## Literate Farmers of Africa: Social Mobility Across Generations

Nicolas Syrichas

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#### William Kamkwamba: the boy who harnessed the wind

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# School dropout with a streak of genius

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#### Introduction

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#### Introduction

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• Africa's young population + job opportunities  $\implies$  tremendous potential for economic growth

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• Opportunities to succeed in life  $\implies$  fair and equitable societies

• Africa's young population + job opportunities  $\implies$  tremendous potential for economic growth

#### Questions

How do African countries fare in terms of economic opportunities for those at the bottom of the income distribution? Are there any significant disparities across local labour markets and demographic groups? What policies could promote job opportunities?

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Measuring "opportunities"

- Advanced Countries ⇒ IM in Labor earnings (Acciari, Polo, and Violante, 2019; Chetty, Hendren, et al., 2014; Corak, 2020)
  - Limitation: Required access to administrative records
- **Developing Countries**  $\implies$  IM in Educational attainment (Alesina, Hohmann, et al., 2021; Asher, Novosad, and Rafkin, 2018; Narayan et al., 2018)
  - Limitation: Distortions in the labor market not captured

Contribution:

• Occupational attainment as a proxy of social status

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#### In this paper...

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  - % Low skilled parents  $\rightarrow$  medium/high skilled children

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- Examine factors that shape IM rates
  - (Observable) Individual and family characteristics
    - Fertility rates, parents marital status, access to basic infrastructure

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- Country level variables
  - Urbanization, health and school infrastructure

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Sevaluate the causal effect of educational attainment on IM rates

•  $IV \rightarrow$  Free Primary school education reform

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#### Outline

• Census Data

• Intergenerational Mobility indicators

Correlates of IM

Conclusion

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#### Census Data

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#### Data

- Data source: IPUMS Census data
  - Representative sample from national sources: 27 countries, 63 censuses, 2800 districts (1970-2016) list of censuses
  - Benin, Botswana, Burkina Faso, Cameroon, Egypt, Ghana, Guinea, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritius, Morocco, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, South Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe
  - 7,7 million children aged 15-25 co-residing with at least one older generation individual less than 65

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#### Selection bias

- Cohabitation bias
  - No information on individuals separated from their parents in early adulthood
- Life-cycle bias
  - Occupational choice might vary over the life-cycle

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#### Selection bias

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#### Remedy

- Children aged 15-25  $\implies$  Cohabitation rates (75%)
  - $\bullet\,$  Secondary or higher students  $\longrightarrow$  High skills
- Vertical transitions in occupations by education intensity  $\implies$  little variation along life-cycle

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#### Intergenerational Mobility indicators

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#### **Ranking Occupations**

I develop a measure of Education Intensity (EI) of each occupation as:

$$EI_o = \sum_{i \in o} \left( \frac{\omega_i}{\sum_{j \in o} \omega_j} \right) \times e_i \tag{1}$$

- $e_i$  is individual i's years of schooling
- $\omega_i$  is an individual's sampling weight.

Rank	Occupation, ISCO-08	White collar (high skill)	Blue collar (medium skill)	Agricultural (low skill)	EI <sub>o</sub> (index)
1	Professionals	~			12.1
2	Clerks	$\checkmark$			10.3
3	Technicians and associate professionals	$\checkmark$			10.2
4	Legislators, senior officials and managers	$\checkmark$			10.1
5	Plant and machine operators and assemble		$\checkmark$		6.6
6	Service workers and shop and market sales		$\checkmark$		5.6
7	Crafts and related trades workers		$\checkmark$		5.5
8	Elementary occupations			$\checkmark$	4.3
9	Housework			$\checkmark$	2.9
10	Skilled agricultural and fishery worker			~	2.5

#### **Transition Matrices**

• Equality of opportunity in Africa is limited



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#### IM Metrics

 $OccUp_i = \begin{cases} 1, & \text{if the child } i \text{ born from low skilled parents has a higher skill profession} \\ 0, & \text{otherwise} \end{cases}$ 

 $OccDown_i = \begin{cases} 1, & \text{if the child } i \text{ born from high skilled parents has an lower skill job} \\ 0, & \text{otherwise} \end{cases}$ 

I run separately for each country the following regressions:

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$$OccUp_{i} = \alpha_{1} + \underbrace{\beta_{o} + \beta_{d} + \beta_{b}}_{\text{Fixed Effects}} + \varepsilon_{i}$$
(4)

$$DccDown_i = \alpha_2 + \underbrace{\beta_o + \beta_d + \beta_b}_{\text{Fixed Effects}} + \varepsilon_i$$
 (5)

where  $\beta_o$  birth-decade old FE,  $\beta_d$  census-decade FE,  $\beta_b$  birth-year FE (z) (z) (z) (z)

(2)

(3)

#### Results

		Upward IM				Downward IM						
Nr	Country	All	Males	Females	Urban	Rural	All	Males	Females	Urban	Rural	N
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	South Africa	0.77	0.78	0.76	0.82	0.71	0.11	0.10	0.11	0.09	0.14	364,642
2	Egypt	0.68	0.77	0.50	0.78	0.49	0.16	0.10	0.26	0.14	0.36	2,887,528
3	Nigeria	0.68	0.70	0.64	0.74	0.65	0.08	0.09	0.06	0.08	0.07	20,113
4	Mauritius	0.58	0.68	0.45	0.67	0.54	0.19	0.08	0.36	0.16	0.22	32,741
5	Cameroon	0.52	0.58	0.45	0.70	0.23	0.12	0.05	0.18	0.11	0.38	174,923
6	Botswana	0.46	0.55	0.40	0.64	0.31	0.31	0.14	0.45	0.21	0.58	38,967
7	Morocco	0.44	0.59	0.26	0.68	0.27	0.29	0.16	0.43	0.14	0.54	1,208,231
8	Liberia	0.40	0.47	0.30	0.59	0.33	0.20	0.18	0.23	0.14	0.37	25,291
9	Togo	0.36	0.33	0.45	0.75	0.32	0.17	0.12	0.18	0.07	0.38	8,852
10	Senegal	0.36	0.48	0.17	0.64	0.18	0.38	0.13	0.68	0.42	0.58	273,688
11	Kenya	0.34	0.40	0.27	0.60	0.33	0.30	0.28	0.34	0.16	0.37	92,007
12	Lesotho	0.34	0.37	0.31	0.58	0.32	0.48	0.35	0.57	0.19	0.54	39,155
13	Ghana	0.27	0.21	0.34	0.59	0.27	0.30	0.45	0.18	0.21	0.39	490,082
14	Zambia	0.25	0.37	0.13	0.63	0.12	0.27	0.15	0.40	0.20	0.68	242,066
15	Zimbabwe	0.24	0.32	0.16	0.59	0.17	0.52	0.44	0.62	0.45	0.63	27,272
16	Sierra Leone	0.23	0.29	0.18	0.57	0.08	0.20	0.13	0.25	0.18	0.25	52,349
17	South Sudan	0.23	0.19	0.27	0.35	0.20	0.42	0.42	0.43	0.24	0.51	33,160
18	Sudan	0.20	0.19	0.27	0.72	0.12	0.17	0.22	0.07	0.10	0.35	127,482
19	Uganda	0.19	0.25	0.12	0.54	0.18	0.46	0.42	0.50	0.26	0.59	354,826
20	Malawi	0.19	0.32	0.05	0.66	0.17	0.39	0.33	0.49	0.22	0.53	200,816
21	Rwanda	0.18	0.21	0.15	0.21	0.17	0.21	0.26	0.17	0.06	0.37	131,626
22	Benin	0.17	0.17	0.18	0.60	0.18	0.29	0.34	0.26	0.15	0.41	190,747
23	Mozambique	0.16	0.27	0.06	0.35	0.07	0.49	0.26	0.72	0.43	0.75	289,322
24	Burkina Faso	0.11	0.13	0.07			0.44	0.45	0.48			94,515
25	Mali	0.08	0.07	0.10	0.46	0.04	0.37	0.41	0.19	0.41	0.73	278,272
26	Tanzania	0.07	0.08	0.07	0.21	0.03	0.56	0.54	0.58	0.40	0.42	990,428
27	Guinea	0.06	0.09	0.00	0.57	0.04	0.12	0.12	0.14	0.08	0.54	214,413
	Average	0.32	0.37	0.26	0.59	0.25	0.30	0.25	0.35	0.20	0.45	

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#### Within Country Heterogeneity

IM up Ghana, Occupation regional upward mobility -.01 - .13 13 - .2 2 - 32 32 - .33 .32 - .33 .33 - .37 .37 - .38 .38 - .42 .42 - .47 .47 - .64



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#### Correlates of IM

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#### What factors correlate with IM

	IM up	IM up	IM down	IM down
	(2)	(3)	(4)	(5)
Constant	0.80***	0.44***	0.21***	0.64***
Individual Characteristics				
Female	-0.16***	-0.14***	0.08***	0.07***
Christian	0.04***	0.01**	-0.04***	0.00
Primary school completed		0.53***		-0.47***
Secondary school completed		0.61***		-0.48***
University school completed		0.62***		-0.40***
HH Characteristics				
No electricity	-0.17***	-0.09***	0.11***	0.04***
Yes, piped water	0.16***	0.07***	-0.06***	-0.03***
Not owned a house	0.07***	0.04***	-0.02***	-0.01***
Parents family status				
Single parent	0.00	0.00	0.00	0.00
Married/in union	0.02***	0.01***	-0.00	-0.00
Separated/divorced/spouse absent	-0.01***	0.00	0.02***	0.01***
Widowed	-0.02***	0.00	0.03***	0.01***
Children				
Number of own children in household	-0.24***	-0.12***	0.20***	0.13***
nchild squared	0.07***	0.04***	-0.06***	-0.04***
nchildcb	-0.01***	-0.00***	0.00***	0.00***
Extended Family				
Nr family members	-0.01**	-0.00	0.00	0.00
Nr family members squared	0.00	0.00	0.00	-0.00
Nr family members cubic	-0.00	-0.00	-0.00	0.00
birth-year FE	Yes	Yes	Yes	Yes
birth-decade old FE	Yes	Yes	Yes	Yes
distict FE	Yes	Yes	Yes	Yes
decade-census FE	Yes	Yes	Yes	Yes
$R^2$	0.27	0.49	0.13	0.30
N	3,610,657	3,610,657	772,738	772,738

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

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#### **Country Correlates**



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#### Conclusion

- I map IM across countries and regions in Africa
- IM varies substantially across countries, regions and demographic groups
- Educational attainment is the strongest correlate of IM
- Policies to improve universal access to education could boost IM rates

### Appendix

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#### Censuses

#### Figure: List of Censuses

No	Country	Census	Individuals	Households	
1	Benin	1979,1992,2002,2010	2,524,628	446301	
2	Botswana	1981,1991,2001,2010	600,289	151714	
3	Burkina Faso	1996,2006	2,498,870	399383	
4	Cameroon	1976,1987,2005	3,406,084	681153	
- 5	Egypt	1986,1996,2006	19,983,770	4412601	
6	Ethiopia	1984,1994,2007	15,882,990	3483999	
7	Ghana	1984,2000,2010	5,669,774	1218677	
8	Guinea	1983,1996,2014	2,237,824	366609	
9	Kenya	1989,1999,2009	6,323,580	1437197	
10	Lesotho	1996,2006	368,003	78814	
11	Liberia	2008	348,057	68836	
12	Malawi	1987,1998,2008	3,132,039	713882	
13	Mali	1987,1998,2009	3,228,570	534229	
14	Mauritius	1990,2000,2011	352,737	94021	
15	Morocco	1982,1994,2004,2014	7,131,045	1407035	
16	Mozambique	1997,2007	3,598,565	830054	
17	Nigeria	2006,2007,2008,2009,2010	426,395	96023	
18	Rwanda	2002,2012	2,624,679	587221	
19	Senegal	1988,2002,2013	2,940,312	343793	
20	Sierra Leone	2004	494,298	82518	
21	South Africa	1996,2001,2007,2011,2016	16,141,863	4641495	
22	South Sudan	2008	542,765	92592	
23	Sudan	2008	5,066,530	922816	
24	Tanzania	1988,2002,2012	10,541,181	2265160	
25	Togo	1970,2010	608,539	125318	
26	Uganda	1991,2002,2014	7,552,455	1598844	
27	Zambia	1990,2000,2010	3,105,551	566531	
28	Zimbabwe	2012	654,688	160728	1.1
		Total: 76	127,243,163	27,654,503	ba

#### Figure: Educational attainment in Africa by occupation



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