Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.8, No.13, 2017

Sub-Saharan Africa's Financial Market Development Gap: A Human Capital Deficiency? (Decomposition of Banking, Financial Sector Intermediation and Stock Market Failures)

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Abstract
This study evaluates the influence of human capital on development of three elements of a financial market, namely: banks, financial sector intermediation to the private sector and stock markets, in Sub-Saharan Africa. The developed model is relatively innovative as it explicitly models financial market failures, includes a nonlinear variable and is underpinned by adaptive expectations. Tertiary education was found to be critical for banking, financial sector intermediation and stock market development. The study finds that, for the banking industry, past failures narrow current gaps. However, increased public expenditure on education is important for only financial sector intermediation and stock market development.
Keywords: Financial markets, Human capital, Sub-Saharan Africa.
JEL Classification: G10, O16, O55.

1. INTRODUCTION

Financial markets are critical for long-term and sustainable development. Yet, Sub-Saharan Africa (SSA) has one of the least developed financial markets, characterized by marginal innovation as well as weak regulations and oversight (Allen, Carletti, Cull, Qian & Senbet, 2010). Out of the almost 48 countries on the sub-continent, only South Africa has functioning bond, derivatives and stock markets. Furthermore, only about 18 SSA economies have stock markets (World Bank, 2017). Also, the average ratio of private sector credit to gross domestic product (GDP) in SSA hovers around 23 percent. The same ratio for United States of America is approximately 246.2 percent.

Previous research highlights that governance and institutional failures explain SSA's deficient financial markets (Anayiatos & Toroyan, 2009; Mbulawa, 2015). Allen *et al.* (2010) and Andrianaivo & Yartey (2009) also emphasize inappropriate laws and regulations as part of the problem. Huang (2010) and Standley (2010) emphasize the importance of socio-economic determinants. The latter factors are instructive as, even after many decades of significant economic liberalization and reforms, SSA financial markets have not witnessed the rapid development envisaged. Although, the sub-continent's banking sector is expanding, more than 60 percent of its population are unbanked. On the other hand, financial sector intermediation to the private sector, although expanding, still lags behind that of developed and other emerging economies. Moreover, the sub-continent's stock markets are small, illiquid and relatively inactive.

This implies that there are other vital determining factors that could significantly enhance the long-term and sustainable advancement of the sub-continent's financial markets. One of such determinants is human capital (Hakeem & Oluitan, 2012). Therefore, this study examines the importance of human capital in financial market development in SSA. Additionally, it addresses the literature gap on such research. Its findings have implications that could deepen and strengthen the sub-continent's financial architecture. To meet its objectives, the paper begins with an introduction. This provides a background and overview. The second chapter succinctly reviews pertinent literature, while the third section explains the underlying analytical framework, data and empirical

methodology. The ensuing chapter presents the results and discusses the findings. The final chapter, however, concludes and summarizes the study.

2. LITERATURE REVIEW

This section reviews pertinent theoretical and empirical research. Theoretically, human capital refers to competencies, hard or soft skills as well as knowledge that improves productivity (Becker, 1993). Spence (1973), on the other hand, argues that human capital variables are simply indicators of capability necessary for production. Gardner (2013) contributes to this theory by highlighting various dimensions of human capital such as formal schooling. The Bowles-Gintis proposition hypothesis intimates that human capital encompasses human capability to adjust to alternate conditions or function in an appropriately organized society (Bowles & Gintis, 1975). This connotes the idea of adaptation. This latter hypothesis is similar to the Schultz/Nelson-Phelps human capital concept. All the afore-mentioned theories are relatively similar, except the Spence hypothesis.

Human capital is essential to appropriate functioning of financial markets (Huang, 2010; Outreville, 1999). It has a long-term sustainable augmenting influence and encourages financial market participation. Moreover, it improves innovation, labor productivity and technological advancement (Cavapozzi, Fiume, Garrouste & Weber, 2010). Low financial literacy limits activity and investment in such systems. As well, the higher the age at which individuals first participate in financial markets, the lower the level of financial development in an economy (Almenberg & Save-Soderbergh, 2011, Thomas & Spataro, 2015). On the other hand, increased human capital lowers the initial age at which individuals undertake financial investments as well as deepens financial markets and widens its scope.

