Linkages between investment flows and financial development: causality evidence from selected African countries

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Abstract

This paper introduces previously missing financial components(efficiency, activity and size) in the assessment of the finance-investment nexus. Using VAR models in the perspectives of VECM and short-run Granger causality, three broad findings are established: (1) while finance led investment elasticities are positive, investment elasticities of finance are negative; (2)but for Guinea Bissau, Mozambique and Togo, finance does not seem to engender portfolio investment; (3)contrary to mainstream literature, financial efficiency appears to impact investment more than financial depth. Four policy implications result: (1)extreme caution is needed in the use of single equation analysis for economic forecasts; (2)financial development leads more to investment flows than the other way round; (3) financial allocation efficiency is more relevant as means to attracting investment flows than financial depth; (4) the somewhat heterogeneous character of the findings also point to shortcomings in blanket policies that are not contingent on country-specific trends in the finance-investment nexus.

JEL Classification: C40; C50; F21; O10; O55

Key words: Financial development; Investment; Causality; Africa

1. Introduction

Investment flow is an essential pre-requisite to triggering economic dynamism, enhancing productivity, diffusing new industrial technologies, contributing to entrepreneurship development, maintaining competitiveness and reducing poverty(Misati & Nyamongo,2010). Thus investment flows are crucial in stimulating growth, revenue to improve public services and employment to lift people out of poverty. However the degree to which investment contributes to growth and poverty alleviation depends on the its ability to gain access to financial services. The financial sector in most African countries has been rapidly developing particularly in the 1990s when these economies adopted financial sector reforms(Misati & Nyamongo,2010). Growth in the financial sectors have been complemented with the dynamism of the Information and Communication Technology(ICT) sector. Whether these developments in the financial sector contribute in any way to growth in investment flows is an empirical question. It is also interesting not to undermine a reverse-effect, as investment flows could also have a significant incidence on financial intermediary development dynamics.

Both theoretical and empirical literature have substantially established linkages between investment and financial development(Rousseau,1999; Xu,2000; Ndikumana,2000; Rousseau & Vuthipadadorn,2005; Love & Zichinno,2006; Forssbaeck & Oxelheim,2008; Landon & Smith,2009; Misati & Nyamongo,2010; Forbes, 2010; Afangideh,2010). However most of the available evidence on this area of research has to a large extent ignored the dynamics of financial development. In a substantial bulk of the literature, financial development has been equated to one particular aspect of the phenomenon: financial depth or money supply. For instance, it will be misleading to equate a positive 'liquid liability'-'foreign investment' nexus to a positive 'financial development'- 'foreign investment' nexus. This study completes existing literature by assessing linkages between

investment flows and financial development dynamics from a multidimensional framework. This assessment is important because theory does not provide clear predictions on the sign of the relationship between financial development and investment. While some studies find support for the McKinnon(1973) and Shaw(1973) proposition which identifies a positive link from financial deepening to investment, others state that this link remains unclear(Misati & Nyamongo,2010, 5). More so a great chunk of studies in this area are mainly focused on high and middle-income countries with little reference to African economies. The few studies focusing on Africa do not fully exploit the plethora of investment and financial development indicators available(Ndikumana,2000; Misati & Nyamongo,2010; Afangideh,2010).

This paper's contribution to existing literature is fivefold. (1) Contrary to the mainstream approach we use four measures of financial intermediary development(depth, efficiency, activity and size) as well as four types of investment flows(domestic, foreign, portfolio and total). Hence we broaden the scope of the investment-finance nexus. (2) The chosen investment and financial indicators result from the broadest macroeconomic dataset available on investment and financial intermediary flows. Thus based on correlation analyses, conceptual frameworks and usages in the literature, these selected indicators are most representative of investment and financial flows in the African continent. (3) Usage of optimally specified econometric methods in contradiction to purely discretionary model specifications in mainstream literature. (4) Distinction between short-run and long-term effects for each investment-finance pair. (5) Based on the findings, we provide the much needed policy recommendations.

The rest of the paper is organized as follows. Section 2 reviews existing literature. Data and preliminary tests for model specification are discussed and reported respectively in Section 3. Empirical analysis is covered in Section 4. Section 5 discusses empirical results while Section 6 concludes.

2. Existing literature

Literature on causality is inundated with empirical findings on the finance-growth nexus for developing countries. Literature pertaining to the assessment of this relationship could be classified into three main strands: proponents of 'finance-led-growth', advocates of 'growth-led-finance' and the bi-directional causality school of thought. Studies consistent with the thesis on 'finance-cause-growth' include, among others: Jung(1986), King & Levine(1993), De Ahmed & Ansari(1998), Darrat(1999), Christopoulos & Tsionas(2004), Ghali(1999), Xu(2000), Jalilian & Kirkpatrick(2002) ,Calderon & Lin(2003) and Hibibullah & End(2006). However works suggesting an anti-thesis(growth cause finance) are fewer(Agbetsiafa, 2003; Odhiambo, 2004,2008); while those positioning with a synthesis (finance cause growth and vice-versa) are much preponderant(Demetriades & Hussein,1996; Akinboade, 1998; Luintel & Khan, 1999; Al-Youssif, 2002; Calderon & Liu, 2003; Odhiambo;2005). While this conflicting literature on the finance-growth nexus is abundant, the finance-investment nexus has received less scholarly attention, especially for African countries(Misati & Nyamongo,2010).

Table 1 below summarizes existing empirical evidence on the conflicts in the literature for the investment-finance nexus. While there are many studies which conclude on a finance-cause-investment nexus(Rousseau,1999; Ndikumana,2000; Xu,2000; Ndikumana,2005; Forbes,2010), there are very few on bidirectional causality(Huang,2006). Despite a thorough search we find no studies on an 'investment-led-finance' nexus, which further lends credit to the motivations of the paper. In the last column of the table, we present concerns that could motivate further research on the linkage.

Table 1: Selected empirical findings on the finance-investment nexus

Author(s)	Countries/Regions	Direction of causality/relation	Resulting basis for our research
A)Studies consistent with finance led investment			
Rousseau(1999)	Japan	Finance led Investment (Financial reforms taking between 1868-1884 led to raising investment between 1880 and 1913.)	Could financial reforms and development also raise the African continent to investment prominence in the 21st century?
Ndikumana(2000)	30 sub-Saharan African countries	Investment is endogenous to finance.	Study is not causality-oriented
Xu(2000)	41 developing countries	Finance led Investment	M2 is the main measure of F.D
Ndikumana(2005)	99 countries (developing and developed)	F.D led Domestic Investment	What about exclusively under-developed countries for the most part?
Rousseau and Vuthipadadorn (2005)	10 Asian economies	Finance led investment (M1 and (M2-M1)) lead to Gross fixed domestic investment	Only M1, (M2-M1) and Gross domestic fixed investments are used as variables.
Love and Zichinno(2006)	36 developed countries(8000 firms)	Finance led Investment	Could the finance-led-investment nexus be same in Africa?
Forssbaeck and Oxelheim(2008)	1379 European non-financial firms	Finance led Foreign Direct Investment.	Could these results be reflected to African countries?
Landon and Smith(2009)	Panel of 17 OCED countries	Currency depreciation negatively granger cause investment(aggregate and sector level investments)	Restricted measure of Financial development
Forbes(2010)	U.S.A	F.D attract Foreign investment	Could F.D in Africa solve certain global imbalances with investment (trade imbalances like the case of U.S.A?
Misati and Nyamongo(2010)	18 sub-Saharan African countries	Savings affect private investment negatively	M2 increase savings in certain African countries(e.g. Malaysia).Does this imply M2 decrease F.D for other countries?
Afangideh(2010)	Nigeria	F.D leads to Agricultural investment	Arbitrary choice of lags for VAR specifications.
B) Studies consistent with investment led finance			
No studies found			
C) Studies consistent with bi-directional causality			
Huang(2006)	43 developing countries from 1970 to 1998.	Positive causal effects in both directions(between F.D and private investment)	What about using a plethora of variables.

FD: Financial Development. OECD: Organization for Economic Co-operation and Development. M1: Monetary plus demand deposits. M2:M1 plus savings and time deposits.

Source(Author's synthesis)

The present paper deviates from the literature summarized in Table 1 in the following ways. (1) Contrary to Xu(2000), Landon & Smith(2009) and Misati & Nyamongo(2010) among others; we cut adrift the mainstream use of more or less three variables in finance-investment causality analysis. (2) The choice of variables will be contingent on a robust selection criteria, such that selected variables should be representative of a broad database. (3) In contrast to the mainstream approach to model specification(Afangideh, 2010), our choice of optimal lags for goodness of fit, will not be arbitrary but contingent on an information criterion whose lag specification best fits each country's data structure. (4) We focus on

Africa where scholarly research on the finance-investment nexus is scares(Misati & Nyamongo,2010).

As we have highlighted before, a great chunk of studies in this area are mainly focused on high and middle-income countries with little reference to African economies. The few studies focusing on Africa do not fully exploit the plethora of investment and financial development indicators available(Ndikumana,2000; Misati & Nyamongo,2010; Afangideh, 2010). It is therefore the interest of this paper to introduce previously missing financial development components in the assessment of the investment-finance nexus in a continent where scholarly research on the linkage is scares.

