INTERNATIONAL TEA ECONOMY:

AN ECONOMETRIC DESCRIPTION

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This study was initiated when Dr. Martin E. Abel, the-then Programme Advisor in Economics at the Ford Foundation, New Delhi and Mr. Harry E. Wilhelm, the Representative of the Foundation, took an interest in it and offered me a Research Associateship at the Foundation. The project, however, got stalled half-way through when, after my contract-period with the Foundation was over, I took up other assignments elsewhere. It remained shelved for nearly three years, and, would, in all probability, still be sitting there, if Dr. T.N. Srinivasan of the Indian Statistical Institute had not provided fresh motivations for me by reading the untidy first draft and agreeing to supervise the work. Since then, there has been - I must admit - a proliferation of drafts ! But, Dr. Srinivasan was always very generous to me with his time and his comments and criticisms immensely helped me in developing my ideas.

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C O N T E N T S

PROLOGUE

Plan, Conclusions & Limitations of the Study : Some Suggestions for further Research

The essay begins with an exposition of problems of primary product exports from the under-developed countries. Chapter 1 discusses these problems with a historical reference to economic development in eighteenth century 'new' countries drawing a parallel between them and today's agricultural LDC-s and emphasizing the importance of primary exports in transforming economic poverty into prosperity in these LDC-s. Deterioration of terms of trade and stagnation of exports - these two problems generally confront a primary exporting country. Problems of export-stagnation are sought to be analysed here by means of a single-commodity approach and Tea is the commodity chosen for analysis. Two theories are advanced to explain export-stagnation of primary products. The first hypothesis claims that 'slack demand' in importing countries is responsible for stagnation, while the second maintains that 'slack supply' from the producing countries due to various internal obstacles is the root cause.

Chapters 3 through 5 analyse different aspects of international demand for Tea with an emphasis on the determinants of competitive supply of Tea in the world export markets. A detailed analysis of 'quality-variation' and 'blending' suggests that international substitution between teas from different producing regions depends very much on 'quality-characteristics' of these teas and not merely on their market prices. The study deviates in this

respect from the traditional path followed by most other research workers who assume without any qualification that teas from different regional growths are 'perfect substitutes'. Our discussion on 'quality' and 'blending' indicates that international trade in Tea has a strong element of complementarity in it and this needs to be thoroughly examined.

The last Chapter brings the internal demand sector of India under a critical examination and studies the problems and prospects of tea supply from India vis-a-vis Indian domestic demand. A comparative account of the geographical spread of markets of different tea-exporters is included to evaluate, albeit indirectly, the marketing strategies adopted by these tea-exporters. Chapter 2 has made an attempt at a simultaneous estimation of world supply and demand for tea. However, as the disclaimer with the chapter-title suggests, these experiments have not yielded any good results. More research need to be taken up in this field.

A major conclusion that emerges out of the analysis of internal and international factors is that the stagnation in tea exports from India is primarily a result of rapid growth of domestic demand. Price movements in different auction centres of the world show that domestic prices in India have been rising at a much faster rate than the world market prices of tea. With two implications : First, for the Indian exporters, rate of domestic profitability has grown faster than that of exports. Secondly, fall in London auction prices and rise in domestic profitability have resulted in declining despatches of Indian tea to London market by Indian exporters.

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Importers of Indian tea have, therefore, been compelled to buy more tea from Indian domestic auctions than from London auctions. Since, average world prices of teas produced in other regions have risen, if at all, at a much slower rate (Chapter 3) than the prices of Indian teas, prices paid by these importers of Indian tea have risen at a faster rate than the prices paid by them for teas from other sources.

One may be tempted to draw a quick conclusion from this last observation to the effect that the international importers faced with relatively higher prices of Indian teas than the other prices readily shift to buying teas from sources other than India. Teas from different producing countries need to be 'perfectly-substitutable' for that. Such an assumption of perfect substituting does not seem to be logical as discussions in Chapters 3 and 4 indicate. The following comments from an expert may bring this point to a sharper focuss : 'The grades into which tea is sorted in producers' factories are not sold as such to consumers. Retail tea, whether sold loose, or, more usually, in the branded packet, is invariably a blend of different grades derived from a variety of estates, and usually from more than a single country of origin. The blend may contain in various proportions twenty to forty different components.'[1] Process of blend-preparation necessarily brings an element of 'complementarity' in tea trade, and role of prices, especially of 'quality teas', in determining international substitution becomes secondary. High quality teas from different growths have distinctive liquoring and

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[1] Reference (7), p 173, in Appendix I

aromatic characteristics and it is difficult to substitute one high-quality tea from a particular growth by another high quality tea from another. Experiments reported in Chapter 4 reveal that substitution takes place generally between 'medium' quality teas from different regions and there is no evidence of substitution between teas of very high or very low quality teas.

This has a special significance for the future of Indian tea exports to the UK market, which is the biggest tea-consuming country of the world. The UK consumer reportedly consumes the best quality teas. Due to the relatively higher rate of rise in Indian 'quality' tea prices than that of 'other' teas, Blenders' costs of producing high-quality 'Indian blends' have gone relatively up as compared to the production costs of blends made from 'quality' teas from other sources. Chapter 4 suggests that in the UK market this phenomenon might have prompted Blenders and Packers to initiate 'long term action' to substitute 'Indian quality blends' by 'quality blends from other teas' in order to offset the repletion of their profits from sale of Indian blends. This is further substantiated by experiments reported in Chapter 3 showing that 'Auction demand' for Indian 'quality' teas has been declining, while there has been no such trend for Indian 'common' teas. As a short-run palliative to the situation, the UK blenders and packers might have been substituting 'second-quality' of a 'grade' in high-quality Indian blends made from the 'first-quality' of the same 'grade'.

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All these observations open up many new areas of research. First of all, one should be careful to make any generalisation in regard to long-term price-trends of primary products. The trend need not be declining. Quality-disaggregation and price-analysis of different quality-grades of teas show that world prices of Indian quality-teas have not been declining, and this is possibly true of quality teas from other producing countries also. With rising living standards in developing countries, more quality teas will be required for domestic consumption and will restrict the exportable-surplus of such teas further in future, if the present production and trade structures remain unchanged.

Research should be taken up to evaluate the production possibilities of 'quality' and 'common' teas in different producing regions, particularly in India. Existing age-structure of the tea-plantation should be worked out and analysed and its relationship with quality-production should be established. It is known that the 'primary' quality of a 'bush' (Chapter 3) tends to decline after the attainment of a certain age. Determination of the 'Optimum Economic Life' of the tea-bush and evaluation of existing age-structure of Indian tea-plantation in terms of this 'Optimum Economic Life' are two important areas of research. Various figures ranging between 40 to 60 years[2, 3] have been quoted as the 'Optimum Economic Life' of tea-bushes. Significantly, as far back as 1956, the Plantation Inquiry Commission found out that 'as much as 28.79 % of the plants are more than 55 years old, having been planted

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[2] Reference (2), Appendix I

[3] Reference (23), Appendix I

before 1900.

..... The percentage of teas planted before 1900 is highest (sic) in the Darjeeling region amounting to 79.16 %'.[4] The warranted rates of replantation, and extension to maintain an increasing supply of 'quality' teas commensurate with the increase in world demand for such teas are directly related to 'Optimum Economic Life' of the bush and age-distribution of tea plantations. Insufficient knowledge about these two crucial variables may result in erroneous action.

One such example is the case of International Tea Agreements instituted in 1930 and in operation almost continuously since then. 'In 1930 India, Ceylon and the Netherlands East Indies inaugurated a scheme of voluntary restriction of exports, but this lasted for only a year. ..... By 1933 ..... a more comprehensive scheme was started under the auspices of a central organisation, the International Tea Committee. ..... The agreement was planned to operate for five years with provision for renewal for further and similar periods. The second period, originally 1938-43, was extended, owing to war conditions, till 1948. There was an interim agreement covering 1948-50'[5] and another similar agreement operated till mid-fifties. Since then, annual export-quotas were worked out for different producing countries under the auspices of the F.A.O. in consultation with the representatives of these countries.

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[4] Reference (2), p 263, Appendix I

[5] References (7), p 178, Appendix I

Providing strength to the market by restricting exports is the basic objective of these agreements. But, the main weakness of these schemes is their aggregative approach. While, 'common' teas may have been in excess-supply in world market, the same can not be unequivocally asserted about the 'quality' teas. If total world demand (meaning domestic demand in producing countries, particularly in India, plus the international import demand) for 'quality' teas is considered, then demand appears to have out-stripped world supplies.

A strategy to even out this imbalance in regional demand and supply of teas may be importation of tea into India from regions of excess production. Although India is the largest tea-producing country of the world, such an import-policy need not be an economically infeasible alternative to the policy of acreage-extension to raise production which has been suggested by most research workers.[6]

Acreage-expansion in India will raise, in the long run, production of quality-teas in India. But, it will also increase the output of 'common' teas, the supply of which in the world market seems to be in excess of demand, unlike the 'quality' teas. Therefore, instead of providing strength to export market, such policy of production increase to keep in tune with the rise in domestic demand only may ultimately hamper India's interest as an exporter. Restriction of supply of 'common' teas to the world market simultaneously raising their supplies to Indian domestic market suggests itself to be an urgent short-run need of the International Tea Economy and India can

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[6] References (11), (18), (20), (21), Appendix I

do this by adopting an open-door policy in regard to tea-imports. A detailed analysis of economic costs and benefits of such an action needs to be undertaken and may suggest that a CustomsUnion type of arrangement in regard to tea-imports between India and Sri Lanka is the best economic option for them. At least in the short-run.

Speaking of Sri Lanka and India, emergence of East Africa as a world supplier of tea comes to mind. International Tea Agreement seems to have provided direct incentives for growth of plantation in this region, at least initially, by indirectly restricting production in the other regions through export-quotas. Not all the producing countries were signatories to the International Tea Agreement. Notably, East Africa was out of these agreements in the initial years, and during the period between 1938 and 1955, 'in East Africa the acreage increased by roughly 85 per cent (and) the contracting countries registered a decrease by about 16 per cent'.[7] This trend, when compared with the changing ownerships pattern in India (and also in Sri Lanka), provides a clue to a probable long-term strategy of the international operators in Tea-industry and trade which may have been in action for a considerable period of time. British interests in tea-estates have been declining[8] in India and Sri Lanka. It is possible that substitution of these two countries' teas by the African teas in the UK, the world's biggest tea consumer, serves the vested-interest groups well. However, this study is too limited in scope and content to provide any evidence to substantiate any such conjectures

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[7] Reference (11), p 76, Appendix I

[8] References (2), (21), Appendix I

and an in-depth study of the structural changes in world-wide ownership-pattern of tea-plantations is called for to examine such hypotheses.

Chapter 5 studies the world demand sector of tea. Total Imports from all sources into the major importing countries are analysed. This is done, because, for an importing country total imports, and not tea imported from a particular producer, are relevant to determine its potential and existing demand. Exports of a particular producer's tea depend on many factors and import demand function for a particular producer's tea for an importing country needs to be estimated with due emphasis on quality and associated problems of complementarity and substitution. The usual approach on the assumption of perfect substitution does not give reliable results. In this sphere, there is another important aspect where very little work has so far been done. This is related to the effects of promotional campaigns on tea consumption.[9] Research in this area should be intensified and results of such inquiries should be fully exploited.

Analysis in Chapter 5 suggests that Tea consumption in the world has been, and is, increasing, and growth-potentials exist in many countries. However, India's position in the world tea map appears to be weak in terms of its potential for future growth (Chapter 6), although it is the biggest world-supplier of tea. Drastic measures to change the structure of competition and co-operation in international arena is called for and unless dynamic actions instituted to bring in desired changes, only unilateral production increase may not solve the problems.

CHAPTER 1

Problems of Primary Product Exports from The Underdeveloped Countries

1.1 International Trade and Economic Development :

1.1.1 The Nineteenth Century Experience :

In the process of many nations' emancipation from economic poverty in the last century, international trade played a very vital role. So much so that when, in more recent years, a series of serious intellectural probes has been undertaken by experts to analyse and understand the economic causes of these historical developments, it has been opined that trade acted as " an 'Engine for Growth' in the 19th century"[1] to transform poverty into prosperity.

The need for commercial links between nations became acute in the last century with the progress of 'Industrial Revolution' which necessitated exploitation of primary production in the underdeveloped world, richly endowed with raw resources, by the newly-industrialised nations, characterised, in general, by a paucity of these primary materials. As a result, a regular two-way trade flow between the industrial " centre " and the agricultural " periphery " opened up[2] and started bringing economic benefits — though in varying degrees — to both these regions.[3] The industrialised nations owed a great deal

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[1] Ragnar Nurkse : Patterns of Trade and Development (Basil Blackwell, 1961) pp 14-15.

[2] Ragnar Nurkse , op. cit., p 10.

[3] P.A. Samuelson : Economics (McGraw Hill Book Company, N.Y., 1970) p. 637
" Nineteenth century foreign lending was twice blessed ; it blessed him who gave and him who received".

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for their sustenance and furtherance of growth to the smooth supplies of foodstuffs and industrial raw materials from the backward countries. On the other hand, the non-industrialised 'peripheral' countries, in return to their primary supplies, were able to import a part of the economic growth of their developed counterparts through the shipment of capital and industrial skill[4] from the latter. Production-possibility-frontiers of both the regions, thus, swelled upwards and this phenomenon was so spectacular that one of the most acclaimed economist of the by-gone era went so far as to say that " The opening of foreign trade ..... sometimes works as a sort of industrial revolution in a country whose resources are previously underdeveloped."[5]

The notion of transmission of growth and associated distribution of wealth through international trade has a prominant place in the neo-classical theories of international trade also. The famous Heckshor-Ohlin theory on factor price equalization in essence says what J.S. Mill declared in the heydays of classical economics : " ..... according to the factor-price equalization theorem, high income in one area should spread through trade in others. The rise in per capita incomes as factor prices tend to be equalised should eventually permit poor areas to accumulate capital. In addition, if the wealthy countries invest directly abroad, the spread of high incomes should be even more rapid. The Heckshor-Ohlin theory thus indicate that under

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4 G.M. Meir : International Trade and Development (Harper and Row, New York, Evanston and London, 1963) pp 159-160.

5 J.S. Mill : Principles of Political Economy, Book III, Exchange : Chapter XVII on International Trade (The University of Toronto Press, Routledge and Kegan Paul, 1965) pp 592-3.

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free trade economic development should spread evenly over the entire inhabited globe.[6]"

1.1.2 The Twentieth Century Perspective :

Economists these days are not so sure regarding the role of trade to develop the backward regions of Asia, Africa, and Latin America. Some of them still look upon trade as an " Engine for Growth" and maintain that the developing nations will be able to improve their lot through trading; but, others are not so optimistic.[7] Basically, the debate stems from some long-standing theoretical doubts[8] in regard to the relevance of the " classical theory " of international trade when applied to the economic and trade structures of the present day under-developed countries vis-a-vis the conflicting assumptions made in the growth theory and the trade theory.[9]

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6 W.P. Trevis : Theory of Trade and Protection (Harvard University Press, Cambridge, Mass. 1964) pp. 242.

7 B. Soderston : International Economics (Harper & Row, N.Y., 1970) p. 5.
" It is still frequently argued that trade is detrimental to countries, today especially in connection with less-developed countries."

8 H. Myint : 'The " Classical Theory " of International Trade and the Underdeveloped countries' in 'Readings in International Economics' ed by R.E. Caves and H.G. Johnson (George Allen and Unwin, London, 1968) pp. 318-338.

9 H.B. Chenary : Comparative Advantage and Development Policy, in 'Surveys of Economy Theory' Volume II (MacMillan, 1969) pp. 125-55.

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Jacob Viner,[10] Gunner Myrdal[11] and Raul Probisch[12] wrote extensively to resolve the issues raised in the debate, but apparently brought more controversies in it. The debate still continues.[13]

Pessimists argue that time has changed and with it also the structure and complex of world trade. The 'Laissez Faire' principles operate no more. This, coupled with the developed nations' greater leverage to influence the course of world trade due to their larger

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[10] J. Viner : International Trade and Economic Development (Oxford, 1953).

[11] G. Myrdal : An International Economy (Harper and Row, New York, 1963).

[12] R. Probisch : Commercial Policy in the Underdeveloped countries (American Economic Review, Papers and Proceedings, Vol 49, No 2, May, 1959).

