Trade competitiveness: Tools and indicators

PREM Knowledge and Learning Forum 2010

May 3, 2010
Outline

1. Export composition, level, and growth
2. Diversification
3. Quality and sophistication
4. Survival
Trade “openness”

- The richer you are the more you trade… but concave relationship
- Take a look at Pakistan v. India, China, and Vietnam...

Source: WDI
Trade “openness”

Openness to Trade 2006-08

Log of GDP per capita (PPP, av. 2006-08)

Trade “openness”
What matters - absolute or relative growth?

Growth of share in world exports (%)
1995-2008

1995-1999: 5.9% pa
2005-2008: 8.8% pa

Source: World Trade Indicators
Export growth by broad sectors can tell an important story of structural change.

**Morocco's goods exports**

- **Manu Exports**
- **Agri Exports**

**Mongolia’s exports**

- **Minerals**
- **Non-minerals**
A product-level analysis can also be an important part of telling the story.

Critical to consider services sector, especially for MICs

Source: World Trade Indicators (also IMF)
Markets is the other important part of the picture

- Morocco is reliant on the EU, but more diversified than some...
Does the trade profile match the predicted pattern?

• Using a standard gravity equation tells a useful story about trading partners

Example: Pakistan

A much simplified approach is the **Trade Intensity Index**: 
= share of your exports to Country X / share of global exports to Country X

Sources: WITS; CEPII
Identifying specific bilateral opportunities: Trade complementarity index

- Measures the degree to which the export pattern of one country matches the import pattern of another. Index of 100 indicates perfect complementarity (and therefore high potential for intra-regional trade) whilst an index of 0 represents complete incompatibility of trade structures.

- The TC between countries k and j is defined as:

\[ TC_{ij} = 100 - \text{sum}(|m_{ik} - x_{ij}| / 2) \]

Where \( x_{ij} \) is the share of good i in global exports of country j and \( m_{ik} \) is the share of good i in all imports of country k.

-- Need to run this at a relatively aggregated level: e.g. SITC2

- Particularly useful for assessing potential for intra-regional trade.
Trade complementarity index

Example: ECOWAS (2007) - at SITC 2
Growth orientation of the export portfolio

- The 40 most dynamic products in world merchandise exports in 2000 = only 4% of the SITC (4-digit) products, but accounted for 40% of export value
Growth orientation of markets

- Most manufacturers will be oriented toward large, low-growth markets...
Growth orientation of markets

• ... while commodities exporters may be more oriented to high-growth markets
Outline

1. Export composition, level, and growth
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4. Survival
Export Diversification: critical in any trade strategy for growth

• Few countries have developed quickly on the basis of exports of primary products alone

• A more diverse structure of exports reduces vulnerability to demand shocks and price swings in overseas markets

• Creates greater opportunities in regional as well as global markets

• Market diversification also critical to exploit opportunities and minimize risks
A profile of export concentration measures from WTI

**Indicators**

<table>
<thead>
<tr>
<th></th>
<th>Tanzania</th>
<th>SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merchandise share of total exports (%)</td>
<td>53.56</td>
<td>52.77</td>
</tr>
<tr>
<td>Services share of total exports (%)</td>
<td>46.44</td>
<td>47.23</td>
</tr>
<tr>
<td>Share of Top 5 Exports</td>
<td>83.52</td>
<td>83.52</td>
</tr>
<tr>
<td>Export Concentration index</td>
<td>25.76</td>
<td>32.60</td>
</tr>
<tr>
<td>Export Destination Index</td>
<td>25.80</td>
<td>26.51</td>
</tr>
<tr>
<td>No. of Products Exported</td>
<td>160</td>
<td>92</td>
</tr>
</tbody>
</table>

Note: data also available from ITC Trade Competitiveness Map (at HS-4 level)

Analyze at 3 or 4-digit level (see next page)
Measures of export product concentration

• The share of the top 5 merchandise exports
  – At what level of the trade classification? - SITC 4 digit in WTI

• Herfindahl-Hirschmann (HH) index

Let $s_{ij}$ be the share of product $i$ in the exports of country $j$, in which case the HHI is

$$H_j = \sum_i s_{ij}^2$$

  – # between 0 (least concentrated) and 1 (most concentrated)
  – SITC 3 digit in WTI (for $i >$100k or 0.3% of total exports)

• Number of products exported
  – SITC 3 digit in WTI (for products >$100k or 0.3% of total exports)
Diversification varies across countries and over time.

Export product concentration index (HH) - selected countries (SITC 3)

Export product diversification: into what?

- Non-traditional relative to traditional export products
- Manufactures relative to agriculture and minerals
- Intra-industry versus inter-industry trade
- “high-productivity” goods relative to “low productivity” goods (Haussman et al) – *we will discuss later*
Tanzania has seen diversification into manufactures.
Diversification can also be driven by two-way trade within sectors, as in in East Asia.
Intra-regional intra-industry trade

\[ GL_{cd,i} = 1 - \frac{|X_{cd,i} - M_{cd,i}|}{(X_{cd,i} + M_{cd,i})}, \]

- where \(X_{cd,i}\) and \(M_{cd,i}\) refer to country \(c\)'s exports and imports respectively, to/from country \(d\) over one particular year (time subscripts are implied)
- Measure takes values between zero and one and increases in the share of IIT.
- Aggregated across industries on a trade-weighted basis

Source: Brulhart (2008)
Example: Low Intra-regional IIT within SACU

<table>
<thead>
<tr>
<th>Region Pair</th>
<th>IIT Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa-Botswana</td>
<td>0.0047</td>
</tr>
<tr>
<td>South Africa-Lesotho</td>
<td>0.0000</td>
</tr>
<tr>
<td>South Africa-Namibia</td>
<td>0.0004</td>
</tr>
<tr>
<td>South Africa-Swaziland</td>
<td>0.0002</td>
</tr>
<tr>
<td>Malaysia-Indonesia</td>
<td>0.1698</td>
</tr>
<tr>
<td>Malaysia-Thailand</td>
<td>0.3987</td>
</tr>
<tr>
<td>Malaysia-Vietnam</td>
<td>0.1321</td>
</tr>
</tbody>
</table>

Grubel and Lloyd Index at 5 digit SITC. All data 2007 except Lesotho 2004
Services: Another route for **product diversification**

- Discussion of export diversification too often ignores opportunities in services
- Conquering new markets for export services (e.g. offshoring)
- Expanding services relative to dominant merchandise exports (e.g. tourism)
- Catalyzing diversification in other sectors (e.g. demonstration effects of tourism to foster export good discovery)
- Services are part of the solution to export diversification constraints – information, consulting, etc.
Services are an important element in Tanzania’s exports and tourism is the most dynamic part of it.

Source: Bank staff from IMF World Economic Outlook and Balance of Payment Statistics
The importance of **market** diversification

- Export growth has been driven more by the intensive (existing export flows) than the extensive margin (new export flows)

- Within the extensive margin the export of existing products to new markets has accounted for a greater share of export growth than the export of new products
  - Markets matter!
Measures of export market concentration/penetration

1. The share of the top 5 markets
2. Herfindahl index
3. Index of export market penetration

\[ IEMP_j = \frac{\sum_{i \in I_{ij}} \sum_{k} Y_{ijk}}{\sum_{i \in I_{ij}} \sum_{k} Z_{ik}} \]

- **Numerator:** Actual number of bilateral flows = all existing product-market combinations (e.g. mangos to Russia, mangos to Kazakhstan, meat to Russia = 3 different export relationships)
- **Denominator:** Potential number of bilateral flows = for each product that Country X exports, this = total # of countries that import this product (from anyone, not necessarily Country x)... then sum this up across all products that Country X exports

\[ Y_{ijk} = 1 \text{ for } X_{ijk} > 0 \text{ else } Y_{ijk} = 0 \]
\[ Z_{ik} = 1 \text{ for } M_{ik} > 0 \text{ else } Z_{ik} = 0 \]

- \( X_{ijk} \) is the value of exports of product \( i \) from exporter \( j \) to importer \( k \),
- \( M_{ik} \) is the value of imports of product \( i \) by importer \( k \),
- \( I_{ij} \) is the set of products in which positive exports are observed
1. Share of top 5 markets

2. Herfindahl index for markets

Export destination concentration index (HH)- selected countries

## 3. Export market penetration

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of products exported</th>
<th>Actual number of export relationships</th>
<th>Potential number of export relationships</th>
<th>Export market penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madagascar</td>
<td>705</td>
<td>2450</td>
<td>66873</td>
<td>3.66</td>
</tr>
<tr>
<td>Malawi</td>
<td>553</td>
<td>1020</td>
<td>53069</td>
<td>1.92</td>
</tr>
<tr>
<td>Mozambique</td>
<td>751</td>
<td>1372</td>
<td>71190</td>
<td>1.93</td>
</tr>
<tr>
<td>S.Africa</td>
<td>2929</td>
<td>43946</td>
<td>262827</td>
<td>16.72</td>
</tr>
<tr>
<td>Zambia</td>
<td>852</td>
<td>1656</td>
<td>80441</td>
<td>2.06</td>
</tr>
<tr>
<td>Korea</td>
<td>2930</td>
<td>74171</td>
<td>261619</td>
<td>28.35</td>
</tr>
<tr>
<td>Germany</td>
<td>3037</td>
<td>168392</td>
<td>268260</td>
<td>62.77</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2915</td>
<td>89062</td>
<td>261904</td>
<td>34.01</td>
</tr>
</tbody>
</table>

Source: Calculated from WITS using data at the 6 digit level of SITC
Dynamic growth associated with rapid expansion in export market penetration
Another view of export market reach

Pakistan's Export Destinations 1998

Pakistan's Export Destinations 2008

Analyze at 6-digit level

Death?

Discovery
1. Export composition, level, and growth
2. Diversification
3. Quality and sophistication
4. Survival
Quality: another source of diversification?

- Knowledge and technology diffusion drives productivity and erodes rents. Competitiveness depends on reducing cost/unit (limited scope) or increasing value/unit.

- Quality upgrading
  - Product upgrading
  - Process upgrading – production technology (de Ferranti & Walton, 2004)

- Quality differentiation source of substantial IIT
  - Horizontal trade or “cross-hauling” – e.g. Fiats to Germany and BMWs to Italy, Zara to Sweden and H&M to Spain
  - Vertical trade in tasks
Does sophistication or quality matter?

- Do countries grow productivity faster by exporting more highly sophisticated products? (HHR, 2007)
- China and other successful developing economies typically contribute particular tasks to a production network. Hence FDI is often a key factor driving exports.
  - For example, whilst China exports a sophisticated electronic product (iPod) the value added in China is a fraction of the export value of the product
  - When adjusted for quality, the structure of China’s exports appears consistent with its level of development (Xu, 2006)
  - It’s not what you make, but how you make it (Lederman & Maloney, 2009)
- Certainly some products offer more upgrading potential than others – e.g. “cars v. bananas” - see Hidalgo et al (2007) on “product space”
- But raising the quality of existing exports (including agricultural) can drive export growth and diversification – even if these products are not exported by rich countries – e.g. Rwandan coffee...
Increasing quality can be a strong driver of export growth – e.g. Rwandan coffee

Ratio of import price from Rwanda to average import price of coffee increased from 0.58 to 1.16 in the US and from 1.10 to 1.14 in the EU
Measuring quality and sophistication

1. **Unit values**: Standard approach, but problems with the trade data: standardization on units, customs attention (bias), “apples to apples comparisons”

