The focus of this model is in line with the Schumpeter School of Thought that a well developed financial system will absolutely produce educated entrepreneurs that will engage in a process of resourcefulness. The study considered STV as a liquidity indicator of the market because it deals with a number of shares that exchanged hands between buyers and sellers in the market and as such it was replaced with listed companies equities, which is an indicator variable because it deals with the number of companies present in the market (population). Also, the stock market size is expected to be affected by other country-specific; as such a control variable (i.e. lending interest rate) is introduced into the model. Again, GDP as a proxy for economic growth was replaced with the human development index as a proxy for economic development.

The functional form of the model is thus:

HDI = *f*(MCAP, LCE, LIR)…… Model 1

The multivariate equation expression is thus:

$HDI = a_0 + a_1MCAP + a_2LCE + a_3LIR + \varepsilon$…….. Equation 1

Where: HDI = Human development index

MCAP = Stock market capitalization

LCE = Listed companies equities

LIR = Lending interest rate

ε = Stochastic error term within a confidence interval of 5%

a_0 = Constant term

a_1, a_2 and a_3 = Coefficients of the independent variables

Stock market liquidity and human development index model: This model is used to test the second hypothesis and is adapted from the Ifeoluwa and Motilewa model:

GROWTH = *f* (TVT_GDP)

Where: TVT_GDP is the stock market liquidity indicator [17].

The focus of this model is in line with the Neo-Classic School of Thought that investing in a stock market raises the liquidity position of an economy. The study replaces TVT_ GDP with stock market turnover ratio and stock market value traded as a proxy for stock market liquidity and inflation as a control variable (country specific). The introduction of inflation as control is because the liquidity variables are not expected to act alone. Again, GROWTH as a proxy for economic growth was replaced with the human development index as a proxy for economic development.

The functional form of the model is thus:

HDI = *f*(TOR, TVT, INFR)…….. Model 2

The multivariate equation expression is thus:

$HDI = a_0 + a_1TOR + a_2TVT + a_3INFR + \varepsilon$……Equation 2

Where: HDI = Human development index

TOR = Turnover ratio

TVT = Value traded

INFR = Inflation rate

ε = Stochastic error term within a confidence interval of 5%

a_0 = Constant term

a_1, a_2 and a_3 = Coefficients of the independent variables

A priori expectation

a_1, a_2 and $a_{3 \geq 0}$ for the two equations.

Method of data analysis

The study employs Augmented Dickey-Fuller (ADF) test of unit root test for stationarity, Johansen Co-integration test for long-run equilibrium relationship among the variables, and OLS-Ordinary Least Squares (NLS-Nonlinear Least Square and ARMA-Autoregressive-Moving-Average) to estimate the variables. All statistical tools are to be employed from E-views. The choices of these statistical tools are that they are easy to interpret and are easy to understand.

Result and Discussion

Augmented Dickey-Fuller (ADF) unit root tests

An Augmented Dickey-Fuller (ADF) unit root test was employed to test the stationarity of the variables. The ADF tests were done at levels. The decision rule is to reject stationary if ADF statistics are greater than the values of critical values at 1%, 5% and 10% in absolute terms or accept stationary if ADF statistics is less than the critical value of 1%, 5% and 10% in absolute terms. If the results of the variables are stationary at 1 (0) according to Kozhan, 2010, one can proceed to estimate the variables. The results of the ADF test are presented below in Tables 1-3 for Mauritius, Nigeria, and South Africa respectively.

Table 1 above shows Mauritius Augmented Dickey-Fuller unit root test for stationarity of the variables. The result shows that HDI, TVT, LCE, INFR, and LIR have an ADF statistics value of -3.441545, -3.457984, -3.760573, -3.505303, and -3.606904 respectively that are greater than 5% and 10% critical level values in absolute term. MCAP, TOR, and ASI have an ADF statistical value of -3.859796, -5.021848 and -4.674109 respectively that is greater than 1%, 5% and 10% critical values in absolute term. The result reveals that the variables are stationary at 1 (0). Thus, ordinary least squares of data estimation can be applied in the analysis of data.

