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# JOURNAL of Applied Economic Sciences

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## APPENDIX

Criteria	Bank	Average - total	Female	Male	Employed	Unemployed	Status of bank client	No bank client status
Suggestions by parents or family members	UniCredit Bank	0.402	0.408	0.407	0.311	0.414	0.418	0.380
	Addiko Bank	0.199	0.197	0.207	0.171	0.202	0.178	0.262
	Intesa Sanpaolo Bank	0.157	0.163	0.144	0.117	0.162	0.169	0.129
	Raiffeisen Bank	0.242	0.231	0.241	0.402	0.221	0.235	0.229
	C.Ratio	0.04	0.04	0.03	0.03	0.04	0.04	0.03
Financial advantages (low interest rate on loans and high interest rates on savings)	UniCredit Bank	0.398	0.410	0.381	0.459	0.396	0.410	0.380
	Addiko Bank	0.191	0.203	0.138	0.142	0.193	0.162	0.276
	Intesa Sanpaolo Bank	0.163	0.156	0.202	0.104	0.173	0.170	0.153
	Raiffeisen Bank	0.248	0.232	0.278	0.295	0.238	0.258	0.190
	C.Ratio	0.04	0.04	0.03	0.04	0.04	0.0	0.06
Availability of financial benefits for undergraduate	UniCredit Bank	0.423	0.415	0.458	0.439	0.424	0.452	0.352
	Addiko Bank	0.192	0.204	0.151	0.132	0.196	0.159	0.283
	Intesa Sanpaolo Bank	0.161	0.172	0.135	0.124	0.167	0.171	0.142
	Raiffeisen Bank	0.224	0.209	0.256	0.305	0.213	0.219	0.224
	C.Ratio	0.05	0.06	0.04	0.00	0.05	0.05	0.05
Favourable locations of the bank and its ATM's	UniCredit Bank	0.404	0.390	0.446	0.294	0.412	0.442	0.292
	Addiko Bank	0.195	0.219	0.126	0.199	0.196	0.171	0.266
	Intesa Sanpaolo Bank	0.173	0.168	0.195	0.151	0.178	0.160	0.218
	Raiffeisen Bank	0.228	0.223	0.233	0.356	0.214	0.226	0.224
	C.Ratio	0.05	0.05	0.05	0.04	0.05	0.05	0.04
Delivering fast services	UniCredit Bank	0.389	0.387	0.389	0.433	0.384	0.408	0.332
	Addiko Bank	0.192	0.207	0.144	0.108	0.198	0.159	0.282
	Intesa Sanpaolo Bank	0.161	0.166	0.146	0.123	0.164	0.175	0.125
	Raiffeisen Bank	0.259	0.239	0.321	0.336	0.253	0.258	0.261
	C.Ratio	0.05	0.05	0.03	0.02	0.05	0.04	0.05
Bank service quality (quality of services of bank personnel)	UniCredit Bank	0.372	0.382	0.343	0.449	0.364	0.377	0.357
	Addiko Bank	0.166	0.155	0.196	0.150	0.168	0.151	0.209
	Intesa Sanpaolo Bank	0.210	0.229	0.154	0.092	0.221	0.221	0.177
	Raiffeisen Bank	0.252	0.233	0.308	0.309	0.247	0.251	0.256
	C.Ratio	0.05	0.05	0.03	0.04	0.05	0.05	0.05
Bank's reputation	UniCredit Bank	0.384	0.370	0.429	0.432	0.377	0.417	0.311
	Addiko Bank	0.224	0.243	0.168	0.150	0.233	0.194	0.293
	Intesa Sanpaolo Bank	0.156	0.154	0.160	0.096	0.163	0.143	0.184
	Raiffeisen Bank	0.235	0.233	0.243	0.322	0.227	0.246	0.212
	C. ratio	0.04	0.04	0.04	0.05	0.04	0.04	0.04

Source: author.

## A Dynamic Analysis of the Nexus between Entrepreneurship, Human Capital Development and Financial Deepening: Evidence from Selected African Economies

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### Abstract:

This paper examines whether human capital development is significant in the nexus between entrepreneurship and financial deepening, while also accounting for institutional quality as control variable in thirteen selected African economies from 1995-2014. Evidence from the augmented Toda-Yamamoto technique shows that human capital does not have long run causal effect on entrepreneurship and financial deepening, which suggests low quality human capital for entrepreneurial development. The paper recommends market-based funding for human capital development to enhance quality, creativity, entrepreneurship, and hence financial deepening. Global best-practice institutional governance system would reduce 'cost to start business' and thereby encourage growth of entrepreneurship.

**Keywords:** African economies; entrepreneurship; financial deepening; human capital.

**JEL Classification:** O1; I2; O31; G100

### Introduction

The need to deepen the nexus between entrepreneurship and financial development has been topical in developing economies. In recent times, given the increasing rate of socio-economic crises and the need to achieve inclusive growth, entrepreneurship is attracting the attention of policy makers, particularly in developing economies. Otchere, Senbet and Simbanegavi (2017) posit that lack of financial deepening and inclusiveness remain broadening challenging tasks for most African economies, as the state of financial development can barely compare with standards in low income countries. In Africa, irrespective of the recent annual growth rate of, average, 5.5 per cent up to 2015, non-inclusivity of virtually all human development parameters may have made the region to still remain poorest on earth (Knoop 2013).

