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**Financial Permeation and Economic Growth: Evidence from  
Sub-Saharan Africa**

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This article empirically analyzes the role of finance in economic growth in Sub-Saharan Africa from the perspective of what is termed herein “financial permeation”. By estimating panel data on 37 countries in Sub-Saharan Africa between 2004 and 2010, we examine whether financial permeation through improved convenience and access to financial services has contributed to economic growth in this region. Empirical results clearly indicate that financial permeation has a statistically significant and robust effect on increasing economic growth in Sub-Saharan Africa.

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## **I. Background to the Study**

Sub-Saharan Africa contains the poorest countries in the world. Many studies have thus examined the main factors that influence economic growth in this region. Their findings indicate that raising education levels; improving sanitary conditions; developing infrastructure such as irrigation systems, roads, electric power distribution systems, and communication systems; and implementing land reforms are necessary to remove barriers to economic growth and eliminate poverty and income inequality in Sub-Saharan Africa (Mwabu and Thorbecke, 2004; Sahn and Younger, 2004; Calderón and Servén, 2008). In this study, we examine this topic from a different perspective by analyzing empirically the potential effect of financial development on economic growth in this poverty-stricken region.

Country and regional-level research has tended to show that financial development is an integral factor to a country's economic growth (King and Levine, 1993; Demirgüç-Kunt and Maksimovic, 1996; Levine and Zervos, 1998) and that a positive bidirectional relationship exists between financial development and economic growth (Demetriades and Hussein, 1996; Luintel and Khan, 1999; Kirkpatrick, 2000; Apergis et al., 2007). In these studies, the provision of financial intermediation is typically referred to as "financial deepening" and is perceived as the increased scale of the financial sector in the

real economy.

Previous studies of Sub-Saharan Africa are no exception. By using causality and cointegration tests, several studies such as Ahmed (2010), Akinlo and Egbetunde (2010), Fowowe (2011), and Hassan et al. (2011) have not only demonstrated the long-term relationship between financial deepening and economic growth but also found that this relationship is causal in one or both directions for most countries in the region.<sup>1</sup>

Another group of relevant studies has also examined the effect of financial deepening on economic growth in Sub-Saharan Africa and found mixed results. For example, some authors (e.g., Gries et al., 2009; Demetriades and James, 2011) argue that the financial systems in Africa do not play a key role in economic growth, because they are extremely underdeveloped, whereas others (e.g., Wane et al., 1996; Allen and Ndikumana, 2000) support the idea that finance promotes growth in African countries as in the developed world.

In contrast to the current body of knowledge, we empirically examine the role of finance in economic growth in Sub-Saharan Africa from the

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<sup>1</sup> Murinde (2012) reviewed many studies that have used causality tests to analyze the relationship between financial deepening and economic growth in African countries. To explain why these studies have yielded inconsistent results, he pointed out issues such as potential specification bias, the selection of financial development indicators, and the statistical power of pre-tests such as unit root and cointegration tests.

perspective of what is termed herein “financial permeation”. Financial permeation refers to the process by which financial intermediaries improve the accessibility and convenience of financial services for users by establishing an extensive national network rather than by expanding in scale. This concept is expected to contribute to economic growth by reducing funding constraints and promoting the economic activities of individuals and companies that were previously unable to utilize financial services. We call this process financial permeation because we liken it to the process by which water permeates dry land to help the soil become fertile and organisms to grow. While several such intermediaries can be envisaged as major players in financial permeation, this study focuses on commercial banks as traditional providers of financial services.<sup>2</sup>

Specifically, we construct proxy measures of the accessibility and usage of financial services among users based on the number of commercial bank branches in terms of demographic and geographic measures and outstanding deposits with and loans from commercial banks. We use panel data on 37 countries in Sub-Saharan Africa between 2004 and 2010 to estimate the effect of financial permeation on economic growth. In addition, we

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<sup>2</sup> Inoue and Hamori (2013) measured financial permeation by employing microfinance related indicators in 76 developing countries between 1995 and 2008 and examined its effect on reducing the poverty ratio.

consider education levels as well as macroeconomic variables such as the inflation rate and economic openness, which have been recognized in related studies as important factors that contribute to economic growth.