Table 2 above shows the Augmented Dickey-Fuller unit root test for stationarity of the variables. The result shows that HDI, MCAP, have ADF statistics value of -7.170999, -3.846812 and respectively that are greater than 1%, 5% and 10% critical level values in absolute term while TOR,

Table 1. *Mauritius ADF unit root test (Source: Researcher's computation from E-Views).*

Variables	ADF Statistics	1% Critical Values	5% Critical Values	10% Critical Value	Order of Integration	Level of Significance
HDI	-3.441545	-3.886751	-3.052169	-2.666593	1(0)	0.8806 (10%)
MCAP	-3.859796	-3.808546	-3.020686	-2.650413	1(0)	0.3430 (10%)
TOR	-5.021848	-3.808546	-3.020686	-2.650413	1(0)	0.0007 (5%)
TVT	-3.457984	-3.808546	-3.020686	-2.650413	1(0)	0.1399 (10%)
LCE	-3.760573	-3.808546	-3.020686	-2.650413	1(0)	0.8086 (10%)
INFR	-3.505303	-3.808546	-3.020686	-2.650413	1(0)	0.1290 (10%)
LIR	-3.606904	-3.808546	-3.020686	-2.650413	1(0)	0.8481 (10%)

Table 2*. Nigeria ADF unit root test (Source: Researcher's computation from E-Views).*

Variables	ADF Statistics	1% Critical Values	5% Critical Values	10% Critical Value	Order of Integration	Level of Significance
HDI	-7.170999	-3.808546	-3.020686	-2.650413	1(0)	0.0000 (5%)
MCAP	-3.846812	-3.808546	-3.020686	-2.650413	1(0)	0.0697(5%)
TOR	-3.418049	-3.808546	-3.020686	-2.650413	1(0)	0.1496 (10%)
TVT	-3.116221	-3.808546	-3.020686	-2.650413	1(0)	0.2407 (10%)
LCE	-3.505195	-3.808546	-3.020686	-2.650413	1(0)	0.8708 (10%)
INFR	-3.145311	-3.808546	-3.020686	-2.650413	1(0)	0.0392 (5%)
LIR	-3.425578	-3.808546	-3.020686	-2.650413	1(0)	0.5491 (10%)

Table 3. *South Africa ADF unit root test (Source: Researcher's computation from E-Views).*

Variables	ADF Statistics	1% Critical Values	5% Critical Values	10% Critical Value	Order of Integration	Level of Significance
HDI	3.045122	-3.808546	-3.020686	-2.650413	1(0)	0.9953 (10%)
MCAP	-3.408439	-3.808546	-3.020686	-2.650413	1(0)	0.5574 (10%)
TOR	-3.542544	-3.808546	-3.020686	-2.650413	1(0)	0.0175 (5%)
TVT	-3.149536	-3.808546	-3.020686	-2.650413	1(0)	0.6745 (10%)
LCE	-3.728020	-3.920350	-3.065585	-2.673459	1(0)	0.3995 (10%)
INFR	-4.160451	-3.831511	-3.029970	-2.655194	1(0)	0.0050 (5%)
LIR	-3.915669	-3.857386	-3.040391	-2.660551	1(0)	0.3182 (10%)

TVT, LCE, INFR, EXR, and LIR has ADF statistics value of -3.418049, -3.116221, -3.505195, -3.145311, and -3.425578 respectively that are greater than 5% and 10% critical level values in absolute term but less than 1% critical level values in absolute term. The result reveals that the variables are stationary at I (0). Thus, the ordinary least square of data estimation can be applied in the analysis of data.

Table 3 above shows the Augmented Dickey-Fuller unit root test for stationarity of the variables. The result shows that INFR, and LIR have ADF statistics value of -4.160451 and -3.915669 respectively that is greater than 1%, 5% and 10% critical level values in absolute term. HDI, MCAP, TOR, TVT, and LCE have ADF statistics value of 3.045122, -3.408439, -3.542544, -3.149536, and -3.728020 respectively that is greater than 5%, and 10% critical level values in absolute term but less than 1% critical value in absolute term. The result reveals that the variables are stationary at 1 (0). Thus, ordinary least squares of data estimation can be applied in the analysis of data.

