Measuring Costa Rica´s participation in GVC´s

Department of Macroeconomic Statistics
ICMTEG, Aguascalientes, México
Sep-Oct, 2014
OUTLINE

• Costa Rica in GVC´s
• Research goals based on international IOT
• Construction of international IOT
• Results for Costa Rica.
Rol of Costa Rica in GVC’s

- What do we know?
- Where we are?
## Strengthening Costa Rica’s Knowledge Base on GVCs

<table>
<thead>
<tr>
<th>Organization</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD</td>
<td>Integration of Costa Rica to TiVA Initiative and other initiatives (Dynemp, STI Outlook) to track upgrading towards knowledge based activities and productive transformation.</td>
</tr>
<tr>
<td>World Trade Organization</td>
<td>Technical Guidance to Costa Rica's participation in global value chains and TiVA Initiative.</td>
</tr>
<tr>
<td>IDE-JETRO</td>
<td>Technical assistance to include Costa Rica’s IO table in an international IO table and research to better understand the way in which Costa Rican firms interact with the main international players in GVCs.</td>
</tr>
<tr>
<td>Duke University</td>
<td>Mapping Costa Rica´s position and upgrading trajectories in electronics, medical devices, aeronautical/aerospace and offshoring services GVCs</td>
</tr>
<tr>
<td>United Nations Statistics Division</td>
<td>Technical assistance to build a firm level database that integrates trade statistics with other variables to analyze the performance of firms that integrate in GVCs</td>
</tr>
<tr>
<td>KDI</td>
<td>Strengthening the innovation ecosystem to drive the upgrading towards knowledge-based activities.</td>
</tr>
</tbody>
</table>
There are three major networks in Latin America, but participation is limited.

Source: OECD Inter-country I-O model, 2011
Trade and Investment

Composition of exports (1990-2013*)

FDI inflows and exports (1990-2013*)

Source: COMEX based on Central Bank and PROCOMER data.

Source: COMEX based on Central Bank data.

Source: COMEX, using PROCOMER data.

* Data for 2013 are based on estimates
Costa Rica’s Participation in GVCs

Costa Rica: Participation of GVC-related exports in total exports 2012

- Other: 62.9%
- GVC-related exports: 37.1%

GVC-related exports by industry, 2012

- Electronics: 57%
- Medical devices: 35%
- Automotive: 6%
- Film & Broadcasting: 1%
- Aeronautic/Aerospace: 1%

Source: COMEX, based on PROCOMER data.
Costa Rica: Employment generated by FDI

**Advanced Manufacturing**
- 2000: 4,500
- 2012: 16,257
- 2013: 17,164

- 2013: 4X 2000

**Life Sciences**
- 2000: 1,500
- 2012: 15,633
- 2013: 17,285

- 2013: 12X 2000

**Services**
- 2000: 1,061
- 2012: 42,148
- 2013: 46,465

- 2013: 44X 2000

Costa Rica: Average monthly wages, FZR vs. the economy at large (2008-2012)

- 2008: 842
- 2009: 884
- 2010: 1,029
- 2011: 1,178
- 2012: 1,287

- 2000: 511
- 2012: 767

**Source:** PROCOMER

**Source:** CINDE
Participation of Costa Rica in the medical devices CGV

**R&D of the product**
- Prototype
- Regulatory approval
- Development process
- Engineering

**Manufactured components**
- Software production
- Electronic development
- Metalworking precision
- Plastics molding and extrusion
- Textiles and fabric

**Assembly**
- Assembly
- Packaging
- Sterilization

**Distribution**
- Exports of final goods
  - Capital goods $32,546,321
  - Terapeutics $301,026,155
  - Medicals $270,528,089
  - Disposables $575,546,086

**Marketing and sales**
- Type of products
  - Cardiovascular
  - Orthopedics
  - Infusion systems
  - Other

**Post sale services**
- Training
- Consultant
- Repairs

**Input providers**
- Resins
- Metals
- Chemicals
- Textiles

**Buyers**
- Distribuidores Mayoristas
- Doctors and Nurses
- Hospitals (Public/Private)
- Individual patients

**Number of companies**
- 0 < X ≤ 5
- 5 < X ≤ 10
- 10 < X ≤ 15
- 15 < X ≤ 20
- >20

**Source:**
1. Trade in Value Added

- Participation in GVC has been documented (gross trade).
- The “Made in the World” initiative of the WTO promoted the concept of Trade in Value Added (TiVA).
- Through TiVA there is a better understanding of the country contribution to GVC’s (more consistent with the management of the GDP)

Questions:

- To what extent Costa Rica participate in the global economy in terms of trade in value added?
  - How does it change the relationship with our trade partners?
  - What are the implications of these changes for our trade policy?
2. Comparative advantages

• Based on the CGV’s the “trade of tasks” is predominant which drives development countries to develop comparative advantages easily.

• Trade in value added statistics provide a new opportunity to measure the comparative advantages of the country.

