CCP:TE 05/5

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May 2005

منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Organización de las Naciones Unidas para la Agricultura y la Alimentación

# COMMITTEE ON COMMODITY PROBLEMS

## INTERGOVERNMENTAL GROUP ON TEA

### Sixteenth Session

### Bali, Indonesia, 20 – 22 July 2005

# APPLICATION OF PRICE TRANSMISSION ON SELECTED TEA MARKETS

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# I. INTRODUCTION AND OBJECTIVES

1. At its Fifteenth Session, the Intergovernmental Group on Tea requested that the Secretariat continue to analyze the extent to which price signals are transmitted in the international tea markets and suggested that possible future studies include those on different types of tea such as value-added tea, as well as price transmission between different market levels including up to retail level. The Secretariat agreed to pursue such studies provided that the necessary data were forthcoming and sought the assistance of the delegations in obtaining these data.

2. The objective of this document is to analyse quantitatively the nature of price transmission between domestic and international market prices and to assess their volatility. Spatial price transmission and volatility is analyzed for three tea markets: India, Kenya and Sri Lanka. Technical details of the quantitative analysis are included in the Appendix.

# II. MARKET INTEGRATION AND PRICE TRANSMISSION

3. Price is the key mechanism by which domestic and international markets are linked. In theory, if a country is linked by trade to the international market in a free market regime, global demand, or supply shocks will have an equal impact on the domestic and international prices. This also applies in the case of a country that is a major exporter and experiences domestic market shocks. Trade ensures that markets are integrated and that the transmission of price signals is complete, thus resulting in an efficient functioning of the market, with all actors in the supply chain and the consumer having accurate information to make decisions on how much to produce, or consume.

4. Nevertheless, there are many factors that can hinder price transmission and create inefficient outcomes. The implementation of import tariffs and export taxes allows international price changes to be fully transmitted to domestic markets in relative terms. However, if the import tariff, or export tax level is prohibitively high, changes in the international price would be only partly, if at all, transmitted to the domestic market.

5. Domestic markets can also be insulated by large marketing margins that arise due to high transfer costs. Especially in developing countries, poor infrastructure, transport and communication services can give rise to large marketing margins due to high costs of delivering the locally produced commodity to the export port, or the imported commodity to the domestic market, hindering the transmission of price signals, and thus preventing arbitrage.

6. Non-competitive behaviour can also hinder market integration. Pricing-to-market behaviour, whereby firms may absorb part of exchange rate movements by altering export prices in home currency, oligopolistic behaviour and collusion among domestic traders may retain price differences between international and domestic prices greater than those determined by transfer costs.

7. Deviations from complete price transmission may occur in the short run, although in the long run price transmission is, in general, expected to be complete. In the short run, price transmission may not be complete due to lagged responses of consumer prices to changes in the producer prices and vice versa and the corresponding slow speed of adjustment of prices along the supply chain. This slow adjustment may occur as a consequence of many factors including storage and inventory holding, delays caused in transportation or processing due to a large number of vertical stages in the supply chain, ‘price-levelling’ practices and the nature of price reporting and collection methods.

8. In addition, the symmetry of response is also important. Asymmetric response of one price to another implies that upward and downward movements in the price in one market are symmetrically or asymmetrically transmitted to the other. This can be due to policies, including

intervention mechanisms or border measures such as tariff rate quotas, or to market characteristics such as industry concentration, imperfectly competitive behaviour, or in all cases in which some agent may exercise pricing strategies resulting in a slow and incomplete pass-through of price shocks. In the short run, asymmetric price transmission may also occur due to inventory holding and the subsequent release of stocks post the realisation of high international price expectations; or to high fixed costs and excess capacity in the production chain.

9. The concept of price transmission can be thought of as being based on three notions as follows: co-movement and completeness of adjustment; causality, dynamics and speed of adjustment; and asymmetry of response. These notional components imply that complete price transmission can be ascertained when prices co-move being in a form of long run equilibrium. If price changes were not passed-through instantaneously, transmission is incomplete in the short run, but complete in the long run, taking into account the possibility of asymmetric adjustment. The distinction between short run and long run price transmission is important and the speed and the manner, by which prices adjust to their equilibrium is essential in understanding the extent to which markets are integrated in the short run.

