Agricultural Trade Flows among Developing Countries: Do Trade Agreements make a Difference?

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Plan of the presentation

- Introduction
  - Motivation
  - Objectives
- Analytical framework
- Specification and estimation
- Data and data sources
- Results
- Summary and conclusions
Introduction

- SADC presents great potential for trade
  - 14 members; 6 share borders with Zambia
  - > 200 million inhabitants
  - > US $180 billion total GDP
- BUT intra-regional trade below potential
  - Tariff and non-tariff barriers
    - NTBs: Licenses, permits, quotas, prohibitions, confinements, export subsidies
  - High production and marketing costs

Introduction (2)

- The SADC Trade Protocol
  - Enacted in 1996 but commenced in 2000
  - Provides a framework for reform
    - Liberalized intra-SADC trade
    - Phased removal of barriers
Motivation

- Anecdotes → barriers still exist!!
- A dearth of hard evidence
  - Determinants of intra-SADC agric trade
  - Impact of the SADC-TP
- Needed to foster integration, welfare

Two objectives

- Determinants of intra-SADC trade for a member state, Zambia
- Impact of SADC-TP on agric imports and exports
Analytical framework

- We use the Gravity model
  - Reduced form of structural trade models (Deardorff 1995)
  - Asserts that bilateral trade is
    - Directly correlated with incomes – size proxy
    - Inversely related to distance
    - Foreign investment policy
    - Geographical, political, trade policy/status

Specification and estimation

- Key issue 1: trading-pair heterogeneity
- The model → multiplicative
  \[
  \ln y_{ijt} = \beta_0 + c_{ij} + \delta'z + \sum_k^{K} \beta_k \ln x_k + \varepsilon_{ijt}
  \]
- Where \( c_{ij} = \) unobserved effects
  \[ \mathbf{x} = \begin{bmatrix} x_k \end{bmatrix} \] vector of gravity variables
  plus governance index
  \[ \mathbf{z} = \text{dummies, incl. common membership to RECs} \]
Specification and estimation (2)

- Key issue 2: RE versus FE
  - Standard Hausman test inappropriate:
    - Panel-level heteroskedasticity (LR test)
    - Panel autocorrelation (Wooldridge’s test)
    - Cross-sectional dependence (Pesaran’s test)
  - Panel-robust auxiliary regression approach (Cameron and Trivedi 2005)
  - FE
Specification and estimation (3)

- Estimation by cluster-corrected FE estimator
  - Correction necessary due to heteroskedasticity and serial correlation
- Impact of SADC-TP
  - $dsadctp = I(\text{Year} > 2000)$
  - Chow test $\leftrightarrow$ structural change
    $$H_0: \beta[dsadctp]=0, \beta[\text{interactions}]=0$$

Specification and estimation (4)

- Selected interactions
  - COMESA
    - Before SADC-TP $\gg$ $H_0: \beta[\text{dcomesa}]=0$
    - During SADC-TP
      $$H_0: \beta[\text{dcomesa}]=0, \beta[\text{dcomesa} \times dsadctp]=0$$
  - Political stability
    - Before SADC-TP $\gg$ $H_0: \beta[\text{stability}_t]=0, \beta[\text{stability}_{t-1}]=0$
    - During SADC-TP
      $$H_0: \beta[\text{stability}_t]=0, \beta[\text{stability}_{t-1}]=0,$$
      $$\beta[dsadctp*\text{stability}_t]=0, \beta[dsadctp*\text{stability}_{t-1}]=0$$
Data and data sources

- 11 years of country-level panel data
  - 5 years before the SADC-TP (1996-2000)
  - 6 years post-SADC-TP (2001-2006)
- Assembled from various sources:
  - Zambian government departments
  - SADC reports & website
  - Other web sources: UN, WB, IMF, AGOA, etc

Data and data sources (2)

- Distances to Mauritius and Seychelles by a web-based algorithm (as-the-bird-flies)
- Political stability point estimates from the WB Governance & Anti-corruption website [www.worldbank.org/wbi/governance](http://www.worldbank.org/wbi/governance)
  - Level and first lag (collinear → joint)
  - Almon lag variables?
    - Equally collinear
    - Data limitations could not permit long lag lengths
Results

- Standard gravity variables largely consistent with expectations
  - Sizes of trading partners (GDP)
    - Positive BUT insignificant
  - Zambia’s FDI inflow
    - Positive and significant in all models

Part of the regression output

<table>
<thead>
<tr>
<th>Variable</th>
<th>Export</th>
<th>Import</th>
<th>Export</th>
<th>Import</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-188.956+</td>
<td>-337.134</td>
<td>-173.548</td>
<td>-276.781</td>
</tr>
<tr>
<td></td>
<td>(117.889)</td>
<td>(194.482)</td>
<td>(116.773)</td>
<td>(204.548)</td>
</tr>
<tr>
<td>Log of partner GDP</td>
<td>7.965+</td>
<td>8.825</td>
<td>7.168</td>
<td>7.205</td>
</tr>
<tr>
<td></td>
<td>(4.946)</td>
<td>(9.292)</td>
<td>(4.916)</td>
<td>(8.843)</td>
</tr>
<tr>
<td>Log of partner per capita GDP</td>
<td>-9.139+</td>
<td>-8.102</td>
<td>-8.324</td>
<td>-7.346</td>
</tr>
<tr>
<td></td>
<td>(5.611)</td>
<td>(10.133)</td>
<td>(5.530)</td>
<td>(9.217)</td>
</tr>
<tr>
<td>Log Zambia GDP</td>
<td>1.642</td>
<td>6.961+</td>
<td>1.589</td>
<td>6.174</td>
</tr>
<tr>
<td></td>
<td>(1.229)</td>
<td>(4.256)</td>
<td>(1.417)</td>
<td>(4.947)</td>
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<tr>
<td>Log Zambia GDP per capita</td>
<td>-0.030</td>
<td>-0.101</td>
<td>-0.057</td>
<td>-0.246+</td>
</tr>
<tr>
<td></td>
<td>(0.157)</td>
<td>(0.150)</td>
<td>(0.162)</td>
<td>(0.144)</td>
</tr>
<tr>
<td>Log of partner FDI</td>
<td>-0.070</td>
<td>-0.102</td>
<td>-0.094</td>
<td>-0.373</td>
</tr>
<tr>
<td></td>
<td>(0.134)</td>
<td>(0.403)</td>
<td>(0.155)</td>
<td>(0.503)</td>
</tr>
<tr>
<td>Log of Zambia FDI</td>
<td>0.957**</td>
<td>1.208***</td>
<td>1.001**</td>
<td>1.178***</td>
</tr>
<tr>
<td></td>
<td>(0.359)</td>
<td>(0.286)</td>
<td>(0.334)</td>
<td>(0.303)</td>
</tr>
<tr>
<td>Comesa dummy, 1=member</td>
<td>-0.783*</td>
<td>-1.920</td>
<td>-0.725*</td>
<td>-2.845**</td>
</tr>
<tr>
<td></td>
<td>(0.363)</td>
<td>(1.904)</td>
<td>(0.321)</td>
<td>(1.224)</td>
</tr>
<tr>
<td>AGOA dummy, 1=eligible</td>
<td>0.368</td>
<td>0.046</td>
<td>0.356</td>
<td>0.241</td>
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<tr>
<td></td>
<td>(0.885)</td>
<td>(0.819)</td>
<td>(0.873)</td>
<td>(0.652)</td>
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<tr>
<td>F statistic</td>
<td>$7.1 \times 10^{***}$</td>
<td>$5.163^{**}$</td>
<td>$19.97^{***}$</td>
<td>$19.44^{***}$</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.651</td>
<td>0.497</td>
<td>0.664</td>
<td>0.548</td>
</tr>
</tbody>
</table>
Results (2)

- Trade agreements
  - SADC-TP
    - Imports $\rightarrow$ Unambiguously positive & significant
      - 39% larger with RSA
    - Exports $\rightarrow$ Only in the model that includes RSA
  - COMESA
    - Positive during SADC-TP,
      - Significant in import model without RSA

Joint tests

<table>
<thead>
<tr>
<th>Test description</th>
<th>All SADC partners</th>
<th>Excluding RSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Export</td>
<td>Import</td>
</tr>
<tr>
<td>SADC-TP (Chow)</td>
<td>39.84*</td>
<td>163.86**</td>
</tr>
<tr>
<td>Political stability</td>
<td>0.69</td>
<td>1.11</td>
</tr>
<tr>
<td>COMESA</td>
<td>1.16</td>
<td>0.28</td>
</tr>
</tbody>
</table>
Results (3)

- Political stability
  - Effects more defined in the SADC-TP period
    - Consistently positive in models without RSA
    - Significant at 5% in the import model

Summary and conclusions

- Zambia’s agricultural trade
  - Driven by
    - Economic sizes (GDP)
    - FDI
      - Supermarkets, NTEs
  - More responsive on the import side
    - Comparative disadvantages?
    - Supply responsiveness?
Summary and conclusions (2)

- RSA overshadows trade relationships with other countries
  - SADC-TP effects largest with respect to imports from RSA
  - COMESA effects visible during SADC-TP
    - But significant only without RSA
      - RSA not a member of COMESA

Summary and conclusions (3)

- Governance of member countries important
  - Effect more defined during SADC-TP
  - Less so when RSA is included
    - RSA is the largest trading partner
    - RSA has consistently larger governance indices

- Structural rigidities still an issue
  - Policy (export bans, import tariff effects)
  - Production and marketing costs
Thank you!!