The remainder of this article is as follows. In Section II, we provide an overview of related studies. In Section III, we introduce the model, and in Section IV, we describe the data. We present the estimation results in Section V and state the conclusion of this paper in Section VI.

## **II. Literature Review**

In recent years, phrases such as “financial inclusion” or “finance for all” have been positioned as new policy objectives by international organizations including the World Bank, Asian Development Bank, and G20, and these concepts have been adopted by certain developing countries (e.g., India, Indonesia, and Brazil). Financial inclusion aims to allow everyone—including “unbanked” individuals that have not been offered financial services such as credit, saving, and money wiring and “underbanked” individuals that have not utilized financial services even though they have access to them—to receive the benefit of economic growth by creating an environment in which all potential users can access financial services.

As the subject of improving the access and convenience of financial

services has gained increasing attention in recent years, we have begun to see the development of databases of related indicators. Some well-known databases include the Financial Access Survey (FAS) by the IMF, Global Financial Inclusion Index (Global Findex), and Enterprise Surveys by the World Bank.<sup>3</sup> Analyses that use these databases to verify such increased access and convenience by country or region are currently underway. For example, Demirgüç-Kunt and Klapper (2012a) used the World Bank's Global Findex to examine how adults in 148 countries around the world are saving and borrowing money, making payments, and managing risks, and reported that approximately half the adult population worldwide remains "unbanked" and that at least 35 percent of adults face barriers to using a bank account. Although these barriers vary based on regional and individual characteristics, high costs, physical distance, and the lack of appropriate procedural documents have been noted as the most common.

In particular, Johnson and Nino-Zarazua (2011) and Demirgüç-Kunt and Klapper (2012b) analyzed the accessibility and convenience of banking in Sub-Saharan Africa. Using the national-level financial access surveys

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<sup>3</sup> The G20 Basic Set of Financial Inclusion Indicators and Core Set of Financial Inclusion Indicators have also been developed in order to capture the state of financial inclusion in a country by the Global Partnership for Financial Inclusion and AFI Financial Inclusion Data Working Group, respectively. These indicators are based on existing data sources such as the FAS, Global Findex, and Enterprise Survey.

conducted in Kenya and Uganda in 2006, the former authors examined the socioeconomic, demographic, and geographic factors that affect accessibility to formal, semi-formal, and informal financial services in both countries. Demirgüç-Kunt and Klapper (2012b), meanwhile, used the Global Findex and Enterprise Surveys in order to examine the access of individuals and small and medium enterprises (SMEs) to banking in African countries, demonstrating that many adults in Africa use informal methods of saving and borrowing money and that most SMEs do not use banks. As such, these studies have all focused on regional characteristics or barriers to financial accessibility rather than considering the effect of financial permeation on economic growth. By examining this point with respect to Sub-Saharan Africa, this study thus contributes to the existing literature.

### **III. Models**

We conduct a panel analysis by using annual data on 37 countries in Sub-Saharan Africa between 2004 and 2010.<sup>4</sup> The dependent variable is real GDP per capita. Explanatory variables include various indicators such as financial permeation, economic openness, the inflation rate, and education levels. The model is defined as follows:

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<sup>4</sup> These 37 countries in Sub-Saharan Africa are reported in Appendix 1.



$$(1) \quad LGDP_{it} = \beta_0 + \beta_1 FP_{it} + \gamma X_{it} + u_{it}, i = 1, 2, \dots, N : t = 1, 2, \dots, T$$

Here,  $LGDP_{it}$  is the logarithm of real GDP per capita in country  $i$  during time period  $t$ ,  $FP_{it}$  represents the financial permeation that occurs through commercial banks in country  $i$  during time period  $t$ ,  $X_{it}$  is the vector of control variables in country  $i$  during time period  $t$ , and  $u_{it}$  is the error term in country  $i$  during time period  $t$ . We use the following indicators as control variables: economic openness ( $OPEN_{it}$ ), the inflation rate ( $INF_{it}$ ), and education levels ( $SCHOOL_{it}$ ).  $FP_{it}$  comprises four proxy variables that measure the accessibility and convenience of banking services, while  $OPEN_{it}$  comprises two variables, the ratio of imports and exports to GDP and the ratio of foreign direct investment (FDI) to GDP. We estimate each combination of one  $FP_{it}$  variable and one  $OPEN_{it}$  variable for eight models altogether.