## III. QUANTITATIVE ANALYSIS OF SPATIAL PRICE TRANSMISSION: RESULTS AND DISCUSSION

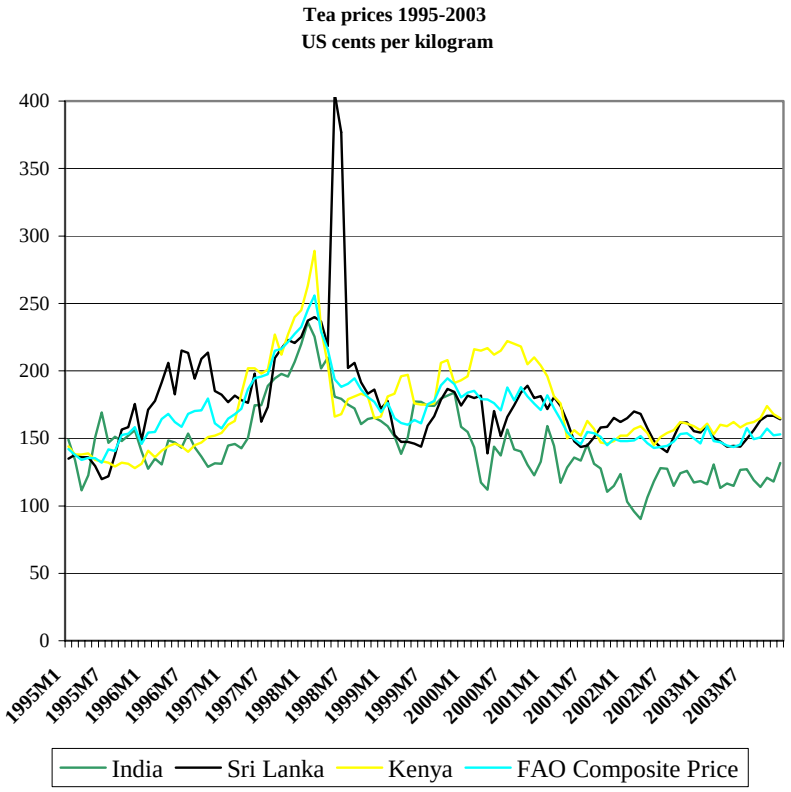
10. The nature of price transmission from the international tea market to tea markets in India, Kenya and Sri Lanka was assessed by testing for co-movement, speed of adjustment and the presence of asymmetric response. These tests were conducted on the basis of monthly auction prices in India, Kenya and Sri Lanka, from January 1995 to December 2003 and the FAO Composite Tea Price, as international reference price[1].

11. On average, auction markets in India, Kenya, Sri Lanka and the international reference price follow a similar trend in the long run (Figure 1), although in the shorter term the national prices deviate from it. During the period under examination, international tea prices experience slow growth in nominal terms, together with some fluctuation. National auction prices behave in a like manner, if not exhibiting a slow rate of decline, like in the case of India.

12. Highly volatile and unpredictable prices are detrimental to the health of a sector, as volatility inhibits investment and adjustment to market conditions, and destabilises income and savings, thus resulting in reduced capital accumulation and losses in efficiency. For primary commodity producing developing countries that are heavily dependent on export earnings, unanticipated variations in export prices also have important consequences for the balance of payments and exchange rates.

13. The analysis suggests that national prices in all countries under examination co-move with the FAO Composite Index, which was assumed as a reference (Table 1). National markets are integrated with the world reference, indicating that transaction costs, or other market distortions, do not inhibit the complete pass-through of price signals, thus providing information that results in efficient outcomes, at least in the long run.

[1] By definition, the FAO Tea Composite Price Index is not a *price*: rather, it is an indicator of the overall tendency of the tea market, encompassing all major auction prices. Therefore, the Index is not a variable that agents would look at when taking a decision on a particular transaction, but a background element for several such decisions.




