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

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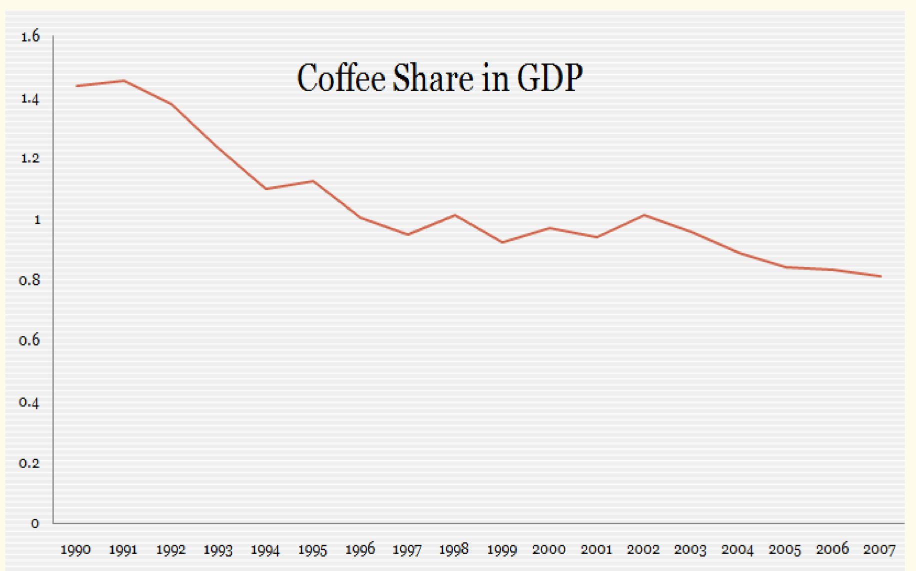
Objectives

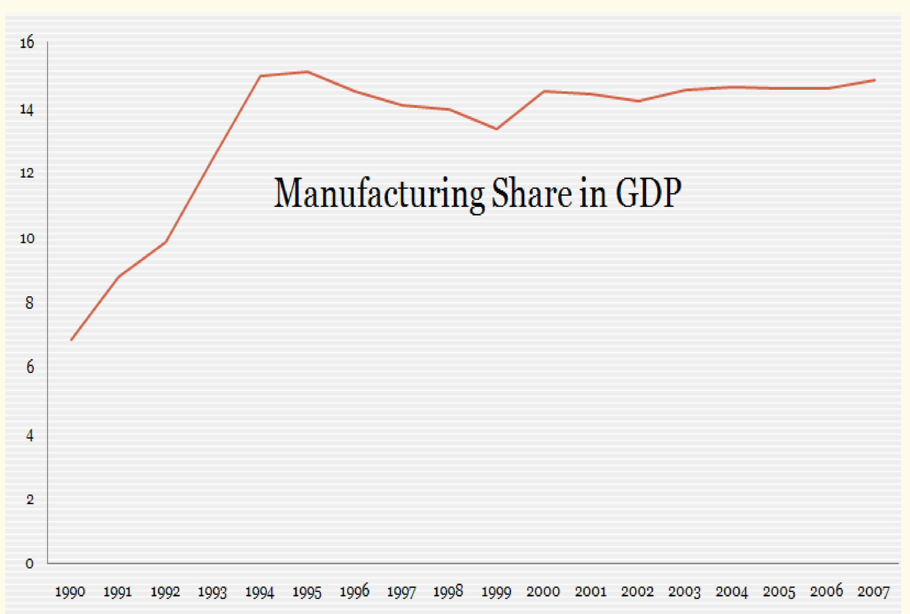
Explore different factors causing structural changes in the Colombian coffee sector.

Coffee Share



Year

Manufacturing Share



Year

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).

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Methodology

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

$$\ln \pi = \alpha_0 + \sum_i \alpha_i \ln p_i + 1/2 \sum_i \sum_h \alpha_{ih} \ln p_i \ln p_h + \sum_j \beta_j \ln Z_m + 1/2 \sum_j \sum_k \beta_{jk} \ln Z_j \ln Z_k + \sum_i \sum_j \gamma_{ij} \ln p_i \ln Z_j$$
$$+ \sum_i \delta_{it} \ln p_{it} * T + \sum_j \eta_{jt} \ln Z_j * T + \varphi_t T + 1/2 \varphi_{tt} T^2$$

where,
•**Pi** represents coffee, manufacturing, non-coffee/manufacturing output prices (N)
•$\mathbf{Z}_j$ 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

$$E_{ii} = \frac{\partial \ln Qi}{\partial \ln Pi} = \frac{\alpha_{ii}}{Si} + Si - 1$$

Cross-price elasticity

$$Eij = \frac{\partial \ln Qi}{\partial \ln Pj} = \frac{\alpha_{ij}}{Si} + Sj$$

Primal Measure of Technological Bias

Net Bias

$$B_i = \sum_{j=C,N,M} S_j * B_{ij}$$

Biases between i_{th} and j_{th} good

$$B_{ij} = \frac{\partial lnS_i}{\partial t} - \frac{\partial lnS_j}{\partial t} \quad for\ i \neq j$$

$$= \frac{\delta_{it}}{S_i} - \frac{\delta_{jt}}{S_j}$$

Rybczynski elasticity

$$\frac{\partial lny_i}{\partial lnz_j} = \frac{\partial \ln (S_i * \frac{\pi}{P_i})}{\partial lnz_j}$$

$$= \frac{\partial lnS_i}{\partial lnZ_j} + \frac{\partial ln\pi}{\partial lnZ_j} - \frac{\partial lnPi}{\partial lnZ_j}$$

$$= \frac{\gamma_{ij}}{S_i} + Sh_j$$

where y_i is quantity of output ith and Z_j. is quantity of input ith

Results

Table 1. Supply price elasticities

Output \ Price	Coffee	Manufacturing	Non C/M
Coffee (C)	-1.4325	0.13737	1.2951
Manufacturing (M)	3.75E-02	-3.1388	3.1012
Non C/M	1.73E-02	0.14375	-0.16103

Table 2. Net technological biases

B_C	B_M	B_N
-0.13458	-0.32265	-1.07E-02

Table 3. Rybczynski elasticities

Output \ Input	Labor	Capital	Natural Resources
Coffee	-265.48	456.73	-190.24
Manufacturing	-266.61	453.93	-186.31
Non Coffee/Manufacturing	-266.78	455.9	-188.11

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

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