

COFFEE MARKET LIBERALIZATION AND THE IMPLICATIONS FOR PRODUCERS IN BRAZIL, GUATEMALA AND INDIA

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THE DATA

The models are estimated using the average monthly ICO Indicator Price for Arabica coffee as a measure of terminal prices and the average monthly producer price for Arabica coffee in Brazil, Guatemala and India for the period January 1973 to October 2007. In analysing the data we should keep in mind the factors that could influence the evolution of coffee prices. The period 1973 to 1989 coincides with the operation of the International Coffee Agreement for regulating the market through export quotas. Under the Agreement, export-quotas were allotted to exporting countries and they were changed according to changes in world coffee prices. However, the Agreement did not always operate as there was failure to reach any agreement among participating countries in 1968, 1972, 1973 and between 1977 and 1980 (Raffaelli, 2005). The Agreement was finally suspended in 1989. The period from 1990 is marked by the liberalisation of the coffee trade at the international level with the abolition of all systems for regulating the coffee market and at the national level through the progressive dismantling of the monopolies of the coffee marketing boards in most coffee producing countries.

<i>Variable</i>	<i>Mnemonic</i>	<i>Details</i>
Producer price of coffee	P_p	is the cash (gate) price received for Arabica coffee by coffee producers. They are the dollar equivalents, that is, prices in local currency have been multiplied by the appropriate exchange rates to arrive at a monthly average producer price in US cents per pound. Although there may be many grades traded for Arabica coffee, most producing countries calculate a weighted average price of the major grades, major being determined on the basis of coffee traded in quantitative terms. The producer prices were obtained from the ICO database and the Coffee Boards of the respective countries. PP in the Excel spreadsheet.
Terminal price of coffee	P_T	is the ICO Indicator Price for Arabica coffee calculated by weighting the ex-dock prices on the international markets in New York, Bremen and Hamburg markets in US cents per pound. The prices are available on daily and monthly basis from the ICO database. IP in the Excel spreadsheet.
Coffee price ratio	U	is the producer price divided by the terminal price of coffee. It is equivalent to the producers' share of the terminal price of coffee.
United States CPI		refers to the all urban consumer price index (old base) downloaded 25 August 2008 from the United States Department of Labor.
UN index of unit values of exports		refers to the United Nations index of unit values of exports of manufactured goods from developed market economies. It is used to convert values/unit values from current to constant terms. Downloaded on 25 August 2008 from the United Nations Conference on Trade and Development.
Coffee production		is the annual data of total production of coffee by coffee exporting countries available from the ICO database.

Note: Lower case variables in the paper are the natural logarithms of the upper case variables.

IDENTIFYING BREAKS IN THE MEAN OF THE COFFEE PRICE RATIO

The Bai and Perron (1998, 2003a, 2003b) approach minimises the sum of the squared residuals to identify the dates of k breaks in the natural logarithm of the ratio of the producer price of coffee to the terminal price of coffee and, thereby, identify $k+1$ shifts in the mean in the coffee price ratio. The estimated model is:

$$u_t = \gamma_{k+1} + \tau_t \quad (1)$$

where u_t is measured as $p_{P,t} - p_{T,t}$ and $p_{P,t}$ and $p_{T,t}$ are the natural logarithms of the producer and terminal prices of coffee respectively for Brazil, Guatemala and India. The terms γ_{k+1} are a series of $k+1$ constants that represent the mean in the coffee price ratio in each of the $k+1$ regimes and τ_t is a random error. The minimum size between breaks is assumed to be 24 months and the final model is chosen using the Bayesian Information Criterion. The technique identifies 11, 8 and 10 breaks in the coffee price ratio for Brazil, Guatemala and India implying that there are 12, 9 and 11 mean coffee price ratios respectively in each country over the past 35 years. The estimated break dates are reported in the table below. The breaks were estimated in RATS 7.2 using the `baiperron.src` and `multiplebreaks.src` procedures written by Tom Doan and available at www.Estima.com.

Table S1: Estimated Break Dates of the Mean of the Coffee Price Ratio

Brazil	Guatemala	India
December 1974 1	June 1975 1	March 1976 1
March 1977	December 1979 2	June 1978
August 1979 2	October 1983	June 1980 2
August 1981	May 1986 3	September 1982
December 1984	May 1988 4	December 1986 3
April 1987 3, 7	April 1993 10	June 1989 4
April 1989 4, 8	April 1995 5	April 1992 14, 17
December 1991	February 1998 12	April 1994 5, 14, 15
August 1996 5, 9		September 1996 16
November 2000 6		November 2004
December 2002		

Notes: Numbers in square boxes indicate breaks corresponding with historical events numbered in Supplementary Appendix S1.