



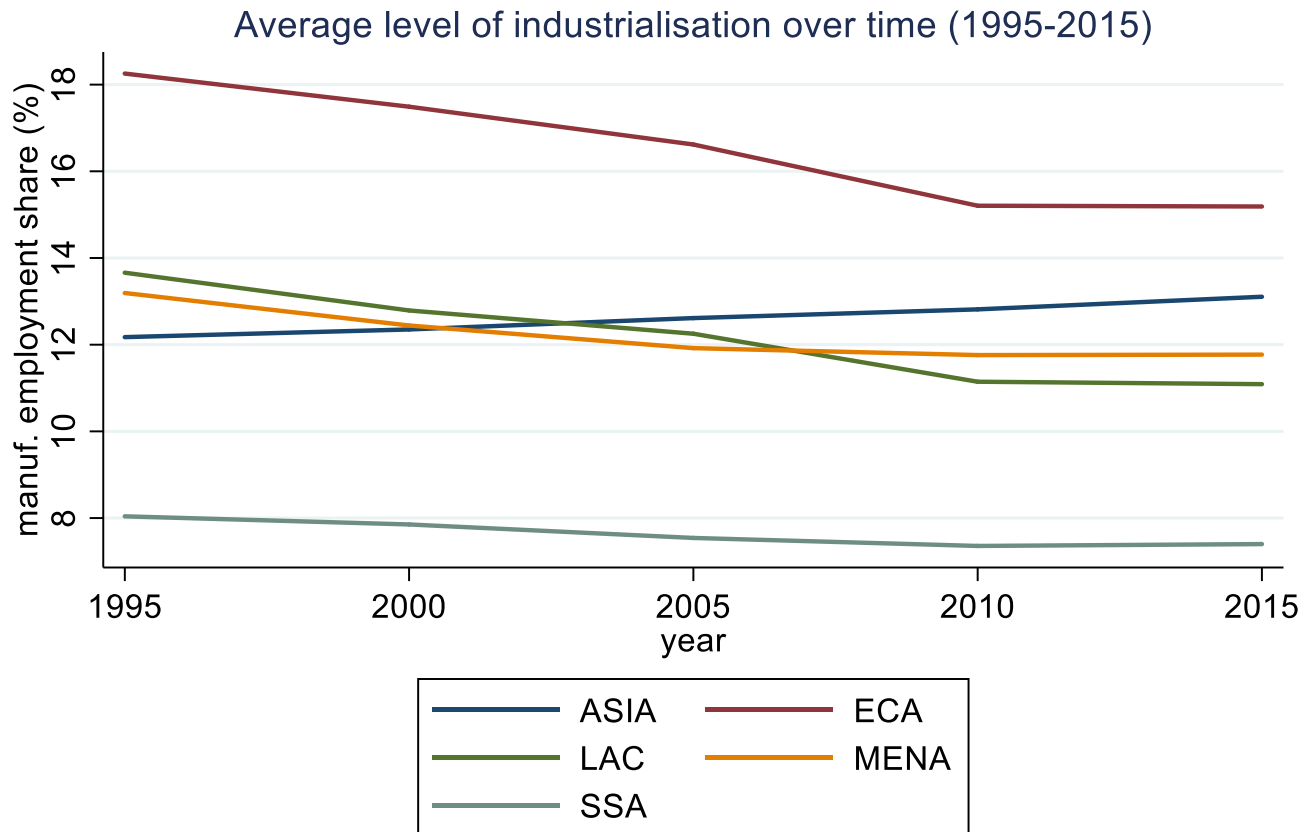
The Role of Technology in Industrialisation: The Case of Developing Economies

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Level of Industrialisation Across Regions



Note: Authors calculations using sectoral employment data from ILO 5 year averages for the period 1995-2015

Technology and Industrialisation

We consider two aspects of technology:

1. technological progress (productivity)

(Kaldor, 1967; Rodrik, 2016)

- technological capabilities

(Lall, 1992; Fagerberg, 1994; Archibugi and Coco, 2005)

“Technological capability defined as the ability to make effective use of technological knowledge in an effort to assimilate, use, adapt, and incrementally change existing technologies” (Yun,2007)

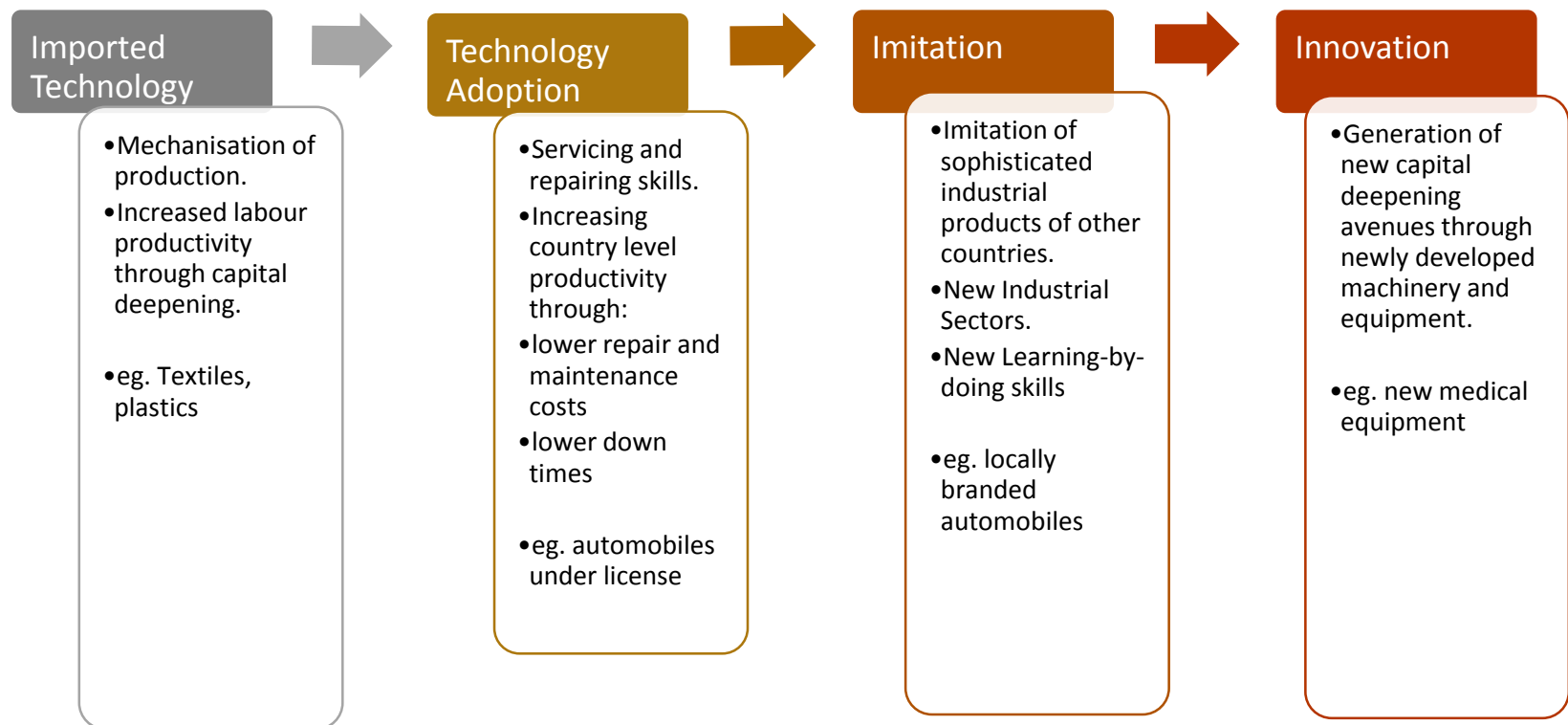
- Both aspects important for international competitiveness.

Measuring Technological capabilities: Approaches in Literature

Author/s	Aspects of Technological Capability	Variables	Period
Archibugi and Coco (2004)	Innovative activity	patents registered at US patent office, scientific publications	162 countries (1987-1990); (1997-2000)
	Technology infrastructure	internet users, telephone mainlines and mobile, and electricity consumption	
	Human capital	scientific tertiary enrolment, years of schooling, and literacy rate	
Fagerberg and Srholec (2017)	Technology	R&D expenditure, patent applications, scientific and engineering articles, internet users	114 countries; 1995-2013
	Education	primary, secondary and tertiary education attainment	
	Governance	government effectiveness, lack of corruption, law and order	
Kondratiuk-Nierodzinska (2016)	New knowledge creation and innovation	patent applications, scientific and technical journal articles, high technology exports	32 EU countries; (1998-2000) (2010-2012)
	Technology transfer /diffusion process	inward FDI, Capital goods imports	
	Absorptive capacity	R&D expenditure, researchers in R&D, tertiary graduates, lifelong learning, tertiary attainment, mobile subscriptions, internet users	

Stages of industrialisation

Technological capabilities and productivity vary over stages of industrialization (Yulek, 2018).



Methodology

Estimation of model of industrialization for low and middle income economies (1995-2015):

$$INDST_{it} = \beta_1 INDST_{i,t-1} + \beta_2 \sum X_{it} + \beta_3 TechGap_{it} + \beta_4 TechCap_{it} + \beta_5 \sum Region + \theta_t + \varepsilon_{it}$$

To capture the **effect of technology** we include two aspects of technology catch-up:

1. Technological progress (*TechGap*)
2. Technology capability (*TechCap*)

Measures of Technology

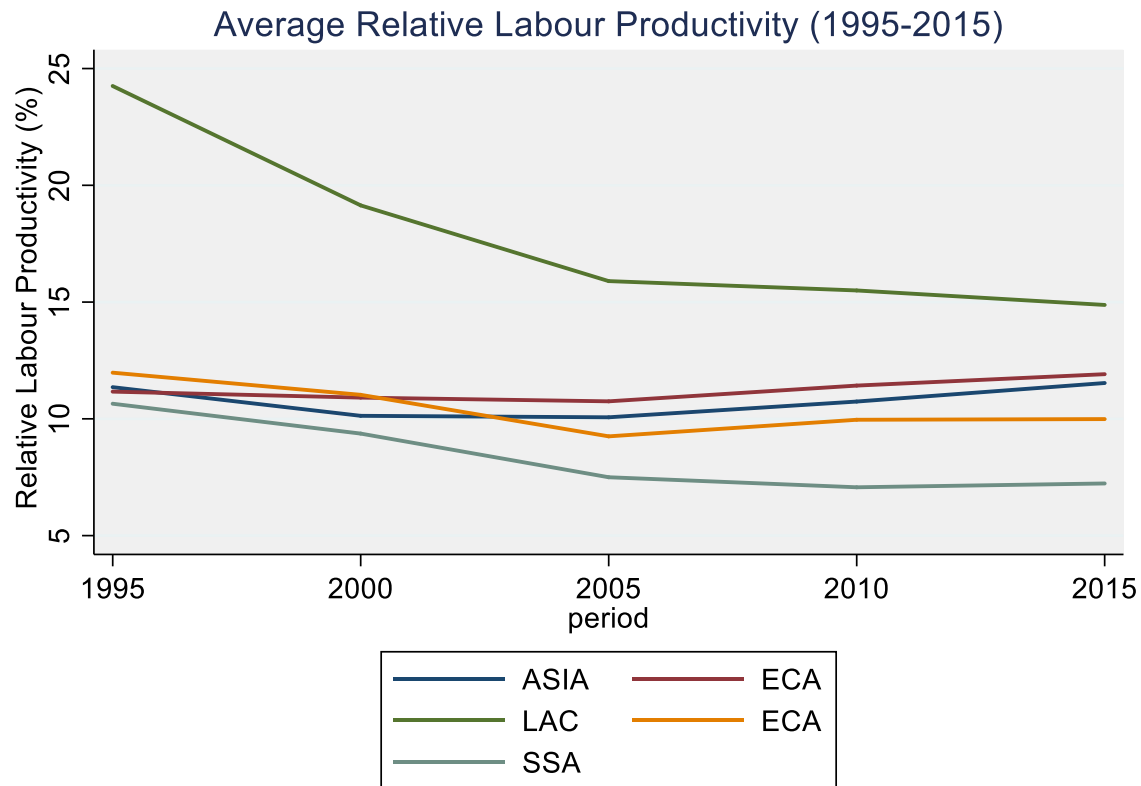
- **Technological Progress:** Relative Labour Productivity (assuming USA as technology frontier):

- **Technological Capabilities:**

We compute various aspects of Technological Capability from set of variables:

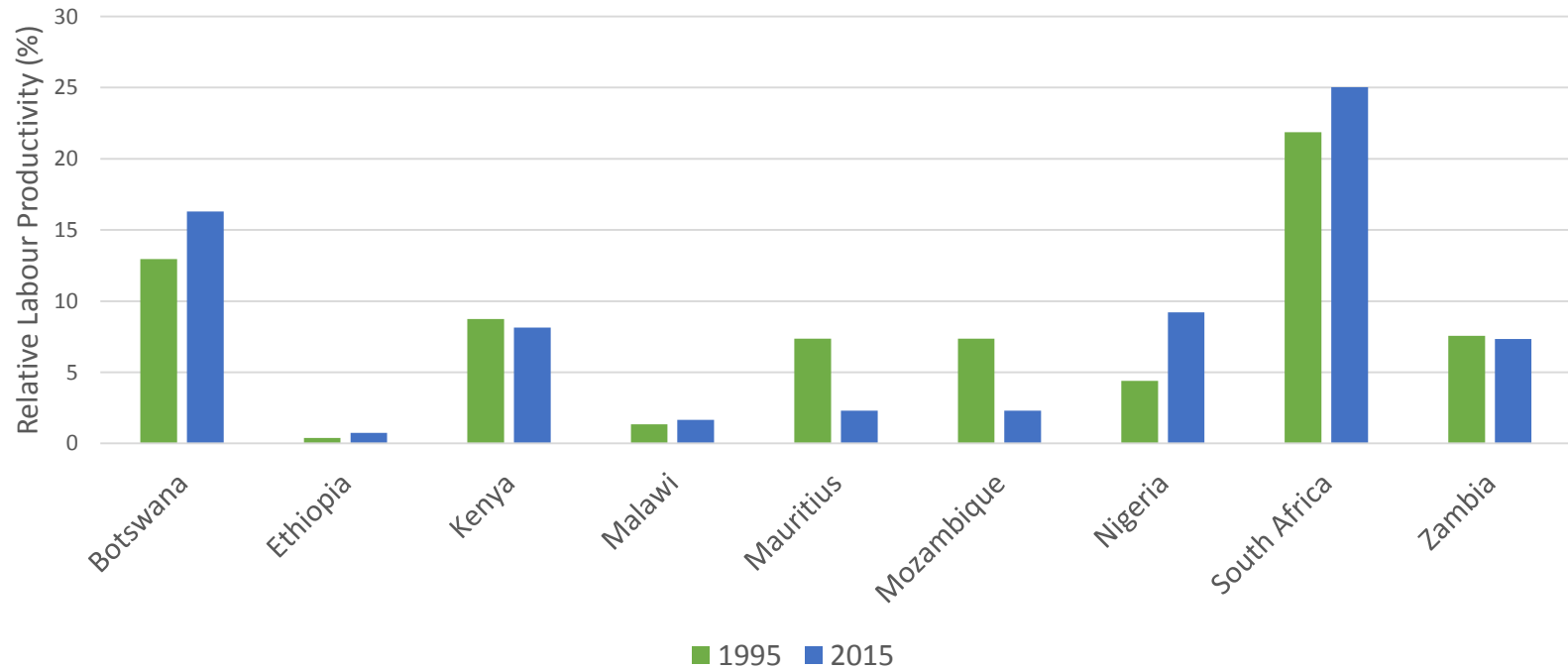
- **Absorptive Capacity**
- **Governance/Institutions**
- **Learning capability**
- **Knowledge Creation**

Technology Gap over time, by region



Technology Gap (1995-2015): Within Region

Sub-Saharan Africa

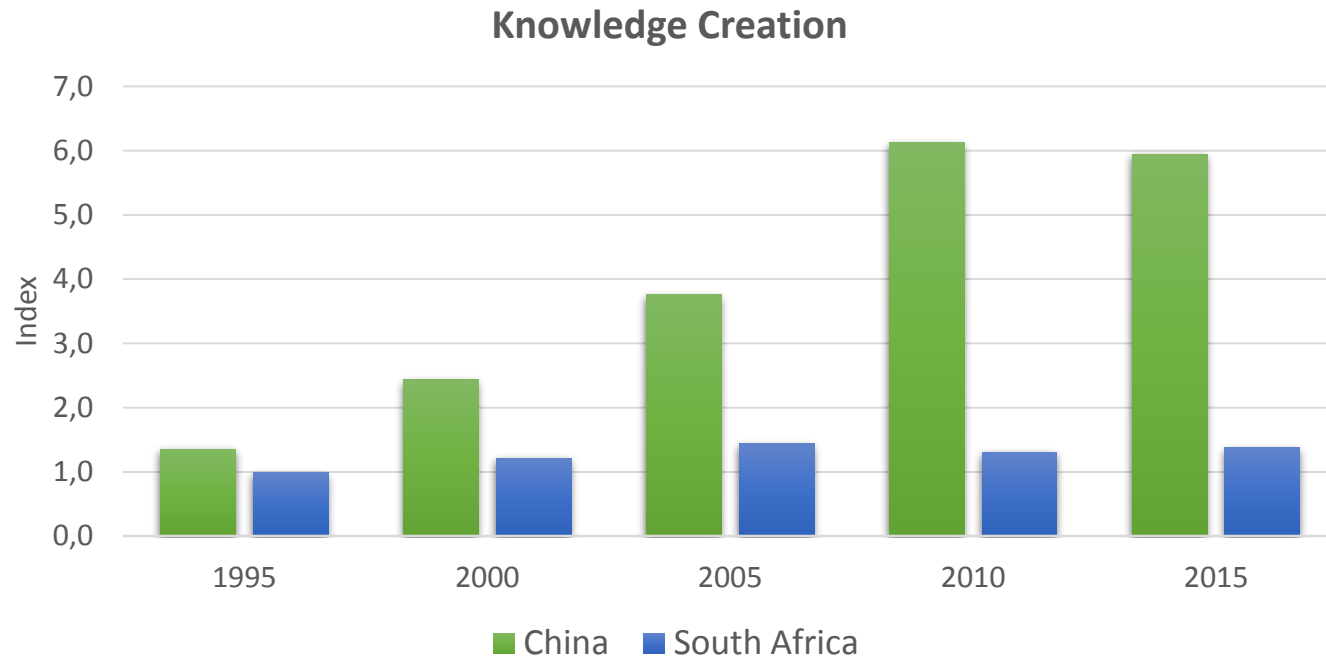


Technological Capabilities Indicators

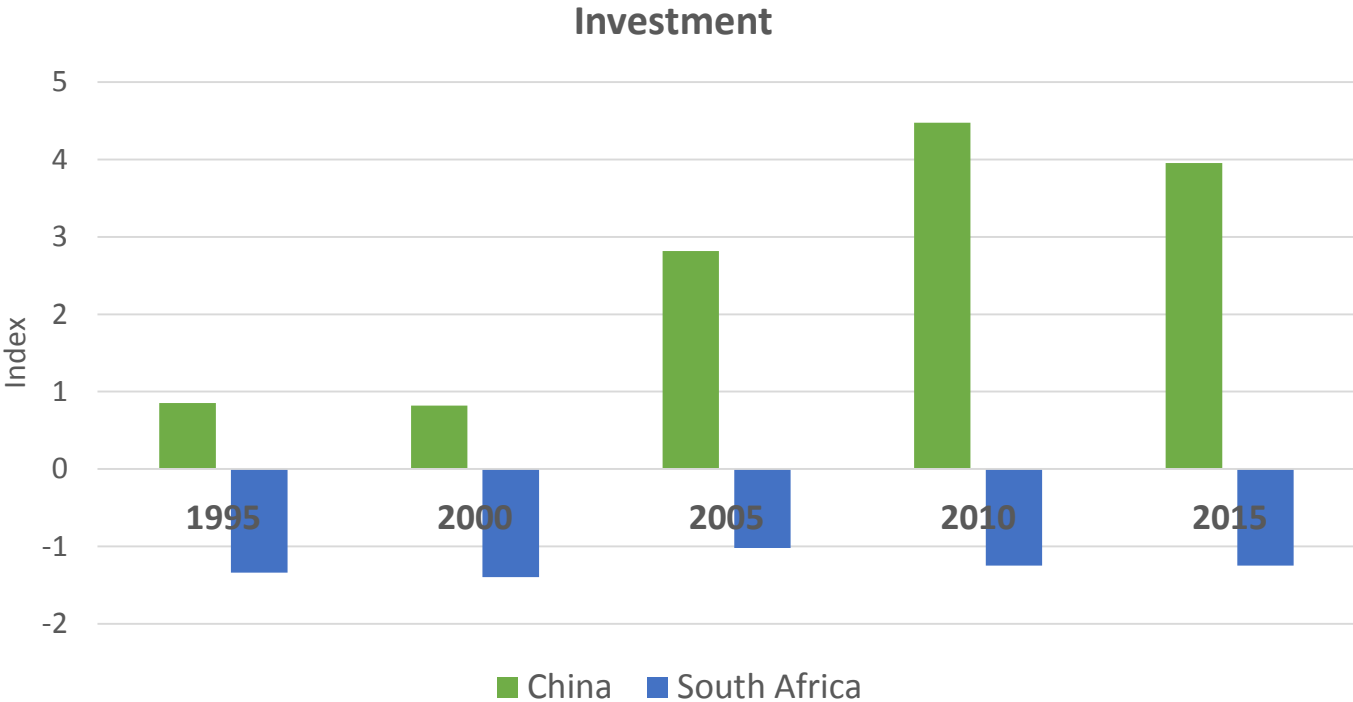
Absorptive Capacity	Knowledge Creation	External Knowledge	Governance	Investment
Education	R&D Expenditure	Capital Goods Imports	Govt. Effectiveness	FDI
Financial Institutions	Journal Articles	High-Tech exports	Regulatory Quality	Capital Formation
Mobile Subscriptions	Patent Applications		Rule of Law	
Internet Users	Financial Markets			
Electricity Consumption				

Source: Authors Calculations based on Factor Analysis Approach

Comparative Technological Capability



Comparative Technological Capability



The effect of technology on Industrialisation

	(1)	(2)	(3)
VARIABLES	Full Sample	ASIA	SSA
<i>Rel_Product</i>	-0.10**	-0.31**	0.18**
<i>Governance</i>	0.03	0.53**	2.40**
<i>Absorptive Capacity</i>	-0.29	1.62**	-1.11
<i>Knowledge Creation</i>	0.06	0.71***	1.14
<i>External Knowledge</i>	-0.17	0.07	3.00**
<i>Investment</i>	0.14*	0.38**	0.01
Constant	43.03***	-121.17**	1.37
Control Variables	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
Observations	134	36	24
Number of id	45	9	6

Conclusions

- Effect of technological progress depends on the stage of industrialization.
- For SSA economies raising productivity may still result in employment increases.
- Crucial role of governance and institutions and access to external knowledge for SSA.

Conclusion

- Policies targeted at raising productivity may result in improvement in level of industrialization . (eg. Education and training, targeting sectors)
- Common goal of multiple policies to support learning, innovation and access to finance (STI and Education).
- Regulatory environment for both capabilities and encouraging investment.