and economic growth of Saudi economy, the standard econometric tool of the Granger causality test [25] has been used. One important precondition for conducting the Granger causality test is to examine the time series properties of the variables in study. Because if the vector autoregressive equation used to conduct the Granger causality test is estimated with data that are non-stationary, the results would not be reliable. To be specific, the t-statistics of the estimated coefficients will be unreliable since the underlying time series would have theoretically infinite variance [26].

To investigate stationary property of time series, the test for a single unit root has been conducted using Phillips-Perron (PP) panel unit root tests. One advantage of using this test over the Augmented Dickey and Fuller (ADF) test is that the PP-test has greater power than ADF test [27]. Another advantage is that the PP tests are robust to general forms of heteroskedasticity in the error term u_t [28]. Besides, unlike the ADF technique, the user does not have to specify a lag length for the test regression in the PP technique. Once the order of integration is determined, the series can be further

tested for the existence of long-run relationships among them using the co-integration technique, and the Johansen-type panel co-integration test as developed by Maddala and Wu [29] has been used.

The co-integration test merely shows the degree of association between variables and not the direction of linkage. Therefore, in order to examine the direction of

linkage, Granger causality tests have been conducted. But for a VAR first-differences system with co-integrated variables the Granger causality test must be conducted in a vector error correction model (VECM) setting [30]. Thus, to analyse in details the long-run adjustments between sector shares, the following dynamic panel vector error correction models are formulated as follows:

$$\Delta GDP_t = \alpha_1 + \sum_{l=1}^n \beta_{1,l} \Delta AGR_{t-l} + \sum_{l=1}^n \theta_{1,l} \Delta OIL_{t-l} + \sum_{l=1}^n \delta_{1,l} \Delta IND_{t-l} + \sum_{l=1}^n \theta_{1,l} \Delta SRV_{t-l} + \gamma_1 ECT_{t-1} + \varepsilon_{1,t} \tag{1}$$

$$\Delta AGR_t = \alpha_2 + \sum_{l=1}^n \beta_{2,l} \Delta GDP_{t-l} + \sum_{l=1}^n \theta_{2,l} \Delta OIL_{t-l} + \sum_{l=1}^n \delta_{2,l} \Delta IND_{t-l} + \sum_{l=1}^n \theta_{2,l} \Delta SRV_{t-l} + \gamma_2 ECT_{t-1} + \varepsilon_{2,t} \tag{2}$$

$$\Delta OIL_t = \alpha_3 + \sum_{l=1}^n \beta_{3,l} \Delta GDP_{t-l} + \sum_{l=1}^n \theta_{3,l} \Delta AGR_{t-l} + \sum_{l=1}^n \delta_{3,l} \Delta IND_{t-l} + \sum_{l=1}^n \theta_{3,l} \Delta SRV_{t-l} + \gamma_3 ECT_{t-1} + \varepsilon_{3,t} \tag{3}$$

$$\Delta IND_t = \alpha_4 + \sum_{l=1}^n \beta_{4,l} \Delta GDP_{t-l} + \sum_{l=1}^n \theta_{4,l} \Delta AGR_{t-l} + \sum_{l=1}^n \delta_{4,l} \Delta OIL_{t-l} + \sum_{l=1}^n \theta_{4,l} \Delta SRV_{t-l} + \gamma_4 ECT_{t-1} + \varepsilon_{4,t} \tag{4}$$

$$\Delta SRV_t = \alpha_5 + \sum_{l=1}^n \beta_{5,l} \Delta GDP_{t-l} + \sum_{l=1}^n \theta_{5,l} \Delta AGR_{t-l} + \sum_{l=1}^n \delta_{5,l} \Delta OIL_{t-l} + \sum_{l=1}^n \theta_{5,l} \Delta IND_{t-l} + \gamma_5 ECT_{t-1} + \varepsilon_{5,t} \tag{5}$$