One strand of human capital research highlights that additions to human capital are an asset investment similar to research and development expenditure or increased capital per worker. Mincer (1974) outlines this with an exposition to returns to schooling. This implies that financial market development may then be perceived as a return to improved human capital. Alternatively, Outreville (1999) suggests that human capital is an indicator of the level of socio-economic development. This latter hypothesis, has much broader applications. One reason is because it may signify human capital improvements as advances in cultural and socio-economic frameworks or processes. Such latter dynamic alterations decrease information and transaction costs and positively improve financial system processes.

Another school of thought, the resource-based theory, postulates that the human capital-financial market development relation may be modeled as a production function, with the former denoted as an input (Quinn, 2005). This is key as human resources design financial market laws, institutions and norms that either stimulate or dampen financial development. The knowledge-based hypothesis, a variant of the resource-based theory, states that the most critical asset is human capital (Crook, Todd, Combs, Woehr & Ketchen, 2011). According to these two theories, however, SSA's financial market development gap is due to deficiencies in its human capital. This study examines whether this is true.

A related but divergent hypothesis postulates that there are positive externalities to individual investments in education, skills acquisition or training (Acemoglu & Angrist, 2000). By extension, increased personal human capital investments indirectly improve financial markets. There may be some merit to this, as innovative financial instruments initially developed by transacting parties in order to overcome existing limitations are eventually adopted by other financial market participants. However, it is the prior knowledge or skills, gained through education by the concerned individuals that enabled them develop such innovative advancements.

An indirect link between human capital and financial market development is implicitly suggested by Bontis (2001). The considered study asserted, generally, that competencies, knowledge and skills of employees can be internalized by the firm or organization. By extending this theory, human capital enhancements are indicative of financial market improvements, as the latter assimilates the former.

Critical human capital variables examined in associated empirical studies include: duration of training, literacy rate, number of years of formal schooling, mathematical and numeracy skills, quality of schooling, school enrolment ratios and student-teacher ratio (Allen *et al.*, 2010; Cavapozzi *et al.*, 2010; Thomas & Spataro, 2015). Alternatively, Bassi, Harrison, Ludwig & McMurrer (2004) and Hansson (2004) use public expenditure or investment on education as a measure of its quality or productivity. Larsson & Morling (2015) proxy this by using wage per employee.

3. ANALYTICAL FRAMEWORK, METHODOLOGY AND DATA

3.1 Analytical framework:

To undertake its empirical analysis, this study develops a variant model developed initially in Afful, Okeahalam and Ayogu (2017). Let country *i* be the representative economy or country. Assume that ξ_t is the level of financial sector development at time *t*. The quality of human capital, Ψ_t, is defined as: $\Psi_t = \chi^* - \chi_t$, where χ^* and χ_t are the optimal and current levels of human capital stock. Let $\frac{\Psi_t}{\xi_{t-1}}$ represent a nonlinear interaction effect between human capital and financial market development / failure. It may be noted that previous level of financial market development, ξ_{t-1}, interacts with current quality of human capital. Then, the relation between ξ_t and Ψ_t may be postulated as:

$$\xi_t = \Psi_t + \frac{\Psi_t}{\xi_{t-1}} \tag{1}$$

As in Afful, Okeahalam and Ayogu (2017), assume that ξ_t is generated through an adaptive expectations process such that $\xi_t = \xi_{t-1} + \delta_t(\xi^* - \xi_{t-1})$. Note that ξ^* is the optimal financial development level, while δ_t is the percentage enhancement to financial development at time *t*. Then equation (1) becomes:

$$(\xi^* - \xi_{t-1}) = \frac{\Psi_t}{\delta_t} + \frac{\Psi_t}{\delta_t \xi_{t-1}} - \frac{\xi_{t-1}}{\delta_t} \tag{2}$$

Suppose that $\delta_t \cong \ln \frac{\xi_t}{\xi_{t-1}}$. For ease of tractability, $\frac{\Psi_t}{\delta_t}$, $\frac{\Psi_t}{\delta_t * \xi_{t-1}}$, $\frac{\xi_{t-1}}{\delta_t}$ and $\frac{\varepsilon_t}{\delta_t}$ are denoted as Ψ_{t,δ_t}, $\frac{\Psi_{t,\delta_t}}{\xi_{t-1}}$, $\xi_{t-1,\delta t}$ and ε_{i,δ_t} respectively.

$$(\xi^* - \xi_{t-1}) = \Psi_{t,\delta_t} + \frac{\Psi_{t,\delta_t}}{\xi_{t-1}} - \xi_{t-1,\delta t} + \varepsilon_{i,\delta_t} \tag{3}$$

$(\xi^* - \xi_{t-1})$ may be interpreted as quality of financial market development in country *i*. Alternatively, it represents the degree of system failure. Equation (3) states that $(\xi^* - \xi_{t-1})$ is determined by Ψ_{t,δ_t}, $\frac{\Psi_{t,\delta_t}}{\xi_{t-1}}$ and $\xi_{t-1,\delta t}$ respectively.