Johansen Co-integration test

Johansen co-integration test is conducted to ascertain the existence of the long - run relationship among the variables for each of the models in the study. The Johansen co-integration test contains two types of co-integration tests. These are unrestricted co-integration, rank test (Trace) and unrestricted co-integration, rank test (Maximum Eigenvalue). According to Johansen, Erik & Par (2007), the decision rule is to accept the null hypothesis if the probability of the critical value is greater than the 5% level of significance [18]. Otherwise, we reject the null hypothesis [19].

Mauritius Co-integration test

The stock market size model that examined the long-run relationship between stock market size variables; stock market capitalization, listed companies' equities, and economic development; human factor development was tested for the null hypothesis of no co-integration on the assumption of the linear deterministic trend. The model includes HDI, MCAP, LCE, and LIR (LIR is a control variable) [20,21]. The result of the co-integration is presented in Table 4. The result of the Trace and Maximum-Eigen probability was above the 5% level of significance. Thus, it becomes necessary to accept the null hypothesis of no cointegration. The study then indicates that there is no co-integration among the variables in the stock market size model. This connotes that there is no long-run relationship between stock market size and economic development in Mauritius.

The stock market liquidity model that examined the long-run relationship between stock market liquidity variables; stock market turnover ratio, stock market value traded, and economic development; human factor development was tested for the null hypothesis of no co-integration on the assumption of the linear deterministic trend. The model includes HDI,

TOR, TVT, and INFR (INFR is a control variable). The result of the co-integration is presented in Table 5. The result of the Trace and Maximum-Eigen probability was above the 5 % level of significance. Thus, it becomes necessary to accept the null hypothesis of no cointegration [22]. The study then indicates that there is no co-integration among the variables in the stock market liquidity model. This connotes that there is no long-run relationship between stock market liquidity and economic development in Mauritius.

Nigeria Co-integration test

The stock market size model that examined the long-run relationship between stock market size variables; stock market capitalization, list companies' equities, and economic development; human factor development was tested for the null hypothesis of no co-integration on the assumption of the linear deterministic trend. The model includes HDI, MCAP, LCE, and LIR (LIR is a control variable) [23]. The result of the co-integration is presented in Table 6. The result of the Trace and Maximum-Eigen probability was above the 5% level of significance. Thus, it becomes necessary to accept the null hypothesis of no cointegration. The study then indicates that there is no co-integration among the variables in the stock market size model. This connotes that there is no long-run relationship between stock market size and economic development in Nigeria.

The stock market liquidity model that examined the long-run relationship between stock market liquidity model variables; stock market turnover ratio, stock market value traded, and economic development; human factor development was tested for the null hypothesis of no co-integration on the assumption of the linear deterministic trend. The model includes HDI, TOR, TVT, and INFR (INFR as a control variable) [24]. The result of the co-integration is presented in Table 7. The results from the Trace and Maximum-Eigen probability show one (1) co-integration equation. The results are based on the probability of the critical values less than 5% level of significance. The study then indicates that there is co-integration among the variables of the stock market liquidity model. This connotes that there is a long-run relationship between stock market liquidity and economic development in Nigeria.

South Africa Co-integration test

The stock market size model that examined the long-run relationship between stock market size variables; stock market capitalization, list companies' equities, and economic development; human factor development was tested for the null hypothesis of no co-integration on the assumption of the linear deterministic trend [25-27]. The model includes HDI, MCAP, LCE, and LIR (LIR is a control variable). The result of the co-integration is presented in Table 8. The results from the Trace and Maximum-Eigen probability show one (1) co-integration equation. The results are based on the probability of the critical values less than 5% level of significance. Thus, it becomes necessary to reject the null hypothesis of no cointegration. The study then indicates that there is co-

Table 4. *Mauritius result of the Co-integration among variables of stock market size model, HDI =ƒ (MCAP, LCE, LIR) (Source: Researcher's computation from E-Views).*

Hypothesized No of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistics	5% Critical Value	Prob.**	Maximum Eigenvalue Statistics	5% Critical Value	Prob.**
None*	0.964196	87.67001	47.85613	0.0000	63.26424	27.58434	0.0000
At most 1	0.517380	24.40577	29.79707	0.1838	13.84197	21.13162	0.3781
At most 2	0.426198	10.56380	15.49471	0.2398	10.55396	14.26460	0.1780
At most 3	0.000518	0.009838	3.841466	0.9207	0.009838	3.841466	0.9207

Trace test indicates 1 co-integrating icon(s) at the 0.05 level
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 5. *Mauritius result of the Co-integration among variables of stock market liquidity model, HDI =ƒ (TOR, TVT, INFR) (Source: Researcher's computation from E-Views).*

Hypothesized No of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistics	5% Critical Value	Prob.**	Maximum Eigenvalue Statistics	5% Critical Value	Prob.**
None*	0.805551	53.63170	47.85613	0.0130	31.11412	27.58434	0.0168
At most 1	0.567743	22.51758	29.79707	0.2706	15.93595	21.13162	0.2286
At most 2	0.288527	6.581626	15.49471	0.6267	6.467944	14.26460	0.5539
At most 3	0.005965	0.113682	3.841466	0.7360	0.113682	3.841466	0.7360

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 6. *Nigeria result of the Co-integration among variables of stock market size model, HDI =f (MCAP, LCE, LIR) (Source: Researcher's computation from E-Views).*

Hypothesized No of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistics	5% Critical Value	Prob.**	Maximum Eigenvalue Statistics	5% Critical Value	Prob.**
None*	0.865122	66.69689	47.85613	0.0003	38.06427	27.58434	0.0016
At most 1	0.634095	28.63259	29.79707	0.0676	19.10226	21.13162	0.0939
At most 2	0.379518	9.530336	15.49471	0.3186	9.067925	14.26460	0.2805
At most 3	0.024044	0.462411	3.841466	0.4965	0.462411	3.841466	0.4965

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 7. *Nigeria result of the Co-integration among variables of stock market liquidity model, HDI =f (TOR, TVT, INFR) (Source: Researcher's computation from E-Views).*

Hypothesized No of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistics	5% Critical Value	Prob.**	Maximum Eigenvalue Statistics	5% Critical Value	Prob.**
None*	0.740002	52.58588	47.85613	0.0168	25.59454	27.58434	0.0879
At most 1	0.504254	26.99134	29.79707	0.1018	13.33214	21.13162	0.4221
At most 2	0.395325	13.65921	15.49471	0.0928	9.558234	14.26460	0.2426
At most 3*	0.194136	4.100975	3.841466	0.0428	4.100975	3.841466	0.0428

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 8. *South Africa result of the Co-integration among variables of stock market size model, HDI =f (MCAP, LCE, LIR) (Source: Researcher's computation from E-Views).*

Hypothesized No of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistics	5% Critical Value	Prob.**	Maximum Eigenvalue Statistics	5% Critical Value	Prob.**
None*	0.881326	78.33363	47.85613	0.0000	40.49612	27.58434	0.0007
At most 1*	0.769137	37.83751	29.79707	0.0048	27.85271	21.13162	0.0049
At most 2	0.380999	9.984795	15.49471	0.2819	9.113307	14.26460	0.2768
At most 3	0.044832	0.871488	3.841466	0.3505	0.871488	3.841466	0.3505

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

integration among the variables in the stock market size model. This connotes that there is a long-run relationship between stock market size and economic development in South Africa [28-30].

The stock market liquidity model that examined the long-run relationship between stock market liquidity model variables; stock market turnover ratio, stock market value traded, and economic development; human factor development was tested for the null hypothesis of no co-integration on the assumption of the linear deterministic trend. The model includes HDI, TOR, TVT, and INFR (INFR as a control variable). The result of the co-integration is presented in Table 9. The results from the Trace and Maximum-Eigen probability show no co-integration equation. The results are based on the probability of the critical values less than 5% level of significance. The study then indicates that there is no co-integration among the variables of the stock market liquidity model. This connotes that there is no long-run relationship between stock market liquidity and economic development in South Africa.

In summary, model 1 that states that there is no co-integration between stock market size and economic development in the long-run was accepted in Mauritius and Nigeria while it was rejected in South Africa; and in model 2 that states that there is no co-integration between stock market liquidity and economic development in the long-run was accepted in all the three countries [31,32].

Result of the Ordinary Least Square (OLS) estimation of models

Two models were formulated. These are: stock market size

model, and stock market liquidity model. Their impact is reported below for each of the countries; Mauritius, Nigeria, and South Africa.

Mauritius result of the OLS estimation: On the Table 10, the result of the estimated stock market size model based on ordinary least squares (OLS) technique was analyzed to show the contribution of each of the variables of stock market size on the economic development of Mauritius. The result shows that MCAP has an insignificant negative impact on economic development (probability = 0.9854 and coefficient = -7.62E-06). LCE has significant positive impact on economic development (probability = 0.0393 and coefficient = 0.001407). LIR, the control variable has significant negative impact on economic development (probability = 0.0229 and coefficient = -0.002977).

The coefficient of determination, R-squared (R^2) is 0.861126 and indicates that about 86% of the changes in economic development are explained by the variation in stock market size indicators (MCAP and LCE). The F-statistic explains the overall significance of the variables of stock market size (MCAP and LCE) on economic development. The F-statistic is 35.13767 with a probability value of 0.0000 less than 5% level of significance. Based on the F-probability, the study concludes that stock market size variables have an overall significant impact on economic development in Mauritius. The coefficient of Durbin-Watson is 1.592545 and is approximately 2. This shows that the model is free of autocorrelation.

Table 11 shows the result of the estimated stock market liquidity (SML) model based on the ordinary least squares (OLS) technique. The SML was analyzed to show the contribution of each of its variables on the economic development of Mauritius. The result shows that TOR has a significant negative impact on economic development (probability = 0.0194 and coefficient = -0.009601). TVT has significant positive impact on economic development (probability = 0.0003 and coefficient = 0.026846). INFR, the control variable has significant negative impact on economic development (probability = 0.0044 and coefficient = -0.008333).

The coefficient of determination, R-squared (R^2) is 0.698054 and indicates approximately 70% of the changes in economic development are explained by the variation in stock market liquidity indicators (TOR and TVT). The F-statistic explains

Table 9. *South Africa result of the Co-integration among variables of stock market liquidity model, HDI =ƒ (TOR, TVT, INFR) (Source: Researcher's computation from E-Views).*

Hypothesized No of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistics	5% Critical Value	Prob.**	Maximum Eigenvalue Statistics	5% Critical Value	Prob.**
None	0.743220	42.58154	47.85613	0.1431	25.83121	27.58434	0.0824
At most 1	0.308346	16.75032	29.79707	0.6585	7.004732	21.13162	0.9537
At most 2	0.289078	9.745591	15.49471	0.3008	6.482657	14.26460	0.5521
At most 3	0.157796	3.262934	3.841466	0.0709	3.262934	3.841466	0.0709

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 10. *Mauritius result of the OLS estimation of the stock market size model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.701137	0.035533	19.73213	0.0000
MCAP	-7.62E-06	0.000411	-0.018542	0.9854
LCE	0.001407	0.000630	2.232520	0.0393
LIR	-0.002977	0.001190	-2.500776	0.0229
R-squared	0.861126	Durbin-Watson stat		1.592545
F-statistic Prob.(F-statistic)	35.13767 0.000000			

(Source: Researcher's computation from E-Views).

Table 11. *Mauritius result of the OLS estimation of the stock market liquidity model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.746662	0.027008	27.64589	0.0000
TOR	-0.009601	0.003720	-2.580540	0.0194
TVT	0.026846	0.005917	4.537232	0.0003
INFR	-0.008333	0.002541	-3.279584	0.0044
R-squared	0.698054	Durbin-Watson stat		1.612682
F-statistic Prob.(F-statistic)	13.10046 0.000111			

(Source: Researcher's computation from E-Views).

the overall significance of the variables of stock market liquidity (TOR and TVT) on economic development. The F-statistic is 13.10046 with a probability value of 0.000111 less than 5% level of significance. Based on the F-probability, the study concludes that stock market liquidity variables have an overall significant impact on economic development in Mauritius. The coefficient of Durbin-Watson is 1.612682 and is approximately 2. This shows that the model is free of autocorrelation.

