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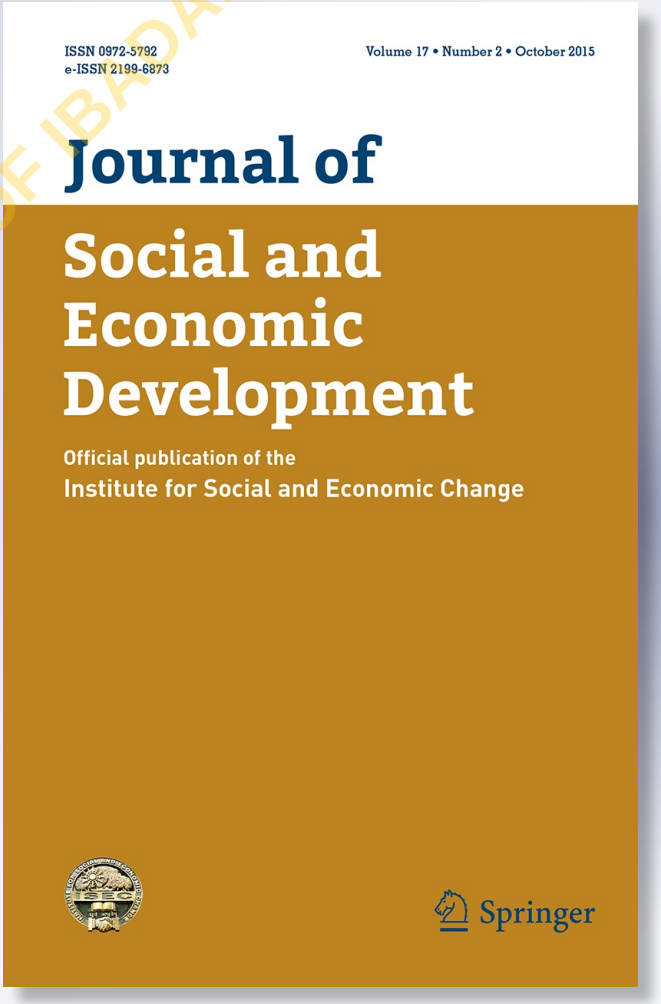

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RESEARCH PAPER

Is there a role for governance in the saving-investment nexus for Sub-Saharan Africa?

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Abstract The study broke some yet to be explored ground in the literature on the Feldstein-Horioka (FH) puzzle. Precisely, it uncovered the role of institutions (particularly governance) in the saving-investment causal nexus using data on a panel of 37 sub-Saharan Africa countries, over the period spanning 1996 through 2010. Deploying a battery of panel estimators, the findings further lend support to earlier opinions on the bound of ranges of saving retention coefficients for the region. More specifically, the coefficients are −0.014, 0.200 and 0.21 in the ordinary least squares (OLS), fixed effects (FE) and random effects (RE) regressions, respectively. These estimates are largely synonymous to those reported for SSA in extant studies. Interestingly, considerable improvement was recorded in the saving coefficient from 0.20 to 0.361 when governance was interacted with saving. This concretely reinforces the useful role of governance in mobilizing saving for investment within these economies. Based on these findings, domestic resource mobilisation can be a veritable vehicle for plugging the substantial investment gap in these SSA economies. However, such policy thrust must be necessarily complemented by far-reaching governance reforms.

Keywords Feldstein–Horioka coefficients · Governance indicators · Panel regression · Sub-Saharan Africa

JEL Classification C23 · D73 · F12 · H5

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Introduction

The argument on the linkage between domestic saving and domestic investment has led to a path-breaking debate, popularly known as Feldstein–Horioka (FH) puzzle in the international macroeconomics literature. This epoch-making debate has not only gained widespread attention, but has also witnessed extensive empirical investigations. Conceptually, FH puzzle posits a high level of correlation between domestic savings and investment in the neighbourhood of unity in a situation solely or almost characterized by financial autarky. However, a low saving retention coefficient or maintenance of a low correlation between domestic savings-investment is assumed to be suggestive of the presence of full capital mobility. Several studies have looked at the FH puzzle including De Wet and Van Eyden (2005), Vamvakidis and Wacziarg (1998), Isaksson (2001), Payne and Kumazawa (2005), Adedeji and Thornton (2006) and Adeniyi and Egwakhide (2013) among others. By and large, it can be inferred from the foregoing that the contentions in respect of the FH puzzle are far from being resolved.