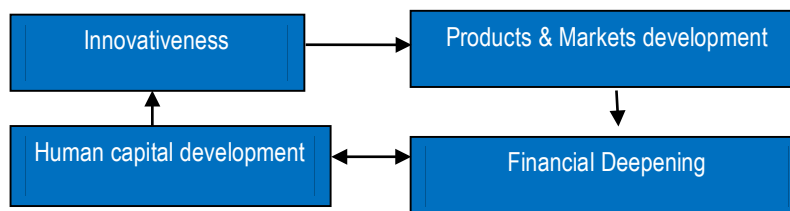
While assessing the millennium development goals (MDG), the World Bank notes that many developing economies, particularly in Africa, may have improvement in access to education, but with respect to quality, the impact evaluation is not encouraging (World Bank 2011). Also, Ghatak, Morelli and Sjöström (2002) note that talent is a basic requirement for entrepreneurial efficiency. Entrepreneurial talents can create markets for finance, labour, and allied factors of production as well as innovative ideas that boost creativity, and hence employment generation such as 'waste to wealth' schemes.

Financial deepening enhances rapid economic development if it provides mobilization, allocation, and operational efficiencies of financial resources. The truism about economic development is that all planning, innovations and struggles to improve human living conditions end up with financial resources being mobilized. Therefore, financial market institutions may be of crucial assistance for the success of entrepreneurship. Through innovation, given market risk, new product or service discoveries may create demand or market. On the other hand, availability of developed financial market is a major incentive that spurs entrepreneurial mind-set to establish an

enterprise. This aligns with Fogel, Hawk, Morck, and Yeung (2006) that institutional incentives and their availability can be very encouraging for wholesale entrepreneurship, while weak institutions can otherwise be detrimental to entrepreneurial spirit and financial development. Access to finance, as well as sound financial decisions are very critical as individuals seek to exit from poverty (George, Okoye, Efobi, and Modebe 2017)

The most effective antidote for fighting extreme poverty in developing economies may be in quality education and marketable skill (World Bank 2016). Successful economies like the United States, Japan, Britain, Turkey etc. may have employed quality human capital development to fast-track the transformation of their economies at both the micro and macro levels. Quality education system (gold standard) may produce quality thinkers, innovators and world class human capital required for global competitiveness. Scientific and technological innovators are sources of inventions that facilitate products and markets, which may broaden and deepen the financial system. Human capital development requires massive investments which can be sourced from the financial system in the form of cheap long-tenured education bond issues. Therefore, the conceptual framework that links quality education and financial system development is presented in Figure 1 below:

Figure1. Conceptual Framework: Human capital and financial development transmission



Source: Developed by the authors (2017)

With regard to quality of entrepreneurial institution, World Bank data-set shows that sub-Sahara Africa, Latin America and Caribbean regions performed below global average in the three incentives that drive entrepreneurship while East Asia and the Pacific regions performed below standard in the levels of bureaucracy, and the minimum number of days to start business. On average, it costs 55 per cent of estimated gross national income per capita to start business in sub-Sahara Africa, the global highest. The overall cost implication, measured by percentage of gross national income (GNI) per capita loss, indicates that Cameroon and Nigeria are the most uninspiring economies for entrepreneurship in Africa, with 32%, and 31% respectively (World Development Indicator (WDI 2016).

The major objective of this paper is to determine whether human capital development has a role in the nexus between entrepreneurship and financial deepening. The study is focused on selected African economies. To achieve this, the following hypotheses were proposed:

- there is no significant relationship between entrepreneurship and financial deepening (*Fdp*);
- there is no significant relationship between human capital development (*Hcd*) and financial deepening (*Fdp*);
- there is no significant relationship between human capital development (*Hcd*) and entrepreneurship.

## 1. Review of Theoretical Literature

Theories on economics of education and human capital compliments the Solow and Swan's exogenous theory and the 'new growth' (endogenous) theory to link poverty, sustainability and inclusivity with the quality of a country's education (Jhingan 2007). Economics of education theorists argue that though education may be costly in schooling time and financial outlay, its social and private benefits could outweigh the cost, particularly at the tertiary level (Musgrave and Musgrave 1989). Quality education has wide positive externalities as the most credible antidote for economic development. It is needed to unlock mechanisms that can transform enormous indigenous potential resources and may be useful to expand the frontiers of the financial system and create wealth for the people (OECD 2001, Sala-i-Martin, Crotti, Battista, Hanous, Galvan, Geiger, and Maiti 2015).

Perhaps, the intellectual foundation on the accretion of finance and its implication as economic development evolves was laid in Gurley and Shaw (1955). The relationship between financial system development and economic growth has been extensively discussed (Patrick 1966, King and Levine 1993b, Levine 2005, Claessens and Feijen 2006). The channels of influence of financial development on growth and *vice versa* include private sector development, improved productivity and capital accumulation, improvements in innovations, greater risk-sharing and potency for lower volatility (Claessens and Feijen 2006). At the higher stage of development, finance responds to growth because the attendant increase in demand for human capital exerts demand pressure on finance (Patrick 1966).