Nigeria result of the OLS estimation: On Table 12 the result of the estimated stock market size model based on ordinary least squares (OLS) technique was analyzed to show the contribution of each of the variables of stock market size on the economic development of Mauritius. The result shows that MCAP has a significant negative impact on economic development (probability = 0.0120 and coefficient = -0.007193). LCE has an insignificant positive impact on economic development (probability = 0.1237 and coefficient = 0.003113). LIR, the control variable has significant negative impact on economic development (probability = 0.0039 and coefficient = -0.037724).

The coefficient of determination, R-squared (R^2) is 0.456768 and indicates that about 46% of the changes in economic development are explained by the variation in stock market size indicators (MCAP and LCE). The F-statistic explains the overall significance of the variables of stock market size (MCAP and LCE) on economic development. The F-statistic is 4.764728 with a probability value of 0.013738 less than 5% level of significance. Based on the F-probability, the study concludes that stock market size variables have an overall significant impact on economic development in Mauritius. The coefficient of Durbin-Watson is 1.745632 and is approximately 2. This shows that the model is free of autocorrelation.

Table 13 shows the result of the estimated stock market liquidity model based on ordinary least squares (OLS) technique was analyzed to show the contribution of each of the variables of stock market liquidity on the economic development of Nigeria. The result revealed that TOR has an insignificant positive impact on economic development (probability = 0.2805 and coefficient = 0.009748). TVT has an insignificant negative impact on economic development (probability = 0.7292 and coefficient = -0.008461). INFR, the control variable has an insignificant positive impact on economic development (probability = 0.3463 and coefficient = -0.008828).

The coefficient of determination, R-squared (R^2) is 0.185971 and indicates that about 19% of the changes in economic development are explained by the variation in stock market liquidity indicators (TOR and TVT). The F-statistic explains the overall significance of the variables of stock market liquidity (TOR and TVT) on economic development. The F-statistic is 1.294592 with a probability value of 0.308450 greater than a 5% level of significance. Based on the F-probability, the study concludes that stock market liquidity variables have an overall insignificant impact on economic development in Nigeria. The coefficient of Durbin-Watson is 1.843906 and is approximately 2. This shows that the model is free of autocorrelation.

South Africa result of the OLS estimation: On Table 14 the result of the estimated stock market size model based on ordinary least squares (OLS) technique was analyzed to show the contribution of each of the variables of stock market size on the economic development of South Africa. The result shows that MCAP has a significant positive impact on economic development (probability = 0.0093 and coefficient = 0.000302). LCE has an insignificant positive impact on economic development (probability = 0.1948 and coefficient = 0.000113). LIR, the control variable has an insignificant negative impact on economic development (probability = 0.5144 and coefficient = -0.001661).

The coefficient of determination, R-squared (R^2) is 0.397407

Table 12. *Nigeria result of the OLS estimation of the stock market size model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.628620	0.395969	1.587547	0.1308
MCAP	-0.007193	0.002559	-2.811049	0.0120
LCE	0.003113	0.001922	1.619546	0.1237
LIR	-0.037724	0.011310	-3.335340	0.0039
R-squared	0.456768	Durbin-Watson stat		1.745632
F-statistic Prob.(F-statistic)	4.764728 0.013738			

(Source: Researcher's computation from E-Views).