Similar to Afful, Okeahalam and Ayogu (2017), this study disaggregates financial market development into three components, namely: banking industry, financial sector intermediation to the private sector and stock markets enhancements. The underlying regression model that examines the influence of human capital on banking sector development is represented as:

$$(\xi^{b*} - \xi^b_{t-1}) = \Psi_{\exp enditure,\delta_t} + \Psi_{scholling,\delta_t} + \Psi_{tertiary,\delta} + \frac{\Psi_{\exp enditure,\delta_t}}{\xi^b_{t-1}} - \xi^b_{t-1,\delta_t} + \varepsilon_{i,\delta_t} \tag{4}$$

Every variable with a superscript of *b* denotes the level of banking sector development or improvement. Similarly, the regression model for financial sector intermediation and stock market development are represented below as equations (5) and (6) respectively:

$$(\xi^{f*} - \xi^{f}_{t-1}) = \Psi_{\exp enditure,\delta_t} + \Psi_{scholling,\delta_t} + \Psi_{tertiary,\delta} + \frac{\Psi_{\exp enditure,\delta_t}}{\xi^{f}_{t-1}} - \xi^{f}_{t-1,\delta_t} + \varepsilon_{i,\delta_t} \quad (5)$$

$$(\xi^{s*} - \xi^{s}_{t-1}) = \Psi_{\exp enditure,\delta_t} + \Psi_{scholling,\delta_t} + \Psi_{tertiary,\delta} + \frac{\Psi_{\exp enditure,\delta_t}}{\xi^{s}_{t-1}} - \xi^{s}_{t-1,\delta_t} + \varepsilon_{i,\delta_t} \quad (6)$$

3.2 Empirical methodology

Related empirical studies are mostly parametric in nature. These past studies may be categorized into two. The first set considers static analytical techniques, such as generalized linear regressions computing fixed and random effects (Mbulawa, 2015; Yoong, 2011). The other group focus on dynamic methodologies. A number of these use dynamic panel approach, such as generalized method of moments (GMM), including Huang (2010), Mbulawa (2015) and Palacois-Huerta (2003). This study also uses GMM methodology because equations (3) – (5) model a dynamic relation between human capital and development in the three considered financial markets. Similar to the afore-mentioned studies, this study uses the one-step GMM estimation method because the two-step process has critical limitations (Greene, 2011; Mbulawa, 2015, Wooldridge, 2010).

However, as a matter of interest, the Breusch-Pagan Lagrangian test is used to ascertain whether the SSA human capital-financial market development relation is characterized by a predominant fixed or random effects influence. This is because the sample is comprised of about 14 SSA countries, spanning 15 years (Gujarati, 2005; Huang, 2010; Mbulawa, 2015; Wooldridge, 2010).

3.3 Data

The SSA region comprises of 48 countries with highly diverse cultures, economies, ethnicity, land sizes and population. Data for the study covers 14 selected SSA countries: Botswana, Cote d' Ivoire, Ghana, Kenya, Malawi, Mauritius, Morocco, Namibia, Nigeria, South Africa, Swaziland, Tanzania, Uganda and Zambia. These are selected because they have all three examined financial market types: banking industry, financial sector intermediation to the private sector and a stock market. Zimbabwe is excluded because of lack of data. The dataset is a balanced panel. The study is limited to the years 2010-2016 because of prior changes in human capital variables in previous years. Also, underlying variable definitions were altered in preceding years. Therefore, for empirical accuracy, consistency and validity, only data within the considered years are used in the empirical analysis. Data was sourced from United Nations Development Programme (2017) and World Bank (2017).