Apart from this general inconclusiveness in the literature, it is striking to note that most empirical attempts, especially for developing economies and Sub-Saharan African (SSA) region in particular, have consistently reported low saving retention coefficients. The simple interpretation is that savings in SSA tend to flow to the most attractive investment projects globally, thus suggesting the existence of a perfect or near perfect capital mobility. The resulting outcomes are in tandem, with the spirit of financial liberalism or at best, a move toward global capital market integration. Several empirical attempts have been made at conducting panel analyses on African continent in general and SSA in particular regarding savings-investment nexus. Nonetheless, most of the resulting outcomes appear divergent on the ground of variations in sample sizes, methodology, coverage periods as well as model specifications. A key missing link from the previous set of studies at least from an SSA perspective is the failure to accord due consideration to the institutional environment (specifically, governance infrastructure) within which both saving and investment decision making occur. Although the importance of governance has been well documented, a casual perusal of the available literature reveals that there has not been any systematic attempt to directly introduce governance measures into the saving-investment space for a broad cross-section of SSA countries. This is pertinent since abundant empirical evidences have tended to confirm the hypothesis that cross-country differences in growth and productivity are related to differences in governance infrastructure (Hall and Jones 1999; Kaufmann et al. 1999; Keefer and Knack 1997; Knack and Keefer 1995; Roll and Talbott 2001). This offers impetus to extending the intuition, as we have attempted in the present study, to the saving-investment connection.

On the basis of the foregoing, our study shares some similarities in spirit with some earlier studies in many respects,[1] on the one hand and also it inventively crafts an intermediating role for governance in the saving-investment space, on the other hand. The present study differs from the previous studies in that it uses the governance indicators compiled by Kaufmann et al. (2006) to construct a composite governance index which is interacted with savings to be able to gauge its resulting impact on the region's investment decisions. This approach is important for a number of reasons: First, in as much as good governance acts to improve the efficiency with which savings can be efficiently mobilized, so also is poor governance regressive to sustained domestic resource mobilization. Second,

[1] See Adedeji and Thornton (2006), Bangake and Eggoh (2010) and Adeniyi and Egwakhide (2013).

unlike developed countries', SSA region is known to be seriously plagued by governance problems. Finally, modelling the region without information on the institutional environment within which other socio-economic and political dimensions operate could impinge on the usefulness of such analysis. For instance, it has been asserted that the institutional environment of a country affects both domestic and foreign investors (Globerman and Shapiro 2002). Thus, it is a natural extension of the literature to consider the impact of governance on cross-country differences in saving-investment nexus. More importantly, lower institutional quality has been found to be associated with lower investment, slower productivity growth, lower per capita income and overall slower output growth. This is well exposited in Acemoglu et al. (2001), Hall and Jones (1999), Olson et al. (2000), Rodrik et al. (2004), Mauro (1995), La Porta et al. (1998) and Aghion et al. (2008).

Following this introductory section,[2] Sect. 2 gives a snapshot of the empirical literature with the bulk of its emphasis on SSA-centric studies. The data description as well as the estimation methodology adopted for the study is detailed in Sect. 3, while Sect. 4 houses the empirical results presentation and discussion. The fifth and final section presents the conclusion.

Literature review

This brief section begins with the pioneering work of Feldstein and Horioka's (1980) with whom the entire FH puzzle discourse began. They validated the puzzle for a sample of 16 OECD countries over the 15-year period spanning 1960–1974. They found, using cross-sectional regressions, a saving retention coefficient of between 0.85 and 0.95 (Apergis and Tsoumas 2009). Their result was further reinforced by Feldstein's (1983) study on 17 OECD countries using a more expanded dataset also confirming the existence of this "home-biased" investment clime. These findings seemed counterintuitive as they contrasted sharply with a priori expectation of almost perfect capital mobility in the OECD, particularly in an era when concerted efforts were geared towards the enhancement of global capital market integration (De Wet and Van Eyden 2005). In support of this high correlation between saving and investment are other studies like Murphy (1984), Penati and Dooley (1984) and Dooley et al. (1987). Miller (1988) using cointegration techniques on US saving and investment rates found that the series are $I(1)$ processes and cointegrated under the fixed exchange rate regime, but not under the flexible exchange rate regime. Using the same technique, Jansen (1996) and Coakley and Kulasi (1997) showed a positive long-run equilibrium relationship between saving and investment in OECD countries. Along this line of high correlation metric, was a study by Coiteux and Olivier (2000) who employed a panel cointegration technique. Ultimately, they found a long-run saving-investment correlation of 0.6 in 21 OECD countries. Using a variety of asymptotically efficient cointegration estimators to test the hypothesis of a unit retention coefficient, Caporale et al. (2005) also had ample evidence in support of the FH puzzle.