However, the channel of influence between educational development and financial development is not clearly defined in literature, particularly as education may be seen as a means to economic growth. The modes of relationship between educational investments and financial development may be examined in terms of financial services development as it relates to school enrolment, access to credit by the literate, women empowerment and gender equality, reduction in child labour, and provision of education infrastructures (Claessens and Feijen (2006). Financial development entails the integration of informal and formal financial sector operations thereby enhancing the capacity of the sector to support credit delivery (Okoye, Modebe, Egbuomwan and Ezeji 2016). Also, educational services that provide access to information for innovative thinking can improve financial development.

The knowledge spill-over theory of entrepreneurship is exploitable to further the nexus between human capital and the entrepreneur towards developing new competences and can also influence the entrepreneur to start new business. Given a world of high level business uncertainty, research and academic institutions serve as power house for entrepreneurs, and as the entrepreneur is constantly motivated by quest for profit, further investment in human capital may be expected (Audretsch 2012). In particular, this view applies to the intrapreneur that capitalizes on knowledge spill-over from current employment to establish new start-ups.

In African economies, access to finance, for both industrial and start-ups, is weak and problematic (WEF 2016). The dearth of formal finance for development of genuine start-up entrepreneur is attributed to deficiency of macroeconomic institutions that have made the financial environment onerous and risky (Knoop 2013). To this extent, informal finance is most common for start-up idealists and majority of micro and small-scale businesses.

The endogenous (new growth) models (Romer 1990, Lucas 1988) can be further explored towards improving Africa's entrepreneurship, through idea development for technological change. Lack of endogenous technological development remains one of many reasons of underperformance in developing countries as global development partners such as UNIDO admonishes developing economies to explore other development-oriented options such as adopting endogenous light technology rather than western model that is based on heavy technology in their development efforts (Eke 2018).

### 1.1. Review of Empirical Literature

William and Vorley (2017) examined the impact of institutional reforms on entrepreneurship in the post-conflict Kosovo relative to practices in the transitional economies. Main outcome of the study indicates that Kosovo is yet to witness institutional challenges similar to those of the transitional economies which may have led to changes witnessed in both the formal and informal institutions. Closely related is the study by Huggins, Prokop and Thompson (2017) which examined the factors responsible for firms' survival in peripheral regions such as Wales in the UK with the outcome that human capital as it relates to the entrepreneurs' experience and firms' growth motivation were responsible for their survival.

Haidar (2012) examined the business regulatory reform relative to economic growth in 172 different economies and found, on the average, that each reform linearly improves growth by 0.15 per cent. McGuick, Lenihan and Hart (2014) advanced the study on innovative human capital (IHC) by using the augmented innovative production function to examine innovative human capital effects on new firms' growth and performance. The outcome reveals that innovative managers are more valuable in small-sized firms with less than 50 employees than in larger-sized firms. In a study on the role of institutions in economic growth and development, Acemoglu and Robinson (2008) identify differences in economic institutions as major reasons for differences in prosperity across countries. They note the political challenges associated with institutional reforms and thereby recommend that institutions must be reformed to solve problems of development and poverty. In line with Acemoglu and Robinson (2008) we argue that institutional reforms will lead to improvement in the quality of human capital, and that entrepreneurial spirit and attitude may help to deepen the intermediacy of finance in both the short and the long term.

### 1.2. Theoretical framework

The endogenous (new) growth theory posits that long run growth and convergence depend on indigenous policies and technical progress, learning by doing or knowledge transfer. Investment in human capital produces ideas, or new knowledge as the main determinant of economic growth (Lucas 1988). For Lucas, investment in human capital has both internal effects and external (spill-over) effects. On Lucas technical framework, national output can be augmented by the following relations:

$$Y_i = A(K_i).(H_i).H^e \quad (1)$$

where:  $A$  is the technical coefficient,  $K_i$  and  $H_i$  stand for physical and human capital inputs respectively,  $Y_i$  is the gross domestic output. Variable  $H$  is the average human capital capability of the economy augmented by parameter  $e$ , the 'public good' effects of  $H$  on the economy's gross domestic product.

By simple algebra: taking log of both sides and by transformation, equation 1 produces:

$$\log Y_i = \log A(K_i) + \log H_i + e \log H \quad (2)$$

Each sector, firm and the individual investor benefits from the average  $H$  in the economy- that is the average level of skill and knowledge is more crucial for entrepreneurial development transmittable to national output growth  $Y_i$ .

## 2. Methodology

Secondary data covering 2004-2015 were sourced from World Bank development indicators (WDI), United Nations development programme statistics, and National Bureau of Statistics of sampled countries. It is a panel data set, that is, series of observations across the thirteen countries, studied over-time, such that in variables  $x_{it}$ ,  $y_{it}$ ,  $i$  and  $t$  subscripts denote individual country and time respectively. It is an unbalanced panel data set as some countries have omitted observations in some years, that is:

$$\{x_{it}, y_{it}\} : \text{for } i = 1 \dots, N ; t = t_1, \dots, \bar{t}_i \quad (3)$$

This study is guided by the population of African capital market economies comprising the twenty-five (25) countries who are registered members of African Securities Exchange Association (ASEA) in 2015 (ASEA 2015). However, only sixteen of these economies had bond issues traded on their Exchanges as at 2014 (ASEA 2014). They are Botswana, Cameroon, Cote d' Ivoire, Egypt, Ghana, Kenya, Malawi, Mauritius, Morocco, Namibia, Nigeria, Rwanda, South Africa, Tanzania, Tunisia and Uganda. However, Malawi, Rwanda and Uganda were excluded due to paucity of data observations, thereby reducing the sample size to thirteen. The sources, measurement indicators, literature justification and *a priori* expectations of each variable are presented in Table 1 below:

Table 1. Description of variables, data sources, measurements, with justification and *a priori* expectation

Variable description	Type/Source/Measurement	Literature justification	Parameters' <i>a priori</i> expectation.
$Fdp$ = Financial deepening	Secondary/World Bank/ Growth of broad money	King and Levine (1993b) , World Bank (2015)	>0
$Hcd$ = Human capital development	Secondary/ World Bank/ Ratio of Government expenditure on education to total	Alexe and Alexe, (2017), McGuick <i>et al.</i> (2014), Huggins <i>et al.</i> (2017)	>0
$Csb$ = 'Cost to start business' (proxy for entrepreneurship)	Secondary/ World Bank/ % of income per capita	Cull and Xu (2005); OECD (2004)	<0
$Iqx$ = Institutions' quality index	Secondary/Worldwide Governance Indicators(WGI),2015: <a href="http://www.govindicators.org/consisting of regulatory quality; rule of law, governance effectiveness">www.govindicators.org/consisting of regulatory quality; rule of law, governance effectiveness</a>	Acemoglu and Robinson (2008)	>0

Source: Prepared by the authors (2017)

The 'cost to start business' ( $Csb$ ) data is the proxy for entrepreneurship. It is measured as percentage of gross national income per capita in respective economies (WDI 2016). The World Economic Forum (WEF) reports on competitiveness that poor record of 'doing business index' reduce new entrants and foreign direct investment (FDI) which influences productivity, prosperity and well-being of citizens (WEF 2013b). For institutional quality ( $Iqx$ ), the relationship between institutions and growth of the financial and economic systems has been treated in various studies (Knoop 2013, Levine 2005, Detragiache, Gupta and Tressel 2005). Poor institutions and corruption are disincentives to entrepreneurial development, foreign direct investment (FDI), and may lead to de-industrialization (Cull and Xu 2005), while human capital development ( $Hcd$ ) may provide the requisite breakthrough in 'human ingenuity and technological innovations' (WEF 2015, WEF 2016). Since human capital and technological development are of long term gestation, it may require market-based finance, such as the development of Africa's

nascent bond market to close the education infrastructure deficit gap in African economies (Eke, Adetiloye, Adegbite and Okoye 2017).

## 2.1. The Model Specification

The underlying functional form of the conceptual and theoretical arguments can be presented implicitly in linear model form as follows:

$$Y_{it} = f(\alpha_1, X_{1it}^{\beta_1}, X_{2it}^{\beta_2}, X_{3it}^{\beta_3}, \dots, \varepsilon_{it}) \quad (4)$$

where:  $Y_{it}$  represents financial deepening;  $X_1$  is 'Cost to start business' ( $Csb$ ), and  $X_2$  is human capital development ( $Hcd$ );  $X_3$  represents institutional quality index ( $lqx$ ).

In explicit form, and by applying the log transformation process, the model becomes:

$$\log Y_{it} = \alpha_1 + \beta_1 \log X_{1it} + \beta_2 \log X_{2it} + \beta_3 \log X_{3it} + \dots + \varepsilon_{it} \quad (5)$$

The study adopts 'Cost to Start Business' ( $Csb$ ), Human capital development ( $Hcd$ ) as independent variables, and institutional quality ( $lqx$ ) as control variable as presented below:

$$Financial\ deepening_{it} = f(Cost\ to\ Start\ Business_{it}, Human\ capital\ development_{it}, Institutional\ quality_{it} \dots) \quad (6)$$

Given the nature of unbalanced panel data, the structure of the model assumes this form:

$$Fdp_{it}^t = a_{it} + \beta_1 Csb_{it}^t + \beta_2 Hcd_{it}^t + \beta_3 lqx_{it}^t + \mu_i + \varepsilon_{it} \quad (7)$$

-                      +                      +

where:  $Fdp$  is financial deepening,  $Csb$  is 'cost to start business', proxy for entrepreneurship;  $Hcd$  is human capital development.

Following King and Levine (1993a) this study adopts financial deepening as measure of financial development, due to its liquidity effects, and may substitute for economic growth.  $lqx$  is institutional quality index.

## 2.2. Estimation Technique

A dynamic relationship is assumed, detailed in an augmented Toda-Yamamoto (ATY) between entrepreneurship, financial deepening, human capital and institutional quality. Toda-Yamamoto (1995) discusses long run regression, by extending granger causality methodology to handle causal relation models in a VAR environment involving non-uniform level of stationarity. The summarized specification of the original Toda and Yamamoto (1995) framework for  $Y_t$  and  $X_t$  series stated with panel notation are presented below:

$$Y_{it} = a + \sum_{j=1}^{m+d} \phi_j Y_{it-j} + \sum_{k=1}^{n+d} \varpi_k X_{it-k} + \varepsilon_{Yit} \quad (8)$$

$$X_{it} = a + \sum_{j=1}^{m+d} \varphi_j X_{it-j} + \sum_{k=1}^{n+d} \delta_k Y_{it-k} + \varepsilon_{Xit} \quad (9)$$

where:  $d$  represents maximum order of integration of the variable in the system,  $m$  and  $n$  are optimal lag of  $Y_t$  and  $X_t$ . The random error  $\varepsilon$  is assumed white noised.