[13] Literature on Economic development and international trade is vast. Among many notable contributions the followings may be mentioned ;

a H.G. Johnson : Money, Trade and Economic Growth, Chapter IV : Economic Development and International Trade (George Allen and Unwin, London, 1962) pp. 75-103.

b J. Bhagawati : Trade, Tariff and Growth : Part Four : Growth and Less Developed Countries (Weidenfeld and Nicolson London 1969) p. 307-61.

c T.N. Srinivasan : Foreign Trade and Economic Development (Cowles Foundation Paper No.265, Cowles Foundation for Research in Economics at Yale University, New Haven, Connecticut, 1968).

d P.K. Bardhan : Economic Growth, Development and Foreign Trade - A Study in Pure Theory (John Wiley & Sons, Inc, 1970).

e R. Findlay : The 'Foreign Exchange Gap' and Growth in Developing Economies in Jagdish N. Bhagwati (ed) : Trade, Balance of Payments and Growth (North-Holland Publishing Company, Amsterdam, London, 1971).

participation in it,[14] makes the attainment of international equilibrium (in the sense of closing the consumption-gap between the rich and the

[14] UNCTAD : Review of International Trade and Development, 1969 (U.N., New York, 1969) pp. 3-4 .

Share of Major Areas in World Trade, Selected Years

Area	% Share in World Trade				Increment 1967-1968	
	1960	1966	1967	1968	Million of dollars	% of increment
World[a]	100.0	100.0	100.0	100.0	23,860	100.0
Developed market-economy countries	66.8	69.5	69.6	70.4	18,500	77.5
Developing countries	21.3	19.0	18.7	18.2	3,200	13.4
Socialist countries	11.9	11.5	11.7	11.4	2,160	9.1

Source : United Nations Monthly Bulletin of Statistics, May and June 1969.

[a] Excluding the trade of China (Mainland), North Korea, and North Vietnam with one another.

poor nations) impossible.[15] Furthermore, nineteenth-century developing nations were structurally different from their counterparts today in Asia, Africa and Latin America. A sparse population endowed with almost unlimited supplies of land and raw materials characterised the nineteenth-century 'new' countries, while, in contrast, developing nations today are plagued with the problem of feeding an almost unlimited stock of labour with very limited resources.[16] Effectiveness of trade as an 'Engine for Growth' is, therefore, being seriously

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[15] Richard T. Gill : Economic Development - Past And Present (Prentice-Hall of India, 1970) p. 3 :

'A century and a half ago the economically advanced countries of Europe and North America produced, on a per capita basis, perhaps two or three times as much output as the less favoured regions of Asia, Africa and Latin America. Now the gap is ten, fifteen, or even twenty times. In one area of the world, a vastly productive urban, industrial, and technologically oriented society has emerged. In the other, the ageless primitive ways of the peasant often still endure. Rapid modern development has created the " affluent society " in the West and, in the same sweep, has brought about an enormous and increasing gap between the living standards of the rich nations and the poor'.

[16] P.B. Kenen : International Economics (Prentice-Hall Inc. Englewood Cliffs, New Jersey) p. 95-97

questioned today.[17, 18, 19]

Inspite of all such arguments, however, it is generally agreed that international trade promotes growth, and growth ——— even if

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[17] Bela Balassa : Trade Prospects for Developing Countries (Richard D. Irwin, Homewood, Illinois, 1964) p. 19 :

'In recent years, doubts have been expressed concerning the adequacy of transmission of economic growth from industrialised countries to less developed areas. Whereas, in the absence of agricultural protection and adequate domestic supplies of raw materials, Britain's economic growth was transmitted to her suppliers of food and raw materials during the nineteenth century, it is alleged that the transmission mechanism does not operate satisfactorily in our time. Various arguments have been marshalled to establish this proposition : the low elasticity of demand for foodstuff, agricultural protection in the industrial countries, the increased share of services in the consumer's budget, the shift towards less material intensive products in manufacturing, the substitution of synthetics for natural materials, and the reduction of input requirements in industrial countries'.

[18] R. Nurkse : The conflict between 'Balanced Growth' and 'International Specialisation' in G. Haberler and R.M. Stern (eds): Equilibrium and Growth in World Economy - Economic Essays by R. Nurkse (Harvard University Press, Cambridge, Mass, 1962) p. 246.

'It is no longer so certain that the less developed countries can rely on economic growth induced from the outside through an expansion of world demand for their exports of primary commodities. In these circumstances reliance on induced expansion through international trade can not provide a solution to problems of economic development'.

[19] R. Nurkse : Dynamic Aspects of Trade Theory - Appendix to 'International Economy and Problems of Growth' in G. Haberler and R.M. Stern (eds) : op. cit, p.326 :

' ..... the origin of growth transmission from advanced to less developed countries is ..... less powerful than once it was.'

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'unbalanced' and 'unsteady' ———— is preferable to stagnation and welcome to any developing country.[20, 21] (We obviously exclude the case of 'immiserizing growth' as visualized by Bhagwati[22] from our sphere of possibilities.)

Growth or no-growth, foreign trade is important to the developing nations for many reasons.[23] For most of these countries, 'the importance of foreign trade for economic development stems from the fact that .... export production and trade constitute a preponderant part of their total economic activity'.[24, 25] Such a hypothesis is, of course, untenable for a country like India where the total foreign trade fluctuates around 5 per cent of the national income[26,27] and obviously does not form a 'prepoderant part' of the total economic

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[20] R. Nurkse : op. cit. p. 244

[21] G.M. Meier : op. cit. Chapter 7

[22] J. Bhagwati : Immiserizing Growth : A Geometrical Note (Review of Economic Studies : Vol XXV, No 3, June 1968) pp. 201-5

[23] H.W. Singer : The Distribution of Gain between Investing and Borrowing countries in R.E. Caves & H.G. Johnson (eds): Readings in International Economics (George Allen & Unwin Ltd, London, 1968) p. 306

[24] U.N. : World Economic Survey, 1962, Chapter 1.

[25] A.I. Macbean : Export Instability and Economic Development (George Allen and Unwin, London, 1966) pp 23-33.

[26] V.K.R.V. Rao : Indian Exports During Three Plan Periods - Retrospect and Prospects (Foreign Trade Review, Vol I, No 1, 1966).

[27] W.B. Reddaway : The Development of Indian Economy (George Allen and Unwin, London, 1962) p. 26.

activity of the country. But, as pointed out by R.I. Mackinon[28] and some others,[29, 30, 31] international trade is essential for a country like India as along as she remains incapable to domestically produce the machine-making machines required for building and reinforcing her industrial infrastructure to achieve adequate momentum for take-off into self-sustained growth. Exchange-earning through exports is a way out to the problem of financing capital imports. A growing foreign trade is, therefore, vital for such economies.

1.1.3 *The Recent Trends : Dilemma of the Developing Nations :*

Recent trends on this score in the developing countries of the world are, however, not encouraging. No doubt, external trade — both in value and volume — had grown to a significant extent over the past two decades in the developed as well as in the developing economies, but the growth rate of trade in the advanced nations had always been much higher than that in the other group.[32] The share of

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28 R.I. Mackinon : Foreign Exchange Constraint in Economic Development and Efficient Aid allocation (Research Centre in Economic Growth, Deptt. of Economics, Stanford University 1964, Reprint No 31)

29 W.B. Reddaway : Op. cit. pp 26-33.

30 H.W. Singer : Op. cit.

31 M.M. Singh : Trade Policies and Economics Development in E.A.G. Robinson & Michael Kidron (eds) : Economic Development in South Asia (Macmillan, 1970) pp 455-75.

32 B. Soderston : Op. cit. p. 129

'..... since World War II, the growth has been rapid - during the 20 years since 1945, 7 to 8 per cent per annum.'

'This development, however, has been quite lopsided. It is primarily exports from the industrial, developed countries have expanded. Exports from the less-developed countries have grown at a relatively modest rate.'

the backward nations in the world trade had been constantly dwindling over the past few decades — and markedly during the post-war years.[33,34,35] Moreover, the developing nations had, all these years, been suffering from a chronic adverse balance of payments, as a consequence to over-valued exchange rates, in general, and a host of other reasons like increasing imports as a corollary to domestic inflation which is a perpetual problem of the developing nations aspiring to fall in line with the developed ones in the race for going ahead and going fast. This lop-sided trade pattern pushed these poor nations amidst an onward but unavoidable crisis wherein they always found themselves there-

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[33] Martin E. Abel, et. al. : Projections of India's Exports in the 1970's (The Ford Foundation, New Delhi, 1970) p. 7 :

'The share of the Industrial Area of the World in total trade increased from 63.7 % in 1960 to 67.7 % in 1968, while the share of the Developing Area decreased from 21.5 % in 1960 to 18.2 % in 1968 .....'

'The salient feature of world trade in the first half of 1960's was the high rate of growth of trade among the industrial countries which averaged 9.2 % between 1960-65 as against 6.7 % between 1955-60'.

[34] U.N. : Economic Survey of Asia and Far East (1966), p. 137 :

'The ECAFE regions' total exports expanded faster in the first half of the 1960's than in the second half of 1950's, but this favourable trend is mainly attributed to rapid trade expansion of the developed ECAFE countries. The developing ECAFE countries lagged far behind. The annual rate of growth in exports for the developing ECAFE countries during 1960-65 was 4.7 % as against 12 % for the developed countries in the region.'

[35] U.N. : The World Economic Survey (1962) Chapter 1 :

'In the Nineteen Fifties, the volume of exports from the less developed countries rose at an annual rate of 3.6 % per annum as against a rate of growth in exports from the developed private enterprise economies not far short of twice as large and as an expansion in the export volume of the centrally planned economies almost three times as large.'

of funds to finance the imports of capital goods so necessary to build an industrial base to base their further developments on.[36] In a nutshell, the developed countries performance in the external trade front has always been far from satisfactory[37] over the last two decades.

1.2 The Problem

1.2.1 The Plight of the Primary Product Exporters :

It is in this background the problems and prospects of primary product exports from the developing countries assume importance. The major bulk of exports from the developing countries consists of agro-based commodities or mineral resources and these exports face a host of problems in to-day's world of tariffs and trade restrictions. Those problems can be grouped into two broad categories : (a) Problems regarding terms of trade and (b) Problems related to the international demand and internal supply constraints.

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[36] Proceedings of the UNCTAD, 1964 (Volume III) Commodity Trade: p. 3

'In few years since the second world war have the developing countries as a group earned sufficient foreign exchange from their exports to finance their merchandise imports. Their combined deficit on merchandise account has, on the contrary, tended to increase, notwithstanding the widespread imposition of various forms of import control.'

[37] An excellent exposition of the problem is found in

(a) R. Nurkse : Contrasting Trends in Nineteenth and Twentieth Century World Trade in G. Haberler and R.M. Stern (eds) : op. cit., pp 292-304 (specifically pp 290-299).

(b) B. Soderston : Economic Growth and International Trade During the Nineteenth and Twentieth Centuries (op. cit., Chapter 8), pp 113-135 (especially 129-135).

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Many men tried their hands on these problems in attempts to suggest remedial measures[38-45] and most of them, barring a few exceptions, reached similar conclusions that prospects of growth through primary exports look rather dim and that the developing nations may be fighting a losing battle in this sector.

1.2.2 The Causal Factors :

A number of economic hypotheses has been put forward to analyse the causes of primary export-stagnation and to quantify the relative effects of internal and external factors affecting such trade.

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38 A.I. Macbean : Export Instability and Economic Development (University of Glasgow, Social and Economic Studies, George Allen and Unwin, 1966).

See especially Chapter V on 'Economic Growth', pp 108-127.

39 S.C. Nandwani : Trade Dilemma of Developing Countries (Cosmopolitan Publishing House, New Delhi, 1969).

40 S. Venu : The Developing Economies and the International Framework (Orient Longman Ltd., New Delhi, 1971).

41 Lila T. Patil : The Evolution and Growth Patterns of International Trade (World Press, Calcutta 1970).

42 Kravis I.B. : External Demand and Internal Supply Factors in LDC Export Performance (Washington DC 1969).

43 John Pincus : Trade, Aid and Development : The Rich and Poor Nations (McGraw-Hill, New York, 1967)

44 UNCTAD : Special Problems in World Trade and Development (Second Session, New Delhi, Volume V, New York, 1968).

45 (a) F.A.O.: Agricultural Commodities - Projections for 1975 and 1985, Vol I (F.A.O., Rome 1967).

(b) F.A.O.: Tea - Trends & Prospects (Monthly Bulletin of Agricultural Economics & Statistics, Vol 14, No 5, May 1965).

(c) F.A.O.: Tea - The Longer Term Outlook for Production (Monthly Bulletin of Agricultural Economics & Statistics, Vol 18, No 4, April 1969).

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There are two main schools of thought in this area : The first school argues that 'slack' demand for primary products in the industrial countries is the root cause for this sluggishness.[46,47,48] But the second school rejects this hypothesis of 'slack demand' being the sine qua non for slow export growth, and claims[49, 50] that it is the 'slack supply' from the exporting regions which causes the phenomenon of stagnation. The slack supply is a direct consequence of the attempts at rapid industrialisation of these agricultural countries and associated rising demand for such raw materials arising out of this process of industrialisation inside the country. This slack supply situation has generally been exacerbated by the faulty policies pursued by governments in these countries. Anne Krueger[51] writes : ' ..... the past behaviour of Indian exports can be more than adequately explained by the policies of the Government of India and the Planning Commission combined with the internal demand and supply factors within India.' P.T. Bauer looks at

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46 Patel, S.J. : Export Prospects and Economic Growth – India (Economic Journal, September 1959) pp 490-506.

47 Kuriso, R : Patterns of Trade and Development in Haberler G. & Ston R. M. (eds) : Op. cit, p 298.

48 Maizels, A : The effects of industrialisation on exports of primary producing countries (Kyklos, XIV, Fasc 1, 1961) and Reply (Kyklos, XV, Fasc 2, 1962).

49 Cairncross, A.K. : International Trade and Economic Development (Kyklos, XIII, Fasc 4, 1960).

50 GATT : Trends in International Trade - A Report by a Panel of Experts (Geneva 1955).

51 A. Krueger : Comment on Patel's Article (Economic Journal, June 61).

the problem from a different angle he read. Krueger's conclusion that Indian policies coupled with the other internal factors were mainly responsible for slow growth of primary exports from India. He observes : 'Indian exports which are largely or wholly standardized products, are only part of world exports of those commodities, and, of course, even smaller part of total supply. Hence, if world consumption of these commodities had remained constant, or even declined, it would be invalid to conclude that the market for Indian exports is saturated'.[52] It can be pointed out that Bauer's hypothesis of insignificant market participation by India does not stand to empirical test in case of commodities like Jute manufactures (yarn and textiles), Tea and Cashew Kernel. India once onjoyed a near-complete monopoly in world supply markets of these commodities and still commands substantial shares of these markets. Nonetheless, the thesis concerning the inadequacy of Indian official policy[53] to supplement the sagging strength of primary export front of the country is likely to have more than a grain of truth in it. This debate about the causes of stagnation of primary product exports from the developing nations assumed a special significance during the decades of fifties and sixties when many of these countries launched programmes of planned developments in order to industrialise their predominantly agro-based production sectors.

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[52] P.T. Bauer : Comment on Patel's Article (Economic Journal, June 61).

[53] See also R. Nurkse : Patterns of Trade and Development, pp 298.

'It can not be denied that domestic policies causing limitations on the supply side in producing countries have also been effective in certain cases.'

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A rich crop of research[54,55,56,57,58] was harvested in a short span of time and many commendable contributions were made. But the issues are not closed yet, and another empirical investigation in this direction may not be unwelcome.

1.2.3 An Approach to the Problem :

Export-stagnation of primary products has been caused by two sets of factors, one being 'internal' to the exporter-economy and the other 'external' to it. It is a combination of these two sets of causal factors - that creates the phenomenon of slackness in export growth. To elaborate the idea, let us cite a simple example. Consider the import demand for 'Tea' by the United Kingdom. It is possible that the tea of supplier 'A' is more in demand in the United Kingdom than the tea of supplier 'B'. There may be many reasons for this. Quality of A's tea may be a factor. Better marketing techniques adopted by 'A' may be another. A dislike for B's tea for 'other' reasons by the

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54 Patel, S.J. : Rejoinder to Comments (Economic Journal, No 71, June 1961) pp 446-49.

55 Cohen B.I. : A Comment on S.J. Patel's Analysis of Indian Exports (Indian Economic Journal, II : July-September 1963) pp. 37-46.

