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Economic Complexity and Structural Transformation: The Case of Mozambique

by

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We evaluate Mozambique's current industrial policy and propose a new set of priority sectors

Context

- Mozambique's current policy regime focuses on a broad range of sectors.
 - **The National Development Strategy (2015-35)** gives priority to 1) agriculture; 2) fishery; 3) extractives; 4) tourism; and 5) manufacturing.
 - **The Industrial Policy and Strategy (2016-25)** gives priority to 1) food and agro-industry; 2) clothing, textiles and footwear; 3) non-metallic minerals; 4) metallurgy and manufacture of metal products; 5) wood and furniture processing; 6) chemicals, rubber and plastics; and 7) paper and printing.
- These sectors are chosen based on broad set of policy objectives:
 - e.g. the Industrial Policy and Strategy (2016-25) prioritizes sectors in accordance with their 1) contribution to the current production level; 2) origin of raw materials used in production; 3) job creation; 4) import substitution; 5) export potential; 6) potential to generate upstream and downstream linkages; and 7) ease of policy implementation.

What we do:

- We identify new products that Mozambique is not currently exporting competitively, but that **(i)** are important for structural transformation and **(ii)** have a high export potential in the country.
- (i) Supply-side:** We use network science methods to identify target products that will improve Mozambique's economic complexity and that can be developed relatively easily given the country's current productive capabilities.
- (ii) Demand-side:** We then apply a gravity model estimation framework to rank the identified target products in accordance with their export potential.
 - Main contribution to the literature (Hausmann et al. 2019; Hausmann et al. 2016; Hausmann and Chauvin 2015; Ayres and Freire 2014; Hausmann and Hidalgo 2013; Hausmann and Klinger 2006; Hidalgo 2011).

Data

Our analysis relies primarily on **international trade data** collected by UN COMTRADE, cleaned by the Growth Lab at Harvard University.

Supply-side

- Trade data at exporter-product level.
 - Export value of 1221 products (HS 4-digit) for 131 countries from 1998-2018.
- Used to **(i)** calculate structural transformation-potential of different products and **(ii)** analyse Mozambique's export structure.

Demand-side

- Trade data at exporter-importer-product level.
 - Trade value of 84 target products for 195 countries from 2011-2018.
 - Supplemented with GDP data (World Bank), regional trade agreements (WTO), and various distance indicators such as common language, colonial ties, contiguity, and physical distance, (CEPII).
- Used to run gravity regressions to estimate the export potential of identified target products.

Supply-side methodology

Aim

Identify new products and sectors that will contribute to economic complexity and that Mozambique can develop relatively easily.

Basic approach

We use methods from network science to calculate the structural transformation-potential of products.