This study extends the  $TY$  dynamic long run form by introducing short run innovation. The model adopts modified Wald test, whose statistics for  $Y$  equation is presented below:

$$F = \frac{(Rss_{RY} - Rss_{UY}) / K}{Rss_{UY} / (N - K)} \quad (10)$$

where:  $K$  represents the number of estimated coefficient. Using the F-test and Chi-squared statistics, the null hypothesis of no co-integration relationship is defined as:  $H_0 = \delta_1 = \delta_2 = 0$  against alternative hypothesis that  $H_1 \neq \delta_1 \neq \delta_2 \neq 0$  of the presence of co-integration.



In explicit form, following Masmoudi (2010) on the dynamic linkage of Global hedged funds and traditional financial assets, the dynamic multivariate panel Granger-VAR system is presented and thus accounts for the elimination of individual country specific effects  $\mu_i$  as shown in equations 11 to 14:

$$\Delta Fdp_{it} = \alpha_1 + \sum_{j=1}^P \theta_{1j} \Delta Hcd_{it-j} + \sum_{j=1}^P \delta_{1j} \Delta Csb_{it-j} + \sum_{j=1}^P \psi_{1j} \Delta Iqx_{it-j} + \sum_{j=1}^P \gamma_{1j} \Delta Fdp_{it-j} + \varepsilon_{it}, \quad (11)$$

$$\Delta Hcd_{it} = \alpha_2 + \sum_{j=1}^P \theta_{2j} \Delta Hcd_{it-j} + \sum_{j=1}^P \delta_{2j} \Delta Csb_{it-j} + \sum_{j=1}^P \psi_{2j} \Delta Iqx_{it-j} + \sum_{j=1}^P \gamma_{2j} \Delta Fdp_{it-j} + \varepsilon_{it}, \quad (12)$$

$$\Delta Csb_{it} = \alpha_3 + \sum_{j=1}^P \theta_{3j} \Delta Hcd_{it-j} + \sum_{j=1}^P \delta_{3j} \Delta Csb_{it-j} + \sum_{j=1}^P \psi_{3j} \Delta Iqx_{it-j} + \sum_{j=1}^P \gamma_{3j} \Delta Fdp_{it-j} + \varepsilon_{it}, \quad (13)$$

$$\Delta Iqx_{it} = \alpha_4 + \sum_{j=1}^P \theta_{4j} \Delta Hcd_{it-j} + \sum_{j=1}^P \delta_{4j} \Delta Csb_{it-j} + \sum_{j=1}^P \psi_{4j} \Delta Fdp_{it-j} + \sum_{j=1}^P \gamma_{4j} \Delta Iqx_{it-j} + \varepsilon_{it}, \quad \dots \quad (14)$$

where:  $\theta, \delta, \psi$ , and  $\gamma$  are unknown parameters;  $\alpha_{1-4}$  are constant terms;  $\varepsilon_{it}$  is the residual, white noise (idiosyncratic) compliant for each equation.

In addition, the VECM framework that allows for multiple co-integrating vectors, with each explanatory variable bearing its *speed-of-adjustment* parameter can be represented as:

$$\Delta Y_t = \alpha + \sum_{i=1}^p \Gamma_i \Delta Y_{t-i} + \Pi e_{t-i} + \varepsilon_t \quad (15)$$

$$\Gamma = \tau \beta' \quad (16)$$

where:  $Y$  represents vector of variables listed in 11-14;  $\tau$  represents a matrix of speed of adjustment parameters,  $\beta$  represents matrix of co-integrating vectors,  $\varepsilon$  is vector of error terms.

### 3. Demonstrations

#### 3.1. Unit root test

To determine the level of stationarity, within the context of heterogeneous panel, the study uses three panel unit root processing techniques. That is, the study assumes the common unit root based statistics; the Levin, Lin and Chu (LLC 2002); and we assume individual or entity based unit root statistics- Im, Pesaran and Shin (IPS 2003) and ADF-Fisher Chi-Square. This study places overriding priority on the IPS test for its superiority in handling heterogeneities among entity unit roots in panel.

The unit root test presented in Table 2 shows that Financial deepening ( $Fdp$ ) is stationary at level while Institutions' regulatory quality ( $Iqx$ ) is stationary at level. Cost to start business ( $Csb$ ), and Human capital development ( $Hcd$ ) are stationary at second difference. The outcome of the integrated variables partly influenced the Toda-Yamamoto estimation techniques, augmented for the short run innovation.

Table 2. Unit Root

Variable	Common unit root process assumed		Individual (country) unit root process assumed				Level of stationarity	Assumption on Exogenous variable
	LLC test	Prob.	IPS test	Prob.	ADF-Fisher Chi-square	Prob.		
Fdp	-5.6666	0.000***	-2.3028	0.0106**	42.7283	0.010**	Level	Ind. Effects
Iqx	-3.3804	0.000***	-2.1539	0.0156**	37.3020	0.004***	1 <sup>st</sup> diff.	Ind. effects
Csb	-	-	-3.7196	0.0001***	52.2211	0.000***	2 <sup>nd</sup> diff.	Ind. effects
Hcd	-	-	-1.5466	0.0610*	30.9009	0.013**	2 <sup>nd</sup> diff.	Ind. Effects

Source: computed by the authors using E-view 7. \*, \*\*, \*\*\* indicates significant at 0.1, 0.05 and 0.001 significant levels respectively

### 3.2. Lag selection process

An examination of Table 3 below reveals that the study chooses lag length 2 as the optimal, being a consensus of majority of the criteria: All Information Criterion (AIC), Final Prediction Error (FPE), and sequential modified LR test statistics.