56 Patel, S.J. : Rejoinder to 'A Comment on S.J. Patel's Analysis of Exports, Indian Economic Journal II, Jan-March, 1964), pp. 377-80.

57 Cohen, B.I. : The Stagnation of Indian Exports, 1951-61, (Quarterly Journal of Economics, 78, November 1964), pp. 604-20.

58 Sing, M.K. : India's Export Trends and the Prospects for Self-sustained Growth (Clarendon Press, Oxford 1964).

consumers in the United Kingdom may be the third factor to contribute to the slackness, while a cartel-type arrangement between the producers in 'A' and the importers of the United Kingdom can not be ruled out. The familiar bug of price competition is already there.

There is another set of factors that may have a significant say in the export growth of a commodity. It is possible that a country's export supply potential is severely limited due to the presence of a large and relatively-unsaturated domestic demand sector, which, with its rising requirements, raises the home market profitability. An exporter faced with the alternative of easy profit at home and the tiresome procedural steps for initiating exports may choose the former. Exporter attitude might become apathetic or indifferent towards exports owing to the high and/or increasing profitability of the home market. This may further discourage the exporter to take the trouble of seeking 'new' markets abroad and, in turn, lose the opportunity of sharing the otherwise-expanding world market which may be successfully encroached upon by the 'new entrants' or the existing rivals. A study of the production possibilities of a producer vis-a-vis the home market demand along with an evaluation of the existing 'marketing' strategies adopted by the exporter and any 'lapses' therein is necessary to form any idea of a country's export-supply potentials. This is attempted in this essay through an analysis of the international trade in one important primary commodity.

The single commodity approach is adopted for many reasons. First, the structure and pattern of export-import trade in any commodity differ from the other in many important aspects. No two commodity

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markets, despite their basic similarities, are alike in all respects. A global approach invariably misses those individual peculiarities which may be important from the stand point of policy formulation. Second, every commodity differs from the others in its mode of consumption pattern in the importing as well as the exporting country. An industrial raw material imported from a [illegible] and an agricultural product exported from [illegible] are expected to confront problems, both at home and abroad, peculiar to themselves and irrelevant to the others. Third, the behaviour-patterns and tastes for different commodities are likely to follow different growthpaths when undergoing changes. A commodity-wise study is, therefore, likely to be of more use to the policy-makers to understand the basic structural set-up and to adopt a realistic attitude towards its improvement. Moreover, the thorough knowledge and understanding of a single commodity market might enlighten one of the working of the other commodity markets also, as, basically, all of them, inspite of their individual idiosyncrasies, are similar in their over-all working designs.

1.2.4 The Commodity :

Tea is the commodity chosen for analysis. This is for many reasons :

1. Tea is a primary product, exported mainly by some developing countries.

2. Tea is an important exchange-earner for India.

3. Indian export trade in Tea embodies all the characteristic features of stagnation. Over the past two decades Indian exports have, in volume, remained more or less constant, while, on the contrary, the total world exports of Tea, over the same years, have increased in volume. This suggests, inter alia, a possibility of Indian marketing or policy failures.

4. World tea market is an oligopolistic one from the supply point of view, with India being a major supplier. Sri Lanka is another major exporter, while Africa is a small but growing exporter, having promise to become a major one in future.

India once held a near-monopoly in world Tea trade. But, gradually, over the last two or three decades, it lost its grip over the market and Sri Lanka outwitted India to fill in the gap. This gradual elimination of India from its pride of place might, at first sight, seem to be a direct consequence of the faulty policies pursued by her exporters and the government. A second look, however, might reveal more. Indian loss in exports might have been prompted by the pressure of domestic demand which raised the home-sale profitability, and discouraged exporters to push Tea in higher proportions to export than to the domestic markets resulting in a rise of Indian export prices. The consequent international price competition with Sri Lanka and Africa might have projected India as an inefficient exporter in the eyes of the importers of tea in the world market.

The apparent anomaly of the situation featuring Indian loss and Sri Lanka's and African gain, in volume terms casts doubts as to

whether the slack world demand, even if existing, is 'the' decisive factor hindering export growth of a commodity like tea. After all, with the present rate of population growth, Tea consumption in the world is bound to rise even if the demand elasticities show no outright improvement.

5. There is another reason to choose Tea for such a study. Tea is a primary commodity, but it is not an essential raw material for industry. So, some researchers[59,60] contention that due to rapid rise in industrialisation in the developing nations supply potential is severely curtailed does not apply to this commodity. The only source of home demand is that of direct consumption. And if home demand is found not to be a binding constraint over export growth a deeper look into the existing policies is needed.

6. Tea is a consumption item and tea-drinking is largely habit-governed. In some of the high income developed nations, tea-drinking may have come to a saturated level. In most of these countries, price is likely to be an unimportant variable in causing variations in Tea sales, while income elasticities may not be high. Therefore, these industrialised countries, generally characterised by a slow rate of population growth, may not hold much promise for

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After 1970, India, however, regained its place as the biggest exporter out-selling Sri Lanka. In this case also, the same doubt regarding the alleged slack world demand remains as India and Sri Lanka together increased their total sales.

GATT : Op. cit.

A.K. Cairncross : Op. cit.

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significant import-rise in near or distant future. The developing nations, on the other hand, are usually marked with a high rate of growth of population. Prices are likely to be important determinants for consumption and in most of these countries, due to significant rises in money income, generated by the plan outlays and the associated income-redistribution, income elasticities of demand may touch a new height, atleast in the long run. It is, therefore, likely that the potential 'future' import markets for Tea are the low-income developing countries,[61] and not the high-income developed countries. India, like the famous one-eyed deer, might have always directed all her export efforts in the already-saturated high-income countries, neglecting the potential 'new' markets.

7. Last, but not the least, Sri Lanka, India's prime competitor in the world tea market, happens to be situated in the same region of the globe as India. Obviously, Sri Lanka does not enjoy any 'locational' advantage over India. A comparison between these two rivals, therefore, does not need to take into account the necessary but bothersome details regarding shipment cost and such other items.[62]

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[61] FAO : Agricultural Commodities - Projections for 1975 and 1985, Vol I (UN, Rome, 1967) pp 24-25

[62] Roy Harrod and D.C. Hague (eds) : International Trade Theory in A Developing World (London, Macmillan & Co, 1964)

The importance of taking transport costs into account in any analysis - either in theory or in practice - of any international trade problem is repeatedly exphasized by experts in this field. In the " Summary Record of the Debate " in this book (pp. 393-405) by D.C. Hague this issue has been brought under direct scrutiny.

CHAPTER 2

Simultaneous Estimation of Demand and Supply of Tea – An Abortive Empirical Experiment

2.1 The Theoretical Set-up

2.1.1 Exporters and Importers of Tea :

The model woven around the Marshallian definition of long term equilibrium of supply and demand is a simple one with two supply and two demand sectors. India and Sri Lanka together supply around 80 per cent of total world exports, and, as, all other suppliers are excluded from the model for the sake of simplicity. Advantages of considering only India and Sri Lanka as exporters are manifold. First, there is no appreciable inflow of tea into any of them from a third source. Second, transaction of tea between these two producers is negligible. And, third, none have any special locational advantage. Cumbersome details of transportation and shipping problems, and freight and insurance charges can, therefore, be kept out of the model.

Demand side is divided into two broad groups : (1) The United Kingdom and (2) The Rest of the World (RW). Imports of tea into these two groups of countries from the above two sources only are considered. The world tea economy depicted in the model is, therefore, a part of the whole. However, this is the major part. One can visualize the economy as follows :

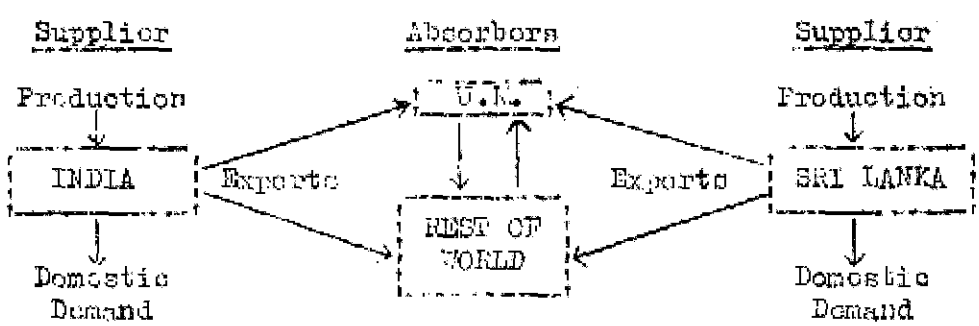

figure 1

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Re-exports from the U.K. to the Rest of the World and vice-versa have been ignored. It may be noted that re-exports of India and Sri Lanka teas from the U.K. to the Rest of the World constitute a small part of the total and a substantial part of the re-exports of tea from the Rest of the world into the U.K. is probably of Indonesian origin[1] which is excluded from the model as a supplier of tea to the world market.

2.1.2 Functional Relationships and the Variables :

The model consists of two production functions, two consumption demand functions and two export-supply functions in the domestic sector of the two suppliers. In the importing sector, there are in all four import demand functions, two each for the two importing regions from the two exporters. Apart from these demand and supply equations, there are six identities explaining definitional equalities.

The 'endogenous' variables of the model are the following :

1, 2)	Q_t^{in} ; Q_t^{sl}	=	Output of (India; Sri Lanka), year t.
3, 4)	C_t^{in} ; C_t^{sl}	=	Consumption in (India; Sri Lanka), year t.
5, 6)	X_t^{in} ; X_t^{sl}	=	Total Exports Supply from (India; Sri Lanka), year t.
7, 8)	$P_t^{h(in)}$; $P_t^{h(sl)}$	=	Domestic Price in (India; Sri Lanka), year t.
9, 10)	$P_t^{e(in)}$; $P_t^{e(sl)}$	=	Export Price in (India; Sri Lanka), year t.
11, 12)	$P_t^{ecf(in)}$; $P_t^{ecf(sl)}$	=	Ratio of Export Price of Tea of (India; Sri Lanka) to World Price of Coffee, year t.

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[1] Annual Bulletin of Statistics (International Tea Committee, London) 1969, p 32.

That is

$p_t^{ocf} = \frac{p_t^{cf}}{p_t^{wi}}$, where

p_t^{cf} = World Price of Coffee, year t .

(13, 14) $M_t^{uk(in)}$; $M_t^{uk(sl)}$ = U.K. Imports from (India; Sri Lanka), year t.

(15, 16) $M_t^{rw(in)}$; $M_t^{rw(sl)}$ = Imports of the Rest of the World from (India; Sri Lanka), year t.

There are, in all, 16 'endogenous' variables in the model.

There are 13 'exogenous' variables in the model :

(1, 2) Y_t^{in} ; Y_t^{sl} = National Income of (India; Sri Lanka), year t.

(3, 4) Y_t^{uk} ; Y_t^{rw} = National Income of (U.K.; Rest of the World), year t.

(5,6,7) L_t^{in}; L_t^{sl}; L_t^{uk} = Cost of Living Indexes of (India; Sri Lanka; U.K.) year t.

(8, 9) R_t^{in} ; R_t^{sl} = Rainfall in (India; Sri Lanka), year t.

(10, 11) $D_t^{e(in)}$; $D_t^{e(sl)}$ = Export Duties on Tea in (India; Sri Lanka), year t.

(12) T = Time Trend.

(13) K = Constant Term.

2.1.3 The Structural Set-up :

The structural equations of the model are the followings :

A) Production Functions :

1) $Q_t^{in} = K_1^{in} + a_1^{in} T_t + b_1^{in} P_t^{in} + c_1^{in} P_t^{h(in)} + d_1^{in} P_t^{c(in)} + e_1^{in} L_t^{in}$

2) $Q_t^{sl} = K_1^{sl} + a_1^{sl} T_t + b_1^{sl} P_t^{sl} + c_1^{sl} P_t^{h(sl)} + d_1^{sl} P_t^{c(sl)} + e_1^{sl} L_t^{sl}$

Equations (1) and (2) should satisfy the following conditions:

i $b_1 , c_1 \quad \gtrless \quad 0$

ii $b_1 , c_1 , d_1 \lesseqgtr 0$ and

iii $e_1 \quad > \quad 0$

Condition (iii) is not obvious. The underlying, and clearly debatable, assumption here is that in a developing country like India or Sri Lanka, where Tea is more like a substitute 'food' for the poor, with the rise in living costs, they take to Tea more and more creating an upward demand pressure. This leads to production of more tea in the short run. 'Intensive plucking' is one such method of increasing production of 'common' i.e. low-quality tea in the short run.

The production functions do not include any variables depicting Capital or Labour employed. One could explicitly use Area under Tea, and labour employed in all Tea estates in these two countries. However, a careful scrutiny of data reveals that Area under tea in these two countries are expanding over the last few decades by a near-constant rate and it is envisaged that Time trend would capture the effect of such area increase. Labour employed in tea estates in India

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has remained almost constant over last few decades, with a slight decline over the recent years. An examination of the data indicates that production-fluctuations in India and Sri Lanka are related primarily to the variations in climatic factors and to the 'induced' changes in the 'plucking intensity'. The last-named effect is assumed to be initiated by the short-run price changes and, since the 'time lag' between the change in prices and the 'induced' change in 'plucking intensity' is not likely to exceed more than a few weeks, the same - period prices have been included in the production function to capture the effects on output of such variations in 'plucking intensity'. However, inclusion of the prices - domestic and exports - is likely to import the problem of multi-collinearity to the data as these two price series are high correlated.

B) Domestic Demand Functions :

3) $C_t^{in} = K_2^{in} + a_2^{in} Q_t + b_2^{in} P_t^{h(in)} + c_2^{in} Y_t^{in} + d_2^{in} L_t^{in}$

4) $C_t^{sl} = K_2^{sl} + a_2^{sl} Q_t + b_2^{sl'} P_t^{h(sl)} + c_2^{sl} Y_t^{sl} + d_2^{sl} L_t^{sl}$

The following conditions on the parameters should hold :

i $K_2 , a_2 , c_2 \geq 0$

ii $b_2 < 0$, and

iii $d_2 > 0$.

The rationale for d_2 being positive is, again, the same as explained in the foregoing paragraphs.

C) Export Supply Functions :

5) $X_t^{in} = K_3^{in} + a_3^{in} T_t + b_3^{in} p_t^{c(in)} + c_3^{in} p_t^{c(in)} + d_3^{in} p_t^{c(in)} + e_3^{in} L_t^{in}$

6) $X_t^{sl} = K_3^{sl} + a_3^{sl} T_t + b_3^{sl} p_t^{c(sl)} + c_3^{sl} p_t^{c(sl)} + d_3^{sl} p_t^{c(sl)} + e_3^{sl} L_t^{sl}$

where the parameters satisfy the following constraints :

i K_3 , a_3 , $\gtrless$ 0

ii b_3 , c_3 , e_3^+ $<$ 0

iii d_3 $>$ 0

D) Import Demand Functions :

7) $M_t^{uk(in)} = K_4^{in} + a_4^{in} T_t + b_4^{in} p_t^{c(in)} + c_4^{in} p_t^{c(sl)} + d_4^{in} p_t^{ecf(in)} + e_4^{in} Y_t^{uk} + f_4^{in} L_t^{uk}$

8) $M_t^{uk(sl)} = K_4^{sl} + a_4^{sl} T_t + b_4^{sl} p_t^{c(sl)} + c_4^{sl} p_t^{c(in)} + d_4^{sl} p_t^{ecf(sl)} + e_4^{sl} Y_t^{uk} L_t^{uk}$

Equations (7) and (8) are UK import demand functions and satisfy the following conditions :

i K_4 , a_4 , c_4 , f_4 $\gtrless$ 0

ii b_4 , d_4 , $<$ 0 , and

iii e_4 $>$ 0

Condition $e_3 < 0$ is complementary to conditions A) $e_1 > 0$ and B) $d_2 > 0$.

