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Trends and Price Formation Mechanism in Indian Tea Auctions

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ABSTRACT

Tea auctions have played a key role as the main vehicle for primary marketing of tea in India for ever since the first Indian auction centre was set up in Kolkata in 1891. Price formation process in tea auction is itself a complex process and the outcome is a result of a complex interplay of various factors. The present study tries to find out factors which play an important role in the price formation mechanism of Indian tea. For the country as a whole more than 50 per cent of sales are routed through auctions. Auction buying is much more fragmented and there exists a sizable gap between wholesale and retail prices. Southern producers are relatively more dependent on auctions as a mode of primary marketing of tea. There is also a clear seasonality in prices of tea within a year. One of the variables explaining the variance in auction prices is unit export price. Higher export price raises the bargaining position of sellers at auctions. Export volume also has an influence on the price formation at auctions as higher export reduces domestic availability and hikes up domestic price. Further, lots offered and quantity sold are inversely related with average price realization at auction, whereas lots sold are positively related with average price realization.

1. Introduction

The economic viability of tea industry depends crucially on profitable disposal of its products. Marketing of Indian tea is a two-stage process. In the first stage tea is sold in primary market via various channels and in the second stage tea passes through various intermediaries and reaches the consumer. Tea is marketed and made available to the final consumer in two different forms – loose and packaged. In the first stage of marketing there are three options - auction, ex-factory and forward contract. Among these the public auction system plays the most important role. Last two options require development of elaborate marketing network on the part of tea producers. But most of the producers did not possess such marketing network till recently or were reluctant to develop such structure. Under such circumstances, auction remained the most popular channel of primary marketing of tea.

Moreover, tea is not a homogeneous product and quality of tea not only varies across estates but also varies over time in a single estate. There are different grades of tea produced out of a given amount of green tea leaves. In such a context, auction provides the best mechanism for the price discovery of tea. Auction mechanism further enables large number of buyers and sellers of tea to assemble at a single place and decide about the quality and price through competitive bidding process. Out of India's total production of 981 million kg in 2008, quantity sold through auction was 546.83 million kg (or 55.70 per cent), export under

forward contract was 44.90 million kg (4.58 per cent) and ex-garden sale was 389.57 million kg representing 39.72 per cent of total disposal (Tea Board, 2008-09).

Price formation process in Indian tea auction is itself a complex process and the outcome is the result of a complex interplay of various factors. There are certain inherent flaws in auction mechanism like cartelization, proxy-bidding, divisibility of lots etc. Still it is difficult to deny its importance in price determination and subsequent influence on the survival of the industry as a whole. The context has become more complex in recent years. First, is the emergence of smallholder-BLF sector in a prominent manner in Indian tea industry. Second, there has been a reorganisation of tea trading structure in India in the liberalised economic environment. Tea trading witnessed a spate of mergers and acquisition during the latter half of 1990s and early 2000. Third, tea is positioned more as a branded product in recent years. Fourth, volume of sales in auction is showing a declining trend in the last decade. But, for majority of tea producers auction still remains the most important means for price determination. Under such circumstances, it would be of importance to study price formation mechanism in Indian tea auctions.

The broad objective of the present study is to examine the price formation mechanism in Indian tea auctions. The study covers the entire auction process. The period of study takes into account the post-liberalisation period mainly from 1990-91 to 2010-11. Both secondary and primary data are used. Secondary sources of auction data (corresponding auction literature and Tea Board of India) have been explored. To complement secondary data, certain primary information and data were collected from Kochi auction centre. The study mostly uses descriptive statistics to explain the phenomenon of price determination in tea auctions. An economic context has been formulated to deal with the issue of price determination and econometric tools are being used to find determinants of price formation in auctions.

The remainder of the paper is presented as follows. Section 2 examines the system of auction and the relative role of different actors therein. Section 3 presents an analysis of trends in prices across different regions and across seasons. Section 4 presents an analysis of the determinants of price in auction using the data obtained from Kochi e-auction centre followed by the last section wherein the concluding observations are presented.

2. Tea Auction System in India

Tea auctions have played a key role as the main vehicle for primary marketing of tea in India since the first auction centre was set up in Kolkata in 1891. The auction system was further strengthened after Independence by the setting up of several other auction centres in northern and southern India. Thus at present there are six principal auction centres, of which Guwahati, Kolkata and Siliguri serve the plantations in north-eastern India while Kochi, Coonoor and Coimbatore serve southern India. Another small north Indian auction centre at Amritsar primarily deals with green tea. Recently a new auction centre was set up in Jalpaiguri.

In India marketing of tea is controlled by the Tea Marketing Control Order (TMCO). The auction system received strong regulatory support in the early 1980s when the Tea Marketing Control Order (TMCO) 1984 was enacted. Amongst other things, Clause 17 of TMCO 1984 stipulated that at least 75 per cent of a producer's made tea with the exception of plantation-packed tea and bulk exports should be sold through auctions. Consequently, auction sales again became the primary means of marketing Indian tea with between 55-60 per cent of tea output being sold through auction (Tea Board, 2002). The difference between this and the 75 per cent TMCO stipulation was primarily due to two notable exemptions allowed by clause 17 of TMCO in the case of packaged tea and bulk tea exports. However, after market liberalisation, the stipulation of statutory minimum sale through auctions was relaxed

in 2001 giving producers' full flexibility in the primary marketing of tea. As a result, during the period from 2001-02 to 2005-06, auction volumes as a per cent of total production got reduced in both north-eastern and southern India. In north-eastern India, the reduction has been fairly significant from 49 per cent to 42 per cent whereas in southern India this impact was less severe (from 83 per cent to 80 per cent) (Tea Board, 2007).

The loss in auction volumes was almost directly correlated to a corresponding increase in private sales. Indeed, throughout 2001, producers especially in north-eastern India had actively explored and pursued private sales as an alternative channel for the primary marketing of tea, partly because of permitted liberalisation but also in search for better price realizations at a time when price realization at auction was poor. Private sales were clearly emerging as an alternative primary marketing channel for bulk tea with a corresponding shift away from traditional auction system. Also selling privately is in general both cheaper and faster when compared to selling through auctions. This difference is especially prominent in north-eastern India where because of seasonal nature of the crop and the regulation of supply to the auctions, the tea that enters the auction system towards the latter part of the season have to wait for a significantly longer time to be catalogued and subsequently sold which increases the warehousing cost and holding interest. In southern India, the difference is less prominent because of the fact that the crop is available all around the year and that distances are shorter. However, it should be mentioned that private sales have some disadvantages compared to the auction system namely risk of delayed payment as well as risk of default.

Auction buying in India is much more fragmented compared to the two other major tea producing countries - Sri Lanka and Kenya. The average buyer in Colombo and Mombassa buys over two million kgs of tea per year which is between 4 to 10 times higher than the average

quantity purchased by a buyer at Indian auction centres (Tea Board, 2002). Since both Colombo and Mombassa are export oriented in nature, bulk purchases are expected vis-à-vis India which has a huge domestic tea market.

The auction facilitates distribution of the largest quantities of the product in the shortest possible time. The auction serves the buyer by enabling them to purchase tea of a much broader variety than they would have otherwise been able to buy moving from garden to garden individually. Buyers are afforded the widest choice to fulfill their particular requirements while sellers are provided a platform for attracting the widest range of market through numerous buyers both domestic and external. A new entrant because of the existence of auction system does not have to necessarily worry about marketing his production. Industry has attracted many investors because it is in business straight away without searching for markets. The producers receive the sale proceeds within 14 days after the sale. The buyers have found the auctions convenient as it facilitates buying from a central point and provides them the opportunity of observing the operations of their competitors. Even for private sale, auctions act as the yardstick. Thus a system has been developed in such a way that services are efficiently provided to both buyers and sellers. Quantity sold through auction in 2008 constituted 55.70 per cent of total crop (Tea Board, 2008-09). Following liberalisation of the auction mechanism as provided under TMCO 2001, producers are relying more on ex-garden sale, commonly known as private sale. Tea packets under brand names are becoming popular. Improved communications have also helped the expansion of the private sale market.

In a standard auction mechanism, processed tea from tea estates are transported to the auction centers for sale through the appointed brokers. Tea is normally kept in the warehouse. The warehouse keeper sends an “Arrival and Weighment Report” showing the date of arrival

and other details pertain to the tea, including any damage or short receipt from the carriers. The tea is then catalogued on the basis of date of arrival within the framework of the respective Tea Traders Association. In north-eastern India, brokers catalogue teas in the order of their arrival at the warehouse. Once a particular sale is closed, subsequent arrivals are printed in the next sale. Registered buyers, representing both domestic market and exporters receive samples of each lot of catalogued teas. These samples are distributed a week ahead of each sale enabling the buyers to taste, inform their principals and receive their order well in time for the forthcoming sale.

As mentioned earlier, producers of tea have three avenues for primary disposal output namely auction, export under forward contract and ex-garden sale. Table 1 represents primary disposal of tea in India.

Table 1: Primary disposal of tea in India 2006-2008

(Expressed as percentage of total sales)

Mode of disposal	2006	2007	2008
Kolkata auction	17.7	18.48	19.9
Guwahati auction	18.9	19.95	20.81
Siliguri auction	11.56	11.28	12.25
Amritsar auction	0.02	0.01	0.03
Jalpaiguri auction	0.04	0.02	0
Cochin	25.84	26.03	24.96
Coonoor	16.36	17.02	20.48
Coimbatore	10.2	10.7	11.37
Tea Serve	6.48	6.03	6.4
Total auction	50.83	52.15	55.7
Export under FC	5.48	5.19	4.58
Ex-garden sale	43.69	42.66	39.72

Source: Tea Digest 2008-09, Tea Board of India.

From the above Table 1, it can be said that for India as whole more than 50 per cent of sales are made through auctions. Around 40 per cent are ex-garden sales. Rest is being exported through forward contract. Volume of auction sales is larger in southern auctions compared to that of north-eastern auctions. Similarly, volume of ex-garden sales is larger in north-eastern region compared to southern regions. Southern producers are relatively more dependent on auctions as a vehicle of primary marketing of tea. In both regions export under forward contract constitutes about 5 per cent of total sales.

3. Trends in Auction Prices

This section is devoted to the analysis of price trends in Indian and world tea markets. Price trends in tea necessitate analysis at two levels - wholesale and retail. This distinction between wholesale and retail prices becomes crucial because there exists a sizable gap between wholesale and retail prices and they exhibit different trends on certain years. Most of the tea producers do not possess the marketing network to reach the consumers directly and for them wholesale price becomes the most important determinant of the tea supply response. A layer of intermediaries exists between the wholesale and the retail point and that explains, to some extent, the high mark-up witnessed in tea marketing chain leading to significant difference between wholesale and retail prices. With regards to the wholesale tea market, auction provides the most popular channel for primary marketing. Producers may also go for private sale, but even in that case auction price acts as a reference point.

Business cycle as applicable in other industries is also applicable in the case of tea industry. Tea industry in India also suffers from depression from time to time both in pre-independence and post-independence period. Before independence tea trade suffered severe depression during 1890s and also during the first and second world wars. In the pre-independent period domestic demand was low and the industry was closely associated with international trade through the

London auctions. After independence, domestic consumption of tea showed increasing trend and exports averaged around 200 million kg though the volumes of tea production and world tea trade have grown manifold. Also importance of London tea auction fell gradually and that of domestic auctions improved as producers in India looked inward and tried to cater to the expanding domestic market. But operation of business cycles remained a determining factor and reflected in price formations in Indian tea auctions. Prices in auction fell sharply in late 1970s and early 1980s. Following this, Government of India tried to strengthen the auction system by issuing Tea Marketing Control Order (TMCO) in 1984 which stipulated that 75% of the tea produced should be sold through auctions with the exception of bulk export and plantation-packed tea. Price situation improved since then. Prices showed a downward trend again in 1992. There were fluctuation after that and in 1997 prices increased sharply and that continued in 1998. After 2000, prices started falling and fell sharply thereafter. Unlike 1984, Government of India responded differently and liberalised TMCO by relaxing the mandatory auction sales and gave producers full flexibility in the primary marketing of made tea. Crash in auction prices continued and average auction price fell from Rs 72-76 per kg in 1998 to Rs 55-56 per kg in 2003. Crash in auction prices occurred irrespective of the volume of tea sold. This implies that supply side factors were not responsible for this sharp decline in prices. In north Indian tea plantations volume of tea sold fluctuated from 217 million kg to 274 million kg while price averaged from Rs 81.91 in 1998 to Rs 62.15 in 2003. In south Indian tea auctions price fall was even sharper as average auction price crashed to Rs 31-33 per kg. But the fall in auction prices were not matched by a corresponding fall in retail market. Retail prices remained stable and in certain cases showed an increasing trend. Also the fact that, internal consumption of tea was increasing steadily together with stable retail prices rules out basic supply-demand imbalance behind the crash in auction prices in 2000. The big gap between auction price and retail

price indicates that there exists a trading premium in the tea value chain cutting into the margins of the tea producers but not being passed on to the consumer in the form of lower prices.

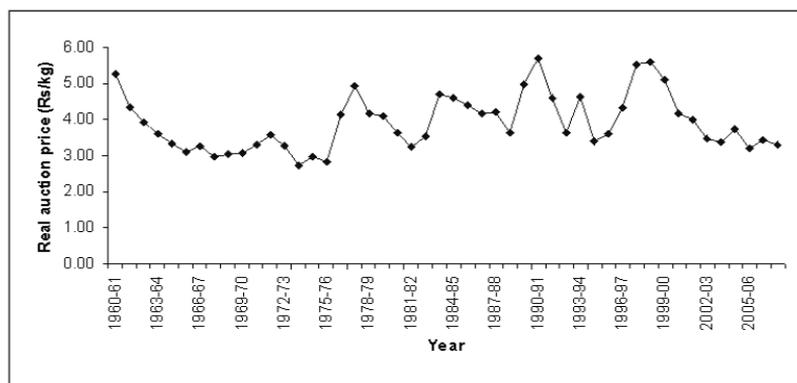
Data on prices from tea auctions from 1960-61 to 2007-08 show two distinct phases. In the first phase, from 1960-61 to 1974-75, the nominal prices of tea were stagnant and the real prices, calculated using the wholesale price index for agricultural commodities with base year 1960-61, declined (Figure 1 and Figure 2). Table 1 shows that, over this phase, the exponential rate of growth of nominal prices was 1.02 per cent per annum. Over the same period, real prices declined at the rate of 1.32 per cent per annum.

In the second phase, from 1974-75 onwards, the nominal prices fluctuated around a rising trend (Figure 1). Over this period, the rate of growth of nominal prices went up to 2.75 per cent per annum (Table 1). In the second phase, the real prices show wide fluctuations around a relatively stagnant trend (Figure 2). Over this period, the rate of growth of real prices was close to zero (Table 1). A close look at the data shows

Figure 1: Long-run average nominal price movement of Indian tea



Source: Tea Digest 2008-09, Tea Board, India.

Figure 2: Average real auction prices of tea at 1960-61 prices

Source: Tea Digest 2007-08, Tea Board, India and Labour Bureau, Government of India.

Note: Real prices have been computed using the wholesale price index for agricultural commodities with the base year 1960-61.

Table 2: Annual rate of growth of average auction prices in India, per cent

Average auction price	1960-61 to 1973-74		1974-75 to 2007-08		1960-61 to 2007-08	
	Growth rate	Standard error	Growth rate	Standard error	Growth rate	Standard error
Nominal	1.02*	0.188	2.75*	0.088	2.93*	0.088
Real	-1.32**	0.517	0.00	0.800	0.146***	0.801

Source: Calculated from Tea Board data.

Note: Growth rate, b , was estimated by running a semi-log regression with the following specification: $\log(P_t) = a + b \cdot X_t + u_t$, where P_t is the price, X_t is the year and u_t is the error term.

* 1% level of significance, ** 5% level of significance, *** 10% level of significance.

that the real auction prices experienced sharp increases during the periods from 1975-76 to 1977-78, from 1988-89 to 1990-91 and from 1996-97 to 1998-99. Instances of sharp fall were observed between 1978-79 and 1981-82, between 1991-92 and 1993-94, and most recently, between 1999-2000 and 2005-06 (Figure 2).

An analysis of data between 1985-86 and 2007-08 suggests that there was a clear difference in levels and trends in prices of tea between the north-eastern and southern auction centres. Tea prices in southern auction centres are lower than the tea prices in north-eastern actions, and further, that the gap in nominal prices of tea between the two regions has increased over the years. The rate of growth of nominal prices between 1985-86 and 2007-08 was 4.24 per cent per annum in the north-eastern auction centres and 3.62 per cent per annum in the southern auctions (Table 3).

Table 3: Annual rate of growth of average prices in north-eastern and southern Indian auctions, per cent

Average auction price	1985-86 to 2007-08	
	Growth rate	Standard error
North-eastern	4.24*	0.088
Southern	3.06**	0.103
All India	3.94*	0.087

Source: Calculated from Tea Board data.

Note: * 1% level of significance, ** 5% level of significance.

The widening gap between the north-eastern and southern auction average prices can be observed in terms of real prices as well.

The difference between the north-eastern and the southern average auction prices in terms of both nominal and real prices can be attributed to the following factors.

First, the quality of tea produced in the southern region is inferior to the quality of tea produced in the north-eastern region. North-eastern region produce relatively superior quality tea than the tea produced in the southern region. In north-eastern region, Darjeeling hills in West Bengal and a part of upper Assam produce orthodox tea which fetches higher price than CTC tea. Southern regions only produce CTC tea and the quality of southern CTC tea is inferior to the north-eastern CTC tea (Tea Board, 2003). Among the north-eastern auctions, Kolkata recorded higher average price than the other two centres essentially because most of the orthodox tea was auctioned in Kolkata. Among the southern auction centres Kochi had a record of relatively higher price realization.

Second, a substantial number of producers in southern regions are small growers whereas in north-eastern regions farm-size is relatively high (Tea Board, 2000). As a result, the small growers in the southern region are entirely dependent on auctions for marketing of tea. On the other hand, many relatively large producers in the north-eastern region have independent private retailing network. This reduces their dependence on auctions (Karmakar & Banerjee, 2005).

Third, buyers' concentration is relatively higher in southern regions (Tea Board, 2003).

Table 4 depicts the movements of prices in different auctions during the last decade and includes the period of steep fall in prices during the first three years of the decade.

There is also a clear seasonality in prices of tea within a year. The arrival of the first flush tea in April normally causes prices to rise, which then decline during July with the arrival of the monsoon, and again rise in October, with autumn flush fetching better prices, and fall in January. This pattern of seasonality is seen in most of the auction centres (Table 5).

Table 4: Average nominal prices across Indian tea auctions, Rs per kg

Auction	2000	2001	2002	2003	2004	2005	2006	2007	2008
Kolkata	81.09	76.36	69.06	68.13	80.34	70.14	79.76	81.90	105.12
Guwahati	68.80	68.68	61.31	59.01	68.78	60.57	68.09	69.63	91.73
Siliguri	60.20	63.41	56.09	54.58	64.13	58.38	64.90	65.92	85.27
North-east	70.34	69.80	62.66	61.31	71.57	63.61	71.62	73.55	95.27
Cochin	51.33	52.21	47.21	45.78	52.30	49.40	54.41	56.05	71.08
Coonoor	39.00	41.47	36.78	34.55	43.30	36.03	47.77	44.19	63.50
Coimbatore	43.35	44.98	40.46	38.30	46.50	40.91	49.38	47.49	63.76
South	44.64	46.02	41.63	39.93	47.01	42.67	50.79	49.70	67.27
All India	61.71	61.66	55.95	56.03	64.54	58.05	66.01	67.40	86.99

Source: Tea Digest 2008-09, Tea Board, India.

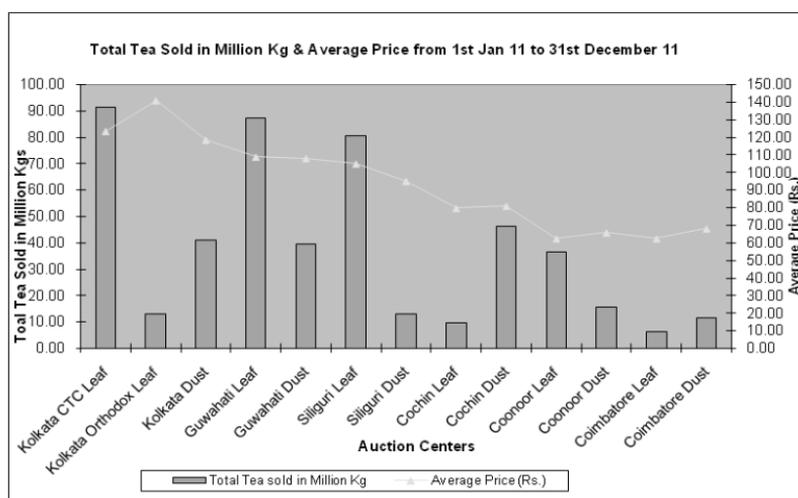
Table 5: Month-wise price realization at six Indian auctions in 2008

Month	Kolkata	Guwahati	Siliguri	Cochin	Coonoor	Coimbatore	Tea Serve
January	76.15	70.88	66.49	57.27	52.55	53.24	48.02
February	68.29	60.97	59.85	57.85	52.64	53.18	50.14
March	70.26	58.98	57.19	58.59	55.55	56.38	53.24
April	93.47	85.76	90.30	57.59	54.87	52.39	53.55
May	75.02	86.64	87.66	59.13	56.27	59.38	54.52
June	82.30	92.37	91.51	62.78	61.40	60.80	60.50
July	78.23	91.55	85.87	67.72	63.35	64.06	63.55
August	74.44	94.78	88.38	81.17	70.57	71.06	69.15
September	74.52	101.00	94.13	93.07	78.39	80.68	75.00
October	75.50	104.94	96.14	89.27	80.50	81.34	77.61
November	77.66	99.94	88.03	81.92	66.11	69.40	63.62
December	81.41	91.80	85.72	76.02	62.30	64.55	60.39

Source: Tea Digest 2008-09, Tea Board, India.

The following Figure depicts the quantity of tea sold and the corresponding prices at different auctions for different types of tea during the year 2011.

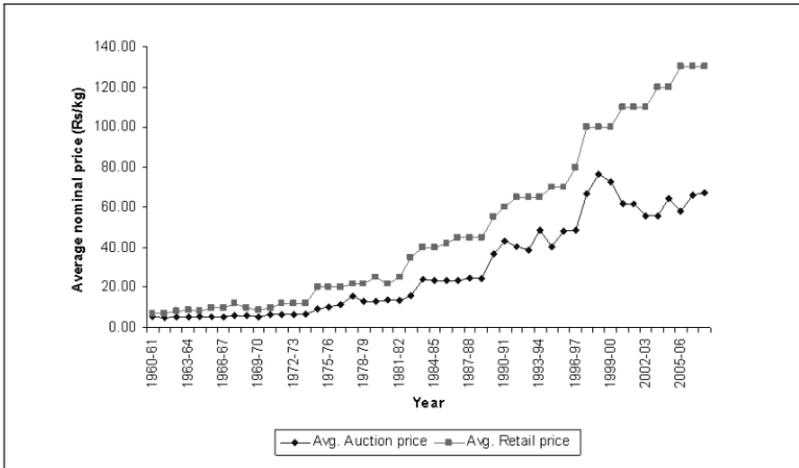
Figure 3: Sale and price realization at Indian auctions for different types of tea during 2011



A comparison of the movement of average auction price and average retail price for the period from 1960-61 to 1974-75 shows that, over this period, although the level of retail prices was higher than that of auction prices, the rate of growth of auction prices was higher than that of retail prices. As a result, over this period, the gap between the two prices closed marginally. Between 1974-75 and 2007-08, on the other hand, retail prices grew at a faster rate than the auction prices, as a result, and in particular after 1999-2000, the gap between the retail prices and auction prices increased as evident from Figure 4.

Table 6 depicts the growth rate of retail prices in different periods for the time span between 1960-61 and 2007-08.

Figure 4: Movement of average auction price and retail price in nominal terms



Source: Various issues of Tea Statistics, Tea Board, India.

Table 6: Growth rate of retail prices 1960-61 to 2007-08

Retail price	1960-61 to 2007-08		1960-61 to 1974-75		1974-75 to 2007-08	
	Growth rate	Standard error	Growth rate	Standard error	Growth rate	Standard error
Nominal	2.99**	0.059	0.172**	0.043	2.77	0.045
Real	.214**	0.056	-0.0621**	0.040	0.263***	0.052

Source: Calculated from Tea Board data.

Note: *1% level of significance, ** 5% level of significance, *** insignificant.

Also auction process itself has many limitations. The study of the Indian tea auction system by A.F Ferguson & Co. commissioned by the Tea Board in 2002 has pointed out some of these loopholes of the auction process. One such limitation is proxy bidding which allows existing tea buyers to bid for others who do not participate in the auction process formally, but are able to secure their desired requirement of made tea through subsequent division of the lots sold through auction.

Also, the best quality teas are now increasingly sold through private sales. Producers mostly send medium and low quality tea to auction. Lower price realization at auction reflects this reality. This is further evident from the fact that estates are now buying green leaves from small-grower sector but they do not have any control over the quality of green leaves. By outsourcing green leaves production to small growers, estates are saving on the cost of production but losing out on quality. With the price paid for green leaf purchases from small growers being determined by a formula that relates to the price of made tea as realized at the auction, manipulations of auction prices benefit estate producers. This benefit of securing green leaves at a fraction of its true value converts into profit at the manufacturing stage. This further undermines the efficacy of the auction process.

4. Auction Price in Kolkata and Kochi

Like other primary commodity markets, tea trade is highly speculative. There is relative inelastic retail demand. Against this, buyers of tea at the auction may often act in collusion in bringing down the prices of ordinary grades so that profits within the value chain can be transferred to the retail end of the chain. In retail, prices are either generally stable or show increasing trend. There is apparently no reason why producers would collude to bring down prices but the problem surfaces when tea production and retailing become vertically integrated and thus dominated by a small number of buyers. A big tea trader would find it profitable to buy backwards into the tea producing operation in order to secure a regular supply of tea through intra-industry trade. Also, a big tea producer may like to expand business in retail sector of the trade, by setting up either retailing network or by entering into tea retailing businesses controlled by other companies. Because of such intra-industry trade, price formations at auctions may get manipulated and become over-loaded with poor quality tea. Very large buyers who are producers as well, would find it worthwhile to depress prices at auctions through monoponic buying which enables them to buy large

share of tea at a lower price. Loss incurred in production can be more than compensated by profit-making at the retail end. Table 7 presents auction and retail prices in Kolkata and Kochi in 2008.

Table 7: Month-wise auction and retail prices at Kolkata and Cochin in 2008

Months	Kolkata		Cochin	
	Auction price	Retail price	Auction price	Retail price
January	66.63	120	58.96	105
February	59.70	120	58.50	105
March	55.19	120	60.03	105
April	72.21	120	58.73	105
May	75.21	120	57.67	105
June	76.47	120	52.60	105
July	83.40	120	51.70	105
August	75.46	120	52.99	105
September	95.96	120	53.70	105
October	74.81	120	51.82	105
November	74.28	120	48.70	105
December	81.51	120	54.77	105
January	72.21	120	58.73	105

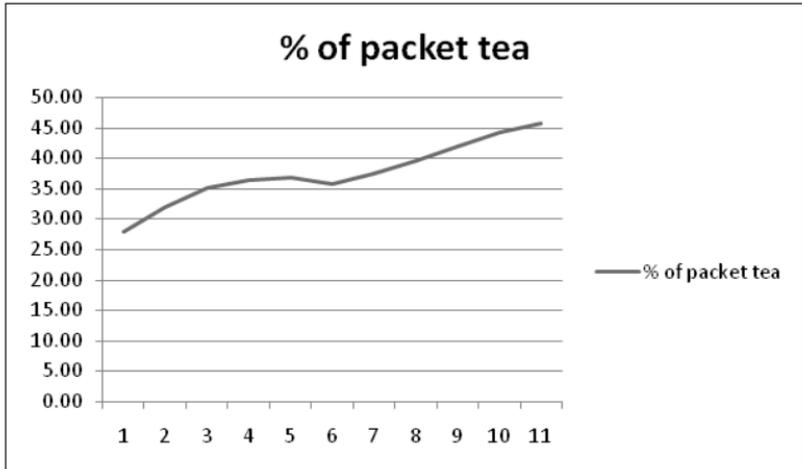
Source: Tea Digest 2008-09, Tea Board of India.

From Table 7, it can be said that in both Kolkata and Trivandrum/ Cochin, retail prices were much above the auction prices and remained steady throughout the year. Auction prices fluctuated over the months, more so in case of Kolkata auction, but retail prices remained steady throughout the year. Larger is the gap between the auction and retail prices, more is the profit for the retailers.

Also the export prices had been falling for a considerable period in dollar terms. Depreciation of Indian rupee since 1991 concealed the

absolute magnitude of this fall to a certain extent. This fall in global prices of tea is different from long-run depreciation in primary commodity prices as elucidated in the Prebisch-Singer hypothesis where prices fall because of the relative inelasticity of commodity demand. In this case declines in price of tea in world export markets were not matched by corresponding decline at the retail level. One explanation may be the gradual replacement of generic tea by branded tea in the retail segment. Also the vertical integration of production and marketing activities in the global tea trade resulted in emergence of MNC blenders and buyers who operated simultaneously in the auction of several countries. Thus, there exists an interlinking among the auctions in different countries dominated by the MNCs and possibility of price manipulations through collusions has increased manifold. Sharp increase in auction prices in India in 1998 was triggered by crop failure in Kenya. By the time auction prices fell to more reasonable level in early 2000, several plantations had extended production on the assumption that buyer demand would continue to remain high. Also during the boom period of 1997-98 created an environment where tea industry in India saw new acquisitions and mergers leading to fall in capital reserves while incurring new cost liabilities. The acquisition of Tetley that enabled Tata Tea to launch transnational operations came about in March 2000. Eveready Industries, as a former part of the Williamson Magor group, acquired a large stake in the Indian tea business through mergers with Mcleod Russell in 1996 and Bishnauth Tea in 2001. Likewise, the smaller players in the Indian tea business also made speculative investments that drew capital away from plantation activities. When the credit options got exhausted, companies that had extended liabilities carelessly and found themselves in distress. This happened in south India initially and then soon spread to plantations in West Bengal also from 2001. Figure 5 depicts the increasing trend of branded tea out of the total tea sales during the period from 1988 to 2008.

Figure 5: Percentage of packet tea out of total tea sales during 1988-2008

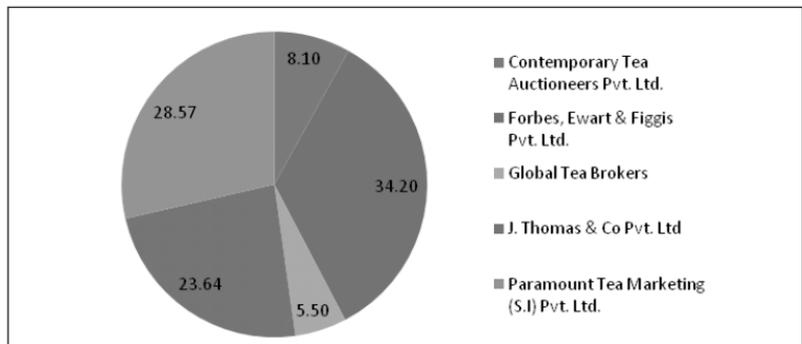


Source: Tea Digest 2008-09, Tea Board of India.

5. Price Determination under Auction: Evidence from Cochin and Kolkata Tea Auctions

There are five registered brokers in Kochi auction centre. The entire transactions at the auction take place through these five brokers. Shares out of the total sale of each of the five brokers are presented in the Figure 6.

Figure 6: Relative share of brokers at Cochin auction for the year 2011

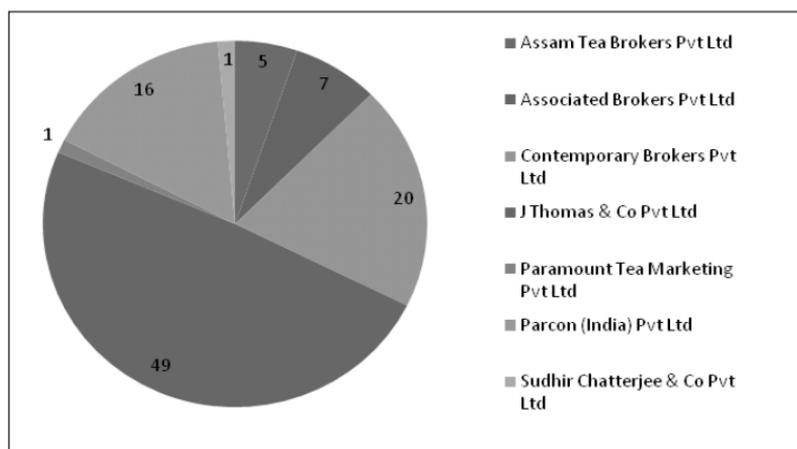


Source: Primary data collected from Cochin auction.

From the above graph it is clear that out of these five brokers, three brokers namely Forbes, Ewart & Figgis Pvt. Ltd., J Thomas & Co Ltd., and Paramount Tea Marketing (S.I.) Pvt. Ltd. controlled more than 90 per cent of the total transactions. Thus, overall there are very few brokers and among them three brokers dominate the proceedings and are in a position to influence price through their clients - both at buyers' end and sellers' end.

Similar situation is also observed in case of Kolkata auction. There are seven auctioneers operating at the Kolkata auction. Out of these, three auctioneers control 85 per cent of total transactions carried out at the auction. Rest four among themselves control about 15 per cent of total transactions. Figure 7 depicts the relative share of brokers at the Kolkata auction in the year 2011.

Figure 7: Relative share of brokers at Cochin auction for the year 2011



Source: Primary data collected from Cochin auction.

Analyses of sellers' behaviour during the last three years at the Kochi auction reveal that there are about 120 odd sellers of tea at the auction. Out of them, 16 odd big sellers contribute about 64 per cent of

total transaction. Table 8 presents the relative share of sellers based on average transactions based on last three years.

Table 8: Relative share of sellers of tea at Kochi auctions

Name of the seller	Qty sold (in kgs)	% share
Bombay Burmah Trading Corporation Ltd.	1786872	2.50
Elavamkudy Tea Company	1080788	1.51
Haileyburiya Tea Estates Ltd	1568489	2.19
Highland Produce Co. Ltd.	1428272	2.00
Hope Plantations	1108361	1.55
Kannandevan Hills Tea Plantations.Co	7194716	10.05
Parisons Estates & Inds. (P) Ltd.	2384548	3.33
Parry Agro Industries Ltd.	7167212	10.02
Peria Karamalai Tea and Ptoduce Co. Ltd.	1386460	1.94
Poddar Plantations	1237161	1.73
Tamilnadu Tea Plantation Corporation Ltd.	3763292	5.26
Tata Coffee Ltd	3256980	4.55
Tata Global Beverages Limited	1731617	2.42
Tea Estate India Ltd.	6570760	9.18
Waterfall Estate East (P) Ltd	1242566	1.74
Woodbriar Estates Ltd.	2745880	3.84
Other 107 sellers	25903866	36.20

Source: Primary data collected from the Cochin tea auction.

Among the big sellers of tea at the Kochi auction, Tata Tea is an important one. Moreover, Kannandevan Hills Tea Plantations Co. earlier belonged to Tata Tea. Tata Tea in 2005 withdrew its plantation operation from Munnar hills and Kannandevan Hills Tea Plantations Co. was formed.

Analysis of buyers' behaviour during the last three years at the Kochi auction reveal that there are about 150 big buyers of tea. Among them 11 buyers control more than 50 per cent sales and rest 139 buyers divide a little less than 50 per cent among themselves. Table 9 presents the relative share of buyers at the Kochi auction based on averages of the last three years.

Table 9: Relative share of buyers at the Kochi auction

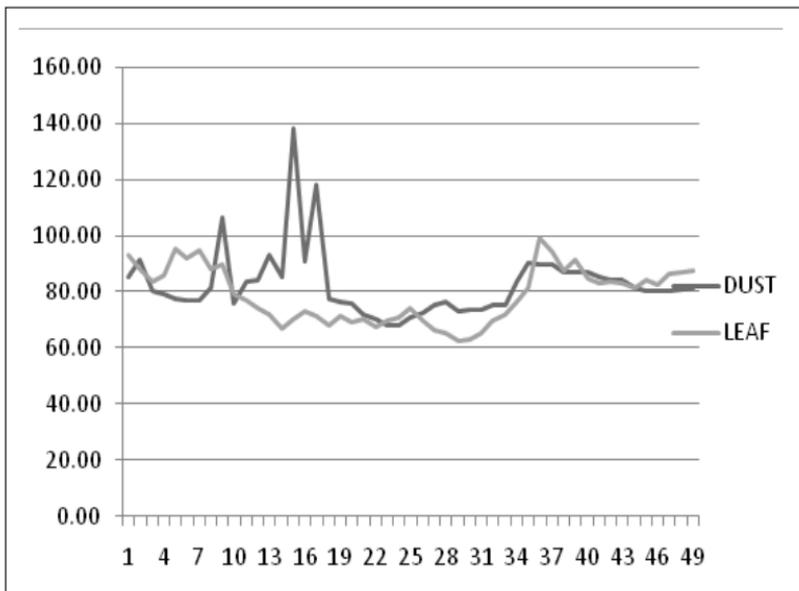
Name of the buyer	Qty. bought (in kgs)	% share
A.V. Thomas & Co.Ltd.	5861333	10.54
Hindustan Unilever Limited	3072056	5.52
Vimal Tea Company	2765787	4.97
V.Dasa Prabhu & Sons	1376422	2.47
Tata Global Beverages Limited	2496264	4.49
R.J.Sons	1633636	2.94
P.C.Mammoo group	3114651	5.60
Shotty Commodities	1024982	1.84
R.J.Sons	1633636	2.94
LMJ International Limited	2140474	3.85
Kerala State Civil Supplies Corpn.Ltd	4522073	8.13
Other 139 firms	25982406	46.71

Source: Primary data collected from Cochin Auction.

Analysis of buyers at Kolkata auction reveals that auction buying in Kolkata is much more fragmented. There are about 317 registered buyers at the Kolkata auction who actively participate in the auction process. Out of these, 20 buyers account for 1 per cent of total volume transacted in the year 2011. Two major buyers of tea at Kolkata auction are Tata Global Beverages Ltd. (with 12.59 per cent share) and Hindustan Unilever Ltd. (with 10.46 per cent share). Buying in Kolkata auction is relatively more fragmented than that of Kochi auction.

Trends in price realization with respect to dust and leaf variety of tea at the Kochi auction reveals that both varieties of tea show a similar kind of movement spanning over sales in a particular year. Initially, at the beginning of the year price shows an upward trend for a few sales and then it declines and remains steady for next few months. Thereafter, it again shows an increasing trend before falling again. At the last few sales at the end of the year, it shows an increasing trend. Even though both dust and leaf variety show similar trends over sales but fluctuations are more in case of dust variety. Figure 8 presents the price movements of dust and leaf varieties of tea over different sales in the year 2010.

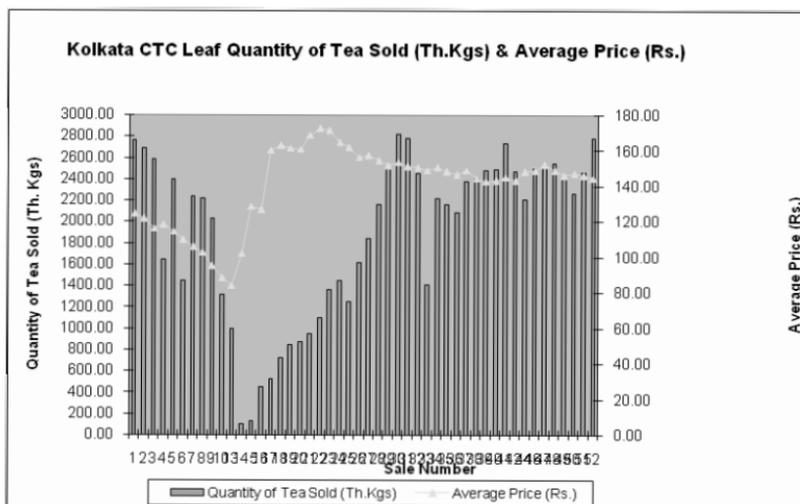
Figure 8: Price movement over sales in 2010



Source: Primary data collected from Cochin auction.

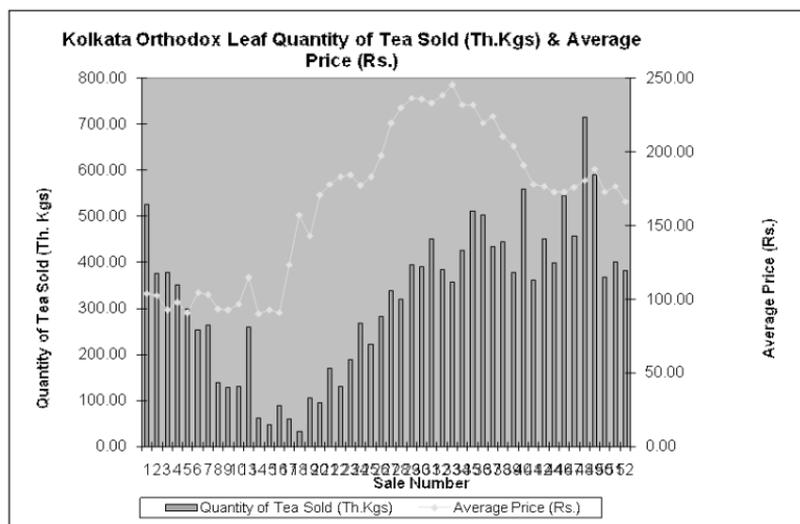
Quantity of tea sold at Kolkata auction and the average price realization at each sale for CTC leaf and Orthodox leaf are depicted in Figure 9 and Figure 10 respectively.

Figure 9: CTC leaf sold and price realization at Kolkata auction during the year 2012



Source: Primary data as collected from Kolkata auction.

Figure 10: Orthodox leaf tea sold and average price at Kolkata auction during the year 2012



Source: Primary data as collected from Kolkata auction.

6. Determinants of Price: A Regression Analysis

A very important question that can be asked is that what factors determine price at the auctions. In other words what factors influence the price formation mechanism at the Indian auctions? Here, I have attempted to construct a model where average price realized at Indian auctions is a function of yield, export volume, export price and quantity of tea sold or offered at auctions. Average price is the dependent variable and yield, export quantity, export price and quantity sold are the independent variables. The general specification of the model is given below.

The general specification of the model is given below.

$$\text{AvgP}_a = R + \beta_y X_y + \beta_{ev} X_{ev} + \beta_{ep} X_{ep} + \beta_q X_p$$

Where AvgP= Annual average price realized at auction

R= constant

X_y = yield (production per hectare)

X_{ev} = export quantity

X_{ep} = unit export price in US dollar

X_p = production

The result of regression model as described above is presented in Table 10.

Table 10: Summary of regression analysis

Variable	Co-efficient	Standard error	t-statistics	p value
Constant (R)	-12.38299	4.898071	-2.53	0.014
Yield (prod per hectare)	.0006734	.00047549	0.14	0.888
Export volume	.000054	.000017	3.18	0.002
Unit export price	.6503697	.020331	31.99	0.000
Production	8.86e-06	.0000113	0.77	0.445

Error sum of squares (ESS) : 358.266916
 Regression sum of squares (RSS): 34417.5054
 Unadjusted R-square: .9897
 Adjusted R-square: .9889
 F-statistic: 1296.90
 P-value for F: .000

The adjusted R-square is .988 indicating that 98.8 of the variance of price are explained by the variables in the model. The last column of the table gives the p-value for a two-tailed test for the null-hypothesis that the corresponding regression co-efficient is zero. All the variables have very low p value; except yield and constant term. Thus, the null-hypothesis that coefficients β_{ev} and β_{ep} are zero can be rejected. However, the null-hypothesis that the coefficients β_y and β_p are zero cannot be rejected.

As the regression analysis shows, one of the variables explaining the variance is unit export price. Export price depends on aggregate foreign demand and supply. That it has a bearing on the domestic price formation implies that it provides the domestic producers an alternative option to dispose off their tea. If the price is relatively higher at the export market, it will enable domestic producers to raise the reserve price at auctions. Higher export price will act as a cushion for them. Even though domestic producers end up selling at domestic auctions, higher export prices raises their bargaining power at auctions. Auction sale is much more secure as payment is guaranteed within 14 days and relatively hassle-free. Comparatively ex-garden export has its intrinsic uncertainty like consignments not reaching on time or reaching late, quality not up-to-the mark, payment default etc. But still export provides an alternative channel of primary marketing of tea. Price on offer at this alternative option has an important influence on the price formation at auctions. Export volume has also an influence on the price formation at auctions. This is obvious because higher export reduces domestic

availability and pushes up domestic price. However, production did not influence the auction price as such. Expectation that years in which production increases would lead to fall in auction prices did not happen. Variation in yield did not affect auction prices. The most important outcome of the regression model is that unit export price has a profound influence on the price formation at auctions.

With a view to explain price variation across different sales in a particular auction, let me take the case of CTC leaf auction at the Kolkata auction for the year 2012. There were 48 sales in 2012 for CTC leaf tea at Kolkata auction. The detailed data for these 48 sales are presented in Table 11 below.

Table 11: Kolkata auction CTC leaf sale 2012

Sale No.	Lots offered	Lots sold	Qty. sold	Avg. price
1	3468	2818	2760.73	124.28
2	3434	2779	2685.10	121.66
3	3371	2753	2579.72	116.16
4	2200	1714	1643.75	118.38
5	3197	2582	2394.30	114.46
6	1952	1622	1446.28	109.68
7	3039	2547	2236.23	105.70
8	3275	2573	2218.79	102.79
9	2981	2335	2032.25	95.09
10	1720	1465	1315.04	88.48
13	1613	1248	996.53	84.12
14	219	166	103.59	102.19
15	248	229	126.22	128.64
16	853	750	451.20	126.58
17	962	877	525.01	160.32
18	1298	1120	719.83	162.87
19	1493	1290	841.81	161.33

Sale No.	Lots offered	Lots sold	Qty. sold	Avg. price
20	1513	1317	867.26	160.76
21	1618	1382	950.54	168.69
22	1777	1529	1100.95	172.23
23	2049	1704	1357.20	171.36
24	2375	1788	1442.28	164.43
25	2326	1593	1247.94	161.62
26	2541	1948	1612.12	156.25
27	2839	2146	1838.73	157.12
28	3313	2479	2160.12	154.41
29	3442	2817	2501.51	151.58
30	3688	3026	2813.53	153.48
31	3720	3015	2779.69	151.07
32	3360	2704	2452.09	150.26
33	2054	1546	1404.35	148.96
34	3277	2476	2211.66	150.43
35	3176	2342	2160.68	148.20
36	2869	2196	2081.13	146.37
37	3017	2533	2374.42	148.92
38	3367	2585	2408.58	144.39
39	3529	2632	2482.66	142.68
40	3347	2616	2493.69	143.09
41	3407	2870	2736.01	145.07
42	3358	2586	2467.45	143.14
44	2721	2287	2208.68	148.27
46	2983	2621	2496.86	148.53
47	3239	2685	2524.46	152.07
48	3154	2595	2546.05	148.77
49	3213	2579	2400.73	146.01
50	2993	2459	2265.84	147.01
51	3290	2680	2457.91	145.73
52	3250	2924	2784.05	144.42

Source: Primary data collected from Kolkata auction.

Based on the data from the above Table 11, the following model is formulated with average price as dependent variable and lots offered, lots sold, quantity sold as independent variable.

$$P = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

Where P=average price

X_1 = Lots offered

X_2 = Lots sold

X_3 = Qty. sold

The estimated price equation is given in Table 12. The result of the estimated price equation reveals that as expected quantity sold is negatively related with price realization. Higher quantity sold is related with lower price. Further, a lot sold is positively related with price realization as higher number of lots sold at relatively higher price. A lot offered is negatively related with average price realization.

Table 12: Estimated price equation at Kolkata CTC leaf auction 2012

Variable	Co-efficient	Standard error	t-statistics	p value
Constant (R)	117.6015	10.72863	10.96	0.000
Lots offered	-.1283646	.0478176	-2.68	0.010
Lots sold	.595192	.0488147	12.19	0.000
Qty sold	-.7156137	.1028448	-6.96	0.000

$$R^2 = 0.7819$$

$$\text{Root MSE} = 24.801$$

$$\text{Prob} > F = 0.000$$

Significant at **0.5 level**

Thus the conclusion from the above model is that lots offered and quantity sold are inversely related with average price realization at auction whereas lots sold are positively related with average price realization.

7. Concluding Observations

Tea auctions have played a key role as the main vehicle for primary marketing of tea in India for over a century. The auction facilitates distribution of large quantities of the product in the shortest possible time. Auction buying in India is much more fragmented compared to the two other major tea producing countries namely Sri Lanka and Kenya. There exists a sizable gap between wholesale and retail prices and they exhibit diverging trends in certain years. A layer of intermediaries exists between the wholesale and the retail point and that explains, to some extent, the high mark-up witnessed in tea marketing chain leading to significant difference between wholesale and retail prices. Regarding the wholesale tea market, auction provides the most popular channel for primary marketing of tea. Producers may also go for private sale but even in that case auction price acts as a reference point.

Data on prices from tea auctions from 1960-61 to 2007-08 show two distinct phases. In the first phase, from 1960-61 to 1974-75, the nominal prices of tea were stagnant and the real prices declined. In the second phase, from 1974-75 onwards, the nominal prices fluctuated around a rising trend. During the second phase, the real prices show wide fluctuations around a relatively stagnant trend. An examination of data between 1985-86 and 2007-08 suggests that there was a clear difference in levels and trends in prices of tea between the north-eastern and southern auction centres. Tea prices in southern auction centres are lower than the tea prices in north-eastern actions, and further, that the gap in nominal prices of tea between the two regions has increased over the years. The widening gap between the north-eastern and southern auction average prices can be observed in terms of real prices as well

There is also a clear seasonality in prices of tea within a year. The arrival of the first flush tea in April normally causes prices to rise, which then decline during July with the arrival of the monsoons, and again rise in October, with autumn flush fetching better prices, and fall in January. A comparison of the movement of average auction price and average

retail price for the period from 1960-61 to 1974-75 shows that, over this period, although the level of retail prices was higher than that of auction prices, the rate of growth of auction prices was higher than that of retail prices. As a result, over this period, the gap between the two prices closed marginally. Between 1974-75 and 2007-08, on the other hand, retail prices grew at a faster rate than the auction prices, and as a result, and in particular after 1999-2000, the gap between the retail prices and auction prices increased.

For India as a whole more than 50 per cent of sales are made through auctions. Around 40 per cent are ex-garden sales. Rest is being exported through forward contract. Volume of auction sales is larger in southern auctions compared to that of north-eastern auctions. Similarly, volume of ex-garden sales is larger in north-eastern region compared to southern regions. Southern producers are relatively more dependent on auctions as a vehicle of primary marketing of tea. In both regions export under forward contract constitutes about 5 per cent of total sales.

It can be said that general law of demand and supply does not always apply to Indian tea market.

In both Kolkata and Trivandrum/Kochi retail prices were much above the auction prices and remained steady throughout the year. Auction prices fluctuated over the months, more so in case of Kolkata auction, but retail prices remained steady throughout the year. Larger is the gap between the auction and retail prices, more is the profit for the retailer of tea.

Further, it is observed that there is a gradual replacement of generic tea by branded tea in the retail segment. Also the vertical integration of production and marketing activities in the global tea trade resulted in emergence of MNC blenders and buyers who operated simultaneously in the auction of several countries. Thus there exists inter linkages among auctions centres in different countries dominated by the MNCs and the possibility of price manipulations through collusions has increased manifold.

One of the variables explaining the variance in auction price is unit export price. Higher export price acted as a cushion for tea producers. Even though domestic producers end up selling more at domestic auctions, higher export prices raises their bargaining power at auctions. Price on offer at this alternative option has an important influence on the price formation at auctions. Export volume has also an influence on the price formation at auctions. This is obvious because higher export reduces domestic availability and pushes up domestic price. However, production did not influence the auction price as such. Expectations that those years in which production increases would lead to fall in auction prices seldom happen. Variation in yield did not affect auction prices. The most important outcome of the regression model is that unit export price has a profound influence on the price formation at auctions. Further, results from another regression analysis reveals that lots offered and quantity sold are inversely related with average price realization at auction whereas lots sold are positively related with average price realization.

8. Policy Imperatives

1. TMCO 1984 should be revived to ensure that a minimum quantity of tea is channelised through auction in view of the fact that auction still acts as a primary mechanism for price discovery of tea for large number of tea producers.
2. Auctioneers at Kolkata auction should evolve a mechanism for consistent supply of tea over the year such that it neutralises the seasonality in production.
3. There should be an effort to monitor the movement of tea from auction to final consumer such that huge mark-up that exists now can be tracked.
4. Inter-linkages between production and marketing should be examined in more details to ascertain the nature of collusive behavior at auction which may undermine the process of price determination.
5. Producers should be encouraged to export more such that prices improve at auctions which will benefit relatively small producers.

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