

Technology Mismatch and African Economic Growth

Jacob Moscona¹

¹Harvard and MIT

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Catalyzing Macroeconomic Policy for Development in sub-Saharan Africa

Technology Mismatch

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- Growing evidence that “rich world technologies” are not always “appropriate” elsewhere

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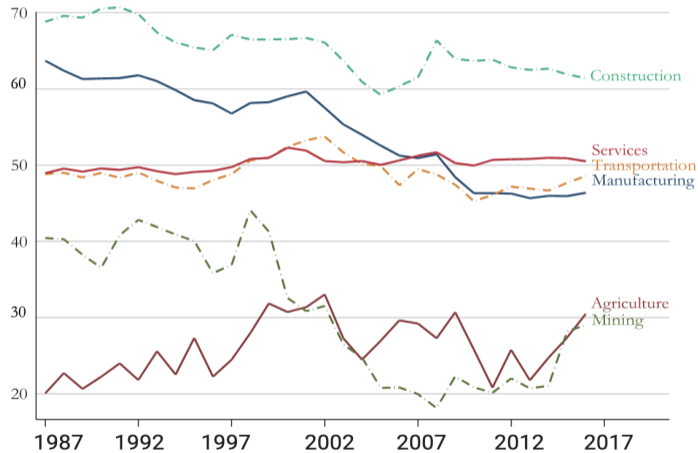
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- Does “tech mismatch” constrain African productivity growth? Today, three examples:
 - 1 Manufacturing
 - 2 Agriculture
 - 3 Climate change adaptation

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- Does “tech mismatch” constrain African productivity growth? Today, three examples:
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 - 2 Agriculture
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- Big picture: existence of appropriate technology could be an important pre-condition for industrial policy, productivity growth, and structural change
- Incentivizing and directing R&D could be a key area for policy intervention

Example #1: Manufacturing

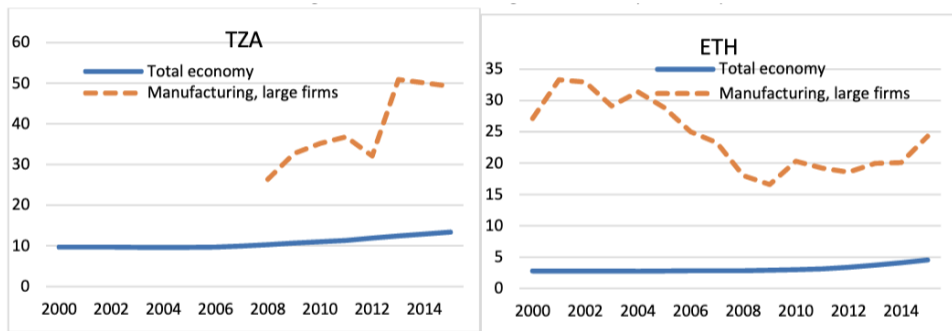
Figure: Declining Labor Share in US Manufacturing, Driven by New (Automation) Technologies



Source: Acemoglu and Restrepo (2019), "Automation and New Tasks: How Technology Displaces and Reinstates Labor", *JEL*

Example #1: Manufacturing

Figure: Large (Productive) Firms in Tanzania and Ethiopia Use “Frontier” Input Mix...

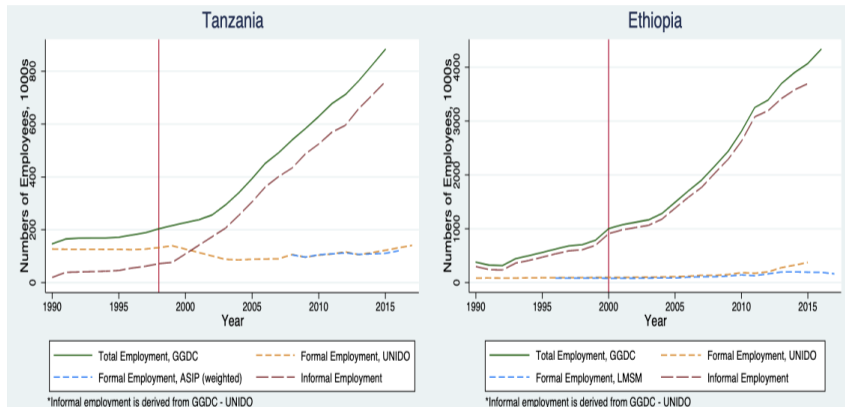


...which is very different from economy-wide factor shares (“mismatch”)

Source: Diao et al. (2021), “Africa’s Manufacturing Puzzle: Evidence from Tanzanian and Ethiopian Firms”

Example #1: Manufacturing

Figure: Formal Sector and Large-Firm Employment is Stagnant (Compared to Informal Sector)



Mismatch between global production technology and local factor abundance limits growth

Source: Diao et al. (2021), "Africa's Manufacturing Puzzle: Evidence from Tanzanian and Ethiopian Firms"

Example #2: Agriculture



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European Maize Borer
Dominant threat: **US, Europe**
BioTech Patents: **5,007**
Effective GM Variety ✓



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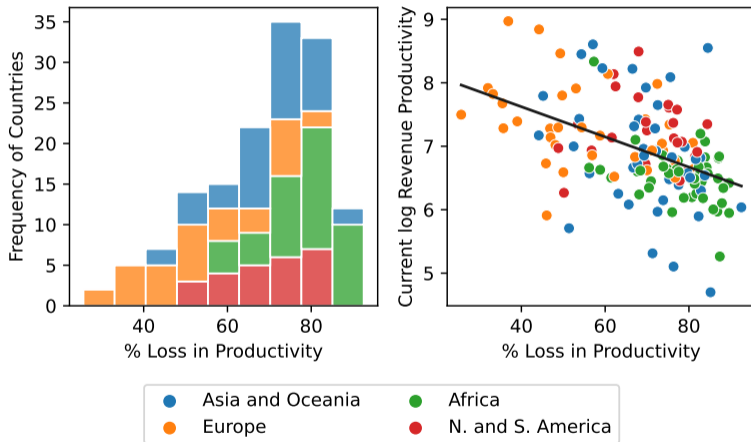


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- Again, there is a **mismatch** between the focus of innovation and local conditions
- To what extent does this mismatch explain low agricultural productivity in Africa?

Example #2: Agriculture

Combining global data on pests & pathogen distributions, technology transfer, and output....



...technology **mismatch** reduces average productivity by 58%, *but 74% in Africa*

Source: Moscona and Sastry (2022), "Inappropriate Technology: Evidence from Global Agriculture"

Example #3: Climate Change Adaptation

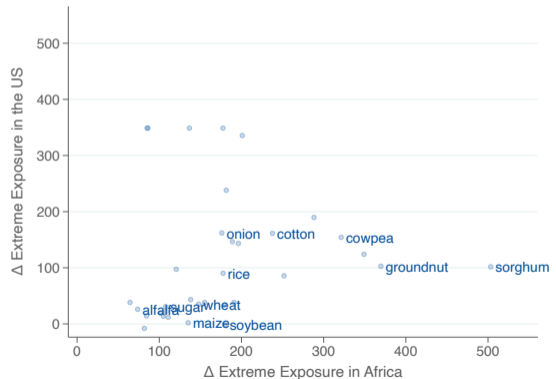
Example #3: Climate Change Adaptation

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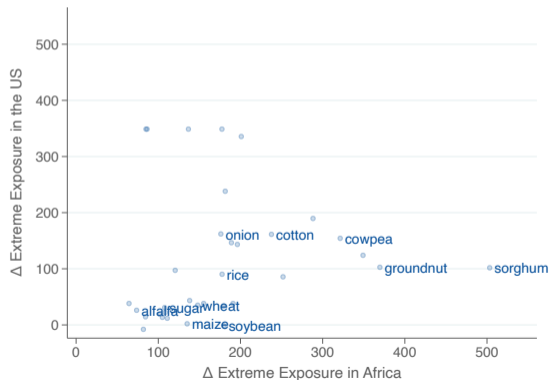
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Adaptation outside of agriculture? Urban flooding? A sea wall may work for Venice, what about Lagos?



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Potential Areas for Progress and Industrial Policy

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- **Interplay between re-directing innovation and re-directing industry**
 - “Appropriate” technologies facilitate productivity growth and shift in industrial structure
 - Larger domestic market size further incentivizes appropriate technology development

Linking Mismatch and Structural Change: Not a New Idea!

[D]espite the tremendous accumulation of material and social technology, **the stock of innovations most suitable to the needs of the less developed countries is not too abundant.** [...] [A]t least one implication [of this shortage of technology] is sufficiently intriguing, and seems to be illuminating of many recent events in the field, to warrant a brief note. It is that a **substantial economic advance in the less developed countries may require modifications in the available stock of material technology.** It will not be a matter of merely borrowing existing tools [or] of directly applying past patterns of growth.

Simon Kuznets (1971), Nobel Prize Lecture

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