• Questions

• How competitive are the Costarrican industries?
  • What are the comparative advantage characteristics of the industries in terms of TiVA?
  • What industries does Costa Rica have advantages on?
  • Which ones are developing advantages and what are the policies to strengthen those advantages?
3. Exports breakdown

- The international IOT allows to breakdown the exports in its various components.
- To understand the participation of Costa Rica in the global production it is crucial to measure the domestic component and to what extend it provides to the global production.

**Questions:**

- ¿How to breakdown the gross exports value in its various components?
  - What is the domestic component of the exports and how it compares to other countries?
  - How that domestic component fit in the global production?
Construction of international IOT

• Main goal:
  – To integrate the domestic input-output table into the international input-output table (WIOD)
## Construction of International IOT

### Costa Rica’s Domestic OIT

<table>
<thead>
<tr>
<th>Intermediate Demand (A)</th>
<th>Final Demand (F)</th>
<th>Export (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia (AI)</td>
<td>Indonesia (AI)</td>
<td>Indonesia (AI)</td>
</tr>
<tr>
<td>Malaysia (AM)</td>
<td>Malaysia (AM)</td>
<td>Malaysia (AM)</td>
</tr>
<tr>
<td>Philippines (AP)</td>
<td>Philippines (AP)</td>
<td>Philippines (AP)</td>
</tr>
<tr>
<td>Singapore (AS)</td>
<td>Singapore (AS)</td>
<td>Singapore (AS)</td>
</tr>
<tr>
<td>Thailand (AT)</td>
<td>Thailand (AT)</td>
<td>Thailand (AT)</td>
</tr>
<tr>
<td>China (AC)</td>
<td>China (AC)</td>
<td>China (AC)</td>
</tr>
<tr>
<td>Korea (AN)</td>
<td>Korea (AN)</td>
<td>Korea (AN)</td>
</tr>
<tr>
<td>Japan (AJ)</td>
<td>Japan (AJ)</td>
<td>Japan (AJ)</td>
</tr>
</tbody>
</table>

### Freight and Insurance (BF)
- BA: Producer's price
- BF: CIF price

### Import from H.Kong (CH)
- HI: Producer's price
- HM: CIF price

### Import from India (GH)
- GI: Producer's price
- GM: CIF price

### Import from EU (CO)
- GI: Producer's price
- GM: CIF price

### Duties & Import Taxes (DT)
- DA: Producer's price

### Value Added (V)
- V: Producer's price

### Total Inputs (XX)
- X: Producer's price

### 35 sectors

### 42 countries

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**Note:** The table above represents a simplified version of the International Input-Output (IOT) model for Costa Rica's domestic OIT, focusing on key sectors and countries involved in trade and production.
Methodology to construct the international IOT

**1. Domestic IOT**

- **Preparing the structure:**
  1-period; 2-currency; 3-prices; 4-industries. 5-trade flows

- **Backdating:**
  RAS algorithm
  2011 -> 2009

- **Assigned trade by country:**
  Imports table and exports vector

**2. International IOT**

- **To fit into the international IOT:**
  Breakdown of Costa Rica separated from the rest of the world (ROW)

- **Consistency testing:**
  Some negatives and some readjustments
  Consistency with national accounts

- **Analysis with CGV indicators:**
  TiVA, comparative advantages, Exports breakdown
Preparing the domestic IOT

1. **Period**: Data from 2009 (last available year for the WIOD at that moment)

2. **Currency**: colones -> dollars (official exchange rate for the year 2009, BCCR)

3. **Price consistency**: basic prices in IOT and WIOD

4. **Concept consistency of industry/product**: ISIC (SUT classification)
   Breakdown: Intermediate consumption, final consumption, capital
   Classification of the WIOD

5. **Consistency of the trade flows**: CIF / FOB adjustment for the imports
   WIOD is FOB (even when it is based on import data)

![Diagram showing the flow of goods from Origin to Final Destination with FOB and CIF indicators]
“Backdating”: to 2009

<table>
<thead>
<tr>
<th>Domestic supply</th>
<th>Intermediate demand</th>
<th>Final demand</th>
<th>External demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Intermediate demand table</td>
<td>Final demand table</td>
<td>Exports vector</td>
</tr>
<tr>
<td>Manufacture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imports</td>
<td>Imports table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td>Value added table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total inputs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data from SUT 2009
“Backdating”: to 2009

**Intermediate demand**

<table>
<thead>
<tr>
<th>Agriculture</th>
<th>Manufacture</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Manufacture</td>
<td>Services</td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Domestic supply**

**Intermediate demand table**

**Total intermediate supply (supply)**

**Data from SUT 2009**

**Intermediate demand table from IOT 2011**
Assigning trade by country

<table>
<thead>
<tr>
<th>Data sources</th>
<th>Intermediate demand</th>
<th>Final demand</th>
<th>External demand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goods:</strong></td>
<td>Exports, imports database</td>
<td></td>
<td>Exports vector</td>
</tr>
<tr>
<td></td>
<td>• DGA – imports FOB</td>
<td>House holds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PROCOMER – exports</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td><strong>Services:</strong></td>
<td>data and technical criteria</td>
<td>Final demand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• BCCR – transport, repairs</td>
<td>table</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PROCOMER – ground transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ICT – tourism</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• DGAC – air transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• WIOD – several sectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Domestic supply</strong></td>
<td></td>
<td>Intermediate demand table</td>
<td></td>
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<tr>
<td><strong>Import</strong></td>
<td></td>
<td>Final demand table</td>
<td></td>
</tr>
<tr>
<td><strong>Value added</strong></td>
<td></td>
<td>Export table</td>
<td></td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Capital</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total inputs</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
## Vector of exports by country and by sector