Table 13. *Nigeria result of the OLS estimation of the stock market liquidity model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.235817	0.113032	2.086286	0.0523
TOR	0.009748	0.008745	1.114757	0.2805
TVT	-0.008461	0.024035	-0.352019	0.7292
INFR	0.008828	0.009114	0.968592	0.3463
R-squared	0.185971	Durbin-Watson stat		1.843906
F-statistic Prob.(F-statistic)	1.294592 0.308450			

(Source: Researcher's computation from E-Views).

and indicates that about 40% of the changes in economic development are explained by the variation in stock market size indicators (MCAP and LCE). The F-statistic explains the overall significance of the variables of stock market size (MCAP and LCE) on economic development. The F-statistic is 3.737137 with a probability value of 0.031391 less than 5% level of significance. Based on the F-probability, the study concludes that stock market size variables have an overall significant impact on economic development in South Africa. The coefficient of Durbin-Watson is 1.587929 and is approximately 2. This shows that the model is free of autocorrelation.

On Table 15 the result of the estimated stock market liquidity model based on ordinary least squares (OLS) technique was analyzed to show the contribution of each of the variables of stock market liquidity on the economic development of South Africa. The result shows that TOR has an insignificant negative impact on economic development (probability = 0.5145 and coefficient = -0.000677). TVT has a significant positive impact on economic development (probability = 0.0050 and coefficient = 0.000661). INFR, the control variable has an insignificant positive impact on economic development (probability = 0.9153 and coefficient = 0.000269).

The coefficient of determination, R-squared (R^2) is 0.430967 and indicates that about 43% of the changes in economic development are explained by the variation in stock market liquidity indicators (TOR and TVT). The F-statistic explains the overall significance of the variables of stock market liquidity (TOR and TVT) on economic development. The F-statistic is 4.291753 with a probability value of 0.019913 less than 5% level of significance. Based on the F-probability, the study concludes that stock market liquidity variables have an overall significant impact on economic development in South Africa. The coefficient of Durbin-Watson is 1.831418 and is approximately 2. This shows that the model is free of autocorrelation.

In summary, the results of the OLS estimations in: Model 1, stock market size has an overall significant impact on the economic development of the three SSA countries, Mauritius, Nigeria, and South Africa. Model 2, stock market liquidity has an overall significant impact on the economic development of the three SSA of Mauritius, Nigeria, and South Africa.

Impact of stock market size on the economic development of SSA countries

Test of hypothesis 1: Stock market size does not have a significant impact on the economic development of SSA countries.

The result that tests whether there is a long-run relationship between stock market size and economic development in SSA countries is presented in Tables 4, 6 and 8 for Mauritius, Nigeria, and South Africa respectively. The result of the Johansen co-integration test for Mauritius and Nigeria shows that there is no co-integration among the variables of the stock market size model while that of South Africa shows that there is co-integration among the variables of the stock market size model. This implies that there is no long-run relationship between stock market size and human development index as a proxy for economic development in Mauritius and Nigeria while in South Africa there is a long-run relationship between stock market size and economic development.

The results of the coefficient of determination (R^2) or F-probability from the OLS techniques showed that stock market size could significantly explain only: 86% or 0.00000, 46% or 0.013738, 40% or 0.031391 of the factors that influence human development index as a proxy for economic development in Mauritius, Nigeria and South Africa respectively. In the overall assessment, the combined variables of this model were significant at the 5 % level of significance. Thus, the study accepted the alternative

Table 14. *South Africa result of the OLS estimation of the stock market size model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.547893	0.042141	13.00130	0.0000
MCAP	0.000302	0.000103	2.934164	0.0093
LCE	0.000113	8.38E-05	1.349792	0.1948
LIR	-0.001661	0.002494	-0.665917	0.5144
R-squared	0.397407	Durbin-Watson stat		1.587929
F-statistic Prob.(F-statistic)	3.737137 0.031391			

(Source: Researcher's computation from E-Views).

Table 15. *South Africa result of the OLS estimation of the stock market liquidity model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.614512	0.021078	29.15423	0.0000
TOR	-0.000677	0.001018	-0.665728	0.5145
TVT	0.000661	0.000205	3.225658	0.0050
INFR	0.000269	0.002490	0.107896	0.9153
R-squared	0.430967	Durbin-Watson stat		1.831418
F-statistic Prob.(F-statistic)	4.291753 0.019913			

(Source: Researcher's computation from E-Views).

hypothesis that stock market size has a significant impact on economic development (human development factor) of SSA countries as indicated in the three countries; Mauritius, Nigeria, and South Africa.