14. In India, movements in the tea prices were found to be caused by the international reference price, but not *vice versa.* This may be explained by the relatively low share of India in global exports, which amounted to 11 to 15 percent in 1995-2003. Shocks in the international reference price may take some 10 to 12 months to be transmitted to the Indian market: this may be the result of inventories held in importing countries, as well as in India, or of the heterogeneous nature of Indian tea which is exported in terms of Darjeeling and the Assam varieties. The nature of price transmission appears symmetric, most probably reflecting a tea exporting sector characterised by competitive behaviour. Finally, Indian auction prices exhibit moderate volatility, fluctuating around their expected trend by as much as 4.5 percent.

**Table 1: Price transmission empirical results**

| | **India** | **Sri Lanka** | **Kenya** |
|---|---|---|---|
| **Co-movement with international price** | Prices co-move in the long run | Prices co-move in the long run | Prices co-move in the long run |
| **Causality** | International price causes Indian price but not *vice versa* | International price causes Sri Lankan price but not *vice versa* | International price causes Kenyan price but not *vice versa* |
| **Speed of adjustment: shock is passed through after *x* months** | 10-12 | Over 12 | 10 |
| **Nature of adjustment: Symmetry or asymmetry** | Symmetric | Asymmetric | Symmetric |
| **Volatility: Coefficient of Variation (CV)** | Moderate: CV=4.45 percent | Moderate: CV=3.77 percent | Moderate: CV=3.45 percent |

Source: FAO econometric analysis.

15. The Sri Lankan auction price and the international reference price move together in the long run. Prices in Sri Lanka appeared to be caused by the FAO Tea Composite Price, but not vice versa, indicating that the FAO Tea Composite Index is correctly synthesising the trend in world market prices. This is further confirmed by the fact that the London Auction Price – for the period in which it was relevant – shows a similar behaviour with respect to the price in Sri Lanka. Shocks in the FAO Index were found to take almost the same period as the other two prices – of Kenya and India – to be fully passed-through to the Sri Lankan market. In addition, the adjustment appears to be asymmetric, with increases in world prices translated into increases in the Sri Lankan market more slowly than in the case of decreases in world prices. This may reflect widening margins between the Sri Lankan and international prices, which need to be investigated in further analysis of the supply chain.

16. Also in Kenya, the direction of causation runs from the international reference price to the national auction price, but not *vice versa*. Despite Kenya's share in global exports during the period under examination varying between 15 and 22 percent, movements in national prices do not cause the international reference price to change. Shocks in the international price require some 10 months to be fully transmitted to the domestic market, a result which may arise from supply chain characteristics, product heterogeneity or policies. Price transmission appears symmetric, most probably reflecting competitive pricing, smooth inventory management and a flexible processing industry. In line with the other prices analysed, unexpected variations in the Kenyan price are estimated to be moderate, with the price fluctuating around a normal trend by 3.45 percent.

17. The analysis suggests that shocks in the international market are passed-through to the domestic auction markets, at least in the long run. For producing countries like Kenya and Sri Lanka, where more that 70 percent and 90 percent of total sales respectively take place through auction, this has important implications: it guarantees that traders have sufficient information on the international market to make decisions on how much tea to purchase. Given that these price signals also filter upstream to the producers, as well as downstream to the consumers, this market system would ensure efficient outcomes for all agents in the supply chain.

## IV. CONCLUSIONS

18. The price analysis suggests that tea prices in India, Sri Lanka and Kenya move together with the international reference price in the long run. This has important implications for the efficient functioning of these markets, as it ensures that agents have adequate information to decide on the quantities to be produced, exported or consumed domestically. The adjustment speed to changes in the international prices was found to be similar across India, Kenya, and Sri Lanka. The asymmetry arising in Sri Lanka may be the result of many factors that can only be revealed by an extensive in-country examination of the supply chain. Future research may have to focus on the organisation of the supply chain, including an examination of the number of stages in the chain, the extent to which competitive pricing pertains in each stage, the relevant contractual arrangements, the efficiency of transport and processing, storage and inventory behaviour, as well as issues related to the distribution of benefits among producers, wholesalers and consumers.