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The Sophistication and Diversification of the African Agricultural Sector: A Product Space Approach

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Poster prepared for presentation at the Agricultural & Applied Economics Association's 2012 AAEA Annual Meeting, Seattle, Washington, August 12-14, 2012

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THE SOPHISTICATION AND DIVERSIFICATION OF THE AFRICAN AGRICULTURAL SECTOR: A PRODUCT SPACE APPROACH

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BACKGROUND

- Role of agriculture (A) in Structural Transformation (ST) :
  - Transfer of resources to more productive sectors with low potential for growth & development (Golin, 2009)
  - Transfer of resources explained by productivity growth in A that spreads to non-agriculture (Mellor, 1973)
- Role of African agriculture (AA) in ST :
  - AA in last 50 years: large number of poor smallholders with marginal contribution to output, low yields, limited trading, few signs of productivity growth, & no falling population-land ratios (Collier & Dearcon, 2011)
  - New evidence (World Bank, 2006): remarkable growth of AA recently with average growth rate of:
    - 2.3% in (1980s), 3.3% (1990s), 3.8% (2000-2005)

OBJECTIVES

- A: largest sector in Africa in terms of both employment (66%) & share of output (31%), but grows at slow rate (3%).
- Need strong productivity growth through diversification (D) & specialization (S) to meet CAADP target of 6% growth/year
- Objectives:
  - Investigate role of AA in ST in light with new evidence
  - Contrast the ST (D & S) of AA with that of Brazil
  - Prescribe policies for improving D & S processes

METHODS AND DATA

- Method: Product Space - PS (Haussmann& Klinger, 2007)
  - Patterns of S determined by what a country is producing
  - High probability to produce apple if already producing grape
- Indicators of **connectivity** between good in PS (space of all products produced in world in given year)
  - ***Proximity***: probability to produce x if already producing y
  - ***Density***: probability for a country with a given basket to produce a new good, say x (calculated from proximities)

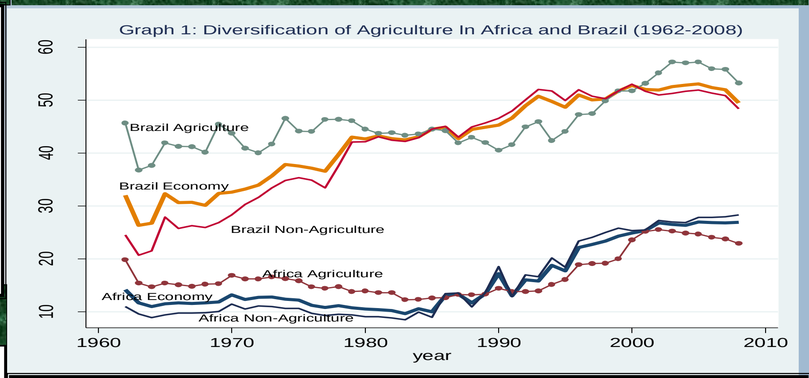
METHODS AND DATA (…)

- Density Gravity Center (DGC): proportion of PS already developed by a country (indicator of diversification)
- Indicators of sophistication of product & country basket (CB)
  - ***Prody***: implicit value of a good (per capita GDP based)
  - ***Expy***: level of sophistication of CB (aggregation of *Prodys*)
- ST: move to PS area with more connected & upscale goods
- **Data**: UN-COMTRADE 1962-2008 (disaggregated at SITC4)

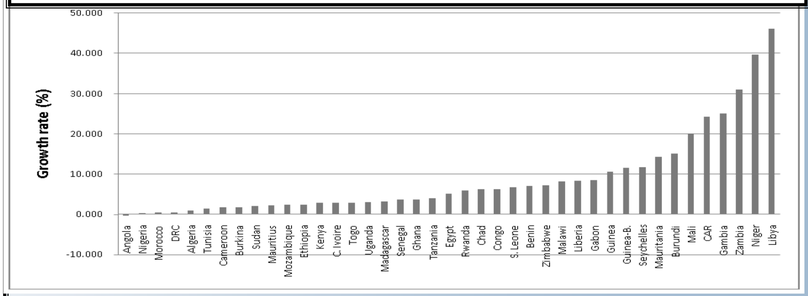
RESULTS AND POLICY IMPLICATIONS

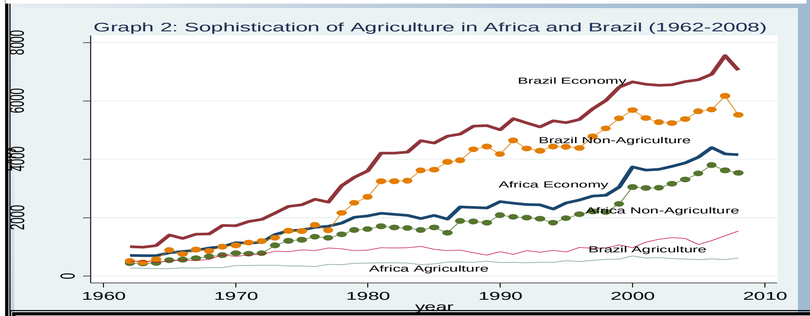
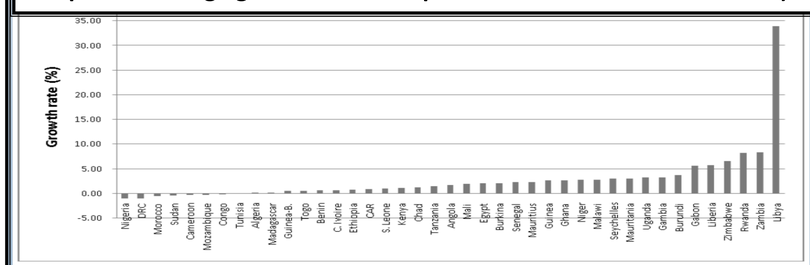
- **Result 1 (graph 1):** slow diversification (D) process of A
  - D index (DI) grew on average at 0.5% per year
  - A outperformed by non-ag with DI growing at 3%/year
  - D comparable with Brazil A (DI grew at 0.6% per year)
- **Result 2 (graph 1a)**: heterogeneity in countries' D of A
  - Strong D for Lybia with avg. annual growth of DI of 34%
  - Moderate D (avg. annual growth rate of DI between 5 & 7%): Zambia, Rwanda, Zimbabwe, Lyberia, & Gabon
  - Reverse D -negative growth of ID: Congo, Mozambique, Cameroon, Sudan, Morocco, DRC, Nigeria
- **Result 3 (graph 2)**: slow specialization (S) of A
  - S index (SI) grew on average at 2% per year
  - S of economy driven by S of non-ag : SI grew yearly & on average at 5% for non-ag & at 4.1% for economy
  - Similar for Brazil: SI is 3% for A but 6% for non-ag & eco
- **Result 4 (graph 2a):** heterogeneity in countries' S of A
  - Strong S for 11 countries (ave annual growth rate - AAGR of SI >10%) with Lybia leading (AAG of SI = 46%)
  - Moderate S for all other countries except Angola (AAGR of SI = -0.32%)
- **Policy implications for improving D and S of AA**
  - Provide incentives for Investing in product discovery
  - Promoting use of yield enhancing technologies
  - Enhancing competition in A input markets

FIGURES



Graph 1a: Average growth rate of diversification index of AA 1962–08)





Graph 2a: Average growth rate of sophistication index of AA 1962–08)