“Structural change in the Colombian coffee sector: 1975-2007”
Mariana Saenz,
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“Structural change in the Colombian coffee sector: 1975-2007”

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Objectives
Explore different factors causing structural changes in the Colombian coffee sector.

Methodology
Economy’s production possibilities set (i.e. technology) is expressed as a restricted revenue function represented by GDP

$$\ln \pi = a + \sum \alpha_i \ln p_i + \frac{1}{2} \sum \sum \beta_{ij} \ln p_i \ln p_j + \frac{1}{2} \sum \sum \sum \gamma_{ijk} \ln p_i \ln p_j \ln p_k + \sum \delta_i \ln p_i + \sum \eta_i \ln Z_i + \sum \xi_i \ln p_i \ln Z_i$$

where,

• $\Pi$ represents coffee, manufacturing, non-coffee/manufacturing output prices ($N$)
• $Z_i$ is the quantity of quasi-fixed inputs endowments (i.e. labor, capital and natural resources endowment)
• Time (i.e. T) has been added as a Taylor approximation to account for technological change

Find output shares
After imposing CRS, symmetry and linear homogeneity in prices, apply Hotelling’s Lemma to the translog specification

Analyzing structural changes

Supply-Price Elasticities
Own price elasticity
$$E_i = \frac{\partial \ln Q_i}{\partial \ln P_i} = \frac{\alpha_i}{\pi} + \frac{S_i}{\pi} - 1$$

Cross-price elasticity
$$E_{ij} = \frac{\partial \ln Q_i}{\partial \ln P_j} = \frac{\alpha_j}{\pi} + S_j$$

Primal Measure of Technological Bias
Net Bias
$$B_i = \sum_{J \neq M} S_j \times B_{ij}$$

Biases between $l_{ij}$ and $l_{ji}$ good

$$B_{ij} = \frac{\partial \ln S_i}{\partial t} - \frac{\partial \ln S_j}{\partial t} \quad \text{for } i \neq j$$

$$= \frac{S_i}{S_j} - \frac{S_j}{S_i}$$

Rybczynski elasticity

$$\frac{\partial \ln y_i}{\partial \ln T_i} = \frac{\partial \ln \left( S_i + \frac{\pi}{P_i} \right)}{\partial \ln T_i}$$

$$= \frac{\partial \ln S_i}{\partial T_i} + \frac{\partial \ln P_i}{\partial T_i}$$

$$= \frac{S_i}{S_j} + \frac{S_j}{S_i}$$

where $y_i$ is quantity of output in and $Z_i$ is quantity of input in

Results

Table 1. Supply price elasticities

<table>
<thead>
<tr>
<th>Output</th>
<th>Price</th>
<th>Coffee</th>
<th>Manufacturing</th>
<th>Non C/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee (C)</td>
<td>-1.4325</td>
<td>0.13737</td>
<td>1.2951</td>
<td></td>
</tr>
<tr>
<td>Manufacturing (M)</td>
<td>3.75E-02</td>
<td>-3.1388</td>
<td>3.1012</td>
<td></td>
</tr>
<tr>
<td>Non C/M</td>
<td>1.73E-02</td>
<td>0.14375</td>
<td>-0.1603</td>
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</tbody>
</table>

Table 2. Net technological biases

<table>
<thead>
<tr>
<th>Output</th>
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<td>Coffee</td>
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Conclusions

• Coffee and manufacturing output are complements in production.
• Both coffee and manufacturing technological change decreases the cost of both coffee and manufacturing output respect to all other output in the economy. Thus, there is coffee and manufacturing expanding technological change.
• Coffee and the manufacturing sector appear to be capital intensive

References


Waheed, A., Mehta, V., and Rastogi, M., "Productivity Regional and Sectorial in Colombia: An Analysis of Land Use and Decade of Panel" (Banco de la Republica, 2009).


Acknowledgments
Dr. Lilian Fuglister and Dr. Richard Perre

Further information:
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Data
• Output prices, output shares, GDP and national investment were obtained from the DANE (www.dane.gov.co)
• Land and labor were obtained from the World Development Indicators
• Average years of total schooling of the male and female population was obtained from the education attainment in the adult population data set developed by Robert Barro and Jong-Wha Lee (1993).

Analyzing structural changes

Coffee Share in GDP
Coffee Share
Year
Manufacturing Share
Manufacturing Share in GDP
Year

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