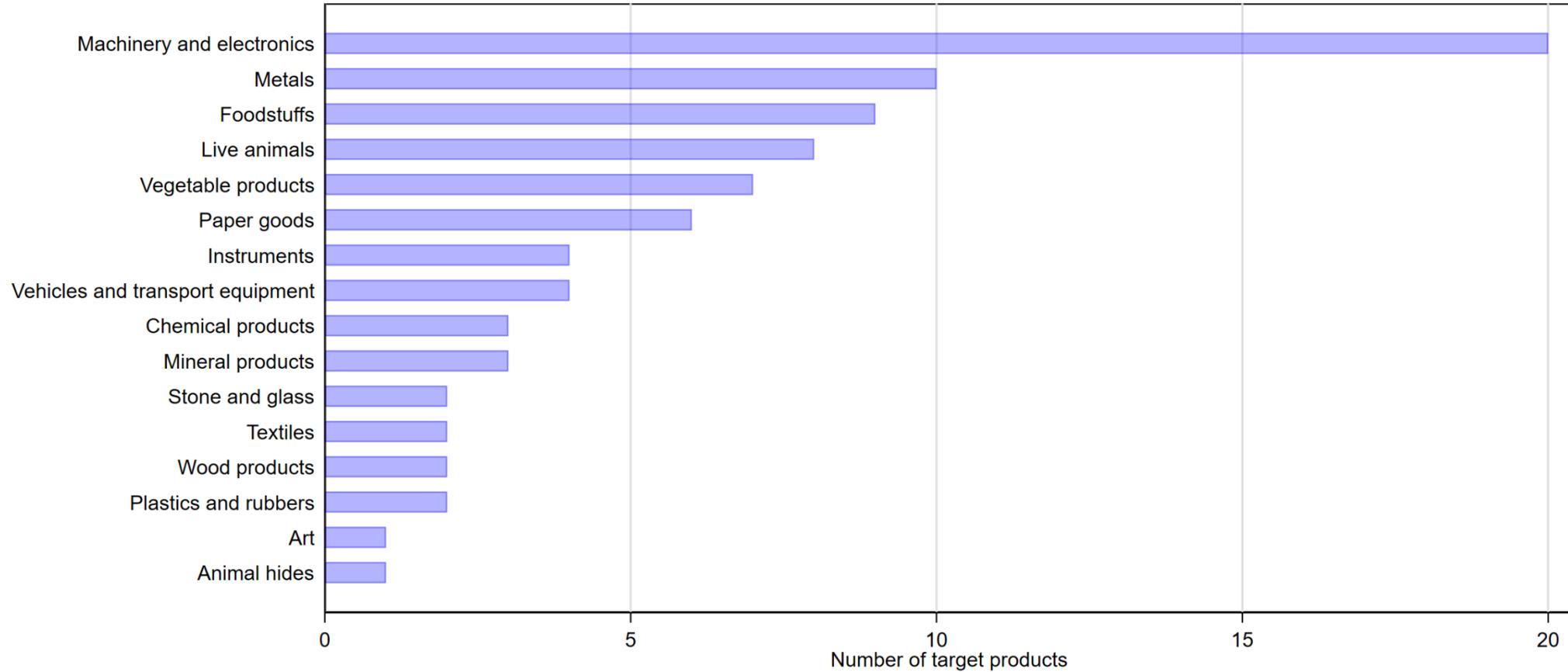
Three criteria for selection of products

1. **Complexity:** products increasing the complexity of Mozambique's economy.
2. **Ease of development:** products relying on the productive capabilities Mozambique's already has.
3. **Stepping-stone potential:** products making it easier to diversify into other complex products.

Weighting scheme

- To evaluate the structural transformation potential of each product, we combine all three measures into one variable by assigning a weight to each measure and summing the weighted measures.

Distribution of 84 identified target products across sectors



Demand-side methodology

Aim

Rank the 84 target products according to their export potential for Mozambique.

Gravity model

- Product-level gravity estimations, where we run a regression for each target product to allow for product-specific coefficients.
- Poisson Pseudo-Maximum-Likelihood (PPML) estimator.

$$T_{int}^{\{p\}} = \exp\left(\alpha^{\{p\}} + \boldsymbol{\beta}^{\{p\}'} \ln \Phi_{in} + \gamma_{it}^{\{p\}} + \theta_{nt}^{\{p\}}\right) \times \varepsilon_{int}^{\{p\}} (1)$$

Indexing

- p : product; i : exporter; n : importer; t : year

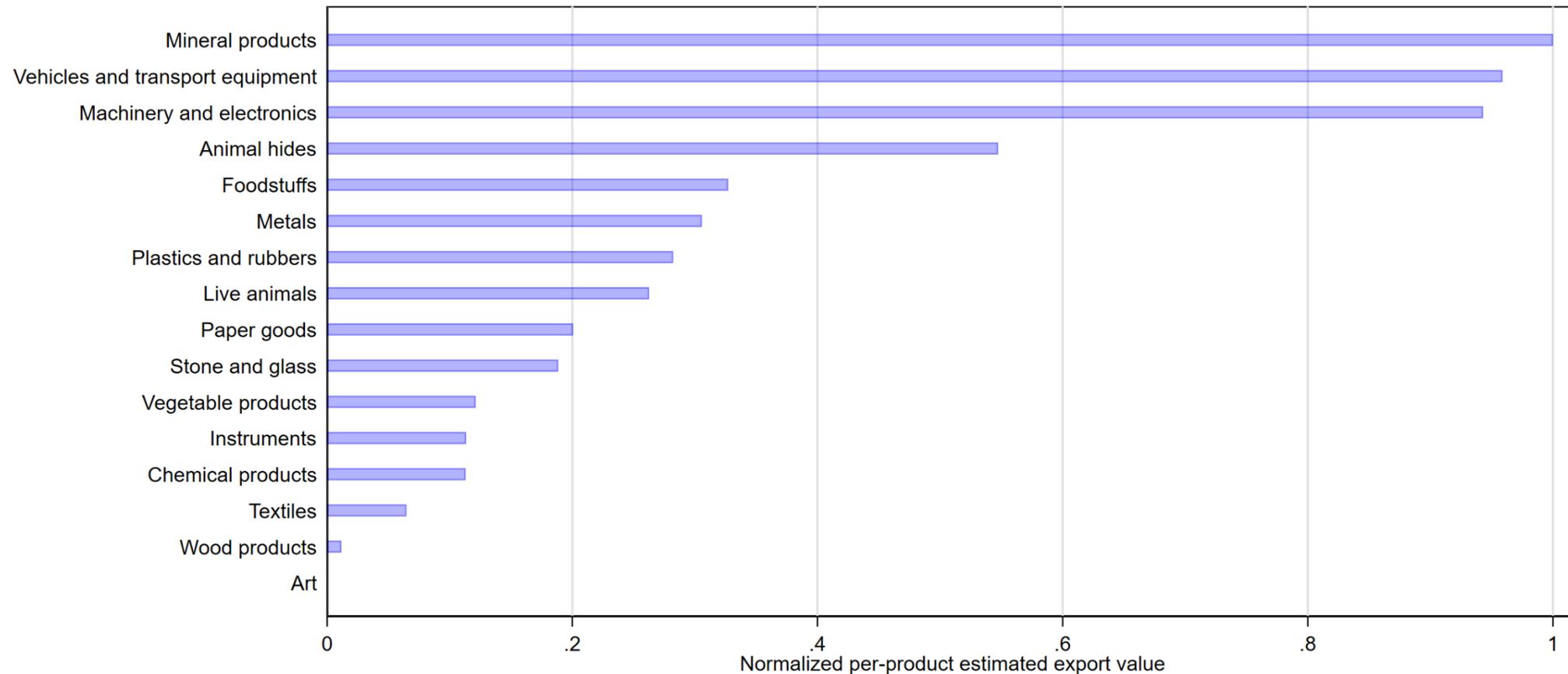
Variables

- $T_{int}^{\{p\}}$: trade volume between exporter i and importer n in product p and year t
- Φ_{in} : vector of dyadic distance measures: physical distance (log); contiguity (dummy); common language (dummy); colonial tie (dummy), regional trade agreement (dummy).
- $\gamma_{it}^{\{p\}}$, $\theta_{nt}^{\{p\}}$: importer-year and exporter-year fixed effects.

Product export potential

- With the gravity model we can predict the potential export revenue of each target product for Mozambique.

Average, predicted export value of the 84 target products across sectors (normalized values)



Conclusion

What we do

We combine a supply-side and demand-side analysis to identify new products and sectors that **(i)** are important for structural transformation and **(ii)** export revenue in Mozambique.

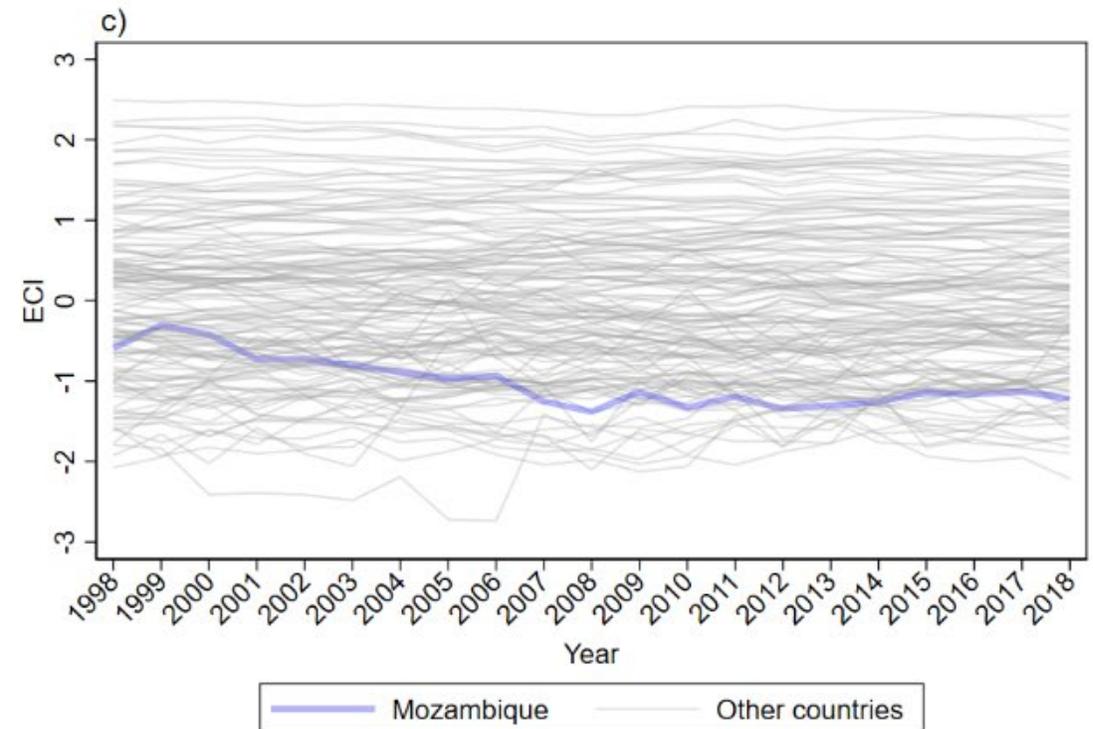
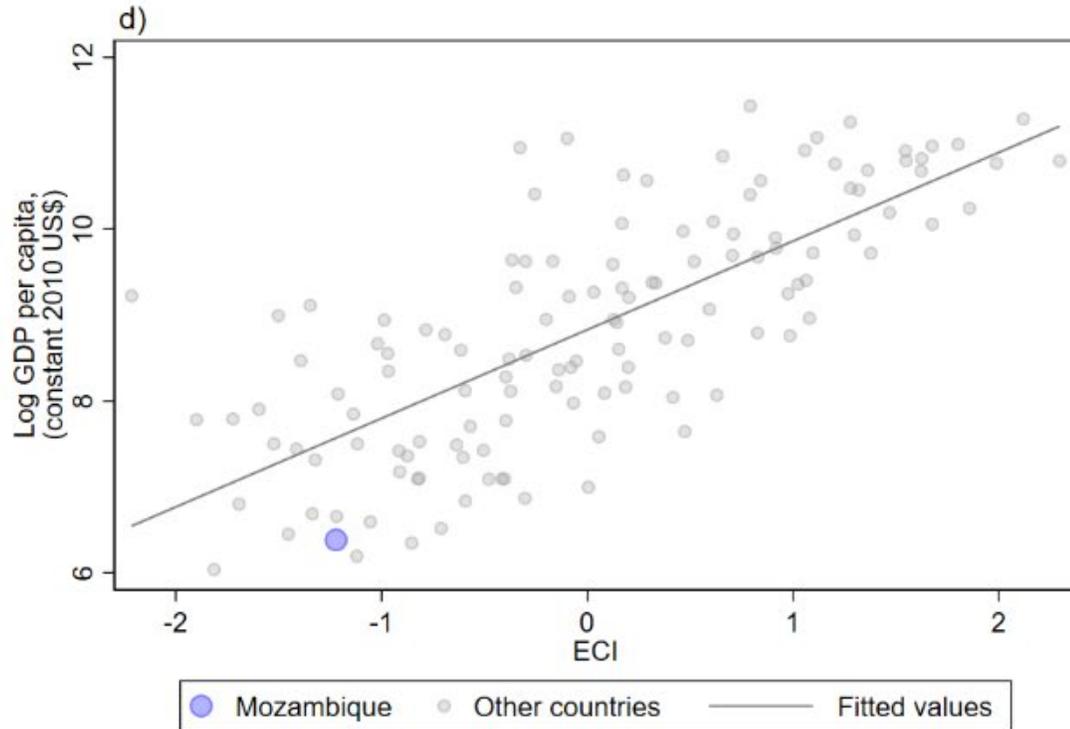
What we find

1. The broad sectoral focus of Mozambique's current policy is largely in line with an ambition to accelerate structural transformation and increase economic complexity.
2. The current focus on agriculture, agro-industry, and metals is especially important for structural transformation and export revenue.
3. There are unaddressed opportunities in machinery and electronics and vehicles and transport equipment.

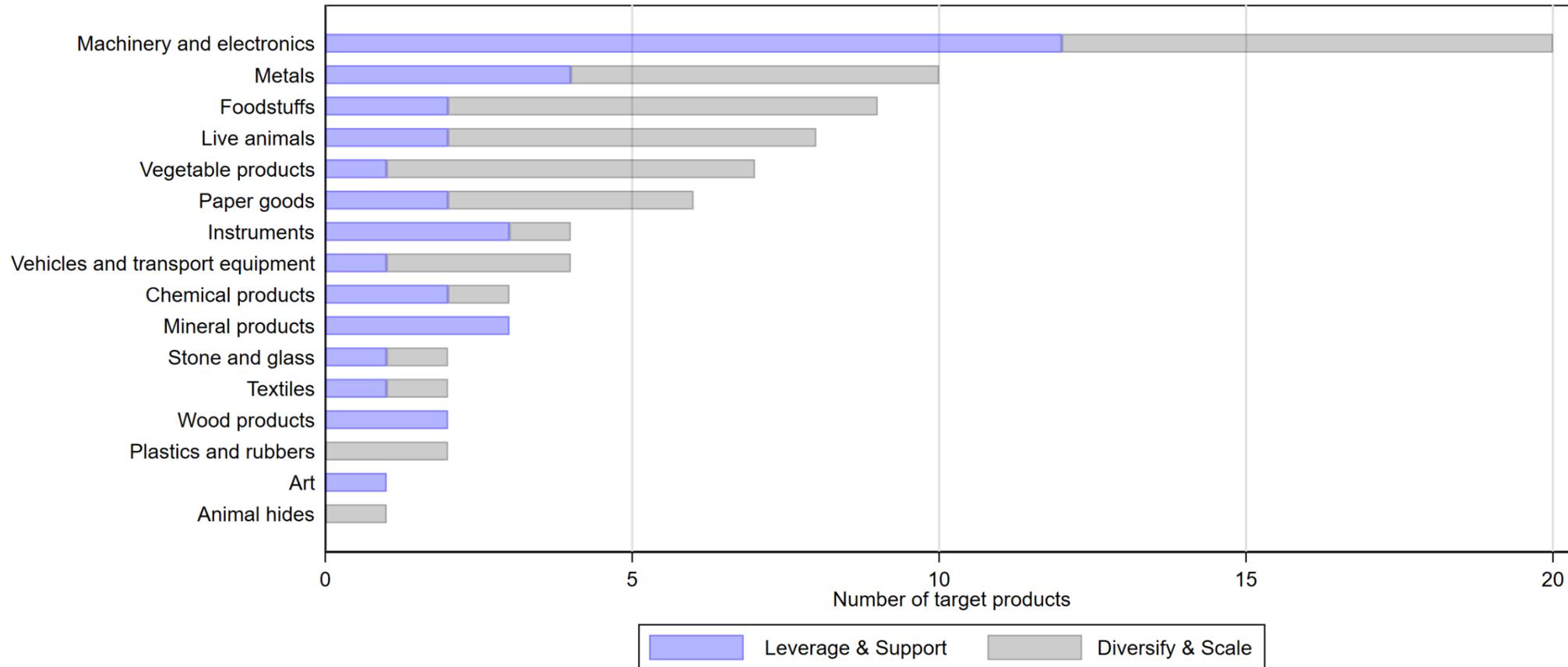
A photograph of a shipping yard. In the foreground, there are several stacks of intermodal containers. The containers are mostly blue and grey, with some red ones. They have various labels and logos, including 'MAERSK' and 'AERSEK'. In the background, there is a large blue gantry crane structure with a white number '335' on it. The sky is clear and blue. The overall scene is industrial and busy.

Thank you!

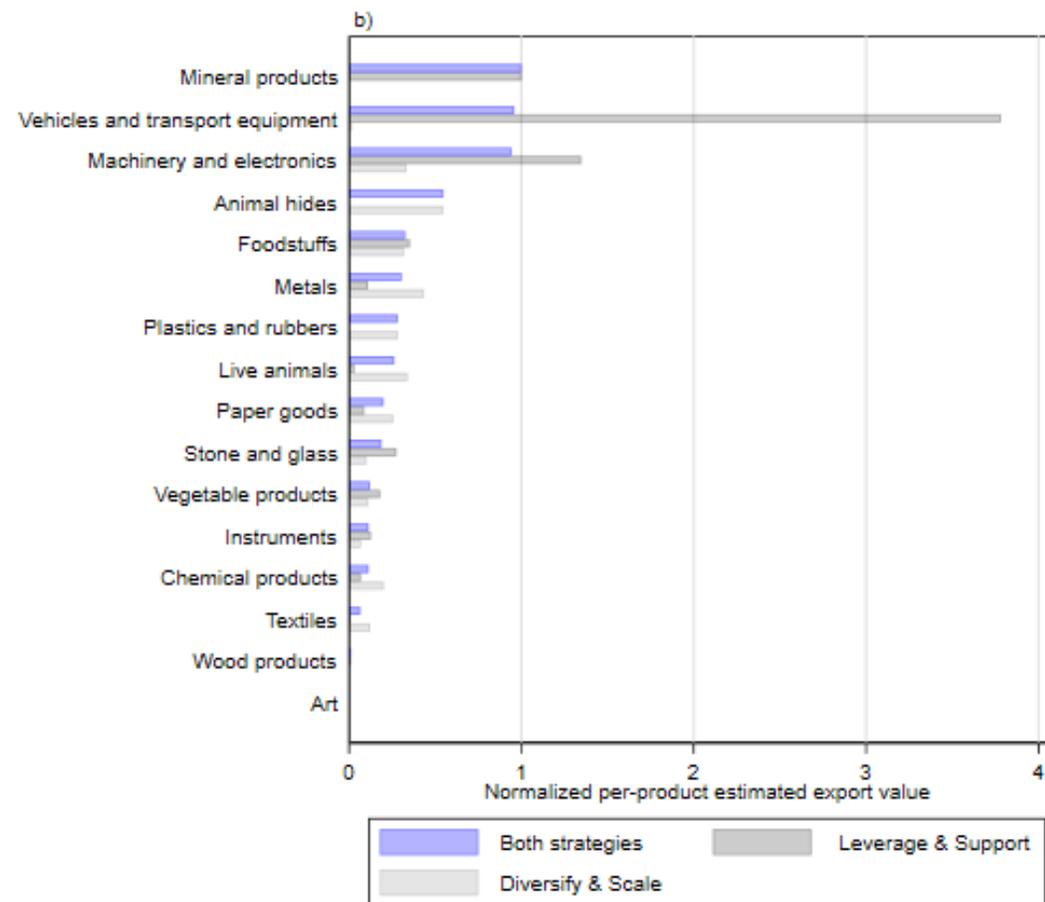
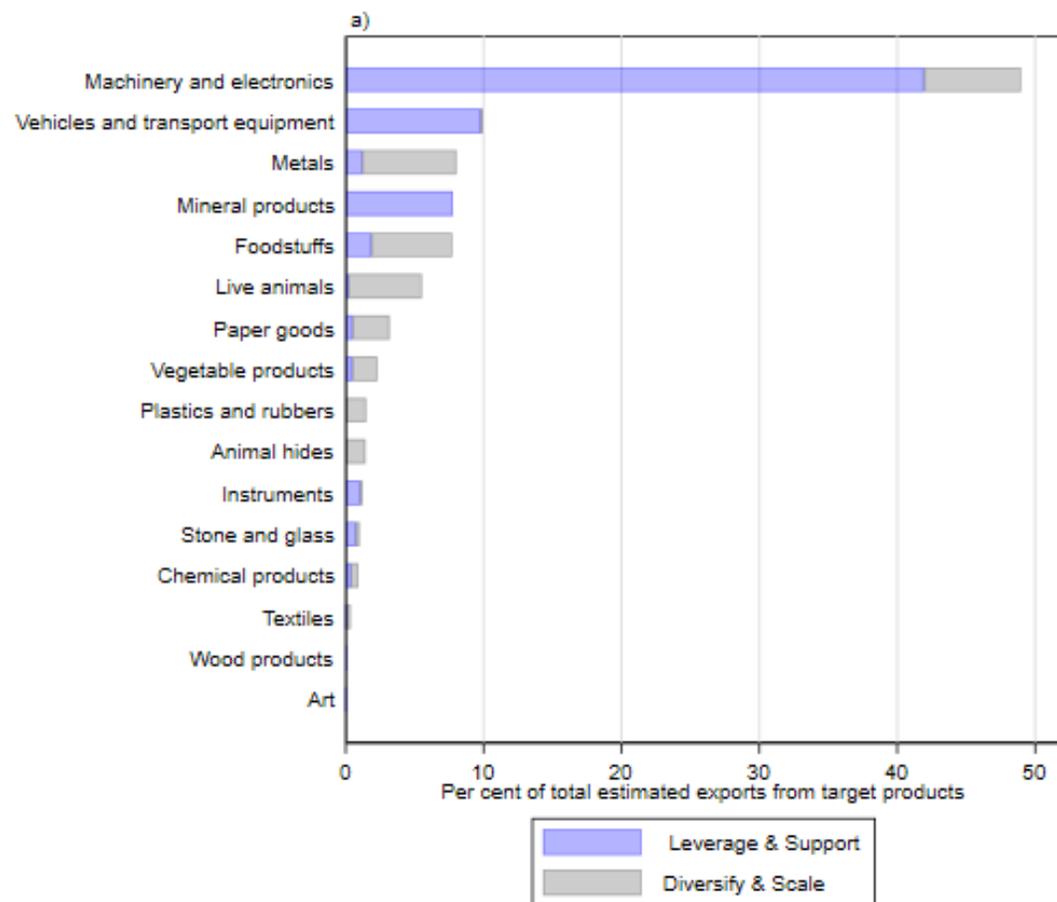
Why do we care about economic complexity?



Distribution of 84 identified target products across product sector and weighting strategy



Estimated export revenue from the 84 identified target products averaged across product sector and weighting strategy (normalized values)



We contribute to two strands of literature

Studies applying the economic complexity methodology to guide industrial policy

- **Examples include:** work on South Africa (Hausmann and Klinger 2006a), Rwanda (Hausmann and Chauvin 2015), Jordan (Hausmann et al. 2019), Panama (Hausmann, Morales, and Santos 2016; Hausmann, Santos, and Obach 2017), Myanmar (Ayres and Freire 2014), Uganda (Hausmann et al. 2014), the Netherlands (Hausmann and Hidalgo 2013), and Southern Africa (Hidalgo 2011).
- **Contribution:** We add a structured demand-side analyses and the first detailed evidence on Mozambique.

Studies using CGE models to analyse the effects of investments in key sectors in Mozambique

- **Examples include:** analyses of the effects of productivity improvements in agriculture and agro-processing (Jensen and Tarp 2004) and biofuels (Arndt et al. 2010; Hartley et al. 2019).
- **Contribution:** We add a new methodology to evaluate the attractiveness of sectors in Mozambique.