Where index t refers to the time period (t = 1, ..., T) and l to the lag. $\varepsilon_{1,t}$, $\varepsilon_{2,t}$, $\varepsilon_{3,t}$, $\varepsilon_{4,t}$, and $\varepsilon_{5,t}$ are supposed to be white-noise errors. γ_1 , γ_2 , γ_3 , γ_4 , and γ_5 are coefficients for the error-correction terms. These coefficients are expected to capture the adjustments of ΔGDP_t , ΔAGR_t , ΔOIL_t , ΔIND_t , and ΔSRV_t towards long-run equilibrium. Equation (1) is used to test causation from agriculture sector, oil and gas sector, industrial sector services sector to GDP growth in Saudi Arabian economy. If all the $\beta_{1,1}$, $\theta_{1,1}$, $\delta_{1,1}$, and $\theta_{1,1}$ = 0, then it implies that change in AGR, OIL, IND and SRV does not Granger cause change in GDP. Similarly, Equation (2) is used to test causality from GDP, oil and gas sector, services sector and industrial sector growth to agricultural output growth. Changes in GDP, OIL, IND and SRV growth does not Granger cause change in AGR growth, if all the $\beta_{2,1}$, $\theta_{2,1}$, $\delta_{2,1}$, and $\theta_{2,1}$ = 0 respectively. Furthermore, if all the $\beta_{3,1}$, $\theta_{3,1}$, $\delta_{3,1}$, and $\theta_{3,1}$, are equal to zero in Equation (3), then neither change in GDP nor change in AGR, SRV and IND would Granger cause change in OIL output growth respectively. Equations (4) and (5) follow similar explanation.

4. Results and Discussion

Table 1 presents the results of PP panel unit root tests with lag length chosen by downward search (t-test on the longest lag). The null hypothesis of a unit root is not rejected for any of the three variables in levels. However, each of the series is found to be stationary in fist difference. Therefore, all the variables are integrated of order one, (I (1)). The results are in line with the view that most macroeconomic variables are non-stationary in level but stationary in the first difference [31].

Table 1: Unit Root Test Results (Phillips-Perron)

Series	Level	First Difference
GDP _t	-1.962 (0.301)	-3.707 (0.007)
AGR _t	-2.237 (0.196)	-5.631 (0.000)
OIL _t	-2.617 (0.097)	-5.726 (0.000)
IND _t	-1.775 (0.387)	-2.550 (0.011)
SRV _t	-1.795 (0.377)	-2.852 (0.059)

Notes: Figures in the parenthesis are the probability value. GDP-gross domestic product, AGR-agriculture sector, OIL-oil and gas sector, IND-industrial sector, and SRV-services sector.

Source: Authors estimation using EViews8.

Since all the series are integrated of the same order – integration of order 1 (I (1)) – the series can be further tested for the existence of long-run relationships among them using the co-integration technique. Table 2 shows the results of panel co-integration tests under the null hypothesis of no co-integration. The results indicate that the null hypothesis of the zero co-integrating vector is rejected using the 99% critical value. This implies that the variables are co-integrated with at least two co-integrating vector.

Table 2: Co-integration Test Results (Johansen and Juselius)

Hypothesized Number of Co-integrating Equation(s): H ₀	Trace Test		Maximum Eigenvalue	
	Statistic	P-Value	Statistic	P-Value
None (r = 0)	174.84	0.000	84.270	0.000
At most 1 (r ≤ 1)	90.576	0.000	55.544	0.000
At most 2 (r ≤ 2)	35.032	0.011	18.063	0.127
At most 3 (r ≤ 3)	16.968	0.029	16.851	0.019
At most 4 (r ≤ 4)	0.1167	0.732	0.1167	0.732

Source: Authors estimation using EViews8.