The three dependent variables are banking sector enhancement, financial sector intermediation to the private sector improvements and stock market development. The ratio of bank deposits to Gross Domestic Product (GDP) is the proxy for the level of advancement in the banking industry. On the other hand, the proportion of total private sector credit by deposit banks and related financial institutions to GDP signifies the quality of financial sector intermediation. Added to this, stock market capitalization to GDP ratio denotes stock market development (Cavapozzi *et al*., 2010; Huang, 2010).

The relevant independent human capital variables are, namely: mean years of schooling, public expenditure on education as a percentage of GDP, pupil-teacher ratio and tertiary schooling gross enrolment ratio (United Nations Development Programme, 2017). These afore-mentioned variables are used by Brown *et al.* (2008), Cavapozzi *et al.* (2010) and Cole & Shastry (2008). A lag of each dependent indicator is included as an additional independent variable in respective regression models.

The optimal financial market and human capital indicators are proxied by data for very highly developed economies. The latter are already defined and categorized in United Nations Development Programme (2017) and World Bank (2017). They represent the critical benchmarks used to develop the independent variables as illustrated in the functional form of the analytical framework and model depicted in equations (1) – (6).

4. EMPIRICAL ANALYSIS, RESULTS AND FINDINGS

4.1 Pre-regression diagnostic tests

i. Multi-collinearity:

The pertinent multi-collinearity test indicators calculated are: condition index, eigenvalue, r-squared, tolerance factor, variance inflation factor (VIF) and VIF square root. Three sets of these are computed for the following regressions: banking industry, financial sector intermediation and stock market development. The multi-collinearity test statistics are presented in tables 1-3 respectively.

Table 1. Banking industry development regression variables - multi-collinearity test

Variable	VIF	VIF square root	Tolerance factor	R-squared	Eigen-value	Condition index
Banking sector development	1.24	1.11	0.81	0.19	4.17	1.00
Banking sector development (LAG)	1.14	1.07	0.88	0.12	0.16	5.08
Mean years of schooling	1.51	1.23	0.66	0.34		
Tertiary education (gross enrolment)	1.82	1.35	0.55	0.45	1.67	1.58
Pupil-teacher ratio	1.88	1.37	0.56	0.44	0.96	2.09
Interaction effect (banking industry and public education expenditure-GDP ratio)	1.81	1.34	0.55	0.45	0.28	3.84

Table 1 presents the multi-collinearity test results for the following variables: banking sector development, banking sector development lag, interaction effect, mean years of schooling, tertiary education gross enrolment and pupil-teacher ratio. Computed VIFs for all examined variables are between 0.10 and 10. This means that there is no multi-collinearity. The other multi-collinearity test statistics also confirm this conclusion.

Table 2. Financial sector intermediation regression variables - multi-collinearity test

Variable	VIF	VIF square root	Tolerance factor	R-squared	Eigen-value	Condition index
Financial sector development	1.19	1.09	0.84	0.16	4.21	1.00
Financial sector (LAG)	1.20	1.10	0.83	0.17	1.55	1.65
Mean years of schooling	1.45	1.21	0.69	0.31	1.11	1.95
Tertiary education (gross	1.81	1.35	0.55	0.45	0.63	2.58
Pupil-teacher ratio	1.85	1.36	0.54	0.46	0.28	3.84
Public expenditure-GDP ratio	1.78	1.34	0.56	0.44	0.17	5.02
Interaction effect (Financial sector intermediation and public education expenditure-GDP ratio)	1.76	1.33	0.57	0.43	0.05	9.41

Tables 2 and 3 report similar multi-collinearity test statistics for financial sector intermediation and stock market development regressions respectively. They also indicate that the examined variables are not multi-collinear.

Table 3. Stock market development regression variables - multi-collinearity test

Variable	VIF	VIF square root	Tolerance factor	R-squared	Eigen-value	Condition index
Stock market development	1.10	1.05	0.91	0.09	4.16	1.00
Stock market LAG	1.14	1.07	0.88	0.12	1.40	1.72
Mean years of schooling	1.43	1.20	0.70	0.30	1.20	1.86
Tertiary education (gross	1.80	1.34	0.55	0.45	0.74	2.39
Pupil-teacher ratio	1.89	1.38	0.53	0.47	0.27	3.89
Public expenditure-GDP ratio	1.77	1.33	0.56	0.44	0.17	4.91
Interaction effect (Stock market development and public education expenditure-GDP ratio)	1.75	1.32	0.57	0.43	0.05	9.07

ii. Stationarity:
The panel stationarity tests compute augmented Dickey-Fuller and Philps-Perron stationarity indicators. While the null hypothesis posits that the analyzed variable has a unit root, the alternative premise avers that the indicator is stationary. The test results are presented in table 4.