3. Data and Methodology

3.1 Data

We investigate a sample of 16 African countries. Owing to the multidimensional nature of the work it is very space consuming to engage in the lengthy task of investigating all current 54 African countries. Constraints in data availability have also affected the size of the sample. While financial indicators are obtained from the Financial Development and Structure Database(FDSD), investment flows originate from African Development Indicators(ADI) of the World Bank(WB). At the onset we selected nine financial development variables and fifteen investment flow measures as summarized in Appendix 1 and Appendix 2 respectively. By virtue of correlation analyses, conceptual similarities and usages in the literature, we narrow the variables to four in each conceptual category. Financial variables entail dynamics of depth, efficiency, size and activity(hence DESA variables) while investment variables are domestic, foreign, portfolio and total flows(hence DFPT variables). Time series spans are country-specific owing to constraints in data availability. In a bid for clarity in presentation, selected variables are elucidated in two strands.

3.1.1 Financial intermediary development

Borrowing from recent African finance literature(Asongu,2011abc) and the FDSD, DESA variables include the following. *Financial depth* measured in terms of broad money supply(M2) in ratio of GDP. This measure represents the monetary base plus demand, saving and time deposits. M2 has been widely used as a measure of financial depth in the investment-finance literature(Xu,2000; Rousseau & Vuthipadadorn, 2005; Misati & Nyamongo,2010). *Financial efficiency* in the context of our paper neither refers to a profitability oriented concept nor to the production efficiency of decision making units in the financial sector(via Data Envelopment Analysis: DEA). What the paper seeks to highlight by *efficiency* is the ability to banks to fulfill their fundamental role of transforming mobilized deposits into credit for economic operators. Assuming economic operators will utilize the credit for investment ends, then we should expect a positive causality flowing from financial efficiency to domestic investment. *Financial size* in the context of our paper is according to the FDSD which defines it as the ratio 'deposit bank assets' to 'total assets'(deposit banks assets on central bank assets plus deposit bank assets). *Financial activity* captures the ability of banks to grant credit to economic operators. The indicator is measured as the ratio of private credit by domestic banks on GDP. Hence from common sense and to some extent economic theory, we expect a positive causality flow from financial activity to some investment types(especially domestic investment).

3.1.2 Investment flows

These flows include domestic, foreign, portfolio and total investments. All the measures are in ratios of GDP. Total investment is the sum of domestic and foreign investments. As earlier highlighted, we initially had to plethora of 15 investment flows which have been narrowed down to these four categories(see Appendix 2).

3.2 Methodology

3.2.1 General model specification

Naturally, when dealing with a vector autoregressive(VAR) process the lag length used is very crucial for the outcome of the analysis. This stems from the fact that increasing lags in VAR processes decreases the power of the test. Conversely, if the lag length is too small the remaining serial correlations in the error terms will bias the test. In this wise it becomes vital to choose an optimal lag that fits the data structure (goodness of fit) and specifies the model accurately[1]. Hence lag selection in VAR models is the information criterion, just as Ordinary Least Squares(OLS) have the coefficient of determination(R^2) and the Fisher statistics as information criteria. In the optimal lag selection process, we opt for the Akaike Information Criterion-AIC(Akaike, 1973). As shown by Liew(2004), while the AIC and Final Prediction Error(FPE) are most accurate in estimating the optimal lag length for small observations(less than 60), the Hannan-Quinn Criterion(HQC) is more appropriate when observations exceed this threshold. Schwarz Information Criterion(SIC) and Bayesian Information Criterion(BIC) have a greater probability of producing underestimations[2]. In selecting the optimal lag length for our VAR processes, since observations for all countries are less than 60, we shall adopt the AIC[3].

3.2.2 Unit root tests

Since our data structure is time series oriented, to control for serial correlations we test for stationary properties by employing Phillips & Perron-PP (1988). Borrowing from the literature(Choi & Chung,1995; Gries et al.,2009), the PP test is more appropriate in the context of low frequency data. Thus this test is relevant given the annual span of the data. Bearing in mind, the presence of unit root (absence of stationarity) is unfavorable to a short

[1] The goodness of fit test is ensured by an optimal lag selection criterion. We shall endeavor to select the criterion that best emphasis' the number of lags which make the model compatible with the data structure.
[2] Overestimations are negligible for all criteria(Liew,2004, p.1).
[3] In our choice of truncated lags we respect the method of Newey and West (1994) for estimating truncated bandwidth in unit root tests.

run VAR process(but appealing to long-run analysis: VECM), we shall test for first difference stationarity; I(1), when level series fails to account for an absence of unit root: I(0). It is worthwhile noting that, whereas the restricted version of VAR processes are short-run estimations and presupposes stationary variables, a precondition for its unrestricted or long run equivalent is the presence of unit root (Engle and Granger, 1987). An in-depth coverage of the mechanics of unit root tests is not deserving of examination here because of their wide understanding and application. Results of PP test are summarized in Tables 2-3.

Table 2. Phillips-Perron unit root test for investment flows

Countries	Domestic Investment				Foreign Investment				Portfolio Investment				Total Investment			
	Level		1st Diff.		Level		1st Diff.		Level		1st Diff.		Level		1st Diff.	
	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)
Burkina F.	-2.31	-2.38	-7.30***	-7.31***	-7.37***	-6.03***	-7.36***	-7.02***	-4.59***	-4.73***	-9.45***	-9.32***	-1.59	-1.04	-6.73***	-7.10***
Cape Verde	-1.74	-1.79	-3.93***	-3.93**	-0.33	-2.35	-4.49***	-4.72***	-5.29***	-5.57***	-11.5***	-11.1***	-3.25	-3.19	-5.87***	-5.70***
Egypt	-2.27	-2.89	-4.78***	-4.85***	-1.81	-1.70	-5.63***	-5.84***	-4.81***	-4.51***	-8.47***	-8.43***	-2.37	-2.61	-5.31***	-5.29***
Ethiopia	-2.15	-3.84**	-9.25***	-9.03***	-1.89	-3.04	-2.28	-1.21	n.a	n.a	n.a	n.a	-2.35	-3.11	-7.24***	-7.35***
Ghana	-0.074	-2.26	-7.00***	-7.67***	-2.33	-4.30***	-6.46***	-6.45***	n.a	n.a	n.a	n.a	-0.41	-2.42	-6.65***	-6.87***
Guinea B.	-1.93	-1.78	-5.57***	-7.52***	1.60	1.60	-5.34***	-5.22***	-2.66	-2.62	1.60	n.a	-2.14	-2.02	-5.93***	-7.00***
Kenya	-3.5**	-4.1**	-10.1***	-9.99***	-4.76***	-4.60***	-8.42***	-8.62***	-3.17**	-3.52**	-7.06***	-6.97***	-3.4**	-4.0**	-9.22***	-9.11***
Madagascar	1.73	0.031	-6.72***	-7.19***	-1.66	-3.15*	-4.14***	-4.10**	n.a	n.a	n.a	n.a	0.50	-0.87	6.76***	-7.10***
Mauritania	-3.7**	-3.76**	-8.83***	-10.6***	-3.01*	-4.11**	-5.82***	-5.72**	-3.04**	-2.93	-7.64***	-7.69***	-3.80	-3.79	-6.38***	-6.41***
Morocco	-2.10	-2.40	-5.39***	-5.30***	-4.54***	-8.35***	-22.7***	-22.3***	-5.52***	-5.60***	-11.4***	-11.2***	-2.31	-2.80	-7.07***	-6.99***
Mozambique	-3.82*	-3.86*	-7.10***	-6.76***	-2.14	-2.21	-3.90**	-3.73*	-2.17	-2.24	-3.47**	-3.33	-2.62	-2.52	-4.61***	-4.39**
Niger	-2.36	-2.34	-5.88***	-5.76***	-3.67***	-3.73**	-9.98***	-10.1***	-5.62***	-6.35***	-13.8***	-13.5***	-2.48	-2.94	-7.34***	-7.41***
Sudan	-1.88	-2.20	-4.32***	-4.32***	-0.85	-1.99	-4.43***	-3.99**	-4.95***	-5.56***	-13.3***	-13.1***	-1.22	-1.62	-7.17***	-7.22***
Togo	-2.32	-2.70	-5.46***	-5.36***	-4.94***	-4.77***	-7.99***	-7.74***	-5.98***	-6.03***	-13.1***	-12.9***	-2.14	2.76	-5.96***	-5.95***

Note: Z(ti) and Z(tit) depict the PP test statistic with an intercept(constant) and 'an intercept with a linear trend' respectively. *,** and *** respectively denote significance at 10%, 5% and 1% levels. As a decision rule, critical values are taken from MacKinnon (1996). Truncated lag (bandwidth) is with respect to the Newey-West criterion.