More importantly, SSA-centric studies have consistently reported a low correlation between saving-investment nexus. Threading along this path are such studies like De Wet and Van Eyden (2005) who applied stationary panel data techniques on a sample of 36 SSA countries from 1980 to 2000. Deploying both fixed and random effect models, they

[2] For a better exposition on historical trend analysis of savings and investment in SSA, interested readers should see Adeniyi and Egwaikhide (2013). Furthermore, this literature review section also draws substantially from this paper.

found low saving retention coefficients of between 0.296 and 0.359 suggestive of high capital mobility in the region. Using data on 37 African countries over the period spanning 1970–2006 and a newly developed Pool Mean Group (PMG) and other estimators like the fully modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS), Bangake and Eggoh (2010) reported cointegration between saving and investment. Precisely, their estimates of the FH coefficient are 0.36, 0.38 and 0.58 for the PMG, FMOLS and DOLS in that order. In a more recent study, Adeniyi and Egwaikhide (2013) re-examined the FH puzzle using a sample of 20 SSA countries. Innovatively, they introduced financial development variables in the saving-investment space, using panel stationarity, cointegration and estimation on annual time series data spanning 1976–2005. They established some estimates of the FH coefficients, viz, 0.32 (OLS), 0.21 (FE) and 0.24 (RE), respectively. Interestingly, there was a jump in the saving retention coefficient from 0.21 to 0.33 when credit provided to the private sector was interacted with saving, thus justifying the importance of financial development in the relationship. The outcome of all these studies corroborated the extant literature for the region and other developing countries (see Dooley et al. 1987; Wong 1990; Vamvakidis and Wacziarg 1998; Isaksson 2001; Mamingi 1997; Payne and Kumazawa 2005, among others, for more detailed narratives).

In view of the foregoing, the paper adds to the existing stock of literature by examining the puzzle[3] exploring the role of institutions in the saving-investment nexus.[4]

Data and methodology

As earlier stated, the main objective of this study is to examine the influence of institutions in the savings-investment nexus for the selected SSA countries. Based on the definition of World Bank, six measures of governance or institution are used.[5] To this end, this section is subdivided into three: data definition, methodology and model specification.

[3] The contradictions with respect to the FH puzzle are from two main perspectives. First, researchers who argue that the FH coefficient is unrelated to capital mobility and that the Feldstein-Horioka methodology is inappropriate for measuring capital mobility (Coakley et al. 1998; Obstfeld 1985; Engel and Kletzer 1987; Ho 2003; Tesar 1991; Obstfeld and Rogoff 2000). Second, researchers that support the validity of the FH methodology in measuring capital mobility providing explanations for the puzzle on methodological and econometric grounds (Gundlach and Sinn 1992; Jansen 1996; Jansen and Schulze 1996; Sarno and Taylor 1998; Bajo-Rubio 1988; Ozmen and Parmaksiz 2003; Coakley et al. 2004)

[4] There are two noteworthy studies on the determinants of savings by Agrawal et al. (2009) and Sahoo and Dash (2013). The former investigated savings behaviour in India, Pakistan, Bangladesh, Sri Lanka and Nepal. Using time series modelling approaches, their results indicated that significant proximate determinants of savings included income, access to banking institutions, foreign savings rate and dependency rate. Furthermore, they found interest rate to have only a trifling influence on savings. In the latter study, the determinants of domestic savings are again examined in the same five South Asian countries as in Agrawal et al. (2009). Nonetheless, they used financial development as additional explanatory variable as well as a panel regression approach. Both of these treatments distinguish the empirical attempt of Sahoo and Dash (2013) from Agrawal et al. (2009). They also found financial development to be positively associated with domestic savings, while the other significant correlates included per capita income, share of agriculture and foreign savings. Nevertheless, our paper is distinct on a number of grounds. First, we explicitly examined the determinants of investment, rather than savings, in SSA. Second, unlike the two studies reported, we suggest an important role for domestic savings as an exogenous driver and not an endogenous variable. Third, we equally craft an intervening role for institutions in the savings-investment nexus for the sampled SSA economies. Finally, we provide relatable policy implications for the SSA region.

[5] The Worldwide Governance Indicators project constructs aggregate indicators of six broad dimensions of governance: Voice and Accountability (VA), Political Stability and Absence of Violence/Terrorism (PS),

Data

Based on data availability, the sample size of this present study is limited to 37 countries in SSA and for the period 1996–2010. The list if the countries are presented in the appendix. Annual data series that were sourced from World Development Indicators, Worldwide Governance Indicators and International Monetary Fund databanks was used.