Table 4. Panel stationarity tests

Variable	**ADF statistic**	**P-value**	**Philip-Perron Statistic**	**P-value**
Banking sector development	47.59	0.00	47.09	0.01
Banking sector development (LAG)	63.81	0.00	99.11	0.00
Financial sector development	43.04	0.03	15.40	0.00
Financial sector development (LAG)	64.67	0.00	102.79	0.00
Stock market development	44.23	0.01	14.21	0.00
Stock market development (LAG)	61.65	0.00	109.91	0.00
Mean years of schooling	41.68	0.03	62.58	0.00
Tertiary education (gross enrolment)	49.69	0.01	45.41	0.00
Pupil-teacher ratio	69.79	0.00	17.43	0.00
Public expenditure-GDP ratio	42.59	0.03	24.85	0.00
Interaction effect (Banking sector development and public education expenditure-GDP ratio)	1.45	0.21	47.39	0.00
Interaction effect (Financial sector intermediation and public education expenditure-GDP ratio)	1.67	0.11	49.92	0.01
Interaction effect (Stock market development and public education expenditure-GDP ratio)	1.64	0.40	49.73	0.00
Interaction effect II (Banking sector development and public education expenditure-GDP ratio)	79.18	0.00	95.95	0.00
Interaction effect II (Financial sector intermediation and public education expenditure-GDP ratio)	43.21	0.03	42.31	0.00
Interaction effect II (Stock market development and public education expenditure-GDP ratio)	95.95	0.00	78.19	0.00

Table 4 illustrates that all examined variables, except the ADF results for all three interaction effects, are stationary. However, in order to overcome this limitation, a multiplicative form of the interaction term was constructed. Therefore, let $\xi_{t-1}^{b} * \Psi_{\exp enditure^{t}}$ be the alternate interaction effect between banking sector enhancement and public education expenditure-GDP ratio. A similar interaction term is computed for the other considered financial markets. These are interaction effect II (banking sector development and public education expenditure-GDP ratio), interaction effect II (financial sector intermediation and public education expenditure-GDP ratio) and interaction effect II (stock market development and public education expenditure-GDP ratio) respectively. The results in table 5 indicate that all the substitute interaction effects are stationary.

4.2 Empirical results
The empirical analysis presents begins with the banking industry, followed by financial sector intermediation and stock market development.

i. Banking industry development
Table 5 presents the Arellano-Bover/Blundell-Bond GMM dynamic panel regression results for the banking industry. It was found that, in SSA, previous banking sector failures somehow narrow current quality gaps. This may result from stakeholder correction of previous deficiencies in current time periods. However, such per period banking industry enhancements are minimal, 0.05. This accords with the underlying adaptive expectations premise as well as the Bowles-Gintis human capital hypothesis.

Table 5. Banking sector dynamic panel (GMM) regression

Variables	Coefficient	Standard error	Z-statistic	P-value
Banking sector failure (LAG)	-0.05	0.02	-2.30	0.02
Mean years of schooling	-3.73	2.19	-1.70	0.09
Tertiary education (gross enrolment)	-0.31	0.11	2.69	0.00
Pupil-teacher ratio	0.31	0.03	0.94	0.35
Public expenditure-GDP ratio	0.04	0.13	0.30	0.76
Interaction effect (Banking sector failure and public education expenditure-GDP ratio)	0.04	0.05	0.89	0.37

The empirical analysis further finds that increased tertiary enrolment decreases banking deficiencies in SSA, -0.31. This possibly means that there are particular analytical, cognitive or instructive skills that enhance banking sector development which are more easily acquired during tertiary studies. This accords with Hakeem & Oluitan (2012), Hansson (2004) and Larsson & Morling (2015).

Also, this result illustrates that increasing years of schooling does not ensure that the sought after human capital competencies are gained. This is especially revealing in SSA where pupils and students spend longer years in school because of long periods of absenteeism during an academic year. In some circumstances, these children are forced to engage in child labor to supplement a scanty household income (Aryeetey & Uldry, 1995). Further, the lack of appropriate learning and teaching resources adds little to the quality of existing human capital. Consequently, extending average formal schooling length may not be the answer.