Similarly, the 'rest of the world' has two import demand functions for imports from these two exporters as follows :

$$9) \quad {}_{t}^{rw(in)} = {}_{5}^{in} + {}_{5}^{in}\, {}_{t} \quad {}_{5}^{in}\, {}_{t}^{c(in)} + c_5^{in}\, p_t^{c(sl)} + {}_{5}^{in}\, p_t^{ecf(in)} + \\ + e_5^{in}\, Y_t^{uk} + f_5^{in}\, L_t^{uk}$$

$$10) \quad {}_{t}^{rw(in)} = {}^{sl} + a_5^{sl}\, {}_{t} + b_5^{sl}\, P_t^{c(sl)} + c_5^{sl}\, {}_{5}^{c(in)} + d_5^{sl}\, p_t^{ecf(sl)} + \\ + e_5^{sl}\, Y_t^{uk} + f_5^{sl}\, L_t^{uk}$$

with the parameters satisfying the following conditions :

$$\text{i} \quad K_5 , \; a_5 , \; c_5 , \; f_5 \quad \gtrless \quad 0 ,$$

$$\text{ii} \quad b_5 , \; d_5 , \quad < \quad 0 , \quad \text{and}$$

$$\text{iii} \quad c_5 \quad > \quad 0$$

Apart from the above 10 equations, there are six definitional identities :

$$11) \quad Q_t^{in} \quad {}_{t}^{in} + {}_{t}^{rw} \quad \text{for all } t ,$$

$$12) \quad Q_t^{sl} = {}_{5}^{sl} + {}_{t}^{rw} \quad \text{for all } t ,$$

$$13) \quad {}_{t}^{in} = {}_{t}^{uk(in)} + {}_{t}^{rw(in)} \quad \text{for all } t ,$$

$$14) \quad X_t^{sl} = {}_{t}^{uk(sl)} + {}_{t}^{rw(sl)} \quad \text{for all } t ,$$

$$15) \quad p_t^{c(in)} = p_t^{h(in)} + p_t^{c(in)} \quad \text{for all } t , \text{ and}$$

$$16) \quad p_t^{c(sl)} = p_t^{h(sl)} + p_t^{c(sl)} \quad \text{for all } t .$$

16 endogeneous variables are explained by the 16 above equations and identities rendering completeness to the model.

It has been verified that the 'rank' and 'order' conditions for identifiability are satisfied by all the equations of the model.

The use of 'monetary' price and income series and the inclusion of the 'cost of Living Indexes' as separate regressors need explanation. This is done because there are 6 identities and 10 structural equations in the model and there are 10 'quantity' variables - (1) q^{in}, (2) q^{ex}, (3) C^{in}, (4) C^{sl}, (5) X^{in}, (6) X^{sl}, (7) $M^{uk(in)}$, (8) $M^{uk(sl)}$, (9) $M^{rw(in)}$ and (10) $M^{rw(sl)}$ - to be explained in the model. If 'real' prices i.e. prices deflated with the regional cost of Living Indexes are to be used in the model, then one has to accommodate as many as 8 'real' price variables - (1) $p^{h(in)}/L^{in}$, (2) $p^{e(in)}/L^{in}$, (3) $p^{h(sl)}/p^{sl}$, (4) $p^{e(sl)}/L^{sl}$, (5) $p^{e(in)}/L^{uk}$, (6) $p^{e(sl)}/L^{uk}$, (7) $p^{e(in)}/p^{cf}$ and (8) $p^{e(sl)}/p^{cf}$. (Note that the U.K. Cost of Living Index has been used in the demand equations for the Rest of World.) This is not possible under the present structural set-up of the model. But, this difficulty can be obviated if 'monetary' price series - instead of the 'real' ones - are used. In this case, there are only 6 endogeneous price variables - (1) $p^{h(in)}$, (2) $p^{e(in)}$, (3) $p^{h(sl)}$, (4) $p^{e(sl)}$, (5) $p^{e(in)}/p^{cf}$ and (6) $p^{e(sl)}/p^{cf}$ - and specification of the model does not pose any problem. The model becomes just identified. Nevertheless, it may be noted that use of 'money' prices brings in an ambiguity in regard to the interpretation of the coefficients of the model.

The second notable feature is the 'omission' of 'Stock' variables in the model. It is done because it is observed from data that percentage share of stocks maintained at any point of time

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in total annual production is very small. Tea is a perishable commodity and producers seem to adjust their output to minimise accumulation of stocks at their end. Annual carryover of stocks, therefore, is negligible at producer's end. This may not, of course, be true at the importers' end. But, the nature and process of stock-adjustments are unknown. Moreover, stock-adjustments are likely to be confined to a less-than-one-year time-span due to the perishable nature of the commodity and an annual model may not and/or need not consider these stock-formation processes explicitly in its structural set-up.

2.2 Data and the Variables :

2.2.1 Description of the Variables :

Output (Q_t^{in} , Q_t^{sl}), Consumption (C_t^{in} , C_t^{sl}), Exports (X_t^{in}, X_t^{sl}) and Imports ($M_t^{uk(in)}$, $M_t^{uk(sl)}$, $M_t^{rw(in)}$, $M_t^{rw(sl)}$) are in physical terms (10^8 lbs). The other variables are described below :

R^{in} - Actual Annual Rainfall in Assam in Millimeters, Indexed (1958 = 100)

R^{sl} - Actual Annual Rainfall in Colombo in Millimeters, Indexed (1958 = 100)

L^{uk} - Cost of Living Index in The U.K. (1958 = 100)

L^{in} - Cost of Living Index in India (1958 = 100)

L^{sl} - Cost of Living Index in Sri Lanka (1958 = 100)

Y^{in} - Indian National Income, 10^9 Rs, Indexed (1958 = 100)

Y^{sl} - Sri Lanka National Income, 10^9 Rs, Indexed (1958 = 100)

Y^{uk} - The U.K. National Income, 10^9 £ , Indexed (1958 = 100)

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Y^{rw} – Index of World GDP (at 1958 prices) multiplied by E^{uk}, Volume (1958 = 100)

D^{in} – Export Duty on Tea in India, Rs/lb, Indexed (1958 = 100)

D^{sl} – Export Duty on Tea in Sri Lanka, Rs/lb, Indexed (1958 = 100)

p^h – Domestic price of tea, Rs/lb, Indexed (1958 = 100)

p^e – Export price of tea, Rs/lb, Indexed (1958 = 100)

The domestic prices, p^h, are constructed using the following identity:

$$p^h = p_t^{hd} + D_t^c + S_t^c \quad , \text{ for all } t \, .$$

where

p^{hd} – Domestic Auction prices of tea excluding of Excise Duties and Cesses.

D^c – Excise Duty on tea (In case of Sri Lanka, Sales Tax on tea).

S^c – Cess on Tea.

It may be noted that in the Domestic consumption functions of India and Sri Lanka, p^h has been used. p^h, however, is not the 'consumer prices' of tea. It is, at best, the wholesale prices of tea in domestic market. The tacit assumption here is that the wholesale and the consumer prices are highly correlated.

2.2.2 Construction of Auction prices, p^{hd}, in India :

Construction of domestic auction prices for India is not straight forward since there are two big auction centres - Calcutta and Cochin - in India. There are two sets of prices and they are

combined on a weighted average basis using the following formula :

$$p_t^{hd(in)} = \frac{T_t^{s(Cal)} \; p_t^{hd(Cal)} + T_t^{s(Coch)} \; p_t^{hd(Coch)}}{T_t^{s(Cal)} + T_t^{s(Coch)}}$$

where

$T_t^{s(Cal)}$ = Tea Sold in Calcutta Auction (10^6 lbs), year t.

$T_t^{s(Coch)}$ = Tea Sold in Cochin Auction (10^6 lbs), year t.

$p_t^{hd(Cal)}$ = Prices (without excise duties and cesses) in Calcutta Auctions (Rs/Kg), year t.

$p_t^{hd(Coch)}$ = Prices (without excise duties and cesses) in Cochin Auction (Rs/Kg), year t.

There are two sets of prices in each of these two auctions, one for 'Leaf' teas and the other for 'Dust' teas. A simple average of these two prices are taken in the first instance to build $p^{hd(Cal)}$ and $p^{hd(Coch)}$ series.

Excise duties are also similar weighted averages of duties on tea sold in Calcutta and Cochin auctions.

In Sri Lanka, three 'varieties' of teas - High-grown, Medium-grown and Low-grown - are sold. There are three price series, but separate sales figures are not available for each of them. In the absence of the 'sales-data', a combined simple average prices of 'all tea' sold in Colombo are used.

2.3 Results and Conclusions :

2.3.1 Empirical Experiments and their Outcome :

Experiments with the above model have not yielded encouraging results. The model was to be attempted as the matrix associated with the normal equations happened to be strongly negative definite. One of the estimated functions, the production function for India, is reported below :

$$\underset{(S.E.)}{Q_t^{in}} = \underset{(42.729)}{61.7591} + \underset{(0.166)}{0.3401}\, p_t^{k(in)} + \underset{(0.183)}{0.3983}\, p_t^{e(in)} + \underset{(0.096)}{0.0612}\, R_t^{in} + \underset{(0.106)}{0.2878}\, L_t^{in} - \underset{(0.978)}{1.4015}\, T_t$$

The equation has been estimated by the 2-stage Least Squares method.

Apparently, the function is satisfactory and acceptable. The coefficients have come out with correct signs; except rainfall, all other variables lie in the statistically acceptable range of error. Nevertheless, these observations are misleading as the associated matrix is not positive definite as revealed by the wrong signs associated with the standard errors. It is not easy to pinpoint the correct causes for breakdown of simultaneous model estimation. The time series employed is perhaps too short to contain enough independent variation so that the associated $(X'X)$ - matrix turns 'nonsingular'. One accepted thumb-rule to examine the non-singularity of a given matrix is to look at the inverted matrix element by element. If the elements differ substantially in magnitude - especially in the diagonal ones - there is every

likelyhood that the original series are collinear. The inverted matrix associated with our model contains diagonal elements as small as 0.002, on the one hand, and as large as 400, on the other hand. It is, thus, expected that the $(X'X)^{-1}$ matrix has a strong element of singularity in it. In fact, with all the series models a common problem is that of the choice of variables, the qualification of which necessarily imports 'collinearity' into the system.

2.3.2 Limitations of Simultaneous Estimation :

The results of the simultaneous model experimented with are not at all happy. Our experience is similar to that of the other researchers in this field. Morgan and Corlett (1951)[2] found out in such an attempt that 'the estimated coefficients exploded due to inadequate independent variations in the various exogeneous variables'. It is, however, to be noted that in case of our model no such 'explosion of coefficients' has occured. Bergstrom (1955)[3], on the other hand noted that his efforts 'yielded results that are quite plausible, but, unfortunately, they were again not significant on usual statistical criteria'. Further, Prais[4] noted in 1962 : 'In other context the application of simultaneous estimation methods, when successful, have yielded results that were almost invariably very close to (and, judged

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Morgan, D.J. and Corlett, W.J. : The Influence of Price in International Trade : A Study in method (JRSS, Series A, Vol 114, 1951) pp 307.

Bergstrom, A.R. : An Econometric Study of Supply and Demand for New Zealand's Exports (Econometrica, 23, 1955) pp 258.

Prais, S.J. : Econometric Research in International Trade : A Review Kyklos, 15, Fase 3, 1962) pp 560-77

CHAPTER 3

The Question of Quality Variation and Substitution : Blenders' Auction Demand for 'Quality' and 'Common' Teas

3.1 Quality and Substitution : Some Theoretical Observations :

3.1.1 Introduction : A Common Defect

Most studies[1] on tea had overlooked one important aspect of tea trade and consumption arising out of the 'quality variation' in tea crop and the necessity for standardisation of quality. Quality is the most important determinant of consumer preference and tea quality varies violently with the fluctuations in a number of factors, some of which are extra-economic and not at all influenced by economic policy changes and some can be influenced by them only in the very long run. Prais and Houthakker[2] (1955) did, of course, bring in, in one of their studies, the question of quality and consumption explicitly; but, this study, based on the family budget surveys in the UK in 1937-9, had a different purpose in view and did not throw any light on the effects of quality variations on international supply and demand.

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[1] See Appendix I below for a complete Bibliography of studies on Tea.

[2] S.J. Prais and H.S. Houthakker : The Analysis of Family Budgets (Cambridge University Press, Cambridge, 1955) pp 109-24.

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exports by volume. Over the same period, Sri Lanka also registered a rise in total exports, her [illegible] in world [illegible] volume having risen by 5 %. In 1951, Sri Lanka's share in world exports by volume was 30 % and it rose up to 35 % in 1969. India, in contrast, is characterised by a steadily declining trend. As much as 45 % of world exports by volume was commanded by India in 1951, and this share went down to 29 % in 1969 (Table 2). Indian loss was absolute and both East Africa and Sri Lanka had successfully encroached into India's territory in world export market.

As pointed out in the section above, and as can be seen from Table 1, for most part of fifties and sixties prices in domestic auctions had fallen for Sri Lanka teas, but had moved up Indian teas. Moreover, in most years, Sri Lanka prices were lower than Indian prices. Prices in Calcutta, Cochin and Colombo auctions establish sharply the contrasting trends in movements of tea prices in these two countries. Tea prices in Calcutta and Cochin auctions had steadily risen over the last two decades, while tea prices in Colombo had remained more or less stagnant during these years. International buyers of tea might, therefore, have found it more profitable to buy tea in Colombo auctions than in Calcutta or Cochin. Since the freight rates from India and Sri Lanka to different parts of the world are virtually the same, a comparison between domestic auction prices for these two countries suggests that a price-war might have placed Indian suppliers at a disadvantage in the world market and some substitution between Indian and Sri Lanka teas might have occurred. A quantitative evaluation of this price-war may be of use and interest to the policy-makers.

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3.1.2 Determinants of Quality :

Tea quality depends on three factors ;

1 the 'jat'[3] of the tea plant, which determines the overall or basic quality of the 'bush';

2 the climatic or seasonal factors like rainfall, temperature etcetera, which determine, given the tea-'bush' of a particular 'jat', the quality of tea from different 'flushes' produced by that bush. (Tea is plucked from a bush at an interval of seven to fourteen days throughout a 'tea season'[4], when, after each plucking, new 'flushes' appear.[5] Quality of tea plucked from the same bush vary from flush to flush due to these factors.);

3 the 'size' of the tea leaves plucked in a flush. (Depending on leaf-sizes different quality-grades of tea are produced from the same flush.)

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[3] C.R. Harler : The Culture and Marketing of Tea (Oxford University Press, London, 1964) p 3.

'The planter does not speak of varieties, forms, types, races, agrotypes, ecotypes (groups of plants which have adapted themselves to their surroundings) or cultivars (sic) selected from such. He uses the vague term 'jat' ... for any group, although agrotype might perhaps be a better term. Tea seed is sold under the name of the estate on which it is grown, and this is also spoken of as the 'jat' of the seed, but here the term has no botanical significance unless the true 'jat' or agrotype name is linked with it'.

[4] 'Tea season' varies from eight months to the full year depending on the length of the monsoon. In North India, the 'season' is from March/April to October/November i.e. it starts 3 to 4 months before and ends 3 to 4 months after the peak-monsoon of July/August. In South India, which has two monsoons, tea is plucked throughout the year. Similarly in Sri Lanka. But, in East Africa, again, the season is limited to eight months from October to May.

E. Bramah : Tea & Coffee (Hutchinson of London, 1972) p 16.

'The first growths of the season, known as new season tippings, are plucked to allow further growths, and these, known as flushes, are plucked every seven to fourteen days. Pluckings .... made in this way ..... (during the whole tea-season) .... are known as new season's tippings, first flush, second flush, quality, rains, autumnal and end-of-season teas.

Quality variation in tea can, thus, be classified under three heads :

(1) Inter-'jat'

(2) Inter-flush; and

(3) Intra-flush.

One can call these variations 'primary', 'secondary' and 'tertiary' respectively.

Nine 'jats' of plants are generally recognised now-a-days and these are grouped under three major species : (1) The Assam jat (or 'assamica'; (2) The China jat (or 'sinonsis'); and (3) The Indo-China jat (or 'Cambodia'). 'All these types hybridize freely'.[6] The Assam jat has five varieties : (a) Light-leaved, (b) Dark-leaved, (c) Manipuri, (d) Burma, and (e) Lusai. Two jats - China-Assam and Indo-China-Assam - are available as hybrids obtained from the Assam and the other two main species. These nine jats are 'traditional'. Research is always being conducted to evolve new ecotypes. Some of these newly evolved varieties have been found to have higher average yields than the traditional 'jats', and have gained considerable popularity among the new producers, especially in East Africa. However, most of these new types are quality-wise inferior to the traditional varieties. 'The finest 'jat' of all is the Assam dark-leaved. ..... The bushes with pubescent leaves can be very high yielders of fine quality tea, and during the spring flush in Assam they produce the most highly valued teas in the world'.[7]

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[6] T. Eden : Tea (Longmans, Greens & Co, London, 1958) pp 1 - 4.