According to the Granger representation theorem [32], a system of co-integrated variables has an error correction representation that combines the short-run dynamics of the variables with their long-run properties, as implied by the co-integrating relationships. Consequently, the VECM approach, besides showing the direction of Granger causality among the variables, enables one to distinguish between “short-run” and “long-run” Granger causality. The former is generally referred to as the Channel 1 source of causation and can be evaluated by testing whether the estimated coefficients on lagged values are jointly statistically significant. This can be done using the F test or χ^2 statistic test. On the other hand, long run Granger causality is generally referred to as the Channel 2 source of causation and can be evaluated by testing whether the coefficient of the error-correction term in each equation [that is, $\gamma_1=0$; $\gamma_2=0$; $\gamma_3=0$; $\gamma_4=0$; and $\gamma_5=0$] is statistically different from zero by a t-test. The empirical results of causality through these channels are shown in Table 3. We report five causality tests relating to zero restriction of relevant variables in the VECM where the null hypothesis is that there is no Granger causality against the alternative that there is Granger causality.

Table 3: Granger Causality Test Results under VECM

Dependent Variables	Explanatory Variables					ECT
	ΔGDP_{t-1}	ΔAGR_{t-1}	ΔOIL_{t-1}	ΔIND_{t-1}	ΔSRV_{t-1}	
	χ^2 - Statistics					
ΔGDP_t	--	7.44 (0.05)	11.93 (0.00)	1.03 (0.79)	9.44 (0.02)	-0.21 (0.36)
ΔAGR_t	7.97 (0.04)	--	4.16 (0.24)	14.54 (0.00)	4.16 (0.24)	0.00 (0.03)
ΔOIL_t	6.44 (0.09)	5.03 (0.16)	--	0.29 (0.96)	4.48 (0.20)	-0.08 (0.76)
ΔIND_t	31.03 (0.00)	1.99 (0.57)	22.02 (0.00)	--	18.89 (0.00)	0.48 (0.00)
ΔSRV_t	38.38 (0.00)	2.24 (0.52)	24.66 (0.00)	23.05 (0.00)	--	-0.20 (0.00)

Notes: Figures in the parenthesis are the probability value. The optimal lag-structure determined through AIC criterion is 3. Diagnostic tests (not reported) conducted for residual autocorrelation are overall found to be satisfactory. Source: Authors estimation using EViews8.

Focusing first on the GDP equation (1), the change in agriculture sector (ΔAGR), oil and gas sector (ΔOIL) and services sector (ΔSRV) appears to ‘Granger cause’ a change in the GDP growth (ΔGDP) at 5%, 1% and 5% significance level, respectively. The inclusion of past information on ΔAGR , ΔOIL and ΔSRV improves the forecast for ΔGDP . Nevertheless, from the agriculture, oil and services sectors equations, it is found that ΔGDP are driven by ΔAGR , ΔOIL and ΔSRV . Therefore, we observe the presence of bidirectional causality between these three sectors and economic growth in the short run. Further, the null hypothesis that ΔIND does not ‘Granger cause’ ΔGDP is accepted, however, the reverse null hypothesis (i.e. is ΔGDP does not ‘Granger cause’ ΔIND) is rejected at 10% level. This shows a unidirectional causality running from economic growth to industrial sector output without any feedback effects.

The outcome revealed that there is no short run causal relationship exists between agriculture growth and oil and gas sector output and between agriculture output and services sector output in any direction. However, the analysis revealed that there is a one-way causal relationship running from industrial sector to agriculture output at the 1% level of significance. The analysis also revealed that the change in oil and gas sector (ΔOIL) appears to ‘Granger cause’ a change in the industrial (ΔIND) and services (ΔSRV) outputs at 1 significance level. The reverse causality, however, does not hold true. Therefore, there exists a short run unidirectional causal relationship between these two sectors and oil and gas sector growth. Another attractive outcome is that ΔIND seems to ‘Granger cause’ change in services sector (ΔSRV), and also ΔSRV seems to ‘Granger cause’ ΔIND at the 1% level of significance. Thus, bidirectional causality existed between services and industrial output of Saudi Arabian economy in the short run.