Table 3. Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-289.6432	NA	0.015154	7.162030	7.279431	7.209165
1	-116.1258	325.8742	0.000325	3.320141	3.907146*	3.555815*
2	-94.72275	38.10787*	0.000286*	3.188360*	4.244968	3.612572
3	-79.98148	24.80847	0.000297	3.219061	4.745273	3.831811

Source: computed by the authors (2017) using E-view 7: where LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion. \* denotes lag order selected by the criteria.

### 3.3. The Findings: short run (dynamic) and long run result

The result of the multivariate interactions is presented in Table 4 below, with four short run (dynamic) multivariate equation results of mixed outcome: Financial deepening (*Fdp*), Human capital development (*Hcd*), and Institutional quality (*lqx*) produce the required standard negative short run adjustment coefficients, indicative of speed of adjustment to equilibrium. It reveals that there are short run dynamic influences flowing from the respective explanatory variables jointly impacting the dependent variables. Thus, the results reveal reasonably that the models tend towards long run stability.

However, the 'cost to start business' (*Csb*) variable produces positive short run coefficient, an indication that the *Csb* models would not converge, tends to be explosive; its short-term instability may be transmitted further to the long term, hence no long term equilibrium.

Table 4. Short Run (Dynamic) Causality Results

Dependent variable	Optimal Lag order of exogenous variables	Coefficient: Short run residual	Std. error	Outcome and implication
<i>Fdp</i>	2	-0.34647	0.2593	Joint influence of the model's exogenous variables flow to the dependent variable and converges to equilibrium
<i>Hcd</i>	2	-0.16253	0.2429	Joint influence of the model's exogenous variables flow to the dependent variable and converges to equilibrium
<i>Csb</i>	2	0.02015	0.3013	No convergence to equilibrium
<i>lqx</i>	2	-0.64305	0.4064	Joint influence of the model's exogenous variables flow to the dependent variable and converges to equilibrium

Source: Authors' computation (2017) using E-view 7.

### 3.4. Long Run Causality Result

The long run causality results presented in Table 5 shows negative long run causality from 'cost to start business' (*Csb*) (proxy for entrepreneurship) to financial deepening (*Fdp*), albeit insignificantly. This suggests that the high 'cost to start business' in Africa is disincentive to prompting financial development.

For hypothesis 2, the Wald test result reveals that *Fdp* positively drives *Hcd* in the long term. An insight into these outcomes may underscore the contentious debate of whether growth drives financial development or otherwise in developing economies. Since *Hcd* does not drive *Fdp*, it can be deduced *a priori* that growth through human capital investments fail to drive financial development, while financial development drives growth in the African region.

The study fails to reject the null hypothesis of no significant causal flow from human capital development (*Hcd*) to entrepreneurship. The outcome suggests low quality education output which does not prompt entrepreneurship. Non-qualitative education system is likely not to produce genius, creativity and inventors. The reverse causality from entrepreneurship (*Csb*) to *Hcd* is however indicates that *Csb* significantly drives *Hcd*.

Further result reveals that financial deepening (*Fdp*) has positive long term causal relationship with institutions' regulatory quality (*lqx*), while the reverse causality is insignificant. Financial deepening may encourage risk taking and risk sharing attitude, which should inspire institutional support to drive effectiveness and efficiency in the financial industry. A dynamic financial market may inspire regulatory institutions, as Levine (2004) reveals



that developments in the money and capital markets have positive link with development of financial institutions, such as regulations that ensure fair secondary market trading, contract enforcements, adequate information dissemination or sharing, investors' protection, and so on. Moreover, the financial system can perform incredibly to aid growth and development if credible institutions are in place in African economies. The lack of long run co-integration flow from regulatory institutions to financial deepening may reveal poor state of institutional support for development in Africa.

Moreover, two positive and significant outcomes of the study is that one way long-term causality exists from institutional quality (*lqx*) to entrepreneurial development (*Csb*), and from *lqx* to human capital development (*Hcd*). The former result, that is, *lqx* driving *Csb* may affirm that effective institutions' governance system is needed for wide-spread entrepreneurship in the region. Given that Africa is largely consumption-oriented population, global entrepreneurs may revert to African economies if requisite regulatory institutions and market-oriented policies are consistently in place. The latter case signals that quality institution significantly impact human capital, transmittable to deepening finance in the region. The result of human capital (*Hcd*) not driving institutional quality (*lqx*) may have revealed the poor education output and 'training for leadership' of African education, such that by *a priori*, quality of education determines a nation's growth supporting institutions and hence the living standard.