[7] C.R. Harler : op. cit., p 10.

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It is important to note that there is a significant positive relationship between the 'quality' of a 'jat' and the 'region' in which it is usually grown. It is known [8] that the best varieties of 'Assam dark-leaved' plants do not yield equally high quality tea if grown anywhere else in the world. This is an important factor determining supply of different varieties of tea and international substitution between teas of different qualities and from different regions must

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[8] C.R. Harler : op. cit., p 26

'The extreme type of China bush grows with difficulty in the plains of Assam, although the bigger leaved China varieties and the so-called China-hybrid thrive, but the average yield and quality are markedly below the standard reached by the average Assam plant.

'In the Darjeeling area of the Himalayas, which in the spring produces very fine, flavoury teas, the bushes are China hybrid, and the Assam type, although it does well there, fails to produce the full hill flavour. On the other hand, hybrid bushes from Darjeeling grown in the plains of Assam also fail to reproduce the full hill flavour. It may thus be concluded that Darjeeling teas owe their character partly to the type of bush and partly to the climate.

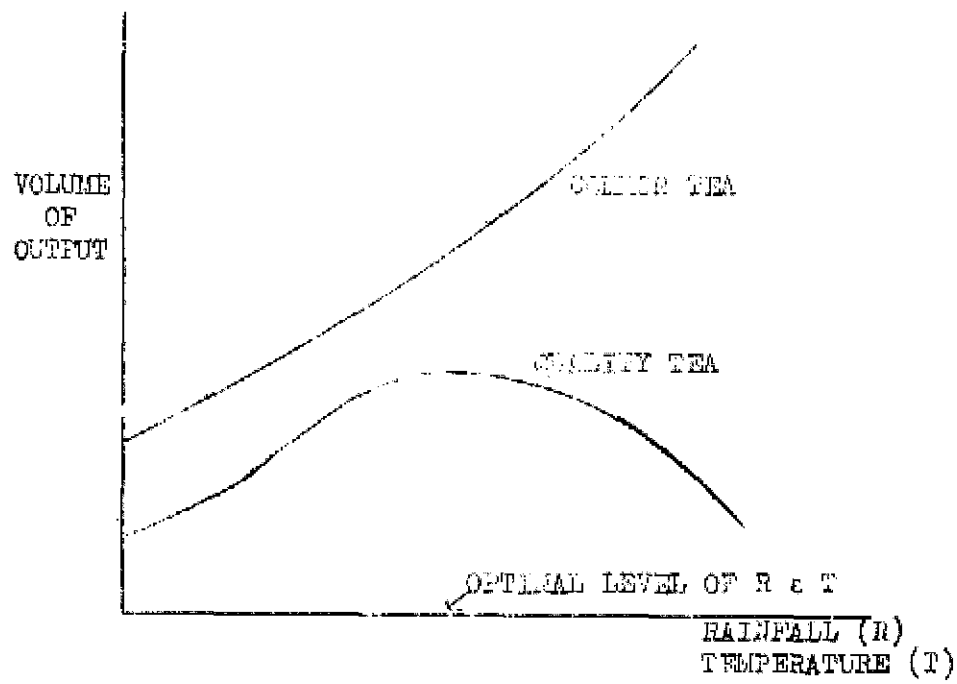
'The China-hybrid is common in Ceylon and Mauritius, and plants were taken from these countries to Nyasaland many years ago. The Assam plant certainly grows well in Ceylon, although whether the mixed Assam type would maintain the quality and flavour for which Ceylon teas are noted is doubtful. In South India, where the climate closely resembles Ceylon, all the Assam types do well and are in general use, but South Indian teas have not (sic) the quality of those of Ceylon. The China-hybrid tea in Nyasaland is now looked upon as a handicap and new openings are with the Assam and Burma types. Similarly, in the rest of Eastern Africa, from Southern Rhodesia to Kenya, the large-leaved plant is favoured.

ake this factor into account?

'Inter-flush' (or, what we call 'secondary') variation in quality occurs due to fluctuations in climatic factors like rainfall, temperature, humidity, steetsam. In general, 'quality' tea is produced when temperature is not very high and rainfall not too excessive. Rises in temperature and rainfall bring in 'heavy flushing' periods with associated decline in quality. Production of 'Common' or 'plain' teas from a bush goes up with heavy flushing due to rise in temperature and humidity. (Figure 1)

FIGURE 1

Output of 'Quality' and 'Common' Teas and Climatic Factors



E. Bramah : op. cit, p. 14 :

'Since tea is such an obligingly easy plant to grow, it is perhaps surprising that it is extremely difficult to get a good quality tea from it. The reason is that the tea plant is like the vine. Soil, aspect, rainfall, elevation, manufacture all effect it in so many subtle ways that planting tea in a new area, evolving a suitable strain of plant, establishing it ..... are often the work of a generation.

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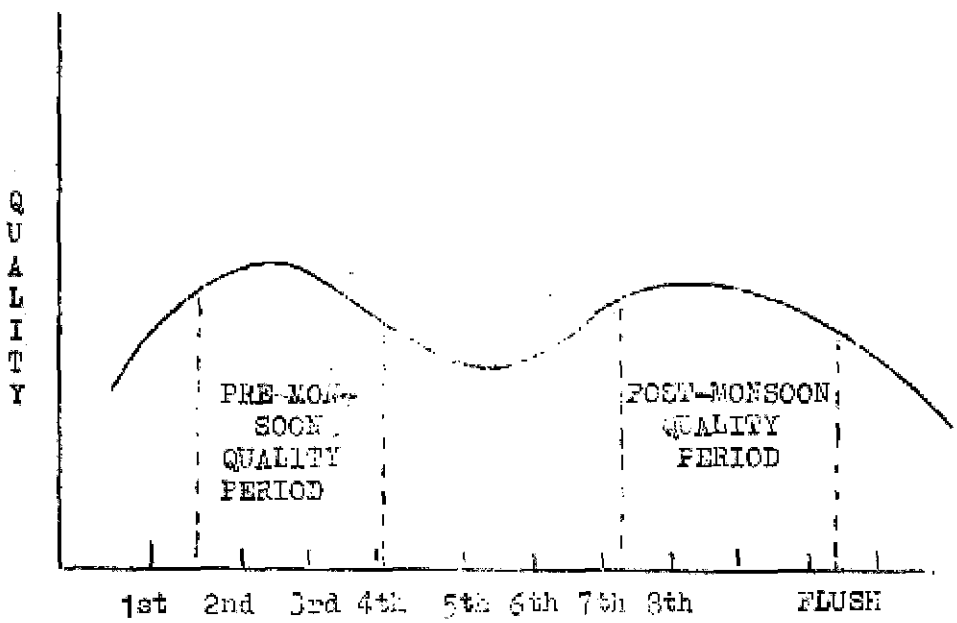
Usually, there are two 'quality-periods' in a tea season preceding and following the rains. Early monsoon ('second' and 'quality' flushes) and post-monsoon ('Autumnal' flushes) periods generally improve the overall quality of tea from the bush. (Figure 2)

FIGURE 2

Inter-flush (Seasonal) Fluctuations in Quality



'Intra-flush' (or, 'Tertiary') quality variations depend on the 'size' of leaves plucked. Generally, the most tender and the smallest leaves plucked from a flush produce the best quality tea known as the 'first quality' of 'that' flush. To ensure this, normal practice is to pluck the topmost 'two leaves and a bud' in any shoot of the plant. But even if this is strictly followed, leaf-sizes vary and consequently the quality. Green leaves are, therefore, sorted and sifted mechanically according to the leaf-sizes during the first stage

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of manufacture, and separated out as 'First', 'Second', 'Third' and subsequent qualities of tea from a flush. These are then separately processed to yield 'black teas' of different quality from that flush. At the final stage, each of these quality-types is sorted out according to 'grades' known as 'leaf', 'broken', 'Fannings' and 'dust' as shown below:[10]

TABLE 1

'Quality-types' and 'grades' of tea from a flush

Qualities	Grades			
	Leaf	Brokens	Fannings	Dust
1st	F'.O.P.	F'.B.O.P.	F'.B.O.P.F.	-
2nd	O.P.	B.O.P.	B.O.P.F.	No.1
3rd	P.	B.P.	P.F.	-
4th	P.S.	B.P.S.	F.	No.2

Abbreviations: F' = Flowery; O = Orange; P = Pekoe
B = Brokens; F = Fannings; S = Souchouy

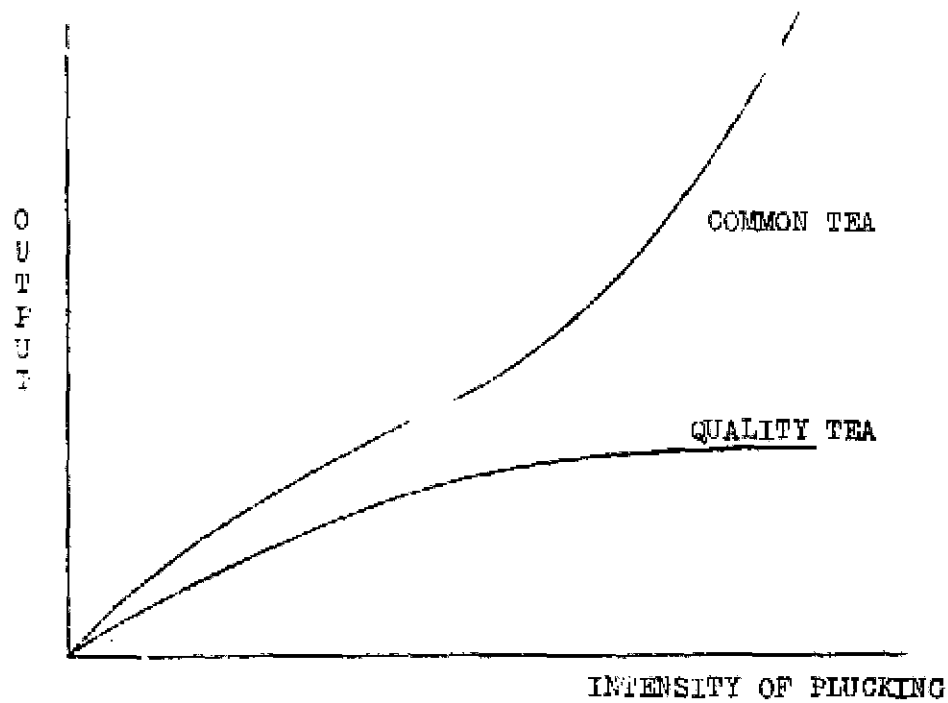
Quantum of production from a flush may be varied by varying the 'intensity' of plucking. If coarser leaves down below the 'first two leaves and a bud' are plucked, output increases with an increased proportion of 'lower quality' or 'common' teas in the total output.

[10] E. Bramah : Op. cit., p 19

Production of 'quality' tea in a flush, however, remains more or less invariant. (Figure 3)

FIGURE 3

Intra-Flush Variation in Output and Intensity of Plucking



Two inferences can be drawn from the foregoing discussion :

First, supply of 'quality' tea is likely to be relatively price-inelastic in the short run, as compared to 'common tea' which is likely to exhibit higher supply fluctuations in response to price changes in the market.

Second, production of 'quality' tea is likely to suffer more from seasonal fluctuations than the 'common' varieties of tea.

3.1.3 Quality Variation, Blending and some questions on Complementarity and Substitution :

Susceptibility of tea to quality changes necessitates 'blending' of different types of tea to standardise quality removing the 'intra-flush' and 'inter-flush' quality-fluctuations.

'At first it might appear that blending is unnecessary, and that it would be less costly if the public were able to receive their teas direct from the individual gardens. In fact, some teas are sold in this way, but the disadvantage of doing so is that it is impossible to procure a constant quality throughout the year. Teas from individual gardens vary not only throughout the season but also from one season to the next, due to local climatic conditions, and in some areas the manufacturing season is short. But by buying adequate quantities from different growths and gardens and blending them together, the tea companies can create blends which maintain a constant quality and price from one month to the next so far as market prices allow.

'The varied leaf and liquoring characteristics of the individual growths, district and marks are all used in such proportions as to get the maximum benefit from each'.[11]

There is another important reason for blending which is generally not realised by persons not intimately connected with tea trade and industry. Teas react differently to the atmospheric humidity and characteristics of water available in different regions.

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[11] E. Bramah : op. cit., p 36

Thus, to get the same taste out of a blend, the constituents may need to be changed from one consuming area to the other depending on these factors. 'Packers take this into account when blending, and draw samples of water for test purposes from the areas in which their blends will be sold, to make sure that the most appropriate teas are blended for each district'.[12]

Usually, a blend has one main constituent, the quality of which is primarily determined by its 'jat', and which gives the blend its distinctive character. In 'high-quality' blends, the major constituents are generally either 'Darjeeling', 'Assam' or 'High-grown' Sri Lanka teas. With each major constituent in a blend, a large number of other types of teas are added due to various reasons : First, certain varieties of 'medium' or 'low' quality tea are often added to the 'high quality' blends to enhance the character of the main constituent. Secondly, certain types of 'neutral' low quality teas are sometimes added in high quality 'blends' to reduce the overall cost of production of the blend. Such neutral teas are known as 'fillers' and do not affect the overall character of a blend as they are usually low quality tea having a good liquor but no distinctive flavour. All these bring certain elements of 'complementarity' into tea trade.

The question of substitution of tea from different countries is also not straight-forward. Since most 'high quality' teas have very distinguishing characteristics - 'Darjeeling', for example, is renowned for its 'muscatel' flavour and a 'greyish' appearance of the liquor, 'Assam' for its 'thick body' and strong 'malty' taste, and

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[12] E. Bramah : op. cit., p 38

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'High-grown' Sri Lanka Tea if available therefore and a rich golden yellow colour of liquor, substitution between 'quality' teas is not very easy. Blenders can substitute one 'quality' tea from one source by another 'quality' tea from another source only if consumer tastes change in favour of the latter, which is a long term process. As a short run palliative to increasing cost of production of a high-quality blend, blenders may substitute the 'first quality' of a particular type of tea by the 'second' or subsequent qualities of the same tea, braving, of course, the risk of adverse consumer reaction in response to associated quality deterioration of that blend.

3.2 Quality and Substitution : Some Empirical Experiments

3.2.1 Price Movement and Tea-disposal in London Auction Market : A pointer to substitution possibilities

Importers from non-tea-producing countries buy tea in bulk in London and/or in domestic auction centres in the producing countries and supply them to home consumers after blending these teas from different sources to suit their taste. It is the international blenders who, therefore, hold the key to international substitution of teas from different sources.

London auction handles a large part of total world exports. Table 2 presents the data on disposal and prices of tea in London auction market which reveal that the disposal of Indian tea through London auction has of late been declining with a compensatory rise in 'exgarden sales' in India, primarily meant for domestic consumption.

TABLE 2

Disposal of India Tea : 1966 - 1971

Year	Output	Sale of Calcutta/Cochin Auction		Sale in London Auction		Direct Exports to UK & others		Direct Ex-garden sale	
		Quantity	% of (2)	Quantity	% of (2)	Quantity	% of (2)	Quantity	% of (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1966	376	223	59.41	67	17.74	11	2.98	75	19.87
1967	384	220	57.23	81	21.15	14	3.59	69	18.03
1968	402	241	59.92	77	19.05	12	2.92	73	18.11
1969	394	252	64.12	41	10.38	10	2.58	90	22.92
1970	418	238	56.94	51	12.25	15	3.58	114	27.23
1971	433	247	57.09	43	9.88	17	4.01	126	29.02

Source : Tea Statistics (Tea Board, Calcutta, 1970-71 and 1971-72) p 26 and p 27 respectively.