2. **Technology content** (Lall, 2000) Analyzed at 3-digit level
   - Links a product to its technological content
   - Cereals and fish are primary (PP), minerals are resource-based (RB) and manufactured products are low, medium or hi tech (LT, MT,HT)

3. **PRODY and EXPY** (HHR, 2005) Analyzed at 4-digit level
   - PRODY: weighted average of incomes of countries exporting the good
   - EXPY: weighted sum of the a country’s export basket as measured in PRODY

4. **Revealed factor intensity** (Cadot, Shirotori, Tumurchudur, 2009) Analyzed at 4-digit level
   - Same concept as PRODY and EXPY but classifying products based on the revealed factor intensities (capital, labor, land / natural resources) of the exporting countries
Mix of exports by technological content (Lall)


- High tech
- Low tech
- Medium tech
- Primary Products
- Resourced Based

1995, 2008

0, 5, 10, 15, 20, 25, 30, 35
Morocco grew high tech exports quickly, although high tech share has been stable for most of decade.
But analysis export sophistication tells a different story for Morocco
A global view of export sophistication

Richer than what you export

Poorer than what you export

Export Sophistication 2003-05

Log of GDP Per Capita (PPP, 2003-05)
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Low income countries perform well in introducing new export flows.....

Figure 3: Average Export Birth Rate and Log of GDP per Capita (2005)
... but experience higher death rates of export flows....

Figure 4: Average Export Death Rate and Log of GDP per Capita (2005)
... as a result of much lower survival rates

(10 year survival rate = -0.04 + 0.032 Ln(GDP per capita)
So survival matters as much as entry

• “the key element to achieving higher aggregate export growth are longer relationships and hence higher relationship survival rates” (Besedes and Prusa (2006))

• Hence, successful export diversification requires not only entry into new export markets but also survival and growth

• What are the factors that undermine the ability of exporters to survive and then thrive – how to support the acceleration phase?
  – Links to comparative advantage
  – Endogenous constraints
The probability of export flows surviving 5 years is almost twice as high in Germany as in Pakistan

• Survival analysis involves “counting” export relationships (at least at SITC-4 digit... ideally 6-digit) over various periods- many factors need to be considered
  – Minimum values
  – Minimum relationship period (e.g. two or three years)
  – Starting and ending cut-offs
• Survival analysis can also test for various factors – for example here we look at the probability of survival of trade with contiguous countries. In Germany it dramatically improves survival likelihood... in Pakistan it reduces it!

Survival of Pakistan's Export Relationships by Contiguity

Survival of Germany's Export Relationships by Contiguity
Is there a link between comparative advantage and export survival?
Is there a link between comparative advantage and export survival?
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Basic framework - draft

**Export profile**

- Intensive margin
- Extensive margin

**Deepening**

Comparative advantage defying?

**Survival**

Comparative advantage supporting?

**Product diversification**

**Market diversification**

**Trade outcomes**

**Product**

- Quality
- Cost

**Market**

- Market access
- Trade promotion / proactive policy
- Tariffs
- NTBs
- Policy
- Administration

**Diagnostic**

- Standards & certification
- Innovation
- Labor and productivity
- Inputs / backbone services
- Tariffs
- NTBs
- Policy
- Administration

- Transport / trade facilitation
- Location
- Transport / logistics
- Customs / borders

- Business climate and access to finance
- Trade policy (incl exchange rate) and macro-incentive framework
Diagnostic assessment

Product
- Quality
  - Standards & certification
  - Innovation
  - Labor and productivity
  - Inputs / backbone services
- Cost
  - Tariffs
  - NTBs

Market
- Market access
- Trade promo / proactive policy
- Transport / trade facilitation
  - Policy
  - Administration
  - Location
  - Transport / logistics
  - Customs / borders

Skills / capacity
- Institutions
- Cost
- Quality

Business climate and access to finance

Trade policy (incl exchange rate) and macro-incentive framework

Covered in the afternoon session
References


