Does the Diversification of the Economy Matter? An Assessment of the Situation in South Africa

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Abstract: Globally, it is an acceptable principle that a more diverse economy, where economic activity is spread across all economic sectors, has a better chance to survive external shocks and is much more resilient than more sectoral concentrated economies. Developing countries are struggling in this process of diversification as this process requires structural changes in the economy with improved technology, productivity and skills levels. The objective of this study was to assess the relationship between economic diversification and economic growth and development in a developing country. South Africa was selected due to the fact that it is the most advanced economy in Africa with well-developed economic sectors. The methodology is quantitative in nature and panel time series data were collected from 1996 to 2018 for all nine provinces in South Africa. The relationship between selected variables were econometrically tested using two different models with GDP per capita and a diversification index as dependent variables respectively. Other variables included in the models were annual household income and income inequality (Gini Coefficient). The results indicated that there is a long-run relationship between all variables and that diversification does positively impact on GDP per capita, as well as rise in household income. The results also indicated that GDP per capita also impacts positively on the level of diversification of the economy. In terms of causality on the short-run, GDP per capita causes improvements in diversification. It can therefore be concluded that a positive relationship has been identified between economic diversification and economic growth and development in South Africa and that a policy for increased diversification across all economic sectors is a viable economic development strategy that should be implemented by developing countries.

Keywords: Diversification; economic development; GDP; South Africa

JEL Classification: O50

1. Introduction

Economic diversification is critical in developing countries to foster economic development which in turn could lead to structural change and the creation of employment across all economic sectors (Freire, 2017). Many scholars have contributed to the debate in regional economics on which strategy is most appropriate between the diversification of the economy across all sectors, or to focus the development of a few sectors with concentration and specialization. Economic diversification is critical for economic development and requires structural changes to move to a more diverse production and international trade structure (OECD, 2019). Low levels of economic diversification or high levels of concentration usually leads to increased levels of vulnerability for external shocks within an economy (ECLAC, 2017). According to the ECLAC (2017), a concentrated economy with a

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narrow range of products across economic sectors increases the chances of income volatility and negative impacts on economic growth. Diversification and structural changes go hand-in-hand and means the movement of factors of production such as labour, capital investment and innovation from one sector to another where higher levels of productivity could be achieved (OECD, 2019).

Structural change usually means to shift focus from the primary sector to more advanced sectors in the secondary or tertiary sectors. This paper has the primary objective to assess the relationship between economic diversification and economic growth and development. The focus area of the study is on a developing country namely South Africa, which is the most diverse economy in terms of exports and production on the African continent (OECD, 2019). The study seeks to analyse how the country, across all of its provinces, have had structural change since 1996 and to determine how the structure of the economy has changed up to 2018. The study also econometrically tested the relationship between a diversification index and economic growth per capita, but also added two other variables namely annual average household income and the Gini Coefficient as part of the model. The initial theory from the literature is that a more diverse economy should be able to absorb shocks better than a concentrated economy which is built on one or two large industries such as the mining sector. The contribution of this research is based on the fact that such a study has not been conducted recently in South Africa and a panel data set including the 9 provinces will be estimated.

2. Literature Review

Economic diversification could be defined as the planned and deliberate shift within the economy towards a more varied structure of production and international trade with the objectives to increase productivity, create employment and to create the foundation for inclusive growth (OECD, 2019). According to the OECD (2019) there are a number of paths towards a more diversified economy which include a focus on local firms to support them to be more competitive leading to exports; ensure technological growth with improve value chains; and pro-competitive regulatory reforms (Sauvé, (2019). The process of diversification is a long-term process and this is mainly due to the slow process of developing human capital and skills (ECLAC, 2017). According to OECD (2019), to achieve a diversified economy remains a challenge for most developing countries, especially those with the lowest incomes. The economies of such countries are usually also dominated by exports of raw commodities. The diversification of any economy is a complex process and linked to a process of structural change and improvements in productivity through innovation and technology. According to the OECD (2019) there are 4 major determinants of successful diversifications processes namely the existence of incentives for investment, trade, and competition; investment and policy reforms; reallocation of resources to stimulate diversification goals and interventions to rectify policy failures of the past.