Table 6. Banking sector regression diagnostics

REGRESSION DIAGNOSTIC INDICATOR	VALUES
Wald-statistic	20.05
P-value	0.00
Sargan test (H_0 : over-identifying restrictions are valid)	2.94
P-value	0.23
Arellano-Bond test (H_0 : no autocorrelation) – first order	-1.35
P-value	0.18
Arellano-Bond test (H_0 : no autocorrelation) – second order	-1.32
P-value	0.19
Breusch-Pagan lagrangian multiplier test statistic (H_0 : random effect is dominant)	0.27
P-value	0.30

The regression diagnostics in table 6 illustrates that model is appropriately specified, based on the p-value of the Wald statistic. Also, the Sargan test indicates that the regression is not over-identified. Furthermore, there is no autocorrelation between the considered variables, even though the two-step GMM technique was not used. Finally, from the Breusch-Pagan lagrangian multiplier test it may be inferred that the random effect best explains the static relation between human capital and financial market development.

ii. Financial sector intermediation:

Table 7 below presents the GMM dynamic panel regression results for financial sector intermediation. The analysis reveals that tertiary gross enrolment is still relevant in enhancing financial sector intermediation. This is in consonance with the human capital theories espoused previously. Crook *et al.* (2011) and Larsson & Morling (2015), similarly, emphasize tertiary education as critical element in human capital accumulation in financial markets.

Table 7. Financial sector intermediation - dynamic panel (GMM) regression

Variables	Coefficient	Standard error	Z-statistic	P-value
Financial sector (LAG)	-0.03	0.03	-0.92	0.36
Mean years of schooling	-0.26	0.87	-0.30	0.76
Tertiary education (gross enrolment)	-0.41	0.07	-5.61	0.00
Pupil-teacher ratio	0.06	0.04	1.53	0.13
Public expenditure-GDP ratio	-0.39	0.17	-2.23	0.03
Interaction effect (Financial sector intermediation and public education expenditure-GDP ratio)	0.06	0.05	1.24	0.26

The results above, additionally indicate that increased public educational expenditure improves financial sector intermediation. It enhances human capital so that the financial sector can better pool and allocate resources to the private sector (Hakeem & Oluitan, 2012).

Table 8. Financial sector intermediation - dynamic panel (GMM) regression diagnostics

REGRESSION DIAGNOSTIC INDICATOR	VALUES
Wald-statistic	135.46
P-value	0.00
Sargan test (H_0 : over-identifying restrictions are valid)	5.08
P-value	0.08
Arellano-Bond test (H_0 : no autocorrelation) – first order	-0.71
P-value	0.48
Arellano-Bond test (H_0 : no autocorrelation) – second order	-1.37
P-value	0.17
Breusch-Pagan lagrangian multiplier test statistic (H_0 : random effect is dominant)	0.22
P-value	0.32

The regression diagnostics for financial sector intermediation are presented in table 8. They also indicate there is no autocorrelation and over-identification in the regression model. Akin to the banking industry, random effects describe the human capital-financial market relation in SSA.

iii. Stock market development / failure:

Table 9 reports the dynamic panel regression results for stock market development / failure. Unlike the banking industry, prior stock market failure worsen such deficiencies. This possibly describes momentum effects in SSA stock exchanges. An additional reason may because such markets are more susceptible expectations (Bassi *et al.*, 2004; Hansson, B. 2004; Thomas & Spataro, 2015).

Table 9. Stock market development dynamic panel (GMM) regression

Variables	Coefficient	Standard error	Z-statistic	P-value
Stock market (LAG)	1.19	0.41	2.87	0.00
Mean years of schooling	-0.18	-0.27	-0.66	0.51
Tertiary education (gross enrolment)	-0.05	0.03	2.21	0.03
Pupil-teacher ratio	0.002	0.003	0.72	0.47
Public expenditure-GDP ratio	-0.03	0.01	-2.38	0.02
Interaction effect (Stock market development and public education expenditure-GDP ratio)	0.00001	0.00008	0.14	0.89

Comparable to financial sector intermediation, stock market development is enhanced with increased tertiary school enrolment and public expenditure on education. These results in tables 7 and 9 may also indicate that developments in the stock market as well as financial sector intermediation are more advanced financial systems,

requiring added human capital in the form of public expenditure to significantly improve (Bassi *et al.,* 2004; Hansson, 2004).