Based on the t-statistics of the error correction terms, it follows that the error-correction terms in Equations (1) and (3) are insignificant; this suggests that ΔGDP and ΔOIL do not react to the co-integrating errors. Therefore, these variables are exogenous in the long run. However, the error-correction term in Equation (5) is highly significant with the correct sign. Therefore, the null hypothesis of no long-run causality from GDP , AGR , OIL and IND to SRV is rejected at 1% level. The estimated error correction coefficient (-0.21) of Equation (5) indicates that the annual adjustment of SRV will be 21% of the deviation of SRV_{t-1} from its co-integrating value. That is if SRV is above its equilibrium value by one point in any time, SRV falls by 0.21 points on average in the next year and vice versa.

5. Conclusion and Policy Implications

The purpose of this study was to empirically investigate the dynamic relationship between sectoral linkages and economic growth of Saudi Arabian economy over the period 1970 to 2012 using multivariate econometric analysis approach. The PP test was used to check whether the time-series of variables under investigation were stationary. The co-integration test was performed to obtain the number of co-integrating vectors between series, and VECM Granger causality was employed to examine the nature of interdependence between variables. Results of Granger causality test reveals that there exists bidirectional causality among the sectoral output of Saudi Arabian economy at least in the short run. The findings points to a large degree of interdependence between industrial and services sectors growth. This study is certainly revealed that the income of Saudi economy largely depends on the income generating from services and industrial sectors, and the income growth of these two sectors, in turn, depends on growth of oil and gas sector. The findings also revealed that the income growth of agricultural sector largely depends on growth of industrial sector.

Given the nature of the Saudi economy as oil-rich country, the oil and gas sector continue to be the most important and strongest player in the national economy and the dominant driver of other sectoral output growth. Thus, in order to

sustain the agricultural, industrial and services sectors growth, high levels of oil and gas growth need to be maintained and developed. Otherwise, growth of economic sectors will decline in tandem with any fall in oil and gas growth. Indeed, oil and gas sector growth is uncertain for a longer period of time given the potential volatility of international oil markets and the geo-political instability in the Middle East in general and in the Gulf States in particular. Accordingly, policy makers should create a far-reaching long-run development strategy based on industrial and services sectors and their sub-sectors that will eventually separate the Saudi economic structure from its current dependency on oil and gas resources.