Table 5. Long Run Causality Result: Augmented Toda-Yamamoto Granger (Non-causality & co-integration) Approach

Null Hypothesis	Coefficient	MWald test (p lag order =2) value/(prob.):		Co-integration & Causality?
		$\chi^2$ Stat.	F-Stat.	
Csb does not cause Fdp	-0.0002	0.65(0.72)	0.32(0.72)	no
Fdp does not cause Csb	11.149	1.24(0.53)	0.62(0.54)	no
Hcd does not cause Fdp	0.188	2.45(0.29)	1.22(0.30)	no
Fdp does not cause Hcd	0.471	9.86(0.00)***	4.92(0.01)**	yes: Fdp→Hcd
Csb does not cause Hcd	-0.002	5.04(0.08)*	2.52(0.09)*	yes: Csb→Hcd
Hcd does not cause Csb	-9.775	1.97(0.37)	0.98(0.38)	no
lqx does not cause Fdp	0.05	0.42(0.80)	0.21(0.81)	no
Fdp does not cause lqx	1.82	5.39(0.06)*	2.69(0.08)*	yes: Fdp→lqx
lqx does not cause Csb	33.92	11.90(0.00)***	5.95(0.00)***	yes: lqx→Csb
Csb does not cause lqx	0.004	2.12(0.34)	1.06(0.35)	no
lqx does not cause Hcd	0.065	5.19(0.07)*	2.59(0.09)*	yes: lqx→Hcd
Hcd does not cause lqx	-0.462	2.48(0.28)	1.24(0.30)	no

Source: computed by the authors (2017) using E-view 7; \*, \*\*, \*\*\* indicate significance at 0.1, 0.05 and 0.001 levels respectively. denotes one-way causality; yes: indicates co-integration and causality; no: indicates no co-integration and causality. Probability values are in parenthesis.

Presented in Table 6 below is the overall (Wald) test for individual equations in the multivariate model. Two equations, human capital (*Hcd*) and entrepreneurship (*Csb*), are statistically significant. It provides overall long run evidence that the explanatory variables- *Fdp*, *Csb*, *Hcd*, and *lqx* jointly and contemporaneously influence the respective dependent variables (*Csb* and *lqx*) in the long term. However, *Fdp* and *lqx* equations are not significant which may suggest that their respective models require more explanatory variable.

Table 6. Long Run Causality Results: Joint Statistics Modified Wald Test

Variables studied @ lag order P=2: <i>Fdp</i> , <i>Csb</i> , <i>Hcd</i> , and <i>lqx</i>	Test statistics value $\chi^2$		Prob. ( $\chi^2$ Stat.)	Prob. (F. Stat.)	Outcome: joint influence flow?
	Stat.	F. Stat.			
Dependent variable: <i>Fdp</i>	41.0016	5.1252	0.0000 ***	0.0005***	Yes
Dependent variable: <i>Hcd</i>	18.3284	2.2910	0.0189**	0.0500**	Yes
Dependent variable: <i>Csb</i>	229.503	28.6879	0.0000***	0.0000***	Yes
Dependent variable: <i>lqx</i>	16.2833	2.3854	0.038 **	0.0787*	Yes

Source: Computed by the authors (2017) using E-view 7; \*, \*\*, \*\*\* indicate significance at 0.1, 0.05 and 0.001 levels respectively.

### 3.5. Diagnostic Tests

The time series properties of the data were further examined for evidence of long run relationship among the variables. Time series data are often associated with random behaviour, hence when two or more of such variables are included in a model, evidence that the series are co-integrated validates the regression estimates. The test results are presented below:

### 3.5.1. Co-integration test

To ascertain evidence of co-integration, the Pedroni residual result presented in Table 7 suggests rejection of the null hypothesis of no co-integration exists among the variables.

Table 7. Pedroni residual co-integration test

Test	Intercept	Intercept and Trend
Panel <i>adf</i> -statistics	-0.851552	-3.199410**
Panel <i>t</i> -weighted stat.	-1.665850*	-2.560699**
Panel <i>adf</i> -Weighted stat.	-2.061165**	-3.235299**
Group <i>t</i> -statistics	-2.507640**	-3.039117**
Group <i>adf</i> -stat.	-1.985863*	-4.519239**

Source: Computed by the authors (2017) using E-view 7; Pedroni (2004) one sided statistics critical values -1.64 ( $k < -1.64$ ).

\* & \*\* represents significance 5% and 1% respectively, suggests rejection of the null.

### 3.5.2. Serial correlation test

The Lagrange multiplier (LM) serial test result presented in Table 8 below reveals that the study fails to reject the null hypothesis that there is no serial correlation at both lags 1 and 2, as the probability is above 5% threshold.

Table 8. VAR residual correlation LM test

Lag	Observations	LM-Stat.	Probability
1	95	24.09619	0.0874
2	95	24.13770	0.0865

Sources: By the authors using E-view 7. Probs from chi-square with 16 df.

## 4. Discussion of results

A major outcome of the study is that both entrepreneurship (*Csb*) and financial deepening (*Fdp*) do not drive one another in the long term, neither does human capital (*Hcd*) co-integrate and cause entrepreneurship (*Csb*) and institutional quality (*Iqx*). It may indicate poor state of human capital, as catalyst and 'vector' to critical growth variables, enroute impacting financial deepening. Quality education may open up the mind of the learner to latent business opportunity and assist in creating markets that would deepen finance. It points to the key challenge of the education system in developing economies, as current human capital being produced may be less relevant relatively, to match demand, and meet the fast-changing labour market opportunities (UNESCO 2014).