This indicates that Indian producers might have been getting relatively better prices in domestic markets than in London market over the past decade. Price data for Indian, Sri Lanka and Africa teas sold in London and domestic auctions support this view. (Table 3-A and Table 3-B.) From a comparison of London and Calcutta/Cochin prices of North/South Indian teas, it is seen that during fifties price movements in London and domestic auctions for Indian teas were similar in magnitude and direction, but in sixties the trends were contrasting - domestic auction prices had steadily risen while London prices had recorded a monotonic fall. This explains the declining despatch of Indian tea by Indian producers to London markets. But, the fall in London tea prices as se can not be easily explained. International competition from

(1958 = 100)

Year	North India		South India		Sri Lanka		Africa		Indonesia
	London	Calcutta	London	Cochin	London	Colombo	London	Nairobi	London
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1952	61.0	63.6	72.3	76.2	78.0	100.0	54.2	+	87.0
1953	73.7	90.9	90.2	90.5	81.2	111.8	96.1	+	123.3
1954	108.7	140.9	136.2	133.3	107.3	152.9	139.2	+	176.9
1955	108.0	95.5	117.0	109.5	108.6	129.4	110.3	+	116.0
1956	103.6	109.1	112.7	104.8	108.6	129.4	110.3	+	116.0
1957	96.1	95.5	98.5	90.5	78.0	111.8	94.6	+	95.7
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959	81.7	104.5	97.2	104.8	102.7	117.6	93.8	100.0	90.7
1960	100.5	109.1	104.1	100.0	101.2	117.6	104.7	113.3	104.0
1961	95.1	95.5	101.3	100.0	93.7	111.8	105.9	106.7	100.8
1962	102.9	109.1	96.3	100.0	94.4	111.8	96.1	103.3	73.7
1963	94.6	104.5	94.8	100.0	88.3	105.9	96.6	103.3	69.9
1964	92.7	100.0	100.2	104.8	90.9	105.9	99.0	100.0	56.7
1965	88.8	113.6	97.8	104.8	86.4	105.9	109.1	110.0	N.A.
1966	88.5	118.2	91.3	104.8	86.0	94.1	103.7	100.0	N.A.
1967	91.2	122.7	92.8	128.6	88.3	94.1	100.0	106.7	63.9
1968	82.7	113.6	92.4	114.3	83.3	105.9	108.6	90.0	N.A.
1969	76.9	122.7	75.1	114.3	81.9	94.1	79.3	76.7	N.A.

+ Nairobi Auction started from 1958

Source : Annual Bulletin of Statistics, 1969 and 1970 (International Tea Committee, London)

TABLE 3-3

Actual Annual Average Prices of Tea Sold in London (Pence/lb), Calcutta, Cochin, Colombo (all Rs/lb) and Nairobi (shs/lb) Auctions

Year	North India		South India		Sri Lanka		Africa		Indonesia
	London	Calcutta	London	Cochin	London	Colombo	London	Nairobi	London
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1952	35.9	1.4	33.1	1.6	46.2	1.7	22.0	+	34.7
1953	43.4	2.0	41.3	1.9	48.1	1.9	39.0	+	49.2
1954	64.0	3.1	62.4	2.8	63.5	2.6	56.5	+	70.6
1955	63.6	2.1	53.6	2.3	64.3	2.2	44.8	+	46.3
1956	61.0	2.4	51.6	2.2	64.3	2.2	44.8	+	46.3
1957	56.6	2.1	45.1	1.9	46.2	1.9	38.4	+	38.2
1958	58.9	2.2	45.8	2.1	59.2	1.7	40.6	3.0	39.9
1959	48.1	2.3	44.5	2.2	60.8	2.0	38.1	3.0	36.2
1960	59.2	2.4	47.7	2.1	59.9	2.0	42.5	3.4	41.5
1961	56.0	2.1	46.4	2.1	55.5	1.9	43.0	3.2	40.2
1962	60.6	2.4	44.1	2.1	55.9	1.9	39.0	3.1	29.8
1963	55.7	2.3	43.4	2.1	52.3	1.8	39.2	3.1	27.9
1964	54.6	2.2	45.9	2.2	53.8	1.8	40.2	3.0	26.6
1965	52.3	2.5	44.8	2.2	51.2	1.8	44.3	3.3	-
1966	52.1	2.6	41.8	2.2	50.9	1.6	42.1	3.0	-
1967	53.7	2.7	42.5	2.6	52.3	1.6	40.6	3.2	25.5
1968	48.7	2.5	42.3	2.4	49.3	1.8	44.1	2.7	-
1969	45.3	2.7	34.4	2.4	48.5	1.6	32.2	2.3	-

Source : Annual Bulletin of Statistics, 1969 and 1970 (International Tea Committee, London)

Sri Lanka and Africa may be one reason. It is interesting to note that Sri Lanka teas were priced higher than Indian teas all through the fifties in the London auction market, while situation in the sixties were reverse when Sri Lanka prices were always lower than Indian prices. African teas were always priced less than both Indian and Sri Lanka teas.

It may be argued that the Blenders, faced with the situation of lower offerings of Indian 'quality' teas in London market - generally 'high quality' teas are shipped to London market - had to buy their requirements from Calcutta and Cochin markets where the prices were rising on account of (a) domestic pressure of demand in India and (b) international competion. This might have raised Blender's costs of production of 'Indian blends' relative to the costs of production of blends containing Sri Lanka or African teas. It may be noted that prices of Sri Lanka and African teas had been falling in North London and domestic auctions during the last two decades. This situation had a special significance for the British Blenders and Packers who, despite having a system of 'Resale Price Maintenace' for the retailers in the UK domestic market, could not increase the prices of any of their blends at will. In fact, British Government had twice refused permission to Blenders and Packers who represented for a raise in the retail prices[13] of certain blends.

Blenders and Packers might, therefore, have resorted to either or both of the following two courses of action to offset any rise in the cost of production of Indian blends : (1) Substitution of Indian

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[13] E. Brahma : op. cit., p 98 and p 158

teas by teas from the other suppliers and/or (2) Substitution of the 'first' quality Indian teas with the 'second' quality of the same Indian teas. In both cases, long term prospects of Indian tea exports to these countries, especially to the U.K., are likely to suffer since the first option would entail direct substitution of Indian by non-Indian teas and the second option would necessitate deterioration of the quality of Indian blends ultimately turning consumer-preference against the Indian blends.

3.2.2 Blenders' Substitution of 'Quality' Indian tea by 'Common' Indian tea : Some Empirical Evidence

Data on 'quality' and 'common' teas are not easy to compile. Although separate price series for teas from 'Darjeeling', 'Assam', 'Dooars', 'Cachar', 'Terai', etcetera, are available, no sales-figure for these teas are recorded in official statistical documents. In the absence of such data, proxies for 'quality' and 'common' teas are used in the analysis.

Qualitywise North Indian teas are generally superior to South Indian teas. In London as well as in the domestic auctions, North Indian teas are priced higher than the South Indian teas (Table 3-3 and Table 4). The price differentials between the North and South Indian 'leaf' and 'Dust' teas sold in Calcutta and Cochin auctions give an idea of the overall qualitative difference between crops from these regions. In the absence of specific data on 'quality' sold and prices of different 'quality-grade' teas, one may assume that the North Indian teas represent 'quality' variety, and the South Indian

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TABLE 4

Annual Average Prices of North Indian and South Indian Teas in Domestic Auctions (Rs/lb)

Year	Calcutta Auction		Cochin Auction	
	L o a f	D u s t	L o a f	D u s t
(1)	(2)	(3)	(4)	(5)
1951	1.83	1.23	1.97	1.79
1955	2.09	1.27	2.30	1.95
1960	2.42	1.96	2.13	1.96
1961	2.11	1.71	2.12	2.02
1962	2.39	2.22	2.08	1.70
1963	2.34	2.18	2.11	1.93
1964	2.25	2.13	2.16	2.01
1965	2.47	2.32	2.21	2.06
1966	2.60	2.39	2.20	2.06
1967	2.72	2.30	2.62	2.29
1968	2.49	2.32	2.41	2.14
1969	2.69	2.35	2.35	2.14

Source : Annual Bulletin of Statistics (International Tea Committee, London, 1967 & 1970) pp 48-50

teas 'common' type. This assumption is definitely debatable if one thinks of the distinctive characters of North and South Indian teas as such. However, they are taken only as 'proxies' for two quality-grades of teas for this analysis. Auction demand functions for these two quality types of teas are estimated and reported below.

Two simple models are utilized in the empirical exercise :

(1) $Y_t^q = f_1 (P_t^q , Z_t)$

(2) $Y_t^c = f_2 (P_t^c , Z_t)$

where

Y_t^q = Export share of 'Quality' (i.e. North Indian) tea in total output of 'Quality' tea, year t.

Y_t^c = Export share of 'Common' (i.e. South Indian) tea in total output of 'Common' tea, year t.

P_t^q = Ratio of Prices of 'Leaf' to 'Dust' teas sold in Calcutta auction, year t.

P_t^c = Ratio of Prices of 'Leaf' to 'Dust' teas sold in Cochin auction, year t.

Z_t = Time Trend, year t.

'Leaf' tea prices are assumed to represent 'export' prices, and 'Dust' tea prices for 'domestic' prices.

If the theoretical conjecture about international blenders' substitution of 'quality' Indian teas by 'common' Indian teas is true, then those two models should fulfil the following apriori constraints on their coefficients :

(a) $d Y/d P < 0$ for both the Models

(b) $d Y^q/d Z < 0$ for Model 1 and

(c) $d Y^c/d Z > 0$ for Model 2

Empirical results are reported in Table 5.

TABLE 5

Blenders' Auction Demand for 'Quality' and 'Common' Teas from India : 1952-1971

Dependent variable: Share of Exports in output	Independent Variables: Constant (s.e.) (t)	Relative Price (s.e.) (t)	Trend (s.e.) (t)	$\bar{R}^2$ F (DF)	S D W
(A) Quality Tea	0.7211	- 0.2793	- 0.0028	0.4880	0.0261
	(0.1003)	(0.0923)	(0.0010)	10.055	0.9118
	(7.190)	(- 3.025)	(- 2.774)	(2,17)	
(B) Common Tea	0.3902	- 0.1839	0.0122	0.9244	0.0242
	(0.1127)	(0.0867)	(0.0014)	117.173	1.7291
	(3.462)	(- 2.122)	(8.890)	(2,17)	

These two equations suggest, first of all, that a secular rise in demand by the international Blenders for the 'common' Indian teas has taken place over the last two decades. In contrast to this, a secular fall in demand by the international Blenders for the 'quality' Indian teas has been observed. On account of the fact that total world demand for tea in absolute volume has not gone down during this period, the contrasting trends in demand for 'quality' and 'common' teas may imply that international Blenders have been substituting Indian 'quality' teas either by 'quality' teas from other sources like Sri Lanka and East Africa, or by the 'second quality' of the same variety of Indian tea. But, it is already noted that for various reasons substitution between 'quality' teas from different sources is difficult. 'Quality' teas have distinctive characteristics and strong consumer preference is associated with each of them. In the following

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chapter some experiments on international substitution between different 'quality types' from different countries are reported and it will be seen that there is no evidence to suggest that substitution between 'high-quality' teas from different sources was taking place. There is evidence, on the contrary, to support the view that international substitution had indeed been taking place between 'medium quality' teas from different growths. If this is true, then this indirectly substantiates the hypothesis that Blenders may have been substituting 'second quality' Indian teas for the 'first quality' of the same variety Indian teas in Indian blends. This, as pointed above, has a special significance for a country like the U.K. where consumer preference for a particular blend has been built over a long time and would take time to change.

Prices appear to affect the demand for 'quality' teas more than that of 'common' teas. Price elasticities of demand evaluated at the mean values of the variables, however, turn out to be inelastic both for 'quality' as well as for 'common' teas.

Elasticities of Demand

	Price	Time
Quality Tea	- 0.80336	- 0.00084
Common Tea	- 0.67482	+ 0.0444

Lastly, these equations point to an element of speculation in case of 'quality'-tea-buying from auctions. Since the U.K. buyers generally go for 'high quality teas' and since supply of such teas in

London market from India has been declining, the U.K. blenders buy 'quality' teas from London and Calcutta auctions in India simultaneously. Blenders' demand for 'quality' tea in Calcutta auctions is dependent on 'expected' supply of 'quality' teas to London auction. A tea auctioneer's report on the U.K. buying in Calcutta auction says : 'U.K. buyers naturally took less keen view of their requirements as more spot teas would be available in the London auctions'.[14] Presence of such speculative behaviour implies that simple regression models as applied to 'quality' teas are likely to be only partial representation, if not a mis-specification, of the reality. Empirical results also corroborate this view. From statistical considerations, equation for 'quality' teas is unsatisfactory : $\bar{R}^2$ is low, Durbin-Watson statistic is inconclusive. In contrast, equation for 'common' teas is quite satisfactory on statistical criteria. This indicates that speculative dealing is less in case of 'common' teas, but significantly high in case of 'quality' teas.

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[14] J. Thomas & Co (P) Ltd : Tea Market Annual Report, Season 1970-71 (Calcutta, May 1971) p 22

CHAPTER 4

International Substitution between Tea from Different Sources and Import Demand for Indian Tea in UK: The Question of Quality Again

4.1 International Substitution between Tea from Different Sources : Some Theoretical Observations

4.1.1 Determinants of Substitutability : Basic Characteristics of Teas from India, Sri Lanka and Africa

Assam teas generally make an ideal 'base' for a good-quality blend with its strong, 'malty' flavour and good colour. But at the same time, it is also known that 'a very fine Assam with a very fine Ceylon ... would mean only that one would detract from the other, so it follows that the better-quality blends have a pronounced flavour of one of the main growths only and many of packers accordingly label their blends Indian, Ceylon and Darjeeling'.[1] In contrast to the 'Orthodox-Assam', i.e. teas manufactured by Orthodox method[2], mentioned above, Assam teas made by C.T.C. method 'produces teas with a strong, coloury liquor which are the basis of the quick-brew blends introduced in the early 1950's.

'The Dooars district produces teas having smooth, mellow, full-bodied liquors of good colour, and they help to bind together all the teas used in a blend, though some of these teas are made by a process which differs from the Orthodox method and are known as Logg-

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[1] E. Brahmah : op. cit., p 38.

[2] There are three methods of manufacturing black tea : (a) Orthodox, (b) C.T.C. and (c) Logg-out.

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cut teas. ..... The autumnal teas from this district have a distinctive flavour and strength unique in character.

'Darjeelings are renowned for their muscatel flavour and aroma; the high-grown Ceylons, from districts where the leaf grows slowly, have an incomparable fragrance, fine flavour and rich golden colour; and there is always a good demand for mid-country Ceylons with their full, rich, flavoury liquors.

'South Indian teas, especially when grown in the higher districts of Travancore(sic) and Nilgiri, have an aromatic quality much sought after in certain markets. Other districts provide useful, bright-liquoring medium teas, but without the fullness of North Indian varieties, and are sometimes used in blends in place of similar-tasting Ceylons. ..

'Indonesian teas from Java and Sumatra are consistent in quality and appearance throughout the year, and the high-grown teas from these growths have a flavour somewhat similar to those from corresponding elevations in South India and Ceylon. ... African teas are being used in blends in greater quantities as their quality improves year by year.

'After the basic requirements of body, flavour, pungency and colour have been met, it may be found that the blend is averaging out at too high a price, and to counteract this, quantities of neutral, sound-quality teas are added, known as fillers, which will not damage the character and flavour of the blend. These are available from most growths, particularly the marginal districts of North India and Africa,

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the low-grown teas from Ceylon, and teas from Indonesia and Argentina. They usually have a good black lead and colouny liquor, but without any distinctive flavour. Although the fillers are regular components and necessary to blends, they must be used with discretion. An excessive proportion would detract from the strength, body and flavour, thereby wasting the qualities of the expensive tea'.[3]

4.1.2 Teas from Different Sources - Substitutes or Complements ?

Inter-flush and intra-flush quality variations in tea necessitate 'blending' to maintain the stable supply of standard-quality tea to consumers. A 'blend' may literally contain hundreds of different 'types' of teas produced in 'different gardens' in 'different countries'. It is necessary for a 'blend' to have 'one major constituent' which usually is a high or medium 'quality' tea coming from a 'particular growth' from a 'particular region'; but the same blend may contain 'fillers' coming from different 'growths' in different countries. It follows from the process of preparation of blends that substitution of a 'quality'-constituent of a particular 'blend' by another 'quality' type of tea is not easy, if not sometimes totally impossible, without changing the basic characteristic of that blend. This is because the 'quality' teas from different 'growths' in different 'countries' differ significantly in their flavour, aroma and liquoring characteristics and consumers have usually a well-established preference for one or the other of these 'quality' teas. Furthermore, the practice of mixing 'fillers' (i.e., 'neutral' teas which do not change or hamper the basic

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[3] E. Brahmah : op. cit., Chapter 2 : 'Tasting Tea in London', pp 37-8

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character of a 'quality' blend to enhance the characteristics of the 'quality' blend or to reduce the production cost of such a blend brings in an element of 'complementarity' in tea trade. Demand for a particular 'filler' is 'derived' from the demand for the 'quality' tea with which the filler goes well in a blend an fluctuates with the demand for that particular type of 'quality' tea with which the filler may be used in a blend, no matter where has that 'quality' tea or the 'filler' been produced.