Methodological issues

As a starting point, we conduct stationary test so as to avoid spurious regression. The five tests that were considered are: Levin, Lin and Chu; Breitung; Im, Pesaran and Shin W-Stat; ADF-Fisher Chi-Square and PP-Fisher Chi-Squared. Further to this, it is essential to examine the existence of a long-run relationship among the variables in the model. To this end, alternative cointegration tests proposed by Pedroni (1999) are adopted.

The study also made use of fixed effect (FE) and random effect (RE) estimators due to the inability of pooled OLS estimator to treat endogeneity issues such as omitted variable bias. The FE technique takes this into account by creating dummies for all the countries except for one country. It also allows for intercept shift in each country. However, the reduction in the degrees of freedom associated with this approach is noteworthy. The RE takes individual heterogeneity effects into cognisance. It isolates individual country effect in its error term and does not reduce the degrees of freedom in the manner in which the fixed effect does. RE requires that the effects of the omitted variable bias must be uncorrelated with the explanatory variables.

Model specification

Feldstein and Horioka, using cross-sectional data on 16 countries, worked with the following model:

$$\left(\frac{I}{Y}\right)_i = \propto_0 + \theta_1 \left(\frac{S}{Y}\right)_i + U_1 \tag{1}$$

where I denotes domestic investment, S denotes national savings, Y denotes GDP and U_1 is a random disturbance. The coefficient θ referred to as the "saving retention coefficient"-measures the "proportion of the incremental savings that is invested domestically" (Feldstein and Bacchetta 1989). In an attempt to achieve the objective of the study, we extend Eq. (1) to capture variables that might help in better explaining the relationship between saving and investment thus:

$$\mathrm{INV}_{it} = \alpha_0 + \alpha_1 \mathrm{SAV}_{it} + \alpha_2 \mathrm{AID}_{it} + \alpha_3 \mathrm{OPEN}_{it} + \alpha_4 \mathrm{FIN}_{it} + \alpha_5 \mathrm{AGG}_{it} + \varepsilon_{it} \tag{2}$$

where INV is investment as a share of GDP (proxied by gross fixed capital formation), SAV denotes saving as a percentage of GDP, AID captures the proportion of foreign aid in GDP, OPEN is the degree of openness of the economy measured as a ratio of GDP and FIN

Footnote 5 continued
Government, Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL) and Control of Corruption (CC). These six aggregate indicators are based on 30 underlying data sources reporting the perceptions of governance of a large number of survey respondents and expert assessments worldwide. Details on the underlying data sources, the aggregation method and the interpretation of the indicators, can be found in the WGI methodology paper by Kaufmann et al. (2010).

is domestic credit to the private sector as a ratio of GDP. The choice of this measure of financial development is appropriate as it accurately gauges the efficiency of financial intermediation.[6] AGG is constructed as the average of the six measures of governance based on the definition of World Bank. This is carried out by the use of principal component analysis, ε, i and t are the white noise disturbance term, country and time effects, respectively.

Empirical results

In this section, we present and discuss our key findings. Essentially, we first the unit root tests to ascertain the stationarity of the variables so as to avoid spurious regression. Next to this, the results of the cointegration tests that were carried are highlighted. Finally, the eventual panel regressions estimates are also presented.

Table 1 presents the results of the panel unit root tests.[7] The null hypothesis of unit root can be rejected for all the variables at level with the exception of governance indices. However, they become stationary at first difference. All the governance indices with the exception of a few are considered to be stationary at level. To sum up, the mixed results obtained showed that the series would require cointegration testing with a view to avoiding spurious regressions.

We conducted co-integration test that was propounded by Pedroni (1999).[8] We employ seven test approaches: Panel v-statistics, Panel rho-statistics, Panel PP-statistics, Panel ADF-statistics, Group rho-statistics, Group PP-statistics and Group ADF-statistics. The results of these tests are presented in Table 2. Summing up, we found evidence of long-run relationships among the series in the model. Based on the foregoing, the ground is now prepared for empirical estimation of the specified model.

The results of the panel estimations are presented in Table 3. From the pooled OLS results, the magnitudes of the saving retention coefficients range from as low as −0.65 to as high as 0.02 in the models. It is important to infer that these coefficients are significant at various levels. It is also found that the inclusion of control variables such as foreign aid and openness has positive effects on investment, which is in line with economic intuition.

This finding is equally similar to the results obtained by earlier studies. For instance, an open economy would allow for free flow of capital to wherever interest rate is high, thus it

[6] The alternative approach to assessing the role of the financial sector in the savings-investment relationship is to construct an overall index of financial development often using principal component analysis. Such financial development indicator typically encompasses broad money (a size indicator), private sector credit (an efficiency indicator) and market capitalization (a stock market activity indicator). In this study, we refrain from using such an aggregate index as a marker of the effectiveness of the financial system. Credit to the private sector—our preferred measure—is more appropriate for the specific goal of our study namely explaining the important role of the financial sector in the retention of domestic savings for domestic investment. Nonetheless, we thank an anonymous reviewer for highlighting this insightful option.

