

Structural and institutional determinants of investment activity in Africa

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ACRIA 6

Outline

- 1 Motivation
- 2 Investment Activity
- 3 Model
- 4 Nonparametric specification
- 5 Results
- 6 Take-aways

Motivation

- ▶ Cross-country variation in investment activity and returns is widening. GFCF in GDP is between 1 and 90 (WB).
- ▶ This is mostly due to different kinds of frictions that prevent a normalization of interest rates and returns.
- ▶ This inhibits potential for regional integration and investment competitiveness.
- ▶ If progress must be made on regional integration, it is important to identify factors that drive investment related frictions in Africa.
- ▶ The approach should be different for Africa given the greater heterogeneity in structural and institutional frameworks.

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Proposition

In addition to the traditional economic factors, there exist a wider set of factors including political, security, legal and institutional dimensions that should be accounted for in understanding the dynamics of investment activity and competitiveness in Africa.

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Results preview

1. Among structural variables, we find that financial openness is a robust determinant of investment activity in Africa.
2. On the other hand, institutional quality appears to be the robust determinant of investment activity among the institutional variables considered.
3. We also find evidence of nonlinearities in the relationship, suggesting the existence of thresholds and turning points.
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Investment activity

- ▶ There are five main theories used to explain investment activity in the literature (Oshikoya,1994).
 1. Simple accelerator theory,
 2. Liquidity theory,
 3. Expected profits theory,
 4. Tobin's Q theory and
 5. Neoclassical theory
- ▶ The trend in the literature has generally been to focus on economic factors.
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- ▶ Recently, we now see papers that recongnize this and introduce structural variables.
- ▶ And another group that introduces institutional variables to the economic variables.
- ▶ When considered in isolation, it is difficult to place the effects of the structural or institutional variables in context.
- ▶ What we do however is to consider these sets of determinants in a wholesale manner.
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Simple Model

- ▶ We motivate the empirical strategy with a simple theoretical neoclassical model.
- ▶ Say we have a production function of the form

$$Y_{it} = e^z K_{it}^\alpha L_{it}^{1-\alpha} \quad (1)$$

- ▶ The law of motion for capital is

$$K_{i,t+1} = (1 - \delta)K_{it} + I_{it} \quad (2)$$

- ▶ Let the optimal capital stock $\forall i \in t$

$$K_{it}^* = \frac{\alpha Y_{it}}{D\alpha} \quad (3)$$

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- ▶ Now invoke useful result from neoclassical growth theory that in SS with a balanced growth path, the growth rate of output, capital and consumption are equal.
- ▶ Solve for investment by plugging (3) into (2)
- ▶ What we get is

$$I_{it} = \frac{\alpha(\delta + \mu) Y_{it}}{R_{it}^{\sigma}} \quad (4)$$

- ▶ Take the logs and get

$$\ln I_{it} = \ln \alpha + \ln(\delta + \mu_{it}) + \ln Y_{it} - \sigma \ln R_{it} \quad (5)$$

- ▶ Benchmark estimable equation

$$i_{it} = \beta + \rho i_{i,t-1} + \phi g_{it} + \varphi y_{it} - \sigma r_{it} + \Omega' X_{it} + \Psi' Z_{it} + \epsilon_{it}$$

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- ▶ GMM is robust to potential endogeneity problems among others. But it is instrument based. Often we are not blessed with the right instruments.
- ▶ It is also restrictive in the sense that it assumes linearity, monotonicity in the relationship.
- ▶ Hence we also consider a class of nonparametric models that relax these assumptions and is still capable of controlling for endogeneity problems.
- ▶ The specification for the nonparametric regression is;

$$y_{it} = g(\mathbf{X}_{it}, \mathbf{Z}_{it}) + \epsilon_{it}, \quad (7)$$

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Data and descriptives statistics

- ▶ Data set covers 22 sub-Saharan African countries over the period 1980-2011.
- ▶ Sources are (WDI), Polity IV database, Chinn and Ito (2012) and the Penn World Table (PWT) version 8.0.

Statistic	N	Mean	St. Dev.	Min	Max
Fixed Investments	678	19.96	10.63	-2.42	113.58
Investments	689	92.78	189.12	0.09	1,224.88
Financial Openness	696	0.29	0.29	0.00	1.00
LGDP	689	26.65	2.30	21.36	30.72
Business Environment	671	-1.55	6.46	-10	10
Institutional Quality	671	3.38	2.02	1	7
Interest rates	606	5.76	13.24	-53.44	60.69
Inflation	646	14.67	22.23	-17.64	200.03
GDP growth	685	4.28	6.97	-50.25	71.19
Human Development	640	1.83	0.41	1.13	2.85
Trade openness	688	71.81	38.07	6.32	275.23
TFP	458	1.55	3.56	0.57	29.67
Institutional structure	671	2.60	3.44	0	10
Financial development	665	21.38	25.21	1.54	167.54
Stock market	241	8.08	22.42	0.00	148.77

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GMM regressions with GFCF as regressand

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Fixed invest _{t-1}	0.72*** (0.16)	0.96*** (0.21)	0.83*** (0.17)	0.83*** (0.17)	0.85*** (0.17)	0.77*** (0.15)	0.67*** (0.15)	0.51*** (0.18)	0.78*** (0.15)	0.58*** (0.19)
LGDP	0.06 (0.39)	0.45 (0.43)	0.12 (0.51)	0.15 (0.44)	0.05 (0.71)	0.04 (0.68)	0.01 (0.82)	0.08 (0.81)	0.02 (0.44)	0.25 (1.15)
GDP growth	0.42 (0.50)	1.01** (0.52)	0.76* (0.40)	0.78* (0.40)	0.91** (0.39)	0.73** (0.35)	0.46 (0.32)	0.09 (0.40)	0.55 (0.34)	0.32 (0.54)
Interest rate	-0.43* (0.22)	-0.75** (0.33)	-0.93*** (0.27)	-0.90*** (0.26)	-0.84*** (0.31)	-0.76*** (0.25)	-0.90*** (0.29)	-0.90*** (0.27)	-0.48*** (0.16)	-1.15* (0.67)
Inflation		0.24* (0.14)	0.33** (0.13)	0.31** (0.13)	0.29** (0.13)	0.17 (0.11)	0.08 (0.21)	0.00 (0.25)	0.12 (0.08)	0.14 (0.37)
Govt. consumption			0.82** (0.36)	0.77** (0.34)	0.68** (0.32)	0.75** (0.33)	0.98** (0.46)	1.09** (0.51)	0.41** (0.20)	0.85* (0.51)
Financial openness				-2.79 (2.66)	-2.52 (2.72)	-2.67 (2.55)	-4.73 (3.54)	-5.50 (4.00)	-3.40** (1.69)	-6.89 (4.35)
Trade openness					0.02 (0.04)	0.02 (0.04)	0.00 (0.05)	-0.02 (0.05)	0.05 (0.04)	-0.01 (0.09)
Financial development						-0.03 (0.04)	-0.03 (0.05)	-0.02 (0.06)	0.01 (0.02)	-0.00 (0.06)
Institutional quality							-0.23 (0.57)	0.59 (1.54)	0.41 (0.77)	0.31 (1.49)
Institutional structure								-0.52 (1.06)	-1.99 (1.64)	0.16 (1.54)
Business environ									0.93 (0.83)	-0.20 (0.59)
Human cap. dev.										2.31 (5.41)
Constant	6.21 (10.25)	9.20 (11.63)	-12.78 (17.38)	-9.97 (14.63)	-11.92 (20.13)	-11.83 (19.85)	-10.48 (24.43)	-7.81 (26.47)	-0.71 (13.06)	-10.46 (27.05)
N	537	508	508	508	508	490	461	461	429	421
Hansen's J	5.55	1.79	1.86	1.87	1.88	2.07	2.03	2.60	5.86	1.00
Wald χ^2	253***	105***	194***	198***	196***	278***	270***	975***	2211***	227***
AR(2) z	0.99	1.12	0.58	0.61	0.73	0.75	0.38	0.24	0.92	-1.22
Instruments	9	7	8	9	10	11	12	14	17	15

Interesting findings

- ▶ Postulated signs from neoclassical theory are observed.
- ▶ Government consumption positively drives investment. Not surprising since government is a significant player in most African economies.
- ▶ Financial openness is significant and negatively related to investment.
- ▶ The implication is that ceteris paraibus, more financially open economies experience lower levels of investments.
- ▶ Crowding out effect. This is possible if FDI substitutes and displaces domestic investments more than one-for-one.
- ▶ If returns to investments are higher abroad, then greater financial openness could lead to net capital outflows.

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Optimal bandwidth selection

Variable	Bandwith
L.GDP	0.0185
GDP growth	28.674
Interest rate	7.168
Inflation	41.097
Government consumption	3.105
Finiancial openess	0.9988
Trade openess	18.313
Financial development	2.525
Business environment	11823203
Institutional quality	88815043
Institutional structure	5877867
Human development	0.7205
Factor.Country	0.0531
Factor. Year	0.4915

Nonparametric Kernel significance tests

Variable	P-values	
	IID	Wild-Rademacher
L.GDP	0.84	0.96
GDP growth	0.86	0.9
Interest rate	0.77	0.45
Inflation	0.62	0.72
Government consumption	0.73	.03**
Financial openness	0.42	0.71
Trade openness	0.28	0.7
Financial development	0.63	0.25
Business environment	.002**	0.00***
Institutional quality	0.27	.00***
Institutional structure	0.86	0.92
Human development	0.91	0.47