Blending and associated problems of substitution between different teas become even more complicated because the same tea reacts differently to regional differences in water-characteristics and atmospheric humidity to evolve different liquoring and flavouring qualities. An experienced tea-taster and planter records that 'In soft water areas it is usual to use heavy, thick liquoring teas, such as orthodox-manufactured malty Assam and Java teas; soft water brings out the best in them, indeed, even poorer-quality teas from the same growths would benefit. There are, however, certain teas which are unsuitable in these areas for a variety of reasons. China Keemun, Darjeeling, high-grown Sri Lanka and South Indian teas have a tendency to lose their bouquet; C.T.C. and Legg-cut becomes brassy; Japanese and China green teas react unfavourably; and thin liquoring teas are wasted. It follows, therefore, that the latter teas derive the utmost benefit from hard water, while on the thick liquoring teas hard water has the reverse effect of not bringing out their strength.

'The public takes for granted the fact that it can buy packets of tea at the same price week after week, and even year after year,

without appreciating how much work this entails. Nor apart from the variations in quality blenders must also take into account fluctuations in availability and rises and falls in prices. Then it is vital to know which teas to blend together. Particular care has to be taken with teas of fine quality, as it would be a waste to blend two very astringent teas together.

'The same principle of good basic blending applies equally to the less expensive, medium and low-quality packets, for although in these schedules the high-priced flavoury teas are not added, these blends still have the attributes of body, strength, flavour and colour which result from good all-round blending. Preference for one company's tea rather than another's is purely a matter of personal taste. Blenders make every effort to maintain a constant standard, and ensure that the public is given teas which are comparable to those of their competitors by tasting each other's blends all the time.

'It is said that seven years are needed to train a tea taster, this time being spent buying Indian and Ceylon teas in London and other terminal markets abroad, and studying the art of blending. Perhaps the greatest factor which makes it such a long training is that it is only possible to note the seasonal variations in quality of each growth as and when they become available. At the end of this training period one could certainly know how to buy and blend teas, but it is always necessary to keep up with the newly developed gardens and changes in style of manufacture, and there is always more to learn'.[4]

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[4] E. Dramah : op. cit., pp 39-40

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4.1.2 Why Substitution ?

Blenders and Packers take up work (a) on substitution of one 'quality type' from one growth by another 'quality type' of another growth and (b) on creating 'new blends' with new constituents, when, due to rise in auction prices of certain 'quality' teas, some blends having those teas become relatively less remunerative to them than the other blends in market. Table 1 presents some data over the period 1951 to 1969 on price-movements in London, Calcutta, Cochin, Colombo and Nairobi auctions which deal respectively with teas from all countries, North India, South India, Sri Lanka and Africa (Kenya, Uganda, Tanzania, Malawi, Congo, Mozambique (PEA) and some other tea-producing countries). This table reveals some interesting trends as follows :

(a) During 1951-1969, prices of North India, and Sri Lanka teas in London auctions have shown a rising tendency, while those of South India and African teas have registered decline. Fall in African tea prices in this market is much more pronounced than that in South Indian tea prices.

(b) Domestic tea prices in India have been characterised by a steady rise of both North Indian and South Indian teas, and for teas for export as well as for domestic consumption. This rising trend of tea prices in domestic auction in India has been markedly contrasted by declining trends in tea prices in both Colombo and Nairobi auctions.

In view of the relatively higher rate of rise of Indian tea prices in her domestic auctions as compared to the rise (which is in fact negative) in prices of Sri Lanka and African teas in their domestic

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TABLE 1

Prices of Indian, Sri Lanka and African Teas

		1951	1962	1961	1965	1967	1968	1969
A - PRICES IN LONDON AUCTION (Pence/lb)								
1	North India	43.90	58.82	55.99	52.30	53.74	48.66	45.30
2	South India	42.44	45.85	46.39	44.81	42.48	42.26	34.40
3	Sri Lanka	46.05	59.15	55.51	51.15	52.33	49.30	48.50
4	Africa	49.04	40.60	43.04	44.34	40.60	44.11	32.20
B - PRICES IN DOMESTIC AUCTION[1], [2]								
1	Calcutta[3]: (Rupees/lb)							
	a Leaf i For Export	1.83	2.18	2.11	2.47	2.72	2.49	2.69
	b ii For Domestic Consumption	1.23	1.56	1.71	-	-	-	-
	b Dust	1.69	1.99	2.20	2.32	2.30	2.32	2.35
2	Cochin[3]: (Rupees/lb)							
	a Leaf i For Export	1.97	2.10	2.12	2.21	2.62	2.41	2.35
	ii For Domestic Consumption	1.85	1.92	-	-	-	-	-
	b Dust	1.79	1.96	2.02	2.06	2.30	2.14	2.14
3	Colombo (Rupees/lb)	1.90	1.73	1.93	1.83	1.58	1.83	1.61
4	Nairobi[4] (Shillings/lb)	-	2.95	3.19	3.28	3.21	2.71	2.33

[1] Sri Lanka Rupee = 18 d upto 18.10.67 and = 16.8 d thereafter
Indian Rupee = 18 d upto 5.6.66,
= 11.43 d from 6.6.66 to 18.10.67 and
= 13.3 d thereafter

[2] Excluding Export and Excise Duties, and Cesses.

[3] From 1962, no distinction is made between teas sold for export and teas sold for consumption in India. The quantities of Dust sold for export, if any, were insignificant.

[4] Auctions begin in November 1956, but averages are not available until 1958.

Source : Annual Bulletin of Statistics, 1967 and 1969 (International Tea Committee, London) pp 48-51

auctions, and relatively lower rate of fall of average prices of Indian tea in London auctions as compared to the rate of fall of Sri Lanka and African prices in the same auction, the Blenders and Packers operating in the U.K. market might have been attempting to promote blends of other-than-Indian teas in the U.K. market. Such action by the Blenders in the U.K. might have been initiated from another fact that most of them also own tea plantation estates in India, Sri Lanka and Africa. Political climate in India and Sri Lanka over the last two decades might have forced such Blenders to make a re-appraisal of their long-term policies, and might have pressed them to look for a 'safer' region for reinvesting their earnings from tea production and trade. An analysis of ownership pattern in Tea plantation in India clearly discerns a shift from British to Indian ownership over the last two decades.[5], [6] Thus British tea planters are moving away from India (and probably also from Sri Lanka) and are establishing themselves in relatively new tea-growing regions of Africa. If this is what has been, and is, happening, then British Blenders and Packers, from the point of view of their long-term interests, would try to promote blends with more African teas in them and would try to remould the taste-pattern of the new generation tea drinkers in the U.K. in favour of the quick-brewing and strong-liquored African teas rather than to the highly aromatic but light-liquored quality teas from India and Sri Lanka. However, Sri Lanka had been enjoying throughout fifties and

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[5] The Marketing Research Corporation of India : A Survey of Export Potential of Tea and Tea Products, (New Delhi, 1971).

[6] Government of India : Report of the Plantation Enquiry Commission : Part I - Tea (New Delhi, 1956)

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sixties a price advantage over India in both London and domestic auction markets and the adverse trends might have hit primarily Indian teas in the U.K. Moreover, despite the rising costs of production of Indian 'quality' blends, the British Government repeatedly refused permission to Blenders to raise the retail prices of quality blends[7]; thus motivating the blenders to introduce new cheaper blends to the consumers as substitutes to the existing highly-priced 'quality' blends. A similar process of substitution may have been initiated by the Blendors not only in the U.K. market alone, but also in the other markets too, as can be inferred from the following report of a tea-export : " One (i.e. a blendor) admitted that he had generally reduced the percentage of Indians in his blends over a 5-year period (in Canada) without changing the basic character. I believe the same is true in the U.S.A. market where Indian imports have lost grounds to East Africa and Indonesia".[8]

4.2 Price Competition in London Auction Market - 1959-68 :

4.2.1 Comparative Gains and Losses of Africa, Sri Lanka and India in World Tea Markets :

East Africa was a 'marginal exporter' of tea in World market in 1951. In volume terms, only 3 % of world exports was effected by East Africa in that year. By 1969, East Africa, however, made a considerable inroad into the duopolistic export market of tea dominated by Sri Lanka and India and her exports amounted to 13 % of the total world

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7 E. Brahmah : op. cit. p 98 and p 158.

8 J.F. Halloram : Consultant's Report in the Survey of India's Export Potential of Tea (The Marketing Research Corpn of India Ltd,

exports by volume. Over the same period, Sri Lanka also registered a rise in total exports, her percentage share in world export-volume having risen by 3 %. In 1951, Sri Lanka's share in world exports by volume was 30 % and it rose up to 35 % in 1969. India, in contrast, is characterised by a steadily declining trend. As much as 45 % of world exports by volume was commanded by India in 1951, and this share went down to 29 % in 1969 (Table 7). Indian loss was absolute and both East Africa and Sri Lanka had successfully encroached into India's territory in world export market.

As pointed out in the section above, and as can be seen from Table 1, for most part of fifties and sixties prices in domestic auctions had fallen for Sri Lanka teas, but had moved up for Indian teas. Moreover, in most years, Sri Lanka prices were lower than Indian prices. Prices in Calcutta, Cochin and Colombo auctions establish sharply the contrasting trends in movements of tea prices in these two countries. Tea prices in Calcutta and Cochin auctions had steadily risen over the last two decades, while tea prices in Colombo had remained more or less stagnant during these years. International buyers of tea might, therefore, have found it more profitable to buy tea in Colombo auctions than in Calcutta or Cochin. Since the freight rates from India and Sri Lanka to different parts of the world are virtually the same, a comparison between domestic auction prices for these two countries suggests that a price-war might have placed Indian suppliers at a disadvantage in the world market and some substitution between Indian and Sri Lanka teas might have occurred. A quantitative evaluation of this price-war may be of use and interest to the policy-makers.

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TABLE 2

Production and Exports of Indian, Sri Lanka and African Teas

	1951	1961	1965	1966	1967	1968	1969
A - PRODUCTION[+] (Mlln Kg)							
1 India	285 (48.5)	354 (41.2)	366 (38.8)	376 (38.3)	385 (39.2)	402 (38.9)	394 (37.5)
2 Sri Lanka	148 (25.2)	206 (24.0)	228 (24.2)	222 (22.6)	221 (22.5)	225 (21.8)	219 (20.7)
3 Africa	17 (2.8)	37 (4.3)	59 (6.1)	58 (5.9)	58 (5.8)	69 (6.6)	79 (7.5)
B - EXPORTS[+] (Mlln Kg)							
1 India	206 (45.0)	236 (37.8)	199 (33.2)	179 (31.6)	214 (35.1)	208 (33.5)	169 (29.1)
2 Sri Lanka	138 (30.2)	193 (35.4)	224 (37.3)	200 (35.3)	216 (35.6)	209 (33.6)	201 (34.7)
3 Africa	14 (3.0)	32 (5.9)	42 (7.0)	54 (9.6)	52 (8.6)	63 (10.1)	75 (12.9)

[+] Figures in brackets denote percentage share in total world production and exports.

Source : Tea Statistics (Tea Board, Calcutta), Various Issues

4.2.2 Methodology to study Price Competition :

Attempts to estimate elasticities of substitution have been made by many research workers.[9,10,11,12] Some of them sought 'to estimate elasticities of substitution simply by correlating over time the ratio of their export prices'. Of the several objections marshalled against this approach, one is that income elasticities of demand for the same product from different sources may be different.[13] Second, a specification bias - whose nature and direction remain unknown - is likely to be introduced as, in such a model, income, often a significantly important variable, is not incorporated at all. Third, it is not easy to derive the ordinary demand elasticities from the equations giving the substitution elasticities.[14]

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9 Tinbergen J. : Some Measurements of Elasticities of Substitution (Review of Economics & Statistics, Vol XXVIII, August 1946) pp 109-116

10 Polak J.J. : Note on the Measurement of Elasticities of Substitution in International Trade (Review of Economics & Statistics, XXXII, February 1950) pp 16-20

11 Morgan D.J. and Corlett W.J. : The Influence of Price in International Trade : A Study in Method (JRSS, Series A, Vol 114, 1951) pp 307

12 Cohen B.I. : The Stagnation of Indian Exports 1951-61, (Quarterly Journal of Economics, November 1964) pp 604-20

13 Prais S.J. : Econometric Research in International Trade : A Review (KYKLOS, 15, Fasc 3, 1962) pp 560-77

14 Harberger J.P. : Some evidence on the International Price Mechanism (Journal of Political Economy, December 1957) pp 506-21

There are two alternatives to the above approach. First, the competitor's prices may be used as a separate variable in the regression of import values on own price and income but, deflated with a general price index. Multicollinearity is a general problem in such formulations. To obviate this difficulty, some others[15, 16] have preferred 'to deflate the prices of, say, imports, by an index of competing prices rather than by a general index of prices. This, again, leads to difficulties of interpretation, on account of the implicit assumptions on the cross elasticities with respect to the prices of commodities, in general. Where the number of observations are adequate it would accordingly seem better to proceed directly by including competing prices as a separate explanatory variable'.[17]

It may be noted that no definitive conclusion can yet be drawn in this regard from the experience of the empirical exercises and the choice of a particular method is generally dependent on the objective of the research. If derivation of substitution elasticities is of prime consideration, as in the present study, then the method suggested by Cohen,[18] where the ratio of exports from two sources are directly regressed on the ratio of the respective prices, with the implicit assumption that the income elasticities are the same for teas from the

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[15] Adler E.R., Schlesinger E.R. and Westerberg D.V. : The Pattern of U.S. Import Trade since 1923 (Federal Reserve Bank, New York, 1952)

[16] Dutta M.R. : Measuring the Role of Price in International Trade : Some Further Tests (Econometrica, 33, July 1965) pp 600-7

[17] Prais S.J. : op. cit.

[18] Cohen B.I. : op. cit.

two different suppliers, is used. This method is briefly described below :

Suppose, there is only one importing country for a particular commodity, and there are two exporters of the commodity vying with each other to sell the good to this single importer. Let these two exporters be named as follows :

a = The exporting country No.1

b = The exporting country No.2

Let the quantities imported from a and b are the followings :

q^a = Quantity imported from a

q^b = Quantity imported from b.

and the respective prices are

p^a = Import prices for a's exports

p^b = Import prices for b's exports.

The basic assumption of the 'substitution model' is : the volume of imports from 'a' relative to the volume of imports from 'b' depends on the relative c.i.f. prices of the two exporters in the importing country. That is,

$$(1) \qquad \frac{q^a}{q^b} = \left(\frac{p^a}{p^b}\right)^k$$

In the absence of any third supplier, any increase in the c.i.f. prices of a supplier would lead to the reduction in that supplier's share in total volume of trade. If K, therefore, is found to be negative, country a's volume of exports is inversely related to her relative c.i.f. price.

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Again, multiplying (1) by the ratio $\left(\frac{P_b^a}{P_c^a}\right)$

one can get

$$(2) \qquad \frac{P_b^a}{P_c^a}\cdot\frac{q_b^a}{q_c^a} = \left(\frac{P_b^a}{P_c^a}\right)^{k+1}$$

Equation (2) states that if k is less than -1, then country a's market share of the value of imports is inversely related to her relative c.i.f. prices.

The underlying assumption of the above model is that the commodity supplied by the two sources are very close substitutes - with equal income elasticities of demand and cross-price elasticities of demand for all other commodities but not perfect substitutes to importers. For example, British tea importers recognise that Indian tea and Ceylonese tea are not perfect substitutes, but after they are blended, the two types of tea cannot be distinguished by the retail purchaser, and hence, they have the same income elasticities and cross-price elasticities of demand'.[19] This assumption is highly debatable, especially in a country like the U.K. where consumers are likely to have grown preference for certain blends made from certain 'quality' teas imported from certain producers - as pointed out earlier. Nonetheless, as a first approximation, it may be meaningful to quantify the substitution elasticities from a simplified model such as one described here.

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[19] Cohen B.I. , op. cit.