Table 10. Stock market development / failure (GMM) regression diagnostics

REGRESSION DIAGNOSTIC INDICATOR	VALUES
Wald-statistic	89.91
P-value	0.00
Sargan test (H_0 : over-identifying restrictions are valid)	1.81
P-value	0.41
Arellano-Bond test (H_0 : no autocorrelation) – first order	-1.57
P-value	0.12
Arellano-Bond test (H_0 : no autocorrelation) – second order	-1.58
P-value	0.11
Breusch-Pagan lagrangian multiplier test statistic (H_0 : random effect is dominant)	0.00
P-value	1.00

An alternate explanation of the significance of tertiary enrolment in all three considered financial markets may be that the returns to secondary level education with regards to its contribution to financial market development in SSA is zero or negative. This could be because of excess supply of secondary school graduates on the sub-continent. On the other hand, with very few tertiary school graduates in SSA, there may be significant increasing returns to its contribution in the region's financial system.

Another dimension of these findings is highlighted by Behrman, Mitchell, Soo & Bravo (2012), Cavapozzi *et al.* (2020), Hakeem & Oluitan (2012) and Palacois-Huerta (2003). They indicate that additional human capital accumulation decreases risk aversion to financial market participation. Increased education alters perception of risks inherent in financial markets possibly explaining why it encourages participation in financial systems at an earlier age. Perhaps, greater understanding and insight into the operations and workings of markets are engendered with more human capital. Further, increased human capital may improve appreciation, development and implementation of risk management strategies to grow individual and household wealth as well as organizational earnings. However, understanding the human capital-financial market development-risk management triangle could be better explained by behavioral finance.
Another potential reason for the importance of human capital in financial market development may be attributed to the linkage between additional educational expenditure and increased income. Higher incomes resulting from better schooling stimulate demand for more financial products and services. Financial markets respond by creating instruments and services that result in enhanced system development. As well, increased income increases savings and resources flowing through the financial system. All of these, including positive externalities of individual human capital accumulation, may create a positive cycle that explains the human capital-financial market development relation.

The findings of this study raise a few questions, however. Firstly, what specific needs of financial markets require tertiary schooling? What particular skills acquired in tertiary education are so relevant for financial systems? Why does quality of human capital, as represented by public expenditure on education, matter significantly for financial sector intermediation and stock markets? To what extent does SSA's human capital deficit explain its stunted stock markets? These and other related stakeholder concerns, although relevant, cannot be addressed in this study as they are beyond its scope.

5. CONCLUSION AND SUMMARY

This study examines the relevance of human capital in explaining SSA's financial market failure. To achieve its objectives, it commences with an introduction that outlines the contextual background. This is followed by a literature review that discusses previous salient research. The study builds on past studies and develops an analytical framework that explicitly models financial market failures, includes a nonlinear variable and is underpinned by adaptive expectations. The study, thereafter, separates a financial market into the following categories: banking industry, financial sector intermediation to the private sector and a stock market.

The study finds that, for the banking industry, past failures narrow current gaps. This may be explained as an adjustment response by economic agents and market participants as they enhance the sector. Tertiary education

was found to minimize failures in SSA's banking industry. Both tertiary education and public expenditure on education were found to be critical to developing better financial system intermediation to the private sector. The same variables were also found to be vital in addressing stock market failure.

These results emphasize the central importance of human capital in addressing SSA's financial market deficiencies in the long-term. One implication of this is the need to provide appropriate incentives to recruit some of the best, talented and skilled human resource to form part of the financial system. This is especially critical as employees in financial market institutions. This applies chiefly to agencies that monitor, supervise and regulate private financial institutions.

Additionally, obsolete traditional forms of learning and teaching may be insufficient to appropriately developing the needed human capital essential for rapid financial market development in SSA. This requires increased expenditure on education. However, current heavy reliance on state funding to meet this need in SSA is severely insufficient. Additional financing and resources from the private sector and other organizations is necessary.

Considering the current state of SSA's learning and teaching facilities as well as the finding that there is little interaction between human capital and financial markets on the sub-continent, there is a need for such institutions to work together with the educational sector. These may include organizing learning and related activities that stimulate development of required competencies and skills. In Ghana, for instance, an annual banking and financial quiz is held for tertiary students (Ghana News Agency, 2012). It is hoped that the findings of this study will stimulate further research.

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