Figure: Fitted surface for kernel regression of inv. on Finop. and Instqlty

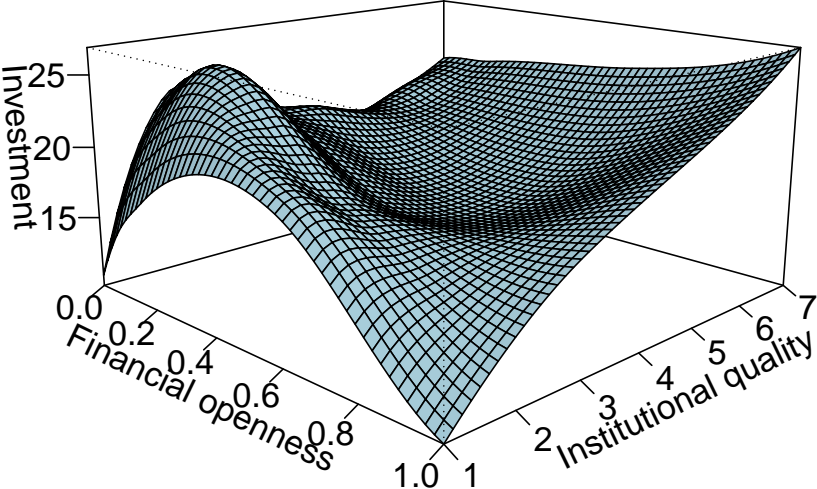


Figure: Contour maps for kernel regression of inv on Finop. and Instqlty

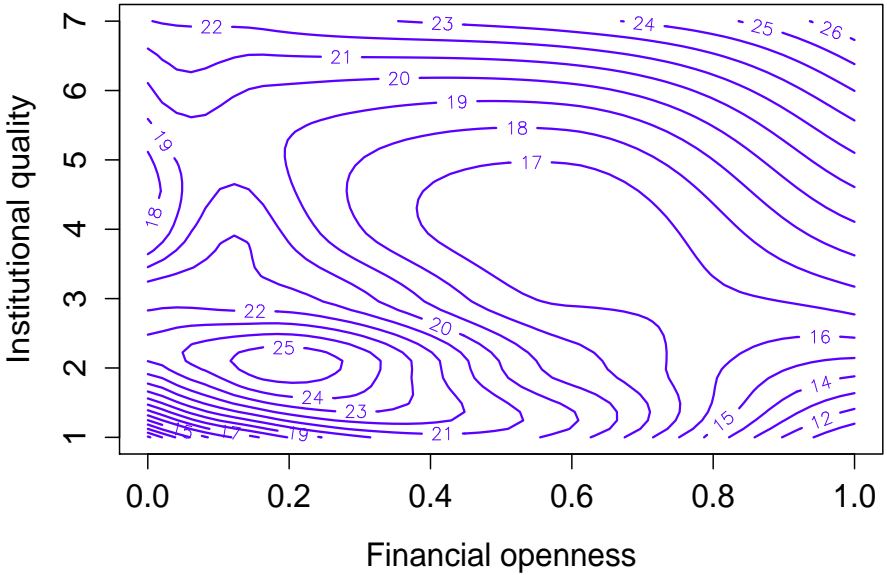
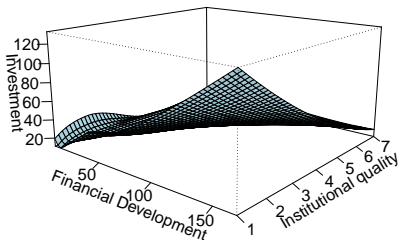


Figure: Fitted values and contour maps for investments on Findev and Instqly



(a) Fitted surface for investments on Findev

(b) Contour maps for investments on Findev

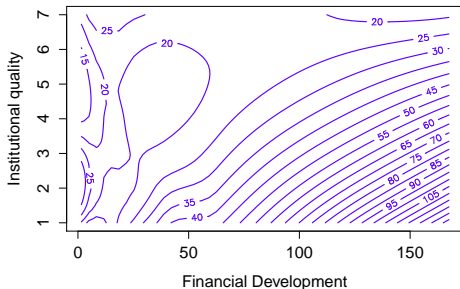
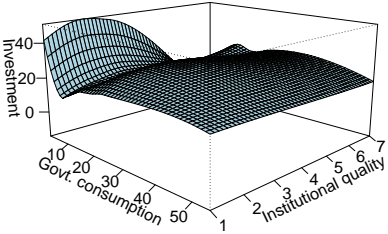
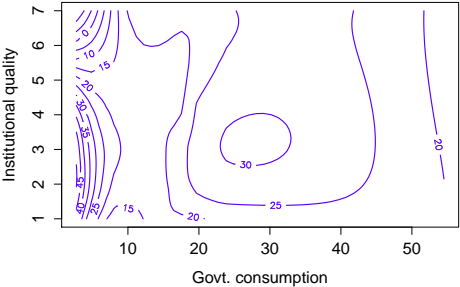


Figure: Fitted values and contour maps for investments on Govtcon and Instqly



(a) Fitted surface for investments on Gvtcon

(b) Contour maps for investments on Gvtcon.



Take-aways

1. Financial openness and institutional quality are reasonably robust structural and institutional determinants of investment activity in Africa respectively,
2. There is evidence of nonlinearity in the relationship and there exist a threshold level of financial openness that achieves high levels of investment,
3. Using interaction terms, the inhibiting effect of financial openness is potentially less in countries with higher levels of institutional quality,
4. Promoting institutional quality is an effective policy towards facilitating investment activity in Africa.

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