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References

- [1] E. Cristina, "Changes in sectoral composition associated with economic growth," *Int. Econ. Rev.*, 38, pp. 431-452, 1997.
- [2] W.W. Rostow, *The Stages of Economic Growth: A Non-Communist Manifesto*, Cambridge University Press, Cambridge, 1960.
- [3] V. Fuchs, *The Service Economy*, National Bureau of Economic Research, New York, 1968.
- [4] S. Kuznets, *Economic Growth of Nations: Total Outputs and Productive Structure*, Harvard University Press, Cambridge, 1971.
- [5] H. Chenery and M. Syrquin, *Patterns of Development 1950-70*, Oxford University Press, London, 1975.
- [6] W.J. Baumol, B.J. Blakman and E.N. Wolff, *Productivity and American Leadership*, MIT Press, Cambridge, 1989.
- [7] W.A. Lewis, "Economic Development with Unlimited Supplies of Labor," *Manchester School of Economic and Social Studies*, 22(2), pp.139-91, 1954.
- [8] M.P. Todaro and S.C. Smith, *Economic Development*, 11th Edition, Addison Wesley Publishing Company Inc, USA, 2012.
- [9] A.K. Alhawaish, "Exports, Imports and Economic Growth in Saudi Arabia: An Application of Cointegration and Error-Correction Modeling," *Pensee Journal*, 76(5), pp.120-134, 2014.
- [10] Aljazira Capital, "Saudi Economy: Opportunities and Challenges, 2013. [Online]. Available: <http://www.aljaziracapital.com.sa/> (Accessed: June 12, 2014).
- [11] A.O. Hirschman, *The Strategy of Economic Development*, Yale University Press, New Haven, 1958.
- [12] G. Wright, "Cheap Labour and Southern Textiles before 1880," *Journal of Economic History*, 39: pp.313-48, 1979.
- [13] S.J. Vogel, "Structural Changes in Agriculture: Production Linkages and Agricultural Demand-led Industrialization," *Oxford Economic Papers*, 46(1): 136-56, 1994.
- [14] N. Gemmill, "Economic Development and Structural Change, The Role of Service Sector," *Journal of Development Studies*, 19, pp.37-66, 1982.
- [15] R. Craigwell, D. Downes, K. Greendige, and K. Steadmago, "Sectoral Output Growth and Economic Linkages in the Barbados Economy over the Past Fifty Years," CBB Working Paper, Barbados: Central Bank of Barbados, 2005.
- [16] R. Tiffin and X. Irz, "Is Agriculture the Engine of Growth?," *Agricultural Economics*, 35(1), pp.79-89, 2006.
- [17] N.H. Blunch and D. Verner, "Shared Sectoral Growth versus the Dual Economy Model: Evidence from Côte d'Ivoire, Ghana, and Zimbabwe," *African Development Review*, 18(3), pp.283-308, 2006.
- [18] S. Katircioglu, "Co-Integration and causality between GDP, agriculture, industry and services growth in north Cyprus: Evidence from time series data, 1977-2002," *Rev. Social Econ. Bus. Stud.*, 51(6), pp.173-187, 2004.
- [19] S. Katircioglu, "Causality between Agriculture and Economic Growth in a Small Nation under Political Isolation: A Case from North Cyprus," *International Journal of Social Economics*, 33(4), pp.331-43, 2006.
- [20] Q.M.A. Hye, "Agriculture on the road to industrialization and sustainable economic growth: An empirical investigation for Pakistan," *Int. J. Agric. Econ. Rural Dev.*, 2(1), pp.1-6, 2009.
- [21] H.E. Chebbi, "Agriculture and economic growth in Tunisia," *China Agric. Econ. Rev.*, 2(1), pp.63-78, 2010.
- [22] H. Sepehrdoust and Q.M.A. Hye, "An Empirical Study of Inter-sectoral Linkages and Economic Growth," *Trends in Applied Sciences Research*, 7(7), pp.494-504, 2012.
- [23] A.K. Alhawaish, "Sectoral Linkages and Economic Growth: Empirical Evidence from Eight Arab World Countries," In *Proceedings of 4th International Conference on Economics and Social Sciences*, Istanbul, 2014.
- [24] Saudi Arabian Monetary Agency (SAMA). [Online]. Available: <http://www.sama.gov.sa/> [Accessed: June 2, 2014].
- [25] C.W.J. Granger, "Investigating causal relations by econometric methods and cross-spectral methods," *Econometrica* 34, pp. 541-51, 1969.
- [26] C.W.J. Granger, "Development in the Study of Cointegrated Economic Variables," *Oxford Bulletin of Economics and Statistics*, 48, 213-28, 1986.
- [27] A. Banerjee, J. Dolado, J. Galbraith and D. Hendry, *Co-Integration, Error-Correction, and the Econometric Analysis of Non-Stationary Data: Advanced Texts in Econometrics*, Oxford University Press, Oxford, 1993.
- [28] P.C.P. Phillips, P.C.B. and P. Perron, "Testing for a Unit Root in Time Series Regression," *Biometrika* 75(3), pp. 35-46, 1988.
- [29] G.S. Maddala and S. Wu, "A Comparative Study of Unit Root Tests with Panel Data and New Simple Test," *Oxford Bulletin of Economics and Statistics*, 61(6), pp. 31-52, 1999.
- [30] W.H. Greene, *Econometric Analysis*, Pearson Education, New Delhi, 2008.

- [31] C.R. Nelson and C.I. Plosser, "Trends and Random Walks in Macroeconomic Time Series: Some Evidence and Implications," *Journal of Monetary Economics* 10(2), pp.139-62, 1982.
- [32] R.E. Engel and C.W.J. Granger (1987), "Cointegration and Error Correction: Representation, Estimation and Testing," *Econometrica* 55(3), pp. 251-76, 1987.

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