The lack of co-integrating linkage of human capital to entrepreneurship is more precarious, as this may have accounted for growing level of unemployment in the economies. Entrepreneurship theory reveals that human capital impacts entrepreneurial development directly and indirectly (Fogel *et al.* 2006). In addition to promoting basic knowledge, academic content of learning ought to promote problem-solving capacities and creative thinkers. Low factor productivity remains the most daunting causes of persistent poverty in developing countries (Altenburg 2011). Entrepreneurial talents require absorption, adaptation and application of knowledge and technology creatively. Similarly, the poor linkage from human capital to institutional quality evidences the underperformance of Africa's institutions and bane of her underdevelopment, unlike advanced economies.

Further result that financial deepening (*Fdp*) lacks co-integrating course with entrepreneurship (*Csb*) may have revealed the perverse state of African financial system, as its high interest cost discourages long term taking attitude. Though, for developing countries Mckinnon (1973) and Shaw (1973) emphasize financial repression as bane of financial development towards impacting the real sector growth, however African economies are noted for 'maladapted' financial system and bank disorientation against long term investments (Ojo 2010). Lack of legal support, information asymmetry, high interest rate on borrowings and corresponding low deposits rate still run in many African financial markets, hence long term borrowing for start-ups and entrepreneurship seem herculean (Knoop 2013).

Furthermore, one-way causal influence from financial deepening (*Fdp*) to human capital development is achieved, and as a fall-out from earlier paragraph, human capital (*Hcd*) does not drive financial deepening (*Fdp*). As human capital creates market and functions it, the result may be an indication of paucity of the financial system to provide needful intermediation function. Given low annual public budget for education in majority of the economies, the low quality of education may not be in doubt, such that outputs may lack entrepreneurial innovativeness and capacity for critical thinking. In reality, quality education is required for the development of needful entrepreneurial 'spirit' in the modern higher school graduate for global competitiveness in innovation and

productivity. UNESCO (2014) contends that in many societies, knowledge acquired by recent graduates did not prepare them for the labour market.

Advocates of a knowledge economy contend that the weak 'state of doing business' index in developing countries may be overcome by requisite knowledge, skill and by extension enquiring mind wishing to overcome business obstacles (Altenburg 2011, World Bank 2001). Upon that feat can skilful innovators engineer financial development through product innovation. Furthermore, lack of creative human capital only end-up increasing the low productive distributive and service sectors for the new school leavers especially at the college graduate level, rather than the much needed higher value addition from new creativity and innovations. Should there be commitment to quality human capital, genuine entrepreneurial development can transform the African economies, improve the level of employment and the peoples' living standard, and reduce household poverty.

## 5. Summary of findings

Three hypotheses were tested. Results of the short-run dynamic residuals of financial deepening (*Fdp*), Human capital (*Hdp*) and institutional quality (*Iqx*) produce negative coefficients, which suggest convergence and co-integration. Result of the first hypothesis reveal that in the long-term entrepreneurship does not significantly impact financial deepening; the second hypothesis similarly reveals that human capital development (*Hcd*) does not positively link financial deepening (*Fdp*) in the long term. Neither does human capital (*Hcd*) drive entrepreneurship

## Conclusion and recommendations

Based on the findings above the study concludes that human capital development does not significantly drive entrepreneurship, which itself does not link financial deepening; an indication that risk taking tasks by prospective entrepreneurs may be a monumental task for financial market development, a negation of the growth led finance hypothesis.

The findings of this study have informed the following recommendations: First, the disconnect from entrepreneurship to financial deepening requires institutions in governments and private sector to devote commitment to entrepreneurship. Secondly, human capital development lacks long term causal relations with financial deepening. Here, a robust education curriculum that incorporates skill development by 'town and gown' interfacing can build the needed manpower to manage productive resources, to create wealth and build businesses.

Thirdly, human capital does not co-integrate with entrepreneurship. It is recommended that higher education should be privatized as competitiveness can produce a better-quality output. Government regulatory policies on education services should be on quality human output rather than quantity. Mechanisms of 'training the trainer' on the needs of the labour market through industry-college recurrent workshops, lectures, seminars and conferences can be initiated by proactive regulatory institutions.

Fourthly, as financial deepening does not influence entrepreneurship in the long term, it requires government to evolve stable macroeconomic system that will lower cost of funds. Government may have to intervene at influencing low monetary policy rates at the Central Bank.

Fifthly, financial deepening driving human capital significantly implies that education infrastructure can be further boosted by existing financial products. This study advocates development of education bond towards financing standard education infrastructures.

Sixthly, entrepreneurship drives human capital significantly in the long term. The paper recommends that the institutional challenges of entrepreneurship such as ease of doing business and financing issues be addressed by government.

Seventh, institutional quality adversely drives entrepreneurship. On institutions link with entrepreneurship, governments should periodically review the legal and regulatory policies to further give incentives to reduce the cost to start-up business and enhance the ease of doing business. Also, government should ensure adequacy and strict enforcement of property right laws. Finally, the non-linkage of human capital to institutional quality requires that government evolve a research culture, invest in research infrastructure, and promote competitive higher education by privatization. Scholarships should be provided for higher quality human capital development.

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