#### **IV. Data**

##### **A. Dependent Variable**

The logarithm of real GDP per capita is used as the dependent variable in this quantitative analysis. The data were obtained from the World Development Indicators (WDI) published by the World Bank (2012). Although real GDP per

capita in Sub-Saharan Africa is low compared with other developing countries and regions, the average growth rate during the sample period was 8.5 percent, which is higher than that for the entire world (4.5 percent) and for other developing countries and regions (7.8 percent).

## B. Explanatory Variables

### Financial Permeation

Financial permeation (*FP*) is the most important of all explanatory variables in this study. To measure the accessibility and usage of financial services, we use four proxy variables: the number of commercial bank branches per 1,000 km<sup>2</sup> (*FP1*), the number of commercial bank branches per 100,000 adults (*FP2*), outstanding deposits with commercial banks as a percentage of GDP (*FP3*), and outstanding loans from commercial banks as a percentage of GDP (*FP4*). The first two are supply-side factors of financial permeation that measure accessibility to banking services. The latter two are demand-side factors of financial permeation that measure the usage of banking services. The data for these four variables were derived from the FAS website (<http://fas.imf.org/>). Since improving the accessibility and convenience of financial services leads to increased economic activities among households and companies that face funding constraints, the coefficient of *FP* in

Equation (1) is expected to be positive.

Table 1 shows the descriptive statistics for each financial permeation indicator. It indicates that financial permeation has increased over time in Sub-Saharan Africa. For example, average *FP1* increased from 4.5 in 2004 to 7.5 in 2010, while average *FP2* increased from 3.5 in 2004 to 6.3 in 2010. In the same time period, the averages of *FP3* and *FP4* increased from 23.1 and 14.5 to 30.9 and 20.6, respectively.

#### Economic Openness

As control variables, we use two indicators of economic openness, namely the ratio of imports and exports to GDP (*OPEN1*) and the ratio of net FDI inflows to GDP (*OPEN2*). The data for all these were obtained from the WDI.

Related studies have shown that promoting economic openness through trade increases economic growth in Sub-Saharan Africa (Fosu, 1990; Sachs and Warner, 1997; Brambila-Macias et al., 2011; Brückner and Lederman, 2012; Chang and Mendy, 2012) [for a survey, see Fosu (2001)]. By contrast, the effect of economic openness through FDI on economic growth is inconclusive. While some studies have indicated that FDI inflows contribute to the growth of Sub-Saharan Africa (Brambila-Macias and Massa, 2010; Brambila-Macias et al., 2011), others have found that FDI inflows do

not promote economic growth (Sukar et al., 2007) or take time to result in growth (Adams, 2009). Thus, these studies suggested that trade and FDI have different effects on economic growth.

#### Inflation Rate

We also take the inflation rate ( $INF$ ) into consideration as a control variable.  $INF$  is calculated as the logarithmic difference in the consumer price index (CPI), where the 2005 value is normalized to 100. CPI data were obtained from the WDI.

The initial quantitative analysis shows that a relatively high inflation rate has a negative effect on medium- to long-term economic growth. However, a marginal increase in the inflation rate does not tend to inhibit economic growth when inflation is relatively lower. Recent studies have indicated that the effect of the inflation rate on economic growth is non-linear. For example, Sarel (1996) analyzed 87 countries around the world and demonstrated that although a marginal increase in the inflation rate negatively influences economic growth when the annual average exceeds 8 percent, this result does not hold when the inflation rate is lower than this threshold; indeed, inflation has a slight positive effect when the annual average is below 8 percent. Khan and Senhadji (2000) also found a threshold at which the inflation rate begins

to affect growth negatively, namely at between 1 and 3 percent in developed countries and 11 and 12 percent in developing countries depending on the estimation method. Thus, the marginal impact of inflation on the growth of Sub-Saharan Africa depends on the level of inflation.

#### Education Levels

Based on data obtained from the WDI, we include education levels measured by the primary school enrollment rate (*SCHOOL*) as a control variable. Education levels in Africa have traditionally been lower than those of other developing regions; however, school enrollment has shown a significant increase in recent years at all levels (Seetanah, 2009). Since increased education levels lead to human resource development and thus economic growth, the coefficient of *SCHOOL* in Equation (1) is expected to be positive.

#### **V. Empirical Results**

The estimation results of Equation (1) are divided into eight cases and reported in Table 2. As mentioned earlier, there are eight cases because we used four proxy variables for financial permeation and two proxy variables for economic openness. Along with the estimated coefficients for the explanatory variables,

the table shows their standard errors in parentheses and  $p$ -values based on the redundant fixed effects test and Hausman test. These two tests facilitate choosing a model in order to estimate the panel data.

The null hypothesis of the redundant fixed effects test is that “there is no unobserved heterogeneity,” or in other words, no fixed effect; therefore, the fixed effects model is chosen when the null hypothesis is rejected. As for the Hausman test, the null hypothesis is that “the individual effects are uncorrelated with the other regressors in the model”; therefore, the fixed effects model is chosen when the null hypothesis is rejected. The results show that the null hypotheses are rejected at the 5 percent significance level in both tests. Therefore, we use the fixed effects model to estimate Equation (1).

The estimation results of the coefficients in Equation (1) are as follows. First, the coefficients for financial permeation are positive as expected and statistically significant at the 1 percent level in all cases (0.0129 for  $FP1$ , 0.0254 and 0.0259 for  $FP2$ , 0.0039 and 0.0038 for  $FP3$ , and 0.0097 and 0.0095 for  $FP4$ ). These results indicate that progress in financial permeation has increased economic growth in Sub-Saharan Africa and they are robust for all financial permeation variables.

Table 2 also shows the estimation results of the control variables, namely economic openness, the inflation rate, and education levels. The

coefficients of economic openness are estimated to be -0.0003, 0.000, 0.0005, and 0.0006 for the trade to GDP ratio (*OPEN1*) and -0.0003, 0.0003, -0.0016, and -0.0020 for the FDI to GDP ratio (*OPEN2*). These results suggest that the effect of economic openness on economic growth is inconsistent, although the results are not statistically significant in all cases.

This finding is different from those of many related studies. A number of Sub-Saharan African countries are currently importing industrial products while exporting agricultural products and primary products such as oil and minerals. In addition, although FDI has grown rapidly in recent years, such investment is concentrated in primary product industries. Therefore, the economic openness estimated in this study suggests the need to develop industries that produce more value-added goods because expanding trade and FDI inflows is unlikely to generate growth under the current industrial structure.

Next, although the coefficients of the inflation rate (*INF*) are estimated to range from 0.0023 to 0.0033, they are not significant in any cases, similar to the coefficients of economic openness. Therefore, the rising inflation rate does not seem to have significantly influenced economic growth in Sub-Saharan African countries during the sample period. Some recent studies indicate that price increases have non-linear effects on economic

growth and that at a certain threshold they begin to exert a negative effect. However, the estimation results in this paper suggest that the inflation rate in Sub-Saharan Africa did not pass the aforementioned threshold even though it was relatively high compared with those in other developing regions during the sample period.

Lastly, in terms of the effect of education, the coefficients of the primary school enrollment rate (*SCHOOL*) range from 0.0021 to 0.0032 and are significant at the 1 percent level.<sup>5</sup> Therefore, we confirm that increased education levels can improve economic growth in Sub-Saharan Africa.

To summarize, Table 2 shows that financial permeation and improved education promote economic growth. These results are robust for all financial permeation indicators. By contrast, economic openness and the inflation rate do not show significant effects on economic growth in Sub-Saharan Africa.

## **VI. Conclusion**

Sub-Saharan Africa has long been a poverty-ridden region, lagging behind other countries in the developing world in terms of economic growth. However, of late, there have been signs that the economic situation in this part of Africa is gradually improving. Since the turn of the century, per capita real

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<sup>5</sup> Even when the secondary school enrollment rate was used to represent education level, the results were similar (these results are available upon request).



GDP growth rates in Sub-Saharan African countries have been rising at a greater rate compared with global levels and the rates in other developing regions. Furthermore, although there is less financial permeation in Sub-Saharan African countries than in other developing nations and regions in terms of the indicators discussed herein, it has rapidly increased in recent years—and at a faster rate than in other areas.

By estimating panel data on 37 countries in Sub-Saharan Africa between 2004 and 2010, this study empirically analyzed whether financial permeation through improved convenience and access to financial services has contributed to economic growth in this region. The presented estimation results indicated that the number of commercial bank branches, outstanding deposits with commercial banks, and outstanding loans from commercial banks, all measures of financial permeation, have positive relationships with real GDP per capita that are significant at the 1 percent level. Although expanding the network of branches and improving accessibility and convenience for customers may be costly for commercial banks in the private sector, increased financial permeation has the effect of gradually promoting economic growth and enriching people's lives. Therefore, Sub-Saharan African countries should support the banking sector in order to increase the penetration of financial services and eliminate barriers to access while

maintaining the balance between profitability and public interest.

Furthermore, we found that education levels also have a positive and significant effect on economic growth in Sub-Saharan Africa. This result suggests that in addition to financial sector outreach and improvements in customer convenience, rising standards of education can contribute to growing the economies of Sub-Saharan African countries.

#### **Appendix 1: List of the 37 Sample Countries**

Angola, Botswana, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Republic of the Congo, Republic of Equatorial Guinea, Ethiopia, Gabon, Republic of the Gambia, Ghana, Republic of Guinea, Kenya, Lesotho, Liberia, Madagascar, Mauritania, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Democratic Republic of Sao Tome and Principe, Seychelles, Republic of Sierra Leone, Republic of South Africa, Republic of the Sudan, Swaziland, Tanzania, Republic of Togo, Uganda, Zambia, Zimbabwe

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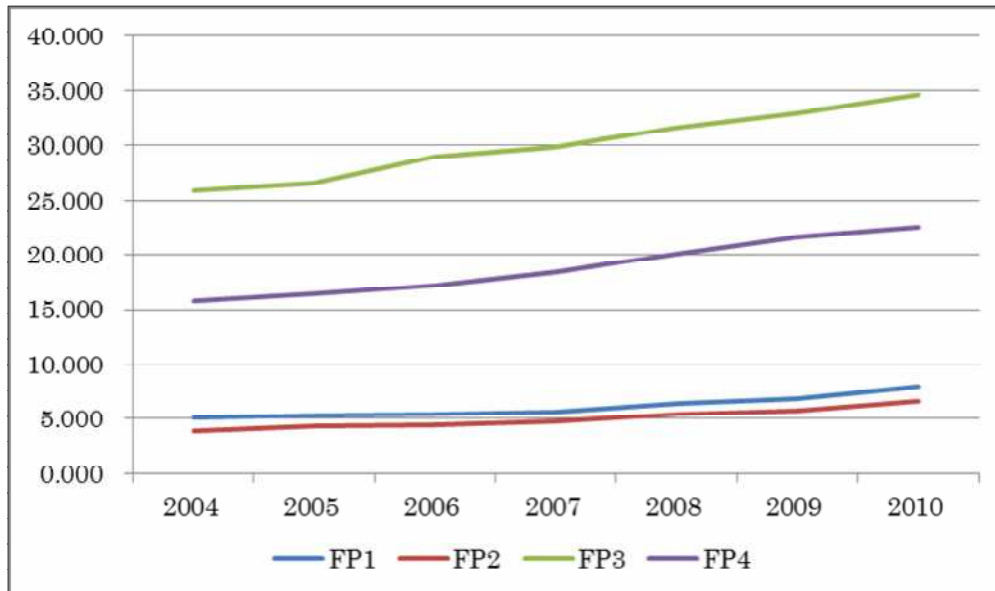
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**Figure 1 Financial Permeation, 2004–2010**  
**(sample average)**



Notes:

FP1: Commercial bank branches per 1,000 km<sup>2</sup>

FP2: Commercial bank branches per 100,000 adults

FP3: Outstanding deposits with commercial banks (percentage of GDP)

FP4: Outstanding loans from commercial banks (percentage of GDP)

**Table 1 Definitions of Variables**

Variable	Notation	Source
Log of per capita real GDP	LGDP	WDI (2012)
Commercial bank branches per 1,000 km <sup>2</sup>	FP1	IMF ( <a href="http://fas.imf.org">http://fas.imf.org</a> )
Commercial bank branches per 100,000 adults	FP2	IMF ( <a href="http://fas.imf.org">http://fas.imf.org</a> )
Outstanding deposits with commercial banks (percentage of GDP)	FP3	IMF ( <a href="http://fas.imf.org">http://fas.imf.org</a> )
Outstanding loans from commercial banks (percentage of GDP)	FP4	IMF ( <a href="http://fas.imf.org">http://fas.imf.org</a> )
Trade (percentage of GDP)	OPEN1	WDI (2012)
FDI (percentage of GDP)	OPEN2	WDI (2012)
Inflation rate of CPI (percentage)	INF	WDI (2012)
Primary school enrollment rate (percentage)	SCHOOL	WDI (2012)

Notes:

IMF: International Monetary Fund

WDI: World Development Indicators

**Table 2 Empirical Results**

	Case 1		Case 2		Case 3		Case 4	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
FP1	0.0129	(0.0021)***	0.0129	(0.0020)***				
FP2					0.0254	(0.0035)***	0.0259	(0.0034)***
FP3								
FP4								
OPEN1	-0.0003	(0.0006)			0.000	(0.0006)		
OPEN2			-0.0003	(0.0014)			0.0003	(0.0013)
INF	0.0033	(0.0030)	0.0026	(0.0024)	0.0023	(0.0029)	0.0023	(0.0023)
SCHOOL	0.0026	(0.0007)***	0.0021	(0.0006)***	0.0027	(0.0007)***	0.0021	(0.0006)***
Number of observations	158		189		158		189	
Adj. R <sup>2</sup>	0.9965		0.9967		0.9968		0.9970	
Redundant fixed effects test	845.0775		1042.9980		813.7920		813.7920	
<i>p</i> -value	0.0000		0.0000		0.0000		0.0000	
Hausman test	11.6749		10.7936		24.4704		28.4728	
<i>p</i> -value	0.0199		0.0290		0.0001		0.0000	
Model	FE model		FE model		FE model		FE model	

**Table 2 Empirical Results (continued)**

	Case 5		Case 6		Case 7		Case 8	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
FP1								
FP2								
FP3	0.0039	(0.0009)***	0.0038	(0.0009)***				
FP4					0.0097	(0.0011)***	0.0095	(0.0011)***
OPEN1	0.0005	(0.0006)			0.0006	(0.0005)		
OPEN2			-0.0016	(0.0013)			-0.0020	(0.0012)
INF	0.0026	(0.0031)	0.0033	(0.0025)	0.0023	(0.0026)	0.0031	(0.0022)
SCHOOL	0.0029	(0.0008)***	0.0023	(0.0007)***	0.0032	(0.0006)***	0.0025	(0.0006)***
Number of observations	158		192		161		195	
Adj. R <sup>2</sup>	0.9959		0.9960		0.9970		0.9969	
Redundant fixed effects test	793.2525		986.6392		831.2658		1063.4417	
<i>p</i> -value	0.0000		0.0000		0.0000		0.0000	
Hausman test	18.8023		20.2357		19.1815		14.4850	
<i>p</i> -value	0.0009		0.0004		0.0007		0.0059	
Model	FE model		FE model		FE model		FE model	