According to Madjd-Sadjadi (2019), economic diversification could have different meanings for different people, but predominantly what it means is linked to the concept of economic complexity. Complexity means that an economy should have a range of sectors and products and services that comprises the economy. Higher levels of economic complexity or diversification should relate to lower levels of volatility in economic growth. According to Lei and Zhang (2014), countries with more diversified economies have generally higher levels of GDP and GDP per capita and as the diversification levels increases over time, the type of products that are exported become more sophisticated (Hausmann & Hidalgo, 2011).

Freire (2017:6) attempted to compile a new theory for the concepts of economic diversification. This theory is based on a "*framework of structural economic dynamics with endogenous technological change*". The theory is explained as many countries that trade with one another, but labour is set as the only production factor. The theory uses the number of sectors that contributes to the growth in the economy as measurement. In the model, the household sector provides the labour and are the consumers; each production sector produces only a single product which are consumed locally as well as traded. A production sector is assessed by the set of labour technologies used in the production process which determines productivity. The model states that on the short-run, countries will only produce products that have sufficient demand, prices and the labour availability. Countries that can produce a specific product at the lowest cost will continue to produce such product. In the long-run, the economy is dynamic with changes in consumption and technology. Technology progression is via new improved processes, and innovation of new products.

Esanov, (2012) conducted a study on economic diversification and the and policy implications for countries heavily depended on natural resources. The study found that economic growth and export diversification is significantly lower in natural resource-rich countries, referring to resource curse, if compared with developed economies; that resource-rich countries have low levels of technology, with low levels of value added in the manufacturing sector, such countries has poor infrastructure and low quality of institutions, trade openness drives the level of export diversification, and FDI inflows do facilitate economic diversification.

Esu & Udonwa, (2015) investigated the level of diversification of the Nigerian economy. Time series data were utilised from 1980 to 2011 using econometric analysis and specifically the error correction model (ECM). Results from the study indicated that, Nigeria has a large potential to develop its economy to be more diversified and could gain from trade, both in the short and long-run. This could be achieved through efforts of large-scale industrialization, incentives for use of new technology across all economic sectors, and promotion of investment in economic base sectors. Riti, Gubak, and Madina, (2016) also analysed performance of non-oil sectors in an oil dominated Nigerian economy to determine the levels of diversification. The results indicated that sectors such as agriculture and telecommunication are positively contributing to GDP, and the contribution of manufacturing are negative due to neglect of the sector. The study recommended improved macro-economic policies to stabilise economic growth and to support diversification.

Sharpley, (2002) analysed the role and impact of the tourism sector on economic diversification in Abu Dhabi as an economy dominated by the exports of oil. Tourism have over the last few decades being recognised as a strategy for economic growth and development and specifically the diversification of an economy. This country has turned to the tourism sector to counter instability in global oil prices, a number of challenges to tourism development are identified. These challenges may be overcome through investment in product and promotion. Sheng, (2011) also investigated the concepts of specialisation compared to diversification in the tourist sector. He states that economies can gain through specialization in goods and services where there is efficient production for high levels of productivity and comparative advantages. Many regions across the world have identified tourism as a sector to revitalise growth with advantages also for other sectors. The benefits of tourism development and specialization includes new employment opportunities, investment in all types of infrastructure, and inflow of money via international tourists.

Albassam, (2015) analysed the economic diversification in Saudi Arabia and states that diversification is important for economic growth and development. Any economy that is dependent for income from a single natural resource such as oil is vulnerable to economic instability if the global demand for such commodity decreases. The study motivates that diversification can contribute significantly to employment creation, countering corruption, and allowing for good governance and institutional quality. This study tested the success of the government in its efforts to diversify the economy using the following variables namely the share of oil to GDP, the share of private sector to GDP, oil exports as a percentage of the country's exports, and oil revenues as a percentage of total revenues over a time frame from 1970 to 2013. The study found that after more than 40 years of attempting to diversify the economy, oil has remained as the main driver of the economy and the main reason for this failure is commitment by the government to fully diversify the economy. Gylfason, (2016) investigated the relationship between economic diversification and economic growth and found that diversification does lead to long-run growth. Shayah, (2015) tested the role of economic diversification in oil-rich countries and the possibility to grow non-oil exports in the UAE. Over time this economy has diversified and the economy is highly flexible to adapt to changes. The research found that the economy is highly diversified if compared to other Arab countries. Sectors that plays a major role in the economy are trade and tourism.

Brown, (2012) investigated the impact of changes in economic diversification on growth and stability in a regional economy in the US. The hypothesis has always been there that diversification is a determinant of stability in regional economies. In this study a time series over 30-years was used to analyse whether changes in diversification could explain growth and stability. The findings from the study include that volatility has a positive relationship with the percentage contribution of employment in resource-based industries. Pirasteh, Sayadi and Saghafi (2009) analysed the levels of concentration and diversification and impact on economic growth and stability in the Euro-Med Region using panel data from 1995 to 2004. The paper compared two hypotheses, the one for a more diversified economy leading to a more resilient economy that is protected against external events and developments, leading more stability or that specialization is critical for growth and production and export diversification. The results indicated that export diversification had a positive impact on economic growth rates and instability in economic performance was reduced.

Yusof, (2013) analysed the role of economic diversification in Malaysia. If the economy is analysed it is clear that diversification has played a major role in high growth levels in the economy and the government used it as a key strategy for structural change. The export-led growth strategy within the manufacturing sector has played a major role in the diversification of exports in the country. A sectoral policy focus has also contributed to the diversification of the Malaysian economy. Over 50 years the diversification success was achieved through macroeconomic stability, low inflation, a stable exchange rate policy, promotion of trade openness, tariff reduction processes, R&D and innovation was supported, development of the manufacturing sector. For effective diversification, effective institutions are a requirement. According to the OECD (2019) a country such as Chile implemented a successful diversification strategy by allowing for value added production within the mining sector as well as improvement of the local logistics industry and also to allow diversification across all sectors. Spatial policies could also play a role in the diversification of an economy. Spatial policies which promote growth poles and special economic zones (SEZs) have been successful implemented in countries such as Malaysia, China and Mauritius. The following drivers for successful diversification are listed by the OECD (2019): good governance and policy implementation; policy focus on export promotion; value added production from natural resources; and the improvement of human capital and skills levels (Gelb, 2010).

Hammouda, Karingi, Njuguna, and Jallab, (2010) analysed the relationships between growth, productivity and diversification in Africa. The results indicate that intensified diversification does result in improvements in production factor productivity in African economies, meaning African countries can facilitate economic growth by means of increased factor productivity through policies of accelerated diversification. Kapunda, (2003) tested the relationship between diversification and poverty eradication in Botswana. The research concluded that a diversified economy leads to a lower level of poverty, but the country still has a long way to go in this process.

From the literature review, it could be concluded that a more diversified economic structure will lead to higher levels of economic growth with all its associated benefits. Within the well diversified sectors, value added processes are required through increase technological development and skills development.

3. Methodology

The research methodology followed in this study is quantitative in nature in order to achieve the study objective. The study is based in South Africa and a pooled panel methodology was implemented where time series data for each of the nine provinces from 1996 to 2018 were collected from Global Insight Regional explorer data set with the aim to test the relationship between the two main variables namely the GDP per capita and the diversification index (also known as the Tress Index) across all economic sectors. The data set starts from 1996, after the first democratic elections in 1994. Two other secondary variables were also included in the analysis namely annual income per household and the Gini Coefficient (refer to Table 1 for details regarding the variables included in the study). A number of econometric methods are included in the analysis and include econometric time series panel data models such as: (1) correlation coefficients to determine the short-run relationships between variables; (2) unit root tests to determine the level of stationarity of the variables and model selection, (3) lag length criteria selection; (4) Granger causality test to assessment causality between all the variables; (5) long-run relationships between the variables using either an ARDL of Fisher-Johansen test leading to regression analysis using FMOLS and DOLS equations; (6) and model stability diagnostic tests. The pooled panel data set was created including the 9 provinces in South Africa and included 207 observations. This research article has the primary objective to test the relationships between two different economic models with model 1 as GDP per capita as the dependent variable and in model 2 the diversification index as dependent variable; with secondary variables annual income per household and the Gini Coefficient also include in both models.

Table 1. Summary of Variables Used in the Econometric Model

Variable	**Variable abbreviation**	**Definition**
GDP per capita: Dependent variable of model 1	GDPC	GDP per capita is calculated by dividing the total output/GDP by the total population of a region or country. In this case the values are in the local currency namely the Rand.
Tress or Diversification index: Dependent variable of model 2.	TRESSIND	The level of diversification or concentration of a region's economy is measured by a tress index. The measurement considers the contributions of all nine economic sectors to the total economy. A tress index of zero represents a totally diversified economy, while an index of 100 indicates a concentrated economy dominated by one of the sectors. A concentrated economy points to a more vulnerable economy.
Annual income per household	INCOME	The total average income per household measured in the local currency of Rand
Gini-Coefficient	GINI	The Gini coefficient or Gini index measures the equal or unequal dispersion of income in a region or country. A coefficient of one represents a perfect inequality where one person in a population receives all the income, while other people earn nothing. A coefficient of 0 indicates perfect equality of income dispersion in a region or country.

Source: Global Insight Regional Explorer, 2020.

In terms of pooled panel data econometric analysis, Brooks (2014) listed the following the basic equation as:

$y_{it} = \alpha + \beta x_{it} + u_{it}$ …. . . ……………………………………………………………. ……. (1)

where y_{it} is the dependent variable, α is the intercept term, β is a k×1 vector of parameters to be estimated on the explanatory variables, and x_{it} is a 1 × k vector of observations on the explanatory variables, t = 1, . ., T; i = 1. The model from the function described in equation (1) can be listed as follows:

$Model\ 1: GDPC_t = \propto_1 + \sum_{j=1}^{k} \beta_{1j}\ GDPC_{t-j} + \sum_{j=1}^{k} \lambda_{1j}\ TRESSIND_{t-j} + INCOME_{t-j} + GINI_{t-j} u_{1t} \ldots\ldots\ldots$ (2)

$Model\ 2: TRESSIND_t = \propto_2 + \sum_{j=1}^{k} \beta_{2j}\ TRESSIND_{t-j} + \sum_{j=1}^{k} \lambda_{2j}\ GDPC_{t-j} + INCOME_{t-j} + GINI_{t-j} u_{2t} \ldots$ (3)

where α_n is the constant, β_n, λ_n are the coefficients, K is the number of lags and u_{1t} and u_{2t} are the stochastic error terms which are also known as shocks in the model. The unit root tests for level of stationarity was conducted using the Levin, Lin and Chu test as well as the PP-Fisher Chi-square test. If the variables are stationary at I (0) a normal panel VAR analysis is conducted whereas if variables are stationary at I (1), the Fisher Johansen panel co-integration test for long run relationship is conducted. If a mixture of variable were determined the only option is a panel ARDL method as estimation.

4. Results and Discussion

4.1. Descriptive Analysis

Firstly, a comparative analysis is done to compare the 9 provinces with the national data. Table 2 provides a summary of the trends in the 4 variables as included in the econometric models. The abbreviations as used per province are: Eastern Cape (EC), Free State (FS), Gauteng (GAU), Kwa-Zulu Natal (KZN), Limpopo (LIM), Mpumulanga (MPU), Northern Cape (NC), North-West (NW) and Western Cape (WC). In terms of GDP per capita, GAU has the highest GDP per capita while EC has the lowest value, while for the level of diversification (Tress Index), the FS has the most diversified index, while the EC is worst off with the most concentrated economy. GAU is the richest province and Limpopo is the poorest province if average household incomes are compared. Interestingly is that the poorest province namely LIM also has the best (lowest) GINI coefficient or income inequally, while GAU which has the highest income has the worst GINI index of all the provinces. In summary, South Africa has a Tress Index of 40. 5 which is relatively low indicating good levels of diversification. The poorest provinces namely EC and LIM in terms of GDP per capita and income, also has the highest tress indexes (indicating low levels of diversification).

Table 2. Trends Comparative Analysis

Region	GDP per capita (in Rand) (GDPC)		Tress Index (TRESSIND)		Average total household income (in Rand) (INCOME)		Gini Coefficient (GINI)	
	2010	2018	2010	2018	2010	2018	2010	2018
SA	53770	54099	40. 5	40. 27	36070	58850	0. 64	0. 63
EC	31684	32758	55. 72	54. 25	23050	40947	0. 61	0. 62
FS	53506	56444	36. 74	36. 95	32136	56978	0. 61	0. 62
GAU	80800	77251	49. 96	49. 88	57079	83436	0. 64	0. 63
KZN	41977	44606	41. 22	41. 37	27535	45849	0. 62	0. 63
LIM	37260	38612	50. 23	50. 09	19916	36460	0. 59	0. 59
MPU	51600	51357	38. 24	36. 35	27450	47101	0. 62	0. 60
NC	53444	51685	43. 25	39. 89	33077	58050	0. 59	0. 60
NW	47411	42252	52. 57	50. 53	28946	52319	0. 60	0. 61
WC	66700	65444	49. 08	45. 80	51824	80126	0. 59	0. 62

Source: Global Insight, 2020.

Table 3 and Figure 1 provide summaries of the descriptive statistics from the analysis for South Africa for the period 1996 to 2018. GDP per capita (GDPC) had an average of R50 338 over the period and achieved a maximum value of R55 440 in 2014, with a lowest amount in 1998. In terms of the trend's analysis for GDPC, a growth period was experienced from 2000 to 2008, but in 2009 the financial crises also negatively affected growth in South Africa. GDPC increased again from 2010 up to 2014, but has since decline year-on-year up to date. The Tress Index (TRESSIND) had a mean of 40. 45 indicating an index below 50. 0 which means a more diversified economy than concentrated (lower index means more diversified economy). The lowest index achieved was 38. 96 in 2008 just before the financial crises and the highest point of 42. 23 was in 2005. The trends in the index can be grouped in two periods, firstly a deterioration in the index from 1996 to 2005 where the highest point was reached, and then from 2006 up to 2018 during which period the index improved. The annual income per household (INCOME) had a mean of R31 170 over the 23-year period with a maximum achieved of R58852 in 2018 and a low point achieved in 1996 of R11 057. The trend graph shows a steady upward trend in annual income over the period. Lastly in terms of the Gini Coefficient Index (GINI), achieved an average of 0. 639 over the total period with a maximum index of 0. 661 in 2000 and a minimum point of 0. 606 in 1996. The trend in the index shows a steep rise from 1996 to 2000, after which it steadily declined up to 2016, but in the last two years the GINI index deteriorated again.

Table 3. Descriptive Statistics

	GDPC in Rand	TRESSIND	INCOME in Rand	GINI
Mean	50338. 43	40. 44	31170. 83	0. 639
Median	53047. 96	40. 27	29331. 84	0. 638
Maximum	55440. 46	42. 23	58852. 99	0. 661
Minimum	43052. 92	38. 96	11057. 18	0. 606
Std. Dev.	4878. 312	0. 954	15360. 47	0. 013
Skewness	-0. 418491	0. 270	0. 340498	-0. 215
Kurtosis	1. 437462	2. 010	1. 802556	2. 814
Jarque-Bera	3. 011145	1. 219	1. 818561	0. 210
Probability	0. 221890	0. 543	0. 402814	0. 9002

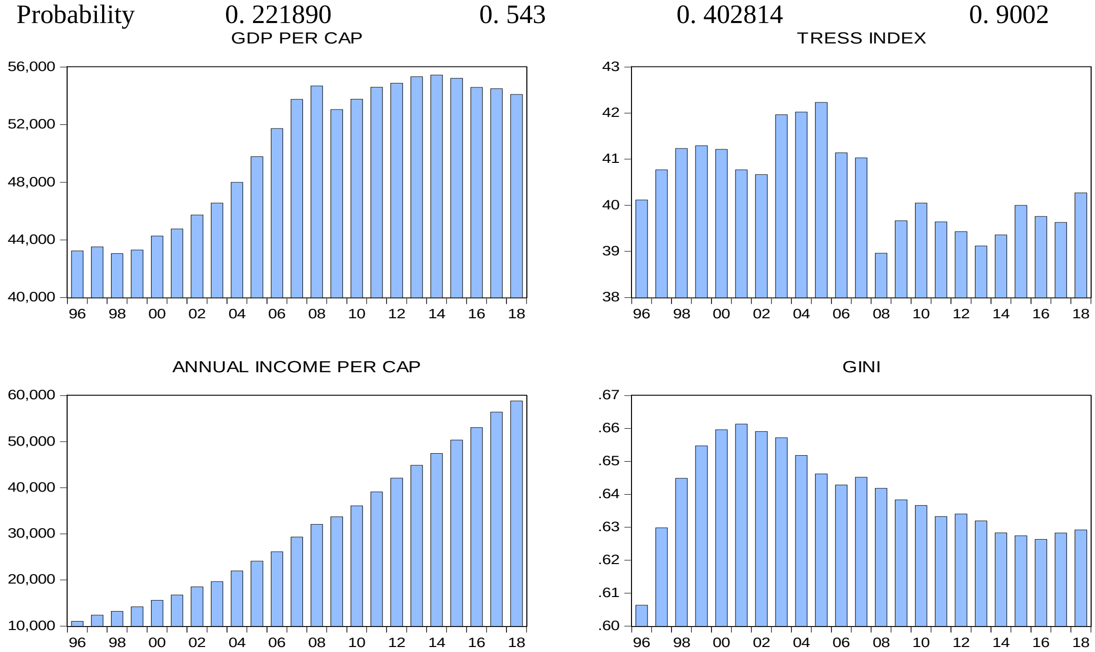

Figure 1. Trend Analysis

4.2. Econometric Analysis

The correlation coefficients of all the variables in the study are analysed as indicated in Table 4. Firstly, the relationships between the TRESSIND and the other variables are discussed. TRESSIND and GDPC has a negative and significant relationship indicating that as the index lowers (diversification improves), GDPC does increase. This is an early indication that the two main dependent variables have a negative relationship and that a more diversified economy could lead to economic growth. TRESSIND also has a negative relationship with INCOME, but this relationship is not significant, indicating that as the economy continue to diversify, income per capita will probably improve. Lastly, the TRESSIND has a positive but non-significant relationship with GINI, also showing that a diversified economy could lead to an improvement in the Gini Coefficient over time. When looking at the other important dependent variable namely GDPC, in addition to the negative relationship with TRESSIND, it also has a positive and significant relationship with INCOME and a negative relationship with GINI. This means when GDPC increases, it could lead to improvements in the GINI. Lastly INCOME and GINI has a significant negative relationship meaning if INCOME increases, the GINI index will also improve (have a lower value).

Table 4. Correlation Coefficient Analysis

Variables	TRESSIND	GDPC	INCOME	GINI
TRESSIND	1. 0000 ----- -----			
GDPC	-0. 1838 [-2. 6780] (0. 0080)	1. 0000 ----- -----		
INCOME	-0. 0671 [-0. 9636] (0. 3363)	0. 6914 [13. 7053] (0. 0000)	1. 0000 ----- -----	
GINI	0. 0751 [1. 0784] (0. 2821)	-0. 0657 [-0. 9436] (0. 3465)	-0. 1401 [-2. 0258] (0. 0441)	1. 0000 ----- -----

Notes: () indicates the p-value and [] the t-statistic; while indicates 5% statistically significant.

In order to determine which econometric model will be the most suitable for the analysis, it is necessary to establish the level of stationarity of all the variables included in the study using unit root tests. Unit root tests were completed for the panel data to decide on the final long-run estimation model. Table 5 reports the results from the Levin, Lin and Chu test, the Im, Pesaran and ADF - Fisher Chi-square tests. The results indicate that all variables are non-stationary at levels I (0), while all variables become stationary at 1st difference; they are therefore stationary at I (1). Based on the unit root test results it could be concluded that the Fisher/Johansen panel cointegration test should be utilised to assess the long-run relationships between the variables for both models.

Table 5. Panel Unit Root Test (P-Values Reported):

Variable	**Type of test**	**At levels I (0)**	**At 1st difference I (1)**	**Final result**
GDPC	Levin, Lin & Chu test	0. 0854	0. 0001	I (1)
	Im, Pesaran and Shin W-stat	0. 5407	0. 0002	I (1)
	ADF - Fisher Chi-square	0. 8169	0. 0009	I (1)
TRESSIND	Levin, Lin & Chu test	0. 4386	0. 0008	I (1)
	Im, Pesaran and Shin W-stat	0. 0619	0. 0002	I (1)
	ADF - Fisher Chi-square	0. 1456	0. 0012	I (1)
INCOME	Levin, Lin & Chu test	0. 9928	0. 0152	I (1)
	Im, Pesaran and Shin W-stat	0. 5392	0. 0311	I (1)
	ADF - Fisher Chi-square	0. 7612	0. 0404	I (1)
GINI	Levin, Lin & Chu test	0. 6681	0. 0011	I (1)
	Im, Pesaran and Shin W-stat	0. 0975	0. 0048	I (1)
	ADF - Fisher Chi-square	0. 1500	0. 0121	I (1)

Notes: Null hypothesis: Unit root. indicates 1% statistically significant, indicates 5% statistically significant.

The next step in the process is to test for the possible long-run relationships between variables in the two models included in the study. Table 6 is a summary of the Fisher - Johansen panel cointegration test for confirmation of long-run relationships between the variables. For this specific test, the null hypothesis states that no long-run relationships exist. In this case the null hypothesis could be rejected, meaning there is a long-run relationship between variables. The results show that for both Trace test and the Max-Eigen test, a long-run cointegration relationship exists between the variables at a 1 percent significance level. It could therefore be stated a long-run equilibrium relationship exists amongst the variables.

Table 6. Fisher Johansen Panel Cointegration Test

Hypothesized No. of CE (s)	Fisher Stat. (from trace test)	Prob.	Fisher Stat. (from max-eigen test)	Prob.
None	122. 30	0. 0001	61. 51	0. 0002
At most 1	75. 11	0. 0009	45. 22	0. 0004
At most 2	48. 17	0. 0001	38. 75	0. 0031

Note: indicates that the test statistics are significant at the 1% level. Probabilities are computed using asymptotic Chi-square distribution.

A requirement of a panel analysis where all the variables are stationary at 1st difference, is the confirmation of the long-run relationships between the variables and this were confirmed for both models included in the study. In order to do this, two additional models are estimated via a regression analysis to determine specific coeficients. The two types of estimation methods utilized are the Fully Modified Ordinary Least Squares (FMOLS) and the Dynamic Ordinary Least Squares (DOLS) models. A consideration of various forms of residual-based panel method results indicates that these models generally outperform single-equation estimation techniques (Pedroni, 2000). The results of both methods need to be compared when deciding on the final results (Tintin, 2009).

The estimations for Model 1 with GDP per capita as the dependent variable are indicated in table 7. In terms of the FMOLS method all of the independent variables are significant predicators at different significance levels. Both TRESSIND and GINI have negative relations with GDPC with coefficients of -0. 13 and -0. 61 respectively. INCOME has a positive impact on GDPC with a coefficient of 0. 14. As an example, it can be stated that a 1 percent decrease in TRESSIND, could lead to an increase of 0. 13% in GDPC. The comparative DOLS method resulted in slightly different outcomes. The TRESSIND was not found to be a significant predicator of changes in the GDPC in this case. Both INCOME and GINI were however significant predictors of GDPC with INCOME having a positive coefficient of 0. 12 while GINI had a negative coefficient of -1. 34.

Table 7. Model 1: FMOLS and DOLS Results

Dependent variable: GDPC

Independent variables: TRESSIND, INCOME, GINI

Method	Variables	Coefficient	T-Statistic	P-Value (Prob)	Adjusted R-Squared
FMOLS	TRESSIND	-0. 1339	-1. 9742	0. 0642	96. 7
	INCOME	0. 1439	11. 2607	0. 0002	
	GINI	-0. 6133	-1. 8661	0. 0736	
DOLS	TRESSIND	-0. 0663	-0. 5307	0. 5969	98. 7
	INCOME	0. 1223	7. 7368	0. 0005	
	GINI	-1. 3374	-4. 4594	0. 0128	

Note: indicates that the test statistics are significant at the 10% level; indicates that the test statistics are significant at the 5% level and indicates that the test statistics are significant at the 1% level.

In terms of model 2 (Table 8) with the TRESSIND as dependent variable, the FMOLS model indicates that only GINI is a significant predicator with a positive coefficient of 0. 75. A 1 percent increase will lead to an increase in the TRESSIND and vice versa. Both GDPC and INCOME have negative impacts on TRESSIND (although not statistically significant) meaning that if income levels or GDP per capita levels decreases in time a recession for example, the TRESSIND will increase, meaning less diversified economy. Interestingly with the DOLS analysis, the impacts of the three independent variables are the same as for the FMOLS analysis but its only GDPC and INCOME that are significant predicators with coefficients of -0. 22 and -1. 31 respectively.

Table 8. Model 2: FMOLS and DOLS results

Dependent variable: TRESSIND

Independent variables: GDPC, INCOME, GINI

Method	Variables	Coefficient	t-statistic	P-value (prob)	Adjusted R-squared
FMOLS	GDPC	-0. 1533	-0. 8118	0. 4181	95. 8
	INCOME	-0. 1146	-0. 6244	0. 5332	
	GINI	0. 7538	2. 6434	0. 0090	
DOLS	GDPC	-0. 2176	-2. 7108	0. 0085	97. 2
	INCOME	-1. 3116	-4. 0770	0. 0001	
	GINI	0. 1983	0. 3856	0. 7007	

Note: indicates that the test statistics are significant at the 10% level; indicates that the test statistics are significant at the 5% level and indicates that the test statistics are significant at the 1% level.

Table 9 is a presentation of the the pairwise Granger-Causality test results for the short-run including all variables included in both models. The main results from the Granger causality analysis include that regarding the two dependent variables, TRESSIND does not cause changes in GDPC, but importantly GDPC does cause changes in the TRESSIND on the short-run. INCOME and GDPC has significant bi-lateral relationships; and so, do GINI and GDPC. The TRESSIND does cause changes or movements in the GINI Index while as could be expected, GINI Index and INCOME have a bi-lateral causality relationship.

Table 9. Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
TRESSIND does not Granger Cause GDPC	189	0. 26089	0. 7706
GDPC does not Granger Cause TRESSIND		3. 90249	0. 0219
INCOME does not Granger Cause GDPC	189	4. 52583	0. 0121
GDPC does not Granger Cause INCOME		5. 84726	0. 0035
GINI does not Granger Cause GDPC	189	15. 0834	9. E-07
GDPC does not Granger Cause GINI		3. 60893	0. 0290
INCOME does not Granger Cause TRESSIND	189	14. 3524	2. E-06
TRESSIND does not Granger Cause INCOME		1. 01668	0. 3638
GINI does not Granger Cause TRESSIND	189	4. 77957	0. 0095
TRESSIND does not Granger Cause GINI		0. 43881	0. 6455
GINI does not Granger Cause INCOME	189	25. 1792	2. E-10
INCOME does not Granger Cause GINI		11. 6731	2. E-05

Note: indicates 5% statistical significance; indicates 10% statistical significance

In terms of residual diagnostics, the models past the Jarque-Bera normality test with a p-value of 0. 3061 and 0. 0821 and a serial correlation p-value of 0. 6724 and 0. 262 for the two models respectively.

5. Conclusions and Recommendations

This article covers the interesting debate of diversification or concentration of an economy. From the literature and the results of the empirical analysis it is clear that diversification across all economic sectors is a path to economic growth and development, while specialisation within specific sectors is also critical. Specialization activities should include value added production and improved linkages between economic sectors. The primary objective of the study was to test the relationship between a diversification index, using the Tress Index, and economic growth and development using GDP per capita. Most important results from the analysis are that on the long-run all of the variables included in the study (GDP per capita, Tress Index, household income and Gini Coefficient) do cointegrate as tested via the Fisher-Johansen cointegration method; that a 1% improvement in the diversification index could lead to a 0. 13% increase in GDP per capita, while both income and the Gini Coefficient also have positive impacts on GDP per capita. With the diversification index as dependent variable, a 1% increase in GDP per capita could lead to an improvement of 0. 22% in the diversification index. On the short-run it was found that GDP per capita, household income and the Gini Coefficient do cause changes in the diversification index and not vice versa. The diversification of any economy is a long-run process and requires many years of implementation of focused economic policy. Limitation of the study include the number of variables used and the type of variables used. Many other variables as determined in the literature review could have been used and future studies will include also other variables and compare regions or countries using the diversification index.

In conclusion, the following recommendations for improved diversification are listed which could assist developing countries to achieve higher levels of inclusive growth: Sustained and focused long term policy implementation is required via the principles of good governance and quality institutions; such policy should have the goal of implementing structural change where policy ensure a shift to relocation of resource where it will lead to growth; ongoing improvement of technology via incentives for innovation which in turn will lead to higher levels of productivity; continued investment in human capita and infrastructure; and lastly a drive towards export promotion.

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