Table 3. Phillips-Perron unit root test for financial development dynamics

Countries	Financial Depth				Financial Efficiency				Financial Size				Financial Activity			
	Level		1st Diff.		Level		1st Diff.		Level		1st Diff.		Level		1st Diff.	
	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)	Z(ti)	Z(tit)
Burkina F.	-3.71***	-4.77***	-10.1***	-9.81***	-2.040	-4.03**	-7.62***	-7.53***	-2.18	-2.49	-6.76***	-6.75***	-1.86	-1.78	-5.06***	-5.03***
Cape Verde	-0.48	-2.16	-2.57	-2.48	-1.76	-2.24	-4.48***	-4.38**	-1.03	-1.52	-2.71*	-2.69	0.05	-2.14	-2.95*	-2.87
Egypt	-1.87	-1.68	-4.74***	-4.90***	-2.20	-2.28	-4.71***	-4.63***	-1.40	-2.32	-4.57***	-4.53***	-0.86	-1.91	-2.33	-2.23
Ethiopia	-1.30	0.041	-4.80***	-5.31***	-1.62	-2.46	-4.71***	-5.11***	-1.22	-1.29	-6.24***	-6.61***	-2.08	-2.11	-3.42**	-3.38*
Ghana	-0.75	-0.97	-7.01***	-9.33***	-1.50	-2.53	-4.87***	-4.91***	-3.17**	-3.76**	-13.1***	-19.4***	0.71	-1.05	-2.91*	-4.37***
Guinea B.	-1.41	-1.67	-3.07**	-3.01	-5.45***	-5.64***	-8.58***	-8.57***	-0.79	1.24	-0.56	-1.14	-1.73	-1.69	-2.04	-1.91
Kenya	-5.68***	-4.80***	-9.55***	-10.2***	-3.40**	-3.36*	-7.26***	-7.18***	-1.67	-1.34	-8.53***	-9.12***	-2.07	-1.07	-5.00***	-5.52***
Madagascar	-3.14**	-3.08	-6.17***	-6.09***	-1.32	-2.06	-6.95***	-6.89***	-1.30	-0.36	-3.59***	-4.29***	-0.71	-2.20	-4.91***	-4.91***
Mauritania	0.17	-2.33	-4.26***	-4.35*	-1.14	-1.4	-4.05***	-4.64***	-0.79	-1.31	-4.07***	-4.34**	-0.78	-2.00	-3.81**	-3.99**
Morocco	1.53	-0.97	-6.08***	-6.43***	-1.85	-2.12	-5.19***	-5.20***	-0.41	-2.01	-6.57***	-6.55***	0.22	-1.51	-3.36**	-3.49*
Mozambique	-0.76	-1.85	-2.71*	-3.28	-1.46	-1.79	-1.66	-1.77	-3.05*	-1.84	-3.78**	-5.45***	-1.78	-2.10	-2.99*	-2.84
Niger	-1.66	-1.64	-4.32***	-4.27***	-1.81	-2.79	-5.79***	-5.67***	-2.68*	-2.73	-7.61***	-7.57***	-1.24	-1.43	-4.20***	-4.16**
Sudan	-2.59	-3.17	-6.11***	-6.12***	-1.48	-0.51	-6.86***	-7.44***	-1.19	-0.47	-4.78***	-5.28***	-2.07	-2.97	-6.33***	-6.27***
Togo	-1.73	-1.69	-4.19***	-4.13**	-2.79*	-3.36*	-9.26***	-9.11***	-3.62***	-3.45*	-6.48***	-6.52***	-2.24	-2.40	-4.73***	-4.75***

Note: Z(ti) and Z(tit) depict the PP test statistic with an intercept(constant) and an 'intercept with a linear trend' respectively. *,** and *** respectively denote significance at 10%, 5% and 1% levels. As a decision rule, critical values are taken from MacKinnon (1996). Truncated lag (bandwidth) is with respect to the Newey-West criterion.

3.2.3 Cointegration tests

Long-run equilibrium relationships between sequences could be determined by various methods. In comparison with cointegration tests proposed in earlier literature (Engle & Granger, 1987; Stock & Watson,1988) we opt to use Johansen(1995a,1995b) because of its wide application and desirable properties(all tested variables are treated as endogenous). This method consists of testing restrictions imposed by cointegration on the unrestricted VAR process in the series. Between the two tests at our disposal(trace statistics and maximum Eigen value), we shall report only the trace statistics in a bid to obtain more robust results(Cheung & Lai, 1993). Borrowing from Ahking(2001), we argue that when a deterministic trend[4] is included in the co-integration model, results are less favorable. However robust results are obtained with the exclusion of a linear deterministic trend in the model. This is logical in the perspective that, the co-integration model is based on the difference of the series which has been de-trended in the stationary process. Beyond this fact, the literature(Johansen,1995b; Hansen & Juselius,1995) cautions on a model that doesn't have a linear trend. It is argued that the minimum deterministic component in the model could be a constant in the co-integrating space to account for differences in measurement units. Logic, common sense and to some extent economic theory also help us understand that, even if we hadn't the intention of including a constant in the co-integration equation, the presence of any I(1) variables in the Vector Error Correction Model(VECM) require the presence of an intercept in the model. In line with the justification above, our cointegration model will have only an intercept in the Cointegration Equation(level) and none in the VAR(first difference) equation. Tables 4 and 5 present bivariate VAR statistics of the cointegration test.

[4] Consistent with deterministic components in time series but less relevant from a visual-graphical perspective of our dataset.

Table: 4 Johansen trace statistics for bivariate VAR (Depth, Efficiency and Investment)

		Financial Depth and Investment Flows				Financial Efficiency and Investment Flows			
Country	**Variables**	AIC (Max)	Rank of CE	Trace test	[p-value]	AIC (Max)	Rank of CE	Trace test	[p-value]
Burkina F (1962-2008)	PF Invt.(**P**)	n.a	n.a	n.a	n.a	1(4)	None	23.240 **	[0.0171]
							At most 1	3.6467	[0.4789]
	Total Invt.(**T**)					1(4)	None	6.9744	[0.8927]
							At most 1	2.4304	[0.6941]
Cape Verde (1985-2008)	Domestic	1(3)	None	12.902	[0.3799]	1(3)	None	7.0325	[0.8891]
	Invt(**D'**)		At most 1	1.6169	[0.8427]		At most 1	2.7718	[0.6307]
	FD Invt.(**F**)	2(3)	None	16.291	[0.1638]	1(3)	None	6.3482	[0.9268]
			At most 1	3.3415	[0.5295]		At most 1	1.4663	[0.8679]
	Total Invt.(**T**)	2(3)	None	9.5268	[0.6896]	1(3)	None	15.188	[0.2204]
			At most 1	2.3041	[0.7178]		At most 1	3.3304	[0.5314]
Egypt (1971-2007)	Domestic	2(3)	None	22.337 **	[0.0237]	2(3)	None	16.187	[0.1686]
	Invt(**D'**)		At most 1	8.1484 *	[0.0785]		At most 1	5.3622	[0.2550]
		1(3)	None	15.663	[0.1944]	2(3)	None	10.328	[0.6138]
	FD Invt.(**F**)		At most 1	3.7530	[0.4620]		At most 1	1.5195	[0.8592]
	Total Invt.(**T**)	2(3)	None	20.368 **	[0.0467]	2(3)	None	17.104	[0.1299]
			At most 1	8.3196 *	[0.0727]		At most 1	6.6440	[0.1510]
Ethiopia (1977-2008)	Domestic	1(3)	None	10.875	[0.5616]	1(3)	None	15.383	[0.2094]
	Invt(**D'**)		At most 1	1.7176	[0.8252]		At most 1	1.1713	[0.9133]
	Total Invt.(**T**)	1(3)	None	12.766	[0.3911]	3(3)	None	18.071 *	[0.0974]
			At most 1	1.8844	[0.7954]		At most 1	1.6861	[0.8307]
Ghana (1973-2006)	Domestic	4(4)	None	30.029 ***	[0.0012]	3(4)	0 None	10.927	[0.5567]
	Invt(**D'**)		At most 1	6.9706	[0.1314]		At most 1	2.4916	[0.6827]
	FD Invt.(**F**)	4(4)	None	20.781 **	[0.0407]	1(4)	None	11.771	[0.4780]
			At most 1	5.8330	[0.2113]		At most 1	1.5663	[0.8513]
	Total Invt.(**T**)	4(4)	None	30.248 ***	[0.0011]	3(4)	None	10.485	[0.5989]
			At most 1	5.2797	[0.2634]		At most 1	2.2191	[0.7337]
Guinea Bissau (1991-2008)	Domestic	2(2)	None	23.745 **	[0.0142]	n.a	n.a	n.a	n.a
	Invt(**D'**)		At most 1	7.4788	[0.1055]				
		1(2)	None	23.439 **	[0.0159]				
	PF Invt.(**P**)		At most 1	3.3354	[0.5305]				
	Total Invt.(**T**)	2(2)	None	24.964 ***	[0.0090]				
			At most 1	7.4224	[0.1081]				
Kenya (1966-2008)	n.a	n.a	n.a	n.a		n.a	n.a	n.a	n.a
Madagascar (1965-2008)	Domestic	2(4)	None	19.703 *	[0.0582]	1(4)	None	10.478	[0.5995]
	Invt(**D'**)		At most 1	5.0404	[0.2890]		At most 1	4.1580	[0.4011]
	FD Invt.(**F**)	1(4)	None	10.839	[0.5651]	2(4)	None	21.491 **	[0.0319]
			At most 1	3.0025	[0.5888]		At most 1	1.7340	[0.8223]
	Total Invt.(**T**)	1(4)	None	12.516	[0.4122]	1(4)	None	10.517	[0.5958]
			At most 1	2.5659	[0.6688]		At most 1	4.4017	[0.3674]
Mauritania (1986-2005)	PF Invt.(**P**)	n.a	n.a	n.a	n.a	1(2)	None	9.7728	[0.6666]
							At most 1	1.1824	[0.9117]
	Total	1(2)	None	15.122	[0.2242]	1(2)	None	19.096 *	[0.0708]
	Invt.(**T**)		At most 1	2.3736	[0.7048]		At most 1	1.4983	[0.8627]
Morocco (1968-2008)	Domestic	1(4)	None	23.096 **	[0.0180]	1(4)	None	11.204	[0.5306]
	Invt(**D'**)		At most 1	7.4138	[0.1085]		At most 1	1.8853	[0.7952]
	Total Invt.(**T**)	1(4)	None	24.379 **	[0.0112]	1(4)	None	11.830	[0.4727]
			At most 1	9.1736 **	[0.0493]		At most 1	1.9211	[0.7887]
Mozambique (1993-2008)	Domestic	1(2)	None	12.050	[0.4529]	2(2)	None	15.932	[0.1808]
	Invt(**D'**)		At most 1	0.51599	[0.9840]		At most 1	2.2597	[0.7261]
	PF Invt.(**P**)	2(2)	None	12.464	[0.4167]	2(2)	None	19.061 *	[0.0715]
			At most 1	0.99160	[0.9374]		At most 1	3.0336	[0.5833]
	FD Invt.(**F**)	1(2)	None	11.609	[0.4929]	2(2)	None	21.844 **	[0.0282]
			At most 1	1.3618	[0.8847]		At most 1	5.9936	[0.1979]
	Total Invt.(**T**)	1(2)	None	8.9049	[0.7462]	2(2)	None	19.406 *	[0.0641]
			At most 1	0.62699	[0.9757]		At most 1	3.0342	[0.5832]
Niger (1969-2008)	Domestic	4(4)	None	21.543 **	[0.0313]	4(4)	None	16.000	[0.1775]
	Invt(**D'**)		At most 1	8.8876 *	[0.0562]		At most 1	2.0145	[0.7716]
	Total Invt.(**T**)	2(4)	None	10.872	[0.5620]	4(4)	None	19.869 *	[0.0551]
			At most 1	3.8387	[0.4486]		At most 1	2.6682	[0.6498]
Sudan (1973-2008)	Domestic	2(3)	None	13.071	[0.3662]	3(3)	None	16.901	[0.1378]
	Invt(**D'**)		At most 1	1.8401	[0.8034]		At most 1	2.6972	[0.6445]
	FD Invt.(**F**)	1(3)	None	11.092	[0.5411]	1(3)	None	10.265	[0.6199]
			At most 1	1.3040	[0.8936]		At most 1	4.0591	[0.4155]
	Total Invt.(**T**)	2(3)	None	17.756	[0.1072]	3(3)	None	21.307 **	[0.0340]
			At most 1	3.5320	[0.4976]		At most 1	3.9695	[0.4287]
Togo (1971-2008)	Domestic	2(3)	None	14.740	[0.2471]	2(3)	None	14.740	[0.2471]
	Invt(**D'**)		At most 1	2.1659	[0.7436]		At most 1	2.1659	[0.7436]
	Total Invt.(**T**)	2(3)	None	16.341	[0.1615]	2(3)	None	16.341	[0.1615]
			At most 1	2.5050	[0.6802]		At most 1	2.5050	[0.6802]

Note that 'n.a' denotes the invalidity of the test because level series of variable is not stationary at least at 1% or 5% significance level for both 'intercept' and 'intercept and trend' categories. (***),(**) and (*) respectively depict; a very strong hypothesis against H0(P<=0.01), moderate evidence against H0(0.01<=P<0.05), and suggestive evidence against H0(0.05<=P<0.1); on the number of co-integrating equations (CE). The test was conducted with the assumption of a restricted constant in the CE and no trend in both the CE and VAR equation. Optimal lags are based on AIC, and their maximum (Max) lag lengths vary from 2 to 4 depending on the number of observations in each country.

Table: 5 Johansen trace statistics for bivariate VAR(Size, Activity and Investment)

Country	Variables	Financial Size and Investment Flows				Financial Activity and Investment Flows			
		AIC (Max)	Rank of CE	Trace test	[p-value]	AIC (Max)	Rank of CE	Trace test	[p-value]
Burkina F	PF Invt.(**P**)	1(4)	None	23.081 **	[0.0181]	1(4)	None	21.835 **	[0.0283]
(1962-2008)			At most 1	3.9389	[0.4333]		At most 1	3.3353	[0.5305]
	Total Invt.(**T**)	1(4)	None	11.942	[0.4626]	1(4)	None	10.778	[0.5709]
			At most 1	5.0382	[0.2893]		At most 1	3.5055	[0.5019]
Cape Verde	Domestic	1(3)	None	13.983	[0.2974]	1(3)	None	20.322 **	[0.0474]
(1985-2008)	Invt(**D'**)		At most 1	1.6205	[0.8421]		At most 1	2.5892	[0.6645]
	FD Invt.(**F**)	1(3)	None	11.258	[0.5255]	1(3)	None	19.280 *	[0.0667]
			At most 1	3.2759	[0.5407]		At most 1	5.2718	[0.2642]
	Total Invt.(**T**)	1(3)	None	19.962 *	[0.0534]	1(3)	None	28.568 ***	[0.0022]
			At most 1	6.2205	[0.1802]		At most 1	10.100 **	[0.0320]
Egypt	Domestic	2(3)	None	21.491 **	[0.0319]	2 (3)	None	18.349 *	[0.0894]
(1971-2007)	Invt(**D'**)		At most 1	2.4418	[0.6920]		At most 1	1.9776	[0.7784]
	FD Invt.(**F**)	1(3)	None	4.8068	[0.9795]	2 (3)	None	9.2289	[0.7171]
			At most 1	1.1531	[0.9158]		At most 1	3.0038	[0.5886]
	Total Invt.(**T**)	2(3)	None	19.262 *	[0.0671]	2 (3)	None	16.362	[0.1606]
			At most 1	2.8016	[0.6253]		At most 1	2.3558	[0.7081]
Ethiopia	Domestic	1(3)	None	10.593	[0.5885]	2(3)	None	11.886	[0.4676]
(1977-2008)	Invt(**D'**)		At most 1	2.5524	[0.6714]		At most 1	2.0806	[0.7594]
	Total Invt.(**T**)	1(3)	None	11.415	[0.5108]	2(3)	None	17.224	[0.1255]
			At most 1	3.4942	[0.5038]		At most 1	5.2234	[0.2693]
Ghana	Domestic	n.a	n.a	n.a		2(4)	None	12.369	[0.4248]
(1973-2006)	Invt(**D'**)						At most 1	1.5632	[0.8518]
	FD Invt.(**F**)					2(4)	None	12.616	[0.4037]
							At most 1	1.4987	[0.8626]
	Total Invt.(**T**)					2(4)	None	12.372	[0.4246]
							At most 1	1.6025	[0.8451]
Guinea Bissau	Domestic	2(2)	None	18.307 *	[0.0906]	2(2)	None	33.080 ***	[0.0003]
(1991-2008)	Invt(**D'**)		At most 1	2.9274	[0.6023]		At most 1	4.6258	[0.3382]
	Total Invt.(**T**)	2(2)	None	17.761	[0.1070]	2(2)	None	12.372	[0.4246]
			At most 1	2.8087	[0.6240]		At most 1	1.6025	[0.8451]
Kenya	n.a	n.a	n.a	n.a		n.a	n.a	n.a	n.a
(1966-2008)									
Madagascar	Domestic	2(4)	None	11.014	[0.5485]	1(4)	None	11.996	[0.4577]
(1965-2008)	Invt(**D'**)		At most 1	4.3463	[0.3749]		At most 1	4.8792	[0.3074]
	FD Invt.(**F**)	4(4)	None	25.098 ***	[0.0086]	2(4)	None	26.032 ***	[0.0060]
			At most 1	1.8128	[0.8083]		At most 1	1.3246	[0.8905]
	Total Invt.(**T**)	2(4)	None	9.5760	[0.6850]	1(4)	None	12.145	[0.4444]
			At most 1	4.0192	[0.4213]		At most 1	4.0661	[0.4144]
Mauritania	PF Invt.(**P**)	2(2)	None	14.410	[0.2683]	1(2)	None	9.6807	[0.6752]
(1986-2005)			At most 1	4.5701	[0.3453]		At most 1	1.2374	[0.9037]
	Total Invt.(**T**)	2(2)	None	29.950 ***	[0.0012]	1(2)	None	14,402	[0.2687]
			At most 1	5.5865	[0.2333]		At most 1	1.0961	[0.9237]
Morocco	Domestic	1(4)	None	10.005	[0.6446]	2(4)	None	10.699	[0.5784]
(1968-2008)	Invt(**D'**)		At most 1	1.2305	[0.9047]		At most 1	1.9632	[0.7811]
	Total Invt.(**T**)	1(4)	None	11.245	[0.5267]	2(4)	None	10.950	[0.5546]
			At most 1	1.5441	[0.8550]		At most 1	2.2633	[0.7254]
Mozambique	Domestic	1(2)	None	20.353 **	[0.0469]	2(2)	None	28.980 ***	[0.0018]
(1993-2008)	Invt(**D'**)		At most 1	8.8217 *	[0.0579]		At most 1	12.926 ***	[0.0082]
	PF Invt.(**P**)	1(2)	None	13.696	[0.3181]	1(2)	None	10.189	[0.6271]
			At most 1	4.1090	[0.4082]		At most 1	3.6165	[0.4838]
	FD Invt.(**F**)	1(2)	None	19.159 *	[0.0694]	2(2)	None	20.437 **	[0.0456]
			At most 1	8.8499 *	[0.0572]		At most 1	8.3149 *	[0.0728]
	Total Invt.(**T**)	1(2)	None	16.387	[0.1594]	2(2)	None	27.411 ***	[0.0035]
			At most 1	7.5190	[0.1036]		At most 1	10.056 **	[0.0327]
Niger	Domestic	1(4)	None	13.393	[0.3409]	1(4)	None	18.376 *	[0.0887]
(1969-2008)	Invt(**D'**)		At most 1	5.7803	[0.2158]		At most 1	2.6679	[0.6499]
	Total Invt.(**T**)	1(4)	None	14.417	[0.2678]	1(4)	None	12.860	[0.3833]
			At most 1	6.4982	[0.1605]		At most 1	1.1849	[0.9113]
Sudan	Domestic	3(3)	None	10.323	[0.6144]	2(3)	None	11.178	[0.5330]
(1973-2008)	Invt(**D'**)		At most 1	1.9588	[0.7819]		At most 1	2.7544	[0.6339]
	FD Invt.(**F**)	1(3)	None	14.472	[0.2642]	1(3)	None	8.0691	[0.8162]
			At most 1	2.7099	[0.6421]		At most 1	1.7042	[0.8276]
	Total Invt.(**T**)	3(3)	None	12.212	[0.4386]	2(3)	None	11.345	[0.5173]
			At most 1	3.4099	[0.5179]		At most 1	2.2773	[0.7228]
Togo	Domestic	3(3)	None	85.011 ***	[0.0000]	1(3)	None	13.310	[0.3474]
(1971-2008)	Invt(**D'**)		At most 1	5.0657	[0.2862]		At most 1	4.0219	[0.4209]
	Total Invt.(**T**)	1(3)	None	17.802	[0.1057]	1(3)	None	11.287	[0.5228]
			At most 1	5.1612	[0.2759]		At most 1	3.5350	[0.4971]

Note that 'n.a' denotes the invalidity of the test because level series of variable is not stationary at least, at 1% or 5% significance level for both 'intercept' and 'intercept and trend' categories. (***),(**) and (*) respectively depict; a very strong hypothesis against H0(P<0.01), moderate evidence against H0(0.01<=P<0.05), and suggestive evidence against H0(0.05<=P<0.1); on the number of co-integrating equations (CE). The test was conducted with the assumption of a restricted constant in the CE and no trend in both the CE and VAR equation. Optimal lags are based on AIC, and their maximum (Max) lag lengths vary from 2 to 4 depending on the number of observations in each country.

As Tables 4 and 5 illustrate, majority of paired variables exhibiting unit root fail to demonstrate a long-run equilibrium. In some cases, where the cointegration rank(r) is equal to the number endogenous variables, the cointegration vector is invertible and the processes are all stationary at level; I(0). Where the r =0, the processes are all I(1) and not cointegrated. However, cointegration occurs when "r" is between zero and the number of endogenous variables(0<r<n). Given the results, we proceed to estimate short-term dynamics(adjustments) for each cointegrated pair. This is the unrestricted version of causality analysis.

4 Causality analysis

As we must have earlier outlined. Our empirical road-map will consist primarily of testing for long-run causality with a VECM. When the likelihood of this test is not feasible owing to cointegration constraints, we test for simple Granger causality with restricted VAR processes.

4.1 Long run estimations

For long-run causality, let's consider foreign direct investment (FDI) and financial efficiency(FE) with no lagged difference, such that:

$$FDI_t = \beta FE_t \quad (1)$$

$$FE_t = \beta FDI_t \quad (2)$$

Resulting VECMs are the following

$$\Delta FDI_t = \alpha(FDI_{t-1} - \beta FE_{t-1}) + \varepsilon_{1,t} \quad (3)$$

$$\Delta FE_{it} = \alpha'(FE_{t-1} - \beta FDI_{t-1}) + \varepsilon_{2,t} \quad (4)$$

From above models, the only right hand term is the error correction term. This term is zero in the long-run equilibrium. It is non zero when FDI and FE deviate from this long-run equilibrium. It helps each variable to adjust and partially restore the equilibrium relation after a shock. The speed of adjustment in event of disequilibrium is measured by α and α' for

corrections of FDI and FE respectively. Therefore, following the example above we intend to replicate the models for each combination of DESA and DFPT variables that are cointegrated. In so doing, we maintain the same deterministic trend assumptions applied in the cointegration tests. These short-run adjustments are in line with the long-run equilibrium and vary when actual equilibriums in the pairs are not in tune with their cointegrated relation. To get this done, we specify our model with the AIC and respect the same number of maximum lags as in the Johansen test. Deterministic trend components are compatible with those from resulting VAR process that defined the long-run equilibrium(cointegration) test[5]. Results presented in Tables 6 and 7 are combined with those from restricted VAR processes(short run causality).

4.2 Short run estimations

Considering a basic bivariate finite–order vector autoregressive (VAR) model, the wisdom of Granger causality as reflected by equations (5) and (6) below, is grounded on evaluating how past values of FDI could help past values of financial efficiency(FE) in explaining the present value of FDI(Eq.5). Since this test preconditions the absence of unit root for each pair under consideration we shall work with first differenced series[6]. The resulting restricted VAR models are as follows:

$$\Delta FDI_t = \sum_{j=1}^{p} \lambda_j \Delta FDI_{t-j} + \sum_{j=0}^{q} \delta_j' \Delta FE_{t-j} + \varepsilon_t \qquad (5)$$

$$\Delta FE_t = \sum_{j=1}^{p} \lambda_j \Delta FE_{t-j} + \sum_{j=0}^{q} \delta_j' \Delta FDI_{t-j} + \varepsilon_t \qquad (6)$$

It is important to note that the statement FDI granger causes FE does not imply that FE is the effect or the result of FDI. Granger causality measures precedence and information content, but does not by itself indicate causality in the more common use of the term. The test

[5] Model will be based on a restricted constant; allowing for just a constant in the CE(Cointegration Equation) and none in the unrestricted VAR equation(VECM).

[6] The choice of first differenced series is also for comparative motives. As observed in Tables 2-3, absence of unit root is more in first differenced than level data.

for zero restrictions on the VAR model is captured by the F-statistics, which is the Wald statistics for the joint hypothesis that parameters for lagged values of FDI equal zero. Therefore, the null hypothesis is the position that FDI doesn't granger cause FE(Eq.6).

Hence, we shall apply (where circumstances are favorable)[7], the two sets of equations for every pair of variables in each country.

Table:6 Causality analysis for Investment led Finance

	Model Specifications	**Domestic Investment**		**Foreign Investment**		**Portfolio Investment**		**Total Investment**	
	AIC(Lags)	Long T ECT/t-stats	Short T F-Stats	Long T. ECT/t-stats	Short T F-Stats	Long T. ECT/t-stats	Short T F-Stats	Long T. ECT/t-stats	Short T F-Stats
Country	Max/Optimal	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.
				Panel A: Impact on Financial Depth					
Burkina F	(4)/-,4,-,-,-,1,-,4.	s.l	1.675	s.l	n.s.a	s.l	0.803	n.s.a	1.366
Cape Verde	(3)/1,-,2,-,-,-,2,-.	---	n.s.d	---	n.s.d	s.l	n.s.d	---	n.s.d
Egypt	(3)/3,1,3,1,-,3,1,2	---	1.756	---	0.981	s.l	0.083	---	2.204
Ethiopia	(4)/2,3,-,-,-,-,1,1	---	0.089	n.s.a	n.s.a	n.s.a	n.s.a	---	0.001
Ghana	(4)/4,4,4,4,-,-,4,1	-0.164 (-0.985)	1.440	-0.877** (-2.680)	4.541**	n.s.a	n.s.a	0.056 (0.376)	0.081
Guinea B	(2)/2,2,-,-,1,2,2,-	-0.59*** (-4.457)	1.993	n.s.a	n.s.a	-0.93*** (-3.746)	5.383**	0.003*** (4.681)	n.s.d
Kenya	(4)/-,1,-,2,-,2,-,1	s.l	1.707	s.l	2.460	s.l	0.934	s.l	1.743
Madagascar	(4)/2,2,1,3,-,-,1,2	0.011 (0.759)	0.830	---	0.893	n.s.a	n.s.a	---	0.763
Mauritania	(2)/-,2,-,-,-,-,1,2	s.l	0.022	n.s.a	n.s.a	n.s.a	n.s.a	---	0.021
Morocco	(4)/1,2,-,3,-,2,1,1	0.004 (0.798)	3.057*	s.l	0.105	s.l	1.623	---	0.018
Moz'bique	(2)/2,1,1,2,2,1,1,-	---	0.435	---	3.038	---	0.396	---	n.s.d
Niger	(4)/4,1,-,1,-,4,2,1	---	0.046	s.l	1.926	s.l	0.092	---	0.558
Sudan	(3)/2,1,1,1,-,1,2,1	---	8.591***	---	0.085	s.l	2.738	---	7.816***
Togo	(3)/1,1,-,1,-,2,1,1	---	0.371	s.l	0.2378	s.l	0.070	---	0.971
				Panel B: Impact on Financial Efficiency					
Burkina F	(4)/-,3,-,-,1,1,1,3	s.l	1.553	s.l	n.s.a	-0.00*** (-4.791)	1.154	---	1.684
Cape Verde	(3)/1,1,1,2,-,1,1,1	---	2.387	---	0.006	s.l	0.015	---	0.209
Egypt	(3)/2,1,2,1,-,3,2,1	---	0.001	---	11.18***	s.l	0.036	---	1.104
Ethiopia	(3)/1,1,-,-,-,-,3,2	---	0.445	n.s.a	n.s.d	s.l	n.s.a	-0.461*** (-4.163)	0.113
Ghana	(4)/3,2,1,1,-,-,3,2	---	0.252	---	0.040	s.l	n.s.a	---	0.234
Guinea B	(2)/-,2,-,-,-,1,-,2	s.l	3.753*	s.l	n.s.d	s.l	0.021	n.s.d	3.255*
Kenya	(4)/-,1,-,2,-,2,-,1	s.l	0.106	s.l	0.704	s.l	1.755	s.l	0.012
Madagascar	(4)/1,1,1,1,-,-,1,1	---	0.029	-0.006*** (-4.272)	0.293	s.l	n.s.a	---	0.076
Mauritania	(2)/-,2,-,2,1,1,1,2	s.l	0.188	s.l	3.278	---	0.000	-0.100*** (-3.737)	0.182
Morocco	(4)/1,1,-,2,-,4,1,1	---	0.058	s.l	0.066	s.l	0.460	---	0.135
Moz'bique	(2)/2,-,2,-,2,-,2,-	---	n.s.d	0.074*** (4.344)	n.s.d	-0.638** (-2.647)	n.s.d	-1.421*** (-4.338)	n.s.d
Niger	(4)/4,4,-,2,-,4,4,2	---	2.257	s.l	0.045	s.l	0.376	-0.644*** (-2.727)	1.144
Sudan	(3)/1,3,1,1,-,4,3,2	---	2.012	---	0.967	s.l	0.241	-0.019 (-0.185)	1.874
Togo	(3)/1,3,-,3,-,2,2,1	---	2.231	s.l	3.081**	s.l	0.401	---	0.002

[7] A favorable circumstance for instance is absence of unit root in the first difference of the two series concerned.

Panel C: Impact on Financial Size									
Burkina F	(4)/-,1,-,-,1,1,1,1	s.l	0.004	s.l	n.s.a	-0.664*** (-4.764)	0.376	---	0.002
Cape Verde	(3)/3,3,1,2,-,1,1,-	---	1.285	---	0.020	s.l	0.106	-0.461** (-2.676)	n.s.d
Egypt	(3)/2,1,1,2,-,3,2,1	-0.19*** (-2.963)	0.267	---	1.110	s.l	0.468	-0.412*** (-2.928)	0.014
Ethiopia	(3)/1,1,-,-,-,-,1,1	---	0.046	s.l	n.s.d	s.l	n.s.a	---	0.001
Ghana	(4)/-,1,-,4,-,-,-,1	s.l	0.096	s.l	0.082	s.l	n.s.a	s.l	0.066
Guinea B	(2)/2,-,-,-,2,-,2,-	-0.011*** (-4.156)	n.s.d	s.l	n.s.d	---	n.s.d	---	n.s.d
Kenya	(4)/-,1,-,2,-2,-,1	s.l	0.351	s.l	1.722	s.l	1.192	s.l	0.091
Madagascar	(4)/2,1,4,4,-,-,2,1	---	0.000	-0.004 (-0.334)	3.875**	s.l	n.s.a	---	0.002
Mauritania	(2)/-,2,-,2,2,1,2,2	s.l	0.119	n.s.a	0.723	---	0.001	-2.368*** (-6.304)	0.117
Morocco	(4)/1,1,-,1,-,2,1,1	---	0.202	s.l	0.000	s.l	0.309	---	0.129
Moz'bique	(2)/1,1,2,1,1,2,2,-	---	0.401	---	0.226	---	1.433	---	0.432
Niger	(4)/4,1,-,1,-,4,1,1	---	0.146	s.l	0.143	s.l	0.161	---	0.068
Sudan	(3)/1,2,1,1,-,1,3,2	---	0.753	---	5.525**	s.l	0.055	---	0.988
Togo	(3)/3,1,-,3,-,2,1,1	-0.082* (-1.771)	0.214	s.l	6.228***	s.l	0.007	---	0.082
Panel D: Impact on Financial Activity									
Burkina F.	(4)/-,1,-,-,1,1,1,1	s.l	4.562	s.l	n.s.a	-0.66*** (-4.654)	0.748	---	2.944*
Cape Verde	(3)/1,3,1,1,-,1,1,-	-0.009 (-0.168)	0.419	0.016 (0.904)	0.726	s.l	4.285*	---	n.s.d
Egypt	(4)/2,-,2,-,-,-,2,-	-0.36*** (-3.795)	n.s.d	---	n.s.d	s.l	n.s.d	---	n.s.d
Ethiopia	(3)/2,1,-,-,-,-,2,1	---	1.623	n.s.a	n.s.d	s.l	n.s.a	---	1.333
Ghana	(4)/2,2,2,2,-,-,2,2	---	0.982	---	0.206	s.l	n.s.a	---	0.608
Guinea B	(2)/2,-,-,-,-,-,2,-	-0.82*** (-5.833)	n.s.d	n.s.a	n.s.d	s.l	n.s.a	---	n.s.d
Kenya	(4)/-,2,-,2,-,2,-,2	s.l	1.393	-0.088** (-2.487)	3.558**	s.l	3.0605*	s.l	2.319
Madagascar	(4)/1,1,2,2,-,-,1,1	---	6.501**	-0.879*** (-5.446)	0.879	s.l	n.s.a	---	7.104**
Mauritania	(2)/-,2,-,-,1,1,1,2	s.l	0.075	n.s.a	n.s.a	---	0.225	---	0.072
Morocco	(4)/2,1,-,1,-,2,2,1	---	1.694	s.l	0.006	s.l	3.111*	---	1.255
Moz'bique	(2)/2,2,2,2,1,1,1,-	---	4.482**	---	2.201	---	0.003	---	n.s.d
Niger	(4)/1,1,-,2,-,4,1,1	0.064* (1.999)	1.941	s.l	3.136*	s.l	0.229	---	0.296
Sudan	(3)/2,1,2,1,-,1,2,1	---	4.634**	---	0.047	s.l	7.089**	---	4.115*
Togo	(3)/1,1,-,1,-,2,1,2	---	0.395	s.l	1.460	s.l	0.288	---	0.092

(F-Stats) F-statistics (Wald statistics) test the significance of lagged values of the independent variable. (ECT/t-stats) Error Correction term and t-ratios. Asterisks indicate the following levels of significance: ***, 1%;**; 5% and *; 10%. "n.a", means at least one of the variables was stationary at level (s.l) series or non stationary at the first difference (n.s.d). (---), depicts the absence of CEs. VEC analysis is performed on the basis of a restricted constant; same deterministic assumptions as in Johansen co-integration test ('constant only in CE and no trend in both CE and VAR). "n.s.a": not specifically applicable because matrix is not positive definite due to issues with degrees of freedom.

Table 7 Causality analysis for Finance led Investment

	Model Specifications AIC(Lags)	Financial Depth		Financial Efficiency		Financial Size		Financial Activity	
		Long T ECT/t-stats	Short T F-Stats	Long T. ECT/t-stats	Short T F-Stats	Long T ECT/t-stats	Short T F-Stats	Long T. ECT/t-stats	Short T F-Stats
Country	Max/Optimal l	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.
				Panel A: Impact on Domestic Investment					
Burkina F	(4)/-,4,-,3,-,1,-,1	s.l	1.818	s.l	4.079**	s.l	0.523	s.l	1.255
Cape Verde	(3)/1,-,1,1,3,3,1,3	---	n.s.d	---	0.454	---	4.183**	0.084*** (4.854)	5.873**
Egypt	(3)/3,1,2,1,2,1,2,-	---	1.995	---	3.802*	-0.158* (-1.885)	1.064	-0.113** (-2.183)	n.s.d
Ethiopia	(3)/2,1,1,1,1,1,2,1	---	0.473	---	1.017	---	3.855*	---	0.321
Ghana	(4)/4,4,3,2,-,1,2,2	-0.34*** (-5.015)	1.104	---	6.433***	s.l	0.141	---	2.892*
Guinea B	(2)/2,1,-,2,2,-,2,-	0.171 (0.585)	2.858	s.l	1.061	0.005 (1.185)	n.s.d	-0.025 (-0.4838)	n.s.d
Kenya	(4)/-,1,-,1,-,1,-,2	s.l	0.001	s.l	9.753***	s.l	1.459	s.l	2.570*
Madagascar	(4)/2,2,1,1,2,1,1,1	0.026*** (3.765)	0.411	---	1.477	---	0.164	---	0.714
Mauritania	(2)/-,2,-,2,-,2,-,2	s.l	1.808	s.l	0.029	s.l	0.935	s.l	0.784
Morocco	(4)/1,2,1,1,1,1,2,1	0.032*** (4.043)	0.764	---	0.027	---	0.002	---	0.244
Moz'bique	(2)/2,1,2,-,1,1,2,2	---	0.011	---	n.s.d	---	0.052	---	3.046
Niger	(4)/4,1,4,4,4,1,1,1	---	1.766	---	1.638	---	0.004	-0.035*** (-3.517)	0.091
Sudan	(3)/2,1,1,2,1,2,2,1	---	15.188***	---	0.010	---	0.591	---	7.740***
Togo	(3)/1,1,1,2,3,1,1,1	---	0.052	---	1.638	0.678*** (14.99)	3.056*	---	0.013
				Panel B: Impact on Foreign Investment					
Burkina F	(4)/-,-,-,-,-,-,-,--	s.l	n.s.a	s.l	n.s.a	s.l	n.s.a	s.l	n.s.a
Cape Verde	(3)/2,-,1,2,1,2,1,1	---	n.s.d	---	2.518	---	1.093	0.061*** (4.245)	0.521
Egypt	(3)/3,1,2,1,1,2,2,-	---	0.618	---	1.898	---	1.032	---	n.s.d
Ethiopia	(3)/-,-,-,-,-,-,-,-	n.s.a	n.s.a	n.s.a	n.s.d	s.l	n.s.d	n.s.a	n.s.d
Ghana	(4)/4,4,1,1,-,1,2,2	0.889** (2.460)	0.284	---	2.662	s.l	1.139	---	2.834*
Guinea B	(2)/-,-,-,-,-,-,-,-	n.s.a	n.s.a	s.l	n.s.d	s.l	n.s.d	n.s.a	n.s.d
Kenya	(4)/-,2,-,2,-,2,2,2	s.l	0.199	s.l	0.087	s.l	1.997	-0.114 (-1.143)	0.072
Madagascar	(4)/1,3,1,1,4,4,2,2	---	0.498	-0.113 (-1.596)	0.0103	-0.354 (-4.815)	1.931	-0.256 (-0.421)	0.207
Mauritania	(2)/-,-,-,2,-,2,-,-	n.s.a	n.s.a	s.l	0.319	n.s.a	1.364	n.s.a	n.s.a
Morocco	(4)/-,3,-,1,-,1,-,1	s.l	32.632***	s.l	0.000	s.l	0.003	s.l	0.955
Moz'bique	(2)/1,2,2,-,2,1,2,2	---	1.536	-0.008 (-0.144)	n.s.d	---	1.652	---	1.865
Niger	(4)/-,1,-,2,-1,-,2	s.l	0.502	s.l	1.554	s.l	3.078*	s.l	1.425
Sudan	(3)/1,1,1,1,1,1,2,1	---	0.001	---	0.049	---	0.458	---	0.008
Togo	(3)/-,1,-,3,-,3,-,1	s.l	0.902	s.l	5.506***	s.l	0.823	s.l	1.677
				Panel C: Impact on Portfolio Investment					
Burkina F	(4)/-,1,1,1,1,1,1,1	s.l	0.277	0.001 (0.059)	0.008	31,7(0,8)	1.097	0.87 (0.214)	0.207
Cape Verde	(3)/-,-,-,1,-,1,-,1	s.l	n.s.d	s.l	0.010	s.l	0.035	s.l	0.320
Egypt	(3)/-,3,-,3,-,3,-,-	s.l	0.053	s.l	0.215	s.l	0.242	s.l	n.s.d
Ethiopia	(3)/-,-,-,-,-,-,--	n.s.a	n.s.a	s.l	n.s.a	s.l	n.s.a	s.l	n.s.a
Ghana	(4)/-,-,-,-,-,-,-,-	n.s.a	n.s.a	s.l	n.s.a	s.l	n.s.a	s.l	n.s.a
Guinea B	(2)/1,2,-,1,2,-,-,-	-34.5*** (-4.304)	4.560**	s.l	0.766	---	n.s.d	s.l	n.s.a
Kenya	(4)/-,2,-,2,-,2,-,2	s.l	0.682	s.l	0.008	s.l	5.649	s.l	0.182
Madagascar	(4)/-,-,-,-,-,-,-,-	n.s.a	n.s.a	s.l	n.s.a	s.l	n.s.a	s.l	n.s.a
Mauritania	(2)/-,-,1,1,2,1,1,1	n.s.a	n.s.a	---	0.077	---	0.035	---	0.002
Morocco	(4)/-,2,-,4,-,2,-,2	s.l	0.653	s.l	0.385	s.l	0.567	s.l	0.057
Moz'bique	(2)/2,1,2,-,1,2,1,1	---	0.026	6.430*** (3.675)	n.s.d	---	2.253	---	1.031
Niger	(4)/-,4,-,4,-,4,-,4	s.l	0.605	s.l	0.816	s.l	0.500	s.l	0.299
Sudan	(3)/-,1,-,1,-,1,-,1	s.l	0.178	s.l	0.073	s.l	0.061	s.l	0.586
Togo	(3)/-,2,-,2,-,2,-,2	s.l	0.995	s.l	8.276***	s.l	14.01***	s.l	1.878

				Panel D: Impact on Total Investment				
Burkina F	(4)/-,4,1,3,1,1,1,1	n.s.a	2.340*	---	2,954**	---	0,678	---	1,112
Cape Verde	(3)/2,-,1,1,1,-,1,-	---	n.s.d	---	0.359	0.309* (1.828)	n.s.d	---	n.s.d
Egypt	(3)/1,2,2,1,2,1,2,-	---	2.387	---	4.177**	-0.226 (-1.514)	0.450	---	n.s.d
Ethiopia	(3)/1,1,3,2,1,1,2,1	---	1.438	-0.000 (-0.002)	3.785**	---	3.866*	---	0.214
Ghana	(4)/4,1,3,2,-,1,2,2	0.270*** (5.140)	4.317**	---	10.11***	s.l	0.397	---	5.392**
Guinea B	(2)/2,-,-,2,2,-,2,-	-0.000 (-0.642)	n.s.d	s.l	0.931	---	n.s.d	---	n.s.d
Kenya	(4)/-,1,-,1,-,1,-,2	s.l	0.030	s.l	8.197***	s.l	2.649	s.l	1.907
Madagascar	(4)/1,2,1,1,2,1,1	---	0.561		1.501	---	0.153	---	0.981
Mauritania	(2)/1,2,1,2,,2,2,1,2	---	1.735	-0.092 (-1.102)	0.025	0.362 (0.554)	0.918	---	0.758
Morocco	(4)/1,1,1,1,1,1,2,1	---	0.174	---	0.133	---	0.051	---	0.305
Moz'bique	(2)/1,-,2,-,1,-,2,-	---	n.s.d	0.887*** (2.248)	n.s.d	---	0.362	---	n.s.d
Niger	(4)/2,1,4,2,1,1,1,1	---	0.338	2.399*** (2.342)	2.977*	---	0.013	---	0.334
Sudan	(3)/2,1,3,2,3,2,2,1	---	16.280***	1.054*** (4.314)	0.002	---	0.002	---	10.20***
Togo	(3)/1,1,2,1,1,1,1,1	---	0.028	---	3.052*	---	4.943**	---	0.006

(F-Stats) F-statistics (Wald statistics) test the significance of lagged values of the independent variable. (ECT/t-stats) Error Correction term and t-ratios. Asterisks indicate the following levels of significance: ***, 1%;**; 5% and *; 10%. "n.a", means at least one of the variables was stationary at level (s.l) series or non stationary at the first difference (n.s.d). (---), depicts the absence of CEs. VEC analysis is performed on the basis of a restricted constant; same deterministic assumptions as in Johansen co-integration test ('constant only in CE and no trend in both CE and VAR). "n.s.a": not specifically applicable because matrix is not positive definite due to issues with degrees of freedom.

5 Discussion of results and policy implications

Based on the findings the following could be established. (1) Granger causality within the simple VAR and VECM frameworks is bidirectional for the most part. (2) There are appealing trends in short-run dynamics: while finance led investment elasticities are positive, investment elasticities of finance are negative for the most part[8]. This confirms conventional wisdom that financial development improves investment allocation. (3) But for Guinea Bissau, Mozambique and Togo, finance does not seem to engender portfolio investment. (4) Contrary to mainstream literature, financial efficiency appears to impact investment flows more than financial depth.

Bidirectional short-run causality from investment flows to financial development dynamics and vice-versa point to the complementary character of the two phenomena. Investment flows are crucial in stimulating economic growth, however the degree to which investment contributes to growth and poverty alleviation depends on the ability to gain access to financial services. Also, an increase in investment flows may engender standardization and

[8] With the exception of Guinea Bissau, Mozambique for investment adjustments ; Egypt, Ghana, Guinea Bissau and Niger for finance adjustments.

improvement in financial services, whether by the dynamism of the ICT sector or multiplication of financial institutions. The bidirectional causality which is in line with Ang(2009) also confirms a longstanding issue of endogeneity in the investment-finance nexus.

We have also observed form short-term adjustments to the long-run equilibrium that while finance elasticities of investment flows are positive for the most part, investment elasticities of finance are negative. This implies that in the aftermath of a shock(disequilibrium) financial development positively impacts investment flows while investment flows negatively affect financial development. In plainer terms, any disequilibrium from the long-run relation between finance and investment will result in the following. (1) Higher financial development which will increase investment flows. This finding is broadly in line with Ndikumana(2000) who has shown that financial development generally exerts a positive incidence on domestic investment in sub-Saharan African countries. (2) Lower investment flows which will mitigate financial development. This interpretation should be treated with caution because a few countries are exceptions to the generalization.

We have also observed from the results that but for Guinea Bissau, Mozambique and Togo, finance does not seem to engender portfolio investment. The thin incidence of financial development on portfolio investment could be explained on two counts. Firstly, portfolio investment is an investment category that is more relevant in financial markets(direct finance) than in the banking sector. Secondly, the relative undeveloped nature of the banking sector in African countries and immediate need of borrowed funds make it less evident for credit to be invested in portfolios instead of real activities by economic agents.

From the results, we have also been able to establish that financial efficiency impacts investment more than does financial depth. Growth in the later denotes an extensive use of currency which might not necessarily be investment-oriented. The former by definition accounts for the ability of banks to transform mobilized funds(deposits) into credit for

economic operators(investment for the most part). This finding also casts some shadow on the mainstream measurement of financial development in the finance-investment nexus(Xu,2000; Rousseau & Vuthipadadorn,2005; Misati & Nyamongo,2010). In Xu(2000) for instance financial depth is the sole measurement of financial development. While the paper establishes a 'finance led investment' nexus, perhaps more dynamics with relevant policy implications might have cropped-up had alternative measures of finance been employed.

Specifically for domestic investment, our findings confirm those of Ndikumana(2005) who posits that financial intermediary efficiency leads to investments via changes in output. That is, reduction in financial intermediation cost(financial efficiency) depends on output for changes in domestic investment. Hence to our query of whether financial reforms could raise the African continent to investment prominence in the 21st century, we could optimistically assert from the weight of available empirical evidence that, allocation efficiency targeted reforms could significantly improve African investment.

Relating the findings to the literature in more detail, the results on foreign direct investment are broadly consistent with Luiz & Charalambous(2009) who assert that financial markets service size has a positive bearing on foreign investment. Findings of this paper also contribute to existing literature by throwing light into the debate over financial thresholds necessary for the financial benefits of foreign investment. While VECM results confirm the strand asserting that financial benefits of foreign direct investment are questionable until greater domestic financial development has taken place, short-run causality results are broadly in line with the opposing school of thought. With respect to the VECM, but for Mozambique in the case of financial efficiency, negative FDI elasticities confirm mainstream consensus (Henry,2007; Kose et al.,2011)that the financial benefits of foreign capital flows are less feasible when domestic financial dynamics are undeveloped. A recent panel data investigation of this hypothesis in the African continent has revealed that it is valid for financial depth and size(Asongu,2012). Short-run causality results on the other hand are in line with Lee &

Chang(2009) and recent African finance literature with respect to financial efficiency and size(Asongu,2012). It follows that with respect to short-run causality results, the financial benefits(especially in efficiency and size) of foreign investment may not be contingent on existing levels of domestic financial development.

Four policy implications result from the findings. (1) Evidence of bi-directional causality for the most part show that extreme caution should be taken when using single equation analysis for economic forecasts. Hence model specifications in the investment-finance nexus should be endogeneity-robust in order to avoid inconsistent and biased estimates as well as unhealthy policy recommendations resulting from such findings. (2) Financial development leads more to investment flows than the opposite effect. Hence governments of sampled countries should focus on financial institutional capacity building in order to generate investment flows rather than expect investment activities to shape financial institutions. (3) Financial allocation efficiency is more relevant as means to attracting investment flows than financial depth. Hence policy measures based on money supply(depth) as an indicator of investment activities should be cautious on the reality that, an extensive use of currency may not necessarily indicate a positive investment climate. (4) The somewhat heterogeneous nature of the findings also point to the fact that blanket policies should take into account country-specific trends in the finance-investment nexus. Hence policies will be more effective if they are contingent on the prevailing finance-investment nexus trends in each country.

5) Conclusion

This paper's contribution to existing literature has been fivefold. (1) Contrary to mainstream studies, we have used four measures of financial intermediary development (depth, efficiency, activity and size) as well as four types of investment flows(domestic, foreign, portfolio and total). Hence we have broadened the scope of the investment finance nexus. (2) The chosen investment and financial indicators have resulted from the broadest

macroeconomic dataset available on investment and financial intermediary flows. Thus based on correlation analyses, conceptual frameworks and usages in the literature, these selected indicators are most representative of investment and financial flows in the African continent. (3) Usage of optimally specified econometric methods in contradiction to purely discretionary model specifications in mainstream literature. (4) Distinction between short-run and long-run effects for each investment-finance pair. (5) Based on the results, we have provided some policy recommendations.

The following findings have been established. (1) Granger causality within the VAR and VECM frameworks is bidirectional for the most part. (2) There are appealing trends of short-run dynamics: while finance led investment elasticities are positive, investment elasticities of finance are negative. This confirms conventional wisdom that financial development improves investment allocation. (3) But for Guinea Bissau, Mozambique and Togo, finance does not seem to engender portfolio investment. (4) Contrary to mainstream literature, financial efficiency appears to impact investment more than does financial depth.

Four policy implications have resulted from the findings. (1) Evidence of bi-directional causality for the most part shows that extreme caution should be taken when using single equation analysis for economic forecasts. Hence model specifications in the investment-finance nexus should be endogeneity-robust in a bid to avoid inconsistent and biased estimates as well as unhealthy policy recommendations resulting from such findings. (2) Financial development leads more to investment flows than the opposite effect. Hence governments of sampled countries should focus on financial institutional capacity building in order to generate investment flows rather than expect investment activities to shape financial institutions. (3) Financial allocation efficiency is more relevant as means to attracting investment flows than financial depth. Hence policy measures based on money supply(depth) as an indicator of investment activities should be cautious on the reality that an extensive use of currency may not necessarily indicate a positive investment climate. (4) The somewhat

heterogeneous nature of the findings also point to the fact that, blanket policies should take into account country-specific trends in the finance-investment nexus. Hence policies will be more effective if they are contingent on the prevailing finance-investment nexus trends in each country.

Appendices

Appendix 1: Correlation analysis of financial development variables

Correlation Matrix

	dbacba	llgdp	cbagdp	dbagdp	pcrdbgdp	pcrdbofgdp	bdgdp	fdgdp	bcbd
dbacba	1.0000	0.2691	-.5197	0.4755	0.5157	0.4642	0.3809	0.3810	0.2716
llgdp	0.2691	1.0000	0.0992	0.8226	0.6515	0.5513	0.9435	0.9522	-.1340
cbagdp	-.5197	0.0992	1.0000	-.0248	-.1025	-.1122	0.0418	0.0362	-.1647
dbagdp	0.4755	0.8226	-.0248	1.0000	0.9302	0.8392	0.8940	0.8792	0.2541
pcrdbgdp	0.5157	0.6515	-.1025	0.9302	1.0000	0.9122	0.7346	0.7168	0.4592
pcrdbofgdp	0.4642	0.5513	-.1122	0.8392	0.9122	1.0000	0.6604	0.6582	0.3506
bdgdp	0.3809	0.9435	0.0418	0.8940	0.7346	0.6604	1.0000	0.9915	-.1297
fdgdp	0.3810	0.9522	0.0362	0.8792	0.7168	0.6582	0.9915	1.0000	-.1459
bcbd	0.2716	-.1340	-.1647	0.2541	0.4592	0.3506	-.1297	-.1459	1.0000

Source(author)

Where: *dbacba*(Deposit Money Bank Assets/(Deposit Money + Central Bank Assets))
llgdp(Liquid Liabilities/ GDP)
cbagdp(Central Bank Assets/GDP)
dbagdp(Deposit Money Bank Assets/GDP)
pcrdbgdp(Private Credit by Deposit Money Banks/GDP)
bdgdp(Bank Deposits/GDP)
fdgp(Financial System Deposit/GDP)
bcbd(Bank Credit/Bank Deposits)
pcrdbofgdp(Private Credit by Deposit Money Banks and Other Financial Institutions/GDP)

Appendix 2: Correlation analysis of investment/financial flows

Correlation Matrix

	FDI	PCF	MRI	NODA	GPriI	GPubI	GFCF	GDI	OCF	NLTB	PFI	PFEF	Bi	NFI	TGDS
FDI	1.00	0.98	0.34	-.01	0.49	0.21	0.51	0.50	-.09	0.02	-.08	-.07	0.31	0.08	-.14
PCF	0.98	1.00	0.34	-.03	0.49	0.20	0.50	0.50	-.09	0.03	0.10	0.05	0.30	0.08	-.14
MRI	0.34	0.34	1.00	0.22	0.51	0.44	0.65	0.63	0.05	-.02	-.02	-.05	0.48	0.06	-.76
NODA	-.01	-.03	0.22	1.00	-.13	0.39	0.09	0.05	-.12	0.02	-.07	-.15	0.27	0.08	-.46
GPriI	0.49	0.49	0.51	-.13	1.00	0.11	0.84	0.81	-.023	-.03	0.01	0.03	0.38	0.06	-.15
GPubI	0.21	0.20	0.45	0.39	0.11	1.00	0.59	0.60	-.04	-.03	-.07	-.15	0.64	0.19	-.31
GFCF	0.51	0.50	0.65	0.09	0.84	0.59	1.00	0.97	-.03	-.03	-.03	-.06	0.64	0.16	-.29
GDI	0.50	0.49	0.63	0.05	0.81	0.57	0.96	1.00	-.03	-.03	-.01	-.05	0.62	0.09	-.24
OCF	-.09	-.09	0.05	-.12	-.03	-.04	-.03	-.03	1.00	-.16	0.04	0.06	-.04	-.03	-.02
NLTB	0.02	0.03	-.02	0.02	-.03	-.03	-.03	-.03-	.16	1.00	0.02	0.00	-.00	-.01	-.01
PFI	-.08	0.09	-.02	-.07	0.01	-.07	-.03	-.01	0.04	0.02	1.00	0.71	-.05	0.01	0.02
PFEF	-.07	0.05	-.05	-.15	0.03	-.15	-.06	-.05	0.06	0.00	0.71	1.00	-.10	0.02	0.07
Bi	0.31	0.30	0.48	0.27	0.38	0.64	0.64	0.62	-.04	-.00	-.05	-.10	1.00	0.13	-.23
NFI	0.08	0.08	0.06	0.08	0.06	0.19	0.16	0.09	-.03	-.01	0.01	0.02	0.13	1.00	-.03
TGDS	-.14	-.14	-.76	-.46	-.16	-.31	-.29	-.24	-.02	-.01	0.02	0.06	-.23	-.03	1.00

Source(author)

Where:
FDI(Foreign Direct Investment/GDP)
PCF(Private Capital Flows/GDP)
MRI(Remittance Inflows/GDP)
NODA(Net Development Assistance/GDP)

GPriI(Gross Private Investment/GDP)
GPubI(Gross Public Investment/GDP)
GFCF(Gross Fixed Capital Formation/GDP)
GDI(Gross Domestic Investment/GDP)
NLTB(Net Long Term Borrowing)
PFI(Portfolio Investment/GDP)
PFEF(Portfolio Equity Flows/GDP)
BI(Budgetary Investment/GDP)
NFI(Net Foreign Investment/GDP)
TGDS(Total Gross Domestic Savings)

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