[7] It is important to state at this point that second-generation of unit root tests exists. One specific example is the test proposed by Pesaran (2007). This class of tests also account for cross-sectional dependence which is potentially an issue in panel data settings. Nonetheless, these tests typically require the data to have a substantial cross-sectional dimension (e.g. number of countries) and more importantly a sufficiently long time span. The data used in this study spans 1996–2010 (15 years) and therefore falls short with respect to the latter requirement. Hence, we defer to the first-generation tests which are less stringent in terms of data demands.

[8] The second-generation cointegration tests, for instance Westerlund (2007), is not feasible given our dataset. The rationale for this submission is the same as those already explained in footnote 6.

Table 1 Panel unit root tests

	LLC t-Stat		Breitung T-Stat		IPS W-Stat		ADF-Fisher Chi^2		PP-Fisher Chi^2	
	Statistics	$I(I)$	Statistics	$I(I)$	Statistics	$I(I)$	Statistics	$I(I)$	Statistics	$I(I)$
INVE	−9.635 (0.000)	$I(1)$	−6.002 (0.000)	$I(1)$	−6.505 (0.000)	$I(1)$	175.623 (0.000)	$I(1)$	440.721 (0.000)	$I(1)$
SAV	−6.477 (0.000)	$I(1)$	−5.462 (0.000)	$I(1)$	−4.854 (0.000)	$I(1)$	143.197 (0.000)	$I(1)$	436.091 (0.000)	$I(1)$
AID	−9.160 (0.000)	$I(1)$	−6.727 (0.000)	$I(1)$	−6.921 (0.000)	$I(1)$	186.194 (0.000)	$I(1)$	490.795 (0.000)	$I(1)$
OPEN	−7.317 (0.000)	$I(1)$	−3.455 (0.000)	$I(1)$	−5.966 (0.000)	$I(1)$	164.828 (0.000)	$I(1)$	426.563 (0.000)	$I(1)$
FIN	−8.852 (0.000)	$I(1)$	−3.918 (0.000)	$I(1)$	−4.507 (0.000)	$I(1)$	143.302 (0.000)	$I(1)$	367.417 (0.000)	$I(1)$
CC	−5.961 (0.000)	$I(0)$	−6.264 (0.000)	$I(1)$	−2.125 (0.017)	$I(0)$	111.462 (0.003)	$I(0)$	349.398 (0.000)	$I(1)$
GE	−9.327 (0.000)	$I(0)$	0.119 (0.000)	$I(1)$	−3.188 (0.000)	$I(0)$	129.783 (0.000)	$I(0)$	119.870 (0.000)	$I(0)$
PS	−4.490 (0.000)	$I(0)$	−1.472 (0.070)	$I(0)$	−1.793 (0.036)	$I(0)$	102.198 (0.017)	$I(0)$	129.657 (0.000)	$I(0)$
RQ	−4.153 (0.000)	$I(0)$	−6.152 (0.000)	$I(1)$	−1.714 (0.043)	$I(0)$	110.316 (0.004)	$I(1)$	320.029 (0.000)	$I(1)$
RL	−6.359 (0.000)	$I(0)$	−6.946 (0.000)	$I(1)$	−1.850 (0.032)	$I(0)$	108.698 (0.005)	$I(0)$	105.159 (0.010)	$I(0)$
VA	−4.025 (0.000)	$I(0)$	−5.716 (0.000)	$I(1)$	−3.723 (0.000)	$I(1)$	94.197 (0.057)	$I(0)$	322.546 (0.000)	$I(1)$

LLC and IPS represent the panel unit root tests pf Levine (2002) and Im et al. (2003), respectively. Fisher-ADF and Fisher-PP is for Maddala and Wu (1999). Exogenous variables: individual effects and individual linear trends. Fisher test is computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality

Source Authors' computation with underlining data from WDI, WGI and IMF

Table 2 Panel cointegration test

Null hypothesis of no. cointegration statistics weighted statistics		
Alternative hypothesis: common AR coefficients (within dimension)		
Alternative hypothesis: individual AR coefficents (between dimension)		
Panel v-statistics	−2.980 (0.816)	−2.153 (0.899)
Panel rho-statistics	−4.257 (0.000)	−4.087 (0.000)
Panel PP-statistics	−15.918 (0.000)	−14.340 (0.000)
Panel ADF-Statistics	−9.753 (0.000)	−6.134 (0.000)
Group rho-statistics	−5.384 (0.008)	
Group PP-statistics	−22.492 (0.000)	
Group ADF-statistics	−9.495 (0.000)	

Source Authors' computation with underlining data from WDI, WGI and IMF

Table 3 Estimates of Feldstein–Horioka (FH) puzzle using disaggregated governance variables

	1	2	3	4	5	6	7	8
SAV	0.200* (0.033)	0.068** (0.0300)	0.177* (0.033)	0.184* (0.033)	0.193* (0.034)	0.185* (0.032)	0.168* (0.032)	0.199* (0.033)
AID	0.406 (0.420)	0.354 (0.419)	1.235** (0.483)	1.073** (0.483)	1.461* (0.491)	1.155** (0.484)	1.243* (0.473)	1.513* (0.505)
OPEN	0.134* (0.017)	0.135* (0.017)	0.134* (0.016)	0.151* (0.016)	0.135* (0.016)	0.137* (0.016)	0.134* (0.015)	0.137* (0.016)
FIN	0.077** (0.037)	0.078 (0.037)	0.118* (0.039)	0.136* (0.039)	0.137* (0.040)	0.136* (0.039)	0.114* (0.039)	0.137* (0.040)
AGG		3.390** (1.436)						
CC			4.387* (1.023)					
GE				5.979* (1.136)				
PS					0.783 (0.607)			
RL						5.400* (1.168)		
RQ							5.939* (1.009)	
VA								0.314 (1.024)
R2	0.819	0.831	0.667	0.672	0.656	0.656	0.677	0.655
Haussman Test	21.203 [0.000]	18.298 [0.000]	19.281 [0.000]	12.025 [0.000]	11.203 [0.000]	14.297 [0.000]	19.025 [0.000]	12.867 [0.000]

Source Authors' computation with underlining data from WDI, WGI and IMF

*, ** and *** implies level of statistical significance at 1 %, 5 % and 10 % respectively. The values in parenthesis are the standard error statistics

is expected to lead to increase in investment. The positive and significant effect of aid shows its importance as a major source of foreign capital inflow in SSA. However, the exact effect of FIN is mixed and not significant notwithstanding the principle that an efficient financial system is expected to bridge the savings-investment gap by pooling and channelling saving for the most effective use.

Quite intriguingly, the status quo remains even with the inclusion of governance indicators. It can be deduced that among the governance indicators, Control of Corruption, Political Stability and Rule of Law matter most in the saving-investment relationship. This can be attributed to the fact that an economy that is considered to be corrupt, experiences political instability and with questionable regards for the law, will have little or no investment affinity. In addition, the resulting impact might erode the confidence of would-be domestic investors and this will consequently impact negatively on their saving decisions. The pooled OLS results are relatively poor as evidenced by the fitness of the models which hovered around 0.23 and 0.39. This may be traceable to its inability to account for heterogeneity in the cross-sections and deal with omitted variable bias.

Moreover, the study employed Hausman test to determine the model appropriateness between FE and RE. Preference is expressed in favour of FE over RE based on the level of significance of Hausman statistics. Relative to the OLS estimates, a marked line of distinction emanated from the estimates of the fixed effects specification both in terms of magnitude and statistical significance. In our estimations, it was found that the saving retention coefficients hovers between 0.068 and 0.200, which are within the neighbourhood of what earlier studies reported. For instance, using PMG, FMOLS and DOLS, Bangake and Eggoh (2010) found saving retention coefficients to be 0.36, 0.38 and 0.58, respectively. Adedeji and Thornton (2006) limited their study to use of DOLS and FMOLS, the FH coefficient obtained was 0.51 and 0.73, respectively. The three studies most synonymous in spirit to ours[9] are Payne and Kumazawa (2005), De Wet and Van Eyden (2005) and Adeniyi and Egwaikhide (2013). The obtained estimates were 0.20 (OLS), 0.23 (FE), 0.24 (RE) for Payne and Kumazawa (2005); 0.31(OLS), 0.34 (FE), 0.28 (RE) for De Wet and Van Eyden (2005); and 0.32 (OLS), 0.21 (FE), 0.24 (RE) for Adeniyi and Egwaikhide (2013).

The savings retention coefficients reported above are quite low and indicative of massive capital outflow from the SSA region. This is consistent with the existing literature on capital flight. Studies have confirmed the existence of huge values of capital export from SSA (See Boyce and Ndikumana, 2012; Nkurunziza 2012). The savings retention coefficient we estimated so far can be queried on two fronts. First, having understood the detrimental effect of capital flight on the economy, policies and institutions such as the Stolen Asset Recovery Initiative has been setup to mitigate the incidence of capita flight (See Fofack 2012, Ndikumana 2013; and Raheem 2015). Second, the turn of the twentieth century has witnessed a rapid surge in intra Africa FDI flows.[10] This being the case, it

[9] These studies adopted the use of pooled OLS, FE and RE. While Adeniyi and Egwaikhide (2013) probed into the likely role of financial system, the other two papers did not take that into consideration. However, none of these studies examined the role of governance in the saving-investment nexus. This is the important gap that the present study fills.

[10] For instance, the recent bilateral FDI flows dataset released by United Nations Conference on Trade and Development (UNCTAD) shows that FDI among SSA member countries is estimated to be in excess of $USD300billion between 2001 and 2012. Of this amount, Nigeria was able to attract $USD109billion, South Africa $USD33, Mozambique $USD10billion, Niger $USD30billion, Malawi $USD18billion. On an individual basis, South Africa's investment in Namibia, Zambia, Zimbabwe, Seychelles are $USD45billion, $USD5.4billion, $USD4.4billion and $USD2.3billion, respectively.

Table 4 Estimates of Feldstein–Horioka (FH) puzzle using disaggregated governance variables (additional controls)

	1	2	3	4	5	6	7	8
SAV	0.455* (0.046)	0.448* (0.047)	0.451* (0.049)	0.451* (0.047)	0.450* (0.040)	0.453* (0.046)	0.444* (0.047)	0.463* (0.047)
AID	2.434* (0.569)	2.268* (0.589)	2.470* (0.576)	2.153* (0.582)	2.351* (0.574)	2.295* (0.574)	2.195* (0.569)	2.744* (0.583)
OPEN	0.082* (0.021)	0.087* (0.021)	0.083* (0.021)	0.090* (0.020)	0.085* (0.021)	0.089* (0.021)	0.093* (0.021)	0.086* (0.020)
FIV	0.258* (0.060)	0.265* (0.060)	0.259* (0.059)	0.274* (0.059)	0.268* (0.060)	0.270* (0.064)	0.252* (0.059)	0.256* (0.059)
CAB	−0.137* (0.040)	−0.137* (0.040)	−0.584** (0.040)	−0.133* (0.040)	−0.136* (0.040)	−0.132* (0.042)	−0.138* (0.043)	−0.131* (0.042)
RINV	49.999** (19.465)	55.862* (20.194)	49.203** (19.571)	55.421* (19.549)	56.134* (20.273)	56.173* (20.083)	55.585* (19.37*)	44.213** (19.537)
AGG		2.009 (1.848)						
CC			−0.584 (1.315)					
GE				**3.135** (1.520)**				
PS					0.781 (0.723)			
RL						1.971 (1.599)		
RQ							**4.062* (1.447)**	
VA								**−2.853* (1.309)**
R^2	0.708	0.719	0.716	0.720	0.749	0.719	0.724	**0.721**

Source Authors' computation with underlining data from WDI, WGI and IMF

Note: CAB is Current Account Balance measures as a ratio of GDP. RINV is used to proxy returns on investment and it is measures as the log of inverse of GDP per capita

*, ** and *** implies level of statistical significance at 1 %, 5 % and 10 % respectively. The values in parenthesis are the standard error statistics

could be argued that domestic savings are recently increasingly being used to finance domestic investment. Based on foregoing, it could be implied that the investment climate (returns on investment) in SSA has become more favourable.

To capture these concerns, we included Current Account Balance (CAB) and returns on investment into the baseline equation. It is expected that parameter α_1 should increase substantially. The results of this inclusion are presented in Table 4 and it supports our hypothesis. Of specific importance is the increase in α_1 from 0.200 (in model 1 of Table 3) to 0.455 (in model 1 of Table 4). Similar results hold for other models. It was also found that returns on investment and CAB are major determinants of investment in SSA. In addition, on the average, these additional variables increased the explanatory power of the models as indicated by the higher R^2 values.

In an attempt to further understand the purported role of governance in the saving-investment nexus, the study interacted governance measures with saving. This is to provide information on how governance helps create and mobilise savings for effective and productive use and as such how it affects the magnitude of saving retention coefficients. These results are presented in Table 5. It was found that FH coefficients increased considerably and significantly as compared with models without interaction terms. This finding serves as new as well as additional evidence to the existing stock of literature on FH puzzle. It is pertinent to mention that these interactive terms are positive and significant for most of the governance indicators used.

Table 5 Alternative Estimates of Feldstein–Horioka Equation (Interaction terms)

	1	2	3	4	5	6
SAV	0.361* (0.044)	0.340* (0.038)	0.417* (0.049)	0.261* (0.034)	0.311* (0.045)	0.209* (0.049)
AID	1.413* (0.474)	1.388* (0.469)	1.379* (0.472)	1.550* (0.473)	1.436* (0.482)	1.553* (0.486)
OPEN	0.142* (0.016)	0.148* (0.016)	0.140* (0.015)	0.136* (0.016)	0.139* (0.016)	0.132* (0.016)
FIN	0.145* (0.039)	0.153* (0.038)	0.150* (0.039)	0.128* (0.039)	0.150* (0.039)	0.139* (0.039)
SAV*AGG	0.213** (0.939)					
SAV*CC	0.193* (0.037)					
SAV*GE		0.244* (0.038)				
SAV*PS			0.269* (0.046)			
SAV*RL				0.124* (0.023)		
SAV*RQ					0.144* (0.045)	
SAV*VA						0.011 (0.042)
R^2	0.673	0.680	0.676	0.673	0.663	0.655

Source Authors' computation with underlining data from WDI, WGI and IMF

*, ** and *** implies level of statistical significance at 1 %, 5 % and 10 % respectively. The values in parenthesis are the standard error statistics

Table 6 Alternative estimates of Feldstein–Horioka equation (interaction terms and additional controls)

	1	2	3	4	5	6	7
SAV	0.482* (0.051)	0.475* (0.049)	0.488* (0.056)	0.448* (0.047)	0.467* (0.052)	0.483* (0.056)	0.451* (0.049)
AID	2.391* (0.568)	2.372* (0.569)	2.398* (0.569)	2.392* (0.565)	2.414* (0.570)	2.414* (0.569)	2.436* (0.569)
OPEN	0.088* (0.021)	0.087* (0.021)	0.087* (0.021)	0.089* (0.021)	0.085* (0.021)	0.084* (0.021)	0.083* (0.021)
FIN	0.259* (0.060)	0.258* (0.060)	0.261* (0.059)	0.266* (0.059)	0.259* (0.060)	0.259* (0.059)	0.259* (0.060)
CAB	−0.140* (0.040)	−0.135* (0.040)	−0.143* (0.041)	−0.139* (0.039)	−0.139* (0.040)	−0.145* (0.041)	−0.135* (0.040)
RINV	53.222* (19.564)	51.151* (19.445)	50.528 (19.467)	56.737* (19.517)	51.515* (19.721)	51.073* (19.509)	49.498** (19.571)
SAV*AGG	0.088 (0.061)						
SAV*CC		0.082 (0.055)					
SAV*GE			0.068 (0.063)				
SAV*PS				0.075** (0.031)			
SAV*RL					0.292 (0.058)		
SAV*RQ						0.054 (0.061)	
SAV*VA							−0.014 (18.597)

Source Authors' computation with underlining data from WDI, WGI and IMF

CAB is current account balance measures as a ratio of GDP. RINV is used to proxy returns on investment and it is measures as the log of inverse of GDP per capita

*, ** and *** implies level of statistical significance at 1 %, 5 % and 10 % respectively. The values in parenthesis are the standard error statistics

We equally extended the interaction models to include CAB and RINV. As in the earlier results, the savings retention coefficients marginally increased with the addition of these new variables. However, the difference was not as huge in the models without interaction. These results are presented in Table 6 below.

Conclusion

Using annual dataset for 37 countries in Sub-Saharan Africa and for the period 1996 to 2010, the study revisited the Feldstein-Horioka Puzzle. The novelty of this study is the inclusion of governance in the estimated models. Results of the stationarity tests showed that all the variables with the exception of governance indicators are stationary at first difference, while the latter are stationary at level. The cointegration results established a long-run relationship among the series in the model.

The estimates of the saving retention coefficient are −0.014 (OLS), 0.20 (FE) and 0.21 (RE). These are similar to the coefficients of earlier studies on FH puzzle. We found that when governance was incorporated into the model, saving retention jumped significantly. This is indicative of marked effect of governance in the puzzle. For instance, the FH coefficient increased from 0.20 to 0.36. This lends support to the role of governance in mobilizing savings for investment within an economy. Based on the foregoing, it is imperative for policy makers to design policies that would improve the governance level of SSA countries so as to ensure increased effect of saving on investment and *ceteris paribus* economic growth.

A key road map for future research is to re-examine this debate using data from different governance data sources. It has been argued that World Bank's measure of governance is subjective. Hence, alternative sources such as International Credit Risk Guide (ICRG) among others should be considered. On a final note, the possibility of extending this debate beyond SSA to other developing regions should also be explored.

Appendix

List of Countries under investigation: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroun, Cape Verde, Central Africa Republic, Chad, Comoros, Congo DR, Cote d'Ivoire, Djibouti, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

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