<table>
<thead>
<tr>
<th>Destinations</th>
<th>United States</th>
<th>China</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exports</strong></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Electronics</strong></td>
<td></td>
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<tr>
<td><strong>Exports vector</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Intermediate demand industries</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Final demand capital uses</strong></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Uses</th>
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<table>
<thead>
<tr>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
</tr>
<tr>
<td>China</td>
</tr>
<tr>
<td>Canada</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Agriculture</td>
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<tr>
<td>Manufacture</td>
</tr>
<tr>
<td>Services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final demand capital uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
</tr>
<tr>
<td>Manufacture</td>
</tr>
<tr>
<td>Services</td>
</tr>
</tbody>
</table>

**Exports**

**External demand**

**Exports vector**
Costa Rica
dissagregation to
the rest of the
world
Consistency testing

1. **National accounts consistency**: Export data from CR, (no mirror data) to ensure consistency with the national accounts.

2. **Reduce negative number findings**: Better assumptions and adjustments to minimize negative numbers.

3. **Discrepancies vector**: When Costa Rica data is more accurate than international data.

   e.g.: Tourism -> Hotels & restaurants
   - Exports from CR to USA. National sources: $418,2M
   - Imports of EE.UU. USA data: $53,8M
   - Discrepancies ROW: -$364,3 M
Results for Costa Rica

• Lessons learned from the international IOT
From gross value to value added

**Gross value**
- Cumulative value exported to another country
- E.g.: Korea – product to China: 65%
- Accurate to measure value if trade is focused on final goods

**Value added**
- Contribution in the exported value to the final destination
- E.g.: Korea – manufacture: 15% to USA
- Accurate to measure the value of the international trade if it is focused on intermediate goods

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of the final value of the product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and development</td>
<td>40</td>
</tr>
<tr>
<td>Manufacture of basic inputs</td>
<td>10</td>
</tr>
<tr>
<td>Advanced manufacture</td>
<td>15</td>
</tr>
<tr>
<td>Assembly</td>
<td>5</td>
</tr>
<tr>
<td>Marketing and sales &amp; customer service</td>
<td>30</td>
</tr>
</tbody>
</table>

Countries:
- EEUU
- China
- Corea
- Vietnam
New methodology shows different magnitudes on exports according to GV vs. VA

Costa Rica: Structure of the export by country
2009

<table>
<thead>
<tr>
<th>Exports destination</th>
<th>X gross value %</th>
<th>X Added value %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest of the world</td>
<td>41.6</td>
<td>38.5</td>
</tr>
<tr>
<td>USa</td>
<td>26.8</td>
<td>28.2</td>
</tr>
<tr>
<td>Western Europe</td>
<td>15.8</td>
<td>17.1</td>
</tr>
<tr>
<td>China</td>
<td>6.1</td>
<td>5.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>4.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Canada</td>
<td>2.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Rest of Europe</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Japan</td>
<td>0.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Also differences on imports GV vs. VA

Costa Rica: Structure of the imports by origin  
2009

<table>
<thead>
<tr>
<th>Origin of the imports</th>
<th>M gross</th>
<th>M value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>39.3%</td>
<td>34.9%</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>29.6%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Western Europe</td>
<td>8.0%</td>
<td>10.6%</td>
</tr>
<tr>
<td>China</td>
<td>7.0%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Mexico</td>
<td>8.2%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Japan</td>
<td>2.5%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Resto of Europe</td>
<td>1.9%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Canada</td>
<td>1.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Implication por trade policy

1. Goals of diversification in terms of value added
   - Real diversification according to final demand

2. Reduce trade barriers direct and indirect trade partners on CGVs
   - Multilateral agreements to help create GVC’s:
     - Alianza del Pacífico
   - Agreements on the supply chains:
     - IT Agreement (ITA)
     - Anti-Counterfeiting Trade Agreement. (ACTA)
Implications for public policies

Encourage participation of CR in CGV

1. Diversification: companies, markets, activities
   - High value FDI.
   - Expand trade platform

2. Strengthen: Participation
   - Merging with local companies.
   - Entrepreneurship.

3. To higher value added activities
   - Continuous investment and human capital.
   - Promote innovation.
What are the components of the exports

Source: Koopman, Shang, Zhi (2013)
Domestic content of the exports

- Intermediate and final product have the same weight.
- Exports indirectly to third parties.
Implication for public policies

1. Trade policy towards intermediate goods
   - Imports contribute to the competitiveness of the companies.
   - To reduce trade barriers on the supply chains.

2. Strategy to increase domestic content
   - No restrictions for inputs with competitive prices.
   - Strength the capacity building for companies to provide inputs with a clear competitive advantage.
Measuring Costa Rica’s participation in GVC’s

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