Impact of stock market liquidity on the economic development of SSA countries

Test of hypothesis 2: Stock market liquidity does not have a significant impact on the economy development of SSA countries.

The result that tests whether there is a long-run relationship between stock market liquidity and economic development in SSA countries is presented in Tables 5, 7 and 9 for Mauritius, Nigeria, and South Africa respectively. The result of the Johansen co-integration test for the three countries; Mauritius, Nigeria, and South Africa shows that there is no co-integration among the variables of the stock market liquidity model. This implies that there is no long-run relationship between stock market liquidity and human development index as a proxy for economic development in Mauritius, Nigeria, and South Africa.

The results of coefficient of determination (R^2) or F-probability from the OLS techniques showed that stock market liquidity could significantly explain only: 70% or 0.000111, 18% or 0.308450, 43% or 0.019913 of the factors that influence human development index as a proxy for economic development in Mauritius, Nigeria, and South Africa respectively. The overall estimation of the collective variables of this model was significant at the 5% level of significance in Mauritius and South Africa but insignificant in Nigeria. Thus, the study accepted the alternative hypothesis that stock market liquidity has a significant impact on economic development (human development factor) of SSA countries as shown in Mauritius and South Africa. In Nigeria, the study accepted the null hypothesis that stock market liquidity has no significant impact on economic development (human development factor) of SSA countries [9-11].

Conclusion and Recommendations

Conclusion

Based on our findings, the study accepted that all the variables of stock market size model indicators have a significant impact on the human development index in the three SSA countries; Mauritius, Nigeria and South Africa. The stock market liquidity model indicators have a significant impact on the human development index in Mauritius and South Africa while in Nigeria they are insignificant. Also, there is no autocorrelation among the variables of the two models. This shows that there is confidence in the level of reliability of the results.

The Johansen co-integration test showed at least two models having co-integration equations among the variables. No cointegration among the variables of the stock market size in Mauritius and Nigeria but in South Africa there is cointegration among the variables. This implies that there is no long-run relationship between the variables in Muaritius and Nigeria but not in South Africa.

From the ordinary least square result R^2 and the F-probability of stock market size for Mauritius, Nigeria and South Africa are: 86% and 0.0000; 46% and 0.013738; and 40% and 0.031391 respectively. Conclusively, the variables of this model are all significant at 5%, meaning the null hypothesis is rejected and the alternative hypothesis accepted. This collaborate the empirical study of Rurangwa that stock market size has a major impact on economic development.

The second model of this model, the stock market liquidity has its Johansen cointegration result for the three SSA countries showing that there is no cointegration among the variables. Meaning that there is no long-run relationship among the variables of the stock market liquidity model variables. The result of the coefficient of determinant, R^2 and the F-probability from the ordinary least square techniques showed that stock market liquidity model are: 70% and 0.000111; 18% and 0.308450; and 43% and 0.019913 for Muaritius, Nigeria, and South Africa respectively. Conclusively, all the variables of this stock market liquidity model in Mauritius and South Africa are significant while that of Nigeria is insiginaficant. This collaborate the empirical study of Okoye with regards to the results of Mauritius and South Africa in this study and Magwera with regards to the result of Nigeria in this study.

Recommendations

Here, the recommendations are based on the findings from the analysis of the two models as follows:

Stock market size: The study recommends that continuous reforms should be in place to bring about a more robust stock market in SSA towards accelerating the human development index of the entire SSA. The government of the various countries should encourage more companies to enlist by relaxing some of the listing requirements like allowing subscriptions list, to remain open for more than a maximum period of 28 working days. The number of days should be increased to allow for more participation. Another requirement to relax is the maximum of 10% of an offering to the staff of a company (or its subsidiaries or associated companies). The percentage should be increased to allow the employees more ownership status and commitment to the growth of the company.

Stock market liquidity: To bring about significant positive impact of stock market liquidity on economic development in Nigeria and to increase the Mauritius and South Africa stock market liquidity significant positive impact on economic development positions, government should put in place an efficient system geared towards high level of trading activities that will bring about a vibrant and free flow of information.

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