4.2.3 Data and Variables of the model :

In the empirical exercise, India and Sri Lanka are the two exportors considered, while imports from these two exportors into the following six importing countries have been studied :

1 The U.K.,

2 Ireland,

3 West Germany,

4 The Netherlands,

5 The U.S.A. and

6 Canada.

Indian and Sri Lanka exports (in million lbs) into each of these six countries are compiled from the Annual Bulletin of Statistics (International Tea Committee, London).

Construction of an appropriate price series poses a problem. London auction prices do not reflect the country-preferences in regard to quality — each country imports tea according to the preferences of her domestic consumers and the taste and habit patterns vary widely from country to country. London auction prices being an average of the prices of all types of teas are not the appropriate variable to use. 'Unit Value' of tea imported into each of these countries would be a better representative of the respective import-price of each of these countries than the average London auction price. Unit values of Indian and Sri Lanka teas imported into these six countries are, therefore, taken as the country import prices. These prices are obtained in Rupees per Kg from various issues of the Tea Statistic (Tea Board,

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India) and are converted to US $ by multiplying with respective exchange rates and then deflated by the National Price Index of the corresponding importing country.

Period covered under study is 1959 to 1968 - except in case of West Germany for which [illegible] not available at the time of experimentation.

4.2.4 Empirical Findings :

Results are summarised in Table 3 below. Five out of six countries studied show that during 1959 to 1968 Sri Lanka did enjoy a price advantage over India. These five countries are the U.K., Ireland, West Germany, The U.S.A. and Canada. The substitution elasticities are negative in all these cases. The only exception is the Netherlands for which the elasticity comes out with a +ve sign. The U.K., West Germany, The U.S.A. and Canadian equations are statistically not unsatisfactory. The coefficients of substitution, K, are statistically significant in all these four functions.

West Germany presents an interesting case. The elasticity of substitution, K, in this case is less than - 1, indicating that the value, and not volume, of Indian imports is inversely related to the c.i.f. prices of Indian tea in West Germany. For all the other countries, it is the volume and not value that is related to the c.i.f. prices of Indian tea exports.

TABLE 3

Price Competition between India and Sri Lanka in Different Markets : 1970 - 1977

[Estimated function : $\log (p_i^1/p_i^2) = \alpha + \beta \log (p^1/p^2)$]

Sl No	Market	α	t_α	t_β	$\bar{R}^2$	D.W.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	U.K.	3.185	- 0.575	0.638	14.24	1.27
			(2.34)	(5.49)		
2	Ireland	2.694	- 0.329	0.247	31.39	1.42
			(0.72)	(0.52)		
3	West Germany	4.652	- 1.306	0.580	40.90	1.73
			(2.01)	(4.05)		
4	Netherlands	11.649	0.379	0.213	25.43	1.23
			(0.62)	(0.38)		
5	U.S.A.	3.219	- 0.630	0.541	14.84	1.71
			(1.82)	(3.31)		
6	Canada	3.736	- 0.873	0.681	19.18	1.44
			(2.63)	(6.92)		

Note : Degrees of Freedom for F - Statistic is (1, 8) for all the functions except in case of West Germany for which it is (1, 7).

4.3 Import Demand for Indian Tea in the U.K.

4.3.1 Past Studies on Tea :

Many attempts to estimate the import demand function for Indian tea in world markets were made in the past. But most of these studies failed to report any good results. M.R. Dutta[20] in 1965 claimed some success. Dutta reported the following least square estimate of the export demand function for Indian tea :

$$(1) \qquad X^T = 2.02 + 0.07\ t - 0.003\ p' - 0.010\ p'' - 0.003\ p + 0.003\ y$$

$$(s.e) \qquad (0.02) \quad (0.001) \quad (0.005) \quad (0.001) \quad (0.002)$$

$$\bar{r}^2 = 0.70, \quad \bar{s} = 0.07, \quad d^2/s^2 = 2.9$$

where X^T is the earnings on Indian tea exports in 1953 tea export prices, p' is the tea price in India divided by the tea price in U.K., p'' is the tea price in India divided by the tea price in Sri Lanka, p is the price of tea in London divided by the price of coffee in New York, y is the per capita income in U.K. in tea prices and t is time.

Apart from the ambiguities in the theoretical formulation of the model in the sense that Dutta's use of three price ratio variables does not have any meaningful interpretation,[21] the estimates appear to have been wrongly reported. At the initial phase of our study, we repeated Dutta's experiment. We got a disappointing function with a

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[20] M.R. Dutta : Measuring the Role of Prices in International Trade : Some Further Tests (Econometrica, Vol 3, No 33, July 1965)

[21] N. Feera : Measuring the Price Sensitivity of Indian Tea Exports : A Comment (Econometrica, Vol 39, No 1, January 1971) pp 177-8.

very low $\bar{R}^2$. In a short note we summarised our results and reported them to Dutta. In reply, Dutta summarised the problems of such single-equation estimation and expressed the opinion that simultaneous equations models for studying these kinds of commodity markets may be the answer. We take the liberty to quote the relevant parts from Dutta's letter[22] to me : ' .... I can not see any big problem of identification in any single equation model, unless you seem to suggest things which are not explicitly included in your model. Multicollinearity is, of course, the problem. I did not claim any escape from the issue, but reported, as far as possible the best results, given the constraints of the severity of multicollinearity. I am not certain if such ..... single equation models are the best research design with respect to foreign trade studies. I have convinced myself that a fresh look should be taken at designing and specifying simultaneous equation models for studying the export-import structure ..... based on quarterly' data.

Peera[23] had also repeated Dutta's experiments and reported some revised functions as follows ;

(1a) $X' = 2.0977 + 0.0664\ t - 0.0038\ p' - 0.009\ p'' - 0.0026\ p + 0.0035y$

(s.e) (0.9072) (0.0281) (0.0090) (0.0053) (0.0010) (0.0026)

(t-ratio) (2.36) (0.43) (1.82) (1.61) (1.36)

$R^2 = 0.6946 \quad \bar{R}^2 = 0.31 \quad d^2/s^2 = 2.31$

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[22] M.R. Dutta : Letter dated January 8, 1970.

[23] N. Peera : op. cit.

Equation (1a) is obviously not very encouraging. $\bar{R}^2$ is low and none but [illegible] significant coefficients.

Dutta also reported the following normal equation in his paper ;

(2) $X^T = 1.67 + 0.01\ t - 0.011\ p' + 0.003\ y$, $\bar{R}^2 = [illegible]$

(s.e.) (0.02) (0.005) (0.002)

Peera's corrected version of this equation is the following ;

(2a) $X^T = 1.655 + 0.0411\ t - 0.0106\ p' + 0.0029\ y$, $\bar{R}^2 = 0.1$

(s.e) (0.0250) (0.0058) (0.0027)

(t-ratio) (1.64) (1.84) (1.05)

Once again, the fit is poor, and $\bar{R}^2$ much lower than Dutta's r .

4.3.2 Deficiencies of the Studies Reported Above : A New Experiment

Notably, such models as described above completely ignore the problem of demand for 'quality' and 'common' tea separately. Substitution between very high quality teas from different 'growths' are likely to be uncommon, as pointed out before; also, blending entails some amount of complementarity between high 'quality' tea of a blend and medium and low quality tea that go as 'fillers' into that blend. All the above models tacitly assume that teas from two sources are perfect substitutes which is not, at all, the reality. It is possible that for imports of a certain variety of 'Indian' tea, in parts of a particular type of 'Sri Lanka' tea are a necessity and vice versa, since, together they might make a perfect blend. Models seeking to explain import demand for Indian or Sri Lanka or African teas separately are usually mis-specified on this count inspite of the inclusion of the

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relative prices of different sources. It appears that in such a situation instead of maximising absolute volume of imports from a particular producing country, it would be more meaningful to explain the 'share' of a particular exporter in total imports of an importing country. Secondly, substitution between different quality-types of teas, instead of assuming that all types of tea from two different countries are perfectly substitutable, should be explicitly brought into the analysis.

A simple model to explain Indian share in total imports of Sri Lanka and Indian teas into the U.K. by means of a ratio variable of respective prices and the U.K. income is reported below :

$$(3)\qquad \frac{X_t^i}{X_t^i + X_t^{sl}} = \underset{(34.086)}{1.00238} - \underset{(0.025)}{0.000005}\,\frac{P_t^i}{P_t^{sl}} - \underset{(11.676)}{0.01688}\; Y_t^{uk}$$
$$\qquad\qquad (0.02941)\quad (0.00021) \qquad\qquad (0.00145)$$

$$\bar{R}^2 = 0.89696 \qquad F = 70.115 \qquad D\,F = (2, 14)$$

$$S = 0.0172 \qquad DW = 2.0161 \qquad \text{Period} = 1952\text{-}71$$

where

X_t^i = U.K. Imports from India, 10^6 lbs, year t.

X_t^{sl} = U.K. Imports from Sri Lanka, 10^6 lbs, year t.

P_t^i = Weighted Average Prices of North Indian and South Indian Teas in London Auctions (Weights are respective teas sold)

P_t^{sl} = Price of Sri Lanka teas in London Auction Market.

Y_t^{uk} = U.K. Income, 10^9 £ , deflated by the Cost of Living Index in U.K. (1958 = 100)

and X_t^{sl} denote imports 'retained' for internal consumption in the U.K. after subtracting the 're-exports' from the total imports.

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From statistical consideration, equation (3) is much more acceptable to the equations of Dutton or Isaac quoted above. However, the price-ratio variable is insignificant - in fact no different from zero. This casts a doubt on the specification of the model, especially as in the section 4.2.4 above, in the double-log equations (Table 3) the price ratio turns out to be significant. But, first, one should note that the dependent variables are different in the two sets. Secondly, the presence of a very strong negative trend factor might have subsumed a part of negative price effect turning it into an unimportant variable. What is significant here is the evidence of presence of an adverse trend operating against Indian imports into the U.K. This may be taken as an indirect evidence supporting the hypothesis that the U.K. blenders might have taken up the substitution of Indian blends in the U.K. market by 'new' blends containing cheaper teas from 'growths' other than Indian.

4.4 International Substitution : Quality revisited

4.4.1 Determinants of Substitution between different quality teas from India, Sri Lanka and Africa in the U.K. market :

Having established the fact that an adverse trend for Indian teas has been operating during the sixties in the U.K. market, it would be of interest to find out which 'quality-grades' have been suffering most from this unfavourable trend. Substitution in high-quality teas like 'Darjeeling' teas with distinctive characteristics is not easy. It appears on apriori grounds that substitution takes place mostly in the range of 'medium' to 'low' quality teas.

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North Indian teas have the widest range of qualities, some of these being the highest priced in the world, some others among the cheapest. Sri Lanka has broadly three types of tea : 'High-Grown', which is the best quality tea from Sri Lanka, 'Medium-Grown' and 'Low-Grown', the latter two varieties are 'common' teas. Prices of most African teas are generally lower in auctions than the prices of the best varieties of Indian and Sri Lankan teas, and, therefore, quality-wise African teas can be considered to be of medium to low quality range. However, African prices may be low in auctions due to the late entry of Africa into world tea trade and consequent lesser familiarity of African teas with the consumers. African teas are generally produced from 'bushes' developed from newly-developed 'clones' and are made by the C.T.C. method giving them quick-brewing and high liquoring properties which are fast gaining popularity with the consumers in the Western countries particularly with the introduction of instant teas and tea-bags. Quick-brewing and high-liquoring teas are generally suitable for preparation of instant teas and tea-bags.

Table 4 and Table 5 present a comparative account of prices of teas from different regions sold in London and domestic Auctions.

Table 4 giving the London auction prices gives a fair idea of the 'quality types' of teas from different countries. Among all varieties of African teas, Kenya teas have the highest price and are comparable pricewise with the 'Medium-grown' Sri Lanka teas and/or the medium-quality Indian teas. Different zones in India generally produce different quality teas. But data on zonewise prices of Indian teas sold in London auction are available only from 1967 onwards and are,

TABLE 4

Annual Average Prices of Tea Sold at London Auctions :

(Pence/lb)

	Origin		1967	1968	1969
1	North India :	Excise Zone I	47.1	43.1	38.3
		Excise Zone II	48.3	45.3	39.1
		Excise Zone III	76.4	-	-
		Excise Zone IV	55.4	49.8	47.7
2	South India :	Excise Zone I	-	40.2	32.6
		Excise Zone II	-	42.3	33.6
		Excise Zone IV	-	49.4	55.5
3	Sri Lanka :	High Grown	54.4	50.6	51.6
		Medium Grown	51.1	48.8	46.1
		Low Grown	43.2	43.7	37.4
4	Kenya		52.1	48.7	48.2
5	Uganda		48.4	43.0	40.0
6	Tanzania		50.3	46.3	43.4
7	Malawi		36.4	40.6	28.1
8	Congo		38.6	41.1	35.8
9	Mozambique		30.6	39.3	25.9

Source : Annual Bulletin of Statistic (International Tea Committee, London) 1970, p 48

TABLE 5

Annual Average Prices of Tea sold in Auctions in Producing Countries
(Excluding Export and Excise Duties and Cess)

Auction Centre	1962	1963	1964	1965	1966	1967	1968	1969
1 CALCUTTA : Leaf								
a Assam	2.53	2.40	2.25	2.44	2.62	2.71	2.47	2.66
b Cachar	1.96	2.05	1.94	2.14	2.21	2.23	2.01	2.17
c Darjeeling	3.37	3.23	3.46	3.92	4.34	4.60	4.38	5.08
d Dooars	2.10	2.12	2.03	2.25	2.28	2.36	2.17	2.22
e Terai	2.08	2.15	2.03	2.25	2.27	2.40	2.15	2.29
Dust								
a Assam	2.36	2.24	2.20	2.36	2.46	2.35	2.40	2.45
b Cachar	1.92	2.08	1.98	2.23	2.28	2.17	2.04	2.07
c Dooars	2.01	2.10	2.03	2.26	2.28	2.23	2.22	2.19
d Terai	1.87	2.02	1.96	2.22	2.24	2.23	2.14	2.18
2 COCHIN : Leaf	2.08	2.11	2.16	2.21	2.20	2.62	2.41	2.35
Dust	1.70	1.93	2.01	2.06	2.06	2.29	2.14	2.14
3 COLOMBO								
a High Grown	2.25	2.08	2.14	2.10	2.01	1.99	2.10	1.98
b Medium Grown	1.67	1.57	1.63	1.70	1.50	1.51	1.72	1.44
c Low Grown	1.59	1.55	1.51	1.67	1.38	1.21	1.65	1.39

Source : Op. cit., pp 50-51

therefore, inadequate for any analysis of substitution.

4.4.2 The Methodology :

In the empirical exercises reported below data on prices of various "regional growths" of North and South Indian tea sold in Calcutta and Cochin are used (Table 5). A study of the prices in London (Table 4) and domestic auctions (Table 5) of various 'growths' clearly shows that the four following broad quality-groups of teas are sold in auctions :

(1) Very high quality teas - 'Darjeeling teas' alone falls in this group.

(2) High quality teas - 'Assam teas' and some 'High-grown' Sri Lanka teas comprise this group.

(3) Medium quality teas - 'Cachar', 'Dooars', 'Terai', 'Cochin Leaf', Sri Lanka 'High' and 'Medium Grown', 'Konya', 'Uganda' and 'Tanzania' teas belong to this group.

(4) Low quality teas - All other varieties of tea.

A word of caution. All the above prices are averages of all prices in each group and represent qualities in only a broad way. Each group of tea has a wide range of qualities, the prices of which are evened out by averaging. It is known that some 'High Grown' Sri Lanka teas are comparable pricewise to the best varieties of 'Darjeeling' teas. Similar assertions would hold true for many other types also. Further, since the method of averaging does not take into account any weightages for different quality grade of teas, quality-representations by such average prices is at best a very crude first

approximation.

A more formidable difficulty in estimating equations for different quality teas is that separate figures for 'regionwise' teas sold in these auctions are not available. In the absence of these, 'shares' of all North Indian or South Indian teas in total sales of teas in London auctions have been used to represent different quality-grades of tea. Underlying assumption of this procedure is that the shares of different quality teas remain more or less fixed as their supplies move up or down in more or less fixed proportion of the total output. Since in India and Sri Lanka, fluctuations in production are never very drastic, this assumption may not be totally inappropriate.

The empirical exercise seeks to explain substitution between four groups of teas :

Group 1	: North Indian	Versus	Sri Lanka
Group 2	: South Indian	Versus	Sri Lanka
Group 3	: South Indian	Versus	Africa
Group 4	: Sri Lanