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Sustainable and Inclusive Economic Diversification

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Content

• The predicament
  – How to reconcile the need to reduce carbon emissions to avoid climate change with the need to promote rapid inclusive economic growth to eliminate global disparities?

• Recent results on economic complexity

• Implications for green growth strategies
• “We recognize that poverty eradication in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development.”

• "We are determined to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations”
Higher income is associated with higher CO$_2$ emissions per capita

Source: Author based on data from World Bank, 2011b (accessed November 2011).
Developing countries have tried to find sustained growth during the past 200 years.

Source: Author based on data from Maddison, 2009.
Complexity Perspectives on Structural Change

• Empirical literature (econophysics):
  – Trade data
  – Tools and methods of network theory and system dynamics

• Seminal work:
  – Hidalgo et. Al 2007
  – Hidalgo & Hausmann, 2009

• Key ideas:
  – Products that countries produce can tell us something about their productive non-tradable capabilities
  – More capabilities → more products (Diversification)
    Diversification ≈ complex economy ≈ Development

Source: Hidalgo and Hausmann (2009)
Diversification is associated with higher total GDP

\[
y = 524.94x^{0.5005} \\
R^2 = 0.7766
\]

Diversification is associated with lower foreign competition regarding the exported products. 

Negative relationship between diversity and ubiquity.

Diversification is path dependent


As economies develop and diversify, they tend to add exports of higher complexity.

What matters in terms of product complexity is not the broad industry classification but the individual products within the industry.

Countries exporting complex products have lower levels of income inequality

Use of product space to identify products for diversification

- Examples
  - Brazil (De La Cruz and Riker, 2012)
  - China and India (Neves, 2012)
  - Colombia (Hausmann and Klinger, 2008)
  - Kazakhstan (Felipe and Hidalgo, 2015)
  - Latvia (Vitola and Davidsons, 2008)
  - Myanmar (Ayres and Freire, 2014)
  - Portugal (Freitas et al., 2013, 2015)
  - South-Asian countries (Freire, 2013b)
  - Selected ASEAN countries (Bayudan-Dacuycuy and Lim, 2017)
  - Least developed, landlocked and small island countries (ESCAP, 2014, 2015; Freire, 2013a, 2017)
  - Atlas covering 128 countries (Hausmann et al., 2013)
Relationship between the level of diversification and the number of potential new products

Strategy for less diversified countries to catch-up: focus on emulation targeting products with above average complexity

Formal model: multi-country multi-sector model with endogenous diversification

Example of result of computer simulations: Comparison of catch up strategies, percentage increase in GDP

Strategies:
1 - Focus on process innovation
2 - Focus on product innovation
3 - Benchmark
4 - Undervalued currency by 10%
5 - Focus on product emulation
6 - Target more complex products
7 - Focus on product emulation & Target more complex products
8 - Focus on product emulation & Target more complex products & undervalued currency by 10%

Finding a greener diversification path

• “In principle we can use the method of reflections to characterize countries and products by N variables” (Hidalgo and Hausmann, 2009)
  – Use CO$_2$ emissions per capita
• Identify the products that are more complex & associated with lower carbon footprint & that are nearby in the product space to the existing product-mix of the countries
However.....High correlation between complexity and carbon footprint.

Source: Author based on data from the United Nations Commodity Trade Statistics Database (COMTRADE).
Solution: Dual Track

- Correlation of complexity and carbon footprint index: $\text{cor \ complexity \ cfp} = 0.9948$ (obs=43289)
- Complexity vs. carbon footprint:
  - $\text{complexity} = 1.0000$
  - $\text{cfp} = 0.9948$ 1.0000

**Emulation targeting products with above average complexity**

**Low carbon innovation**

Source: Author based on data from the United Nations Commodity Trade Statistics Database (COMTRADE).
Main Messages

• Economic development happens through the diversification of economies towards more complex products
• Focus on sustainable industrialization and structural change should complement strategies that focus on greener sources of energy
• Recent results on economic complexity can inform decision makers in developing countries on how to identify potential new sectors for economic diversification associated with lower inequality
• Dual track for greener path:
  – More diversified economies should focus on low carbon innovation
  – Less diversified economies should focus on emulation targeting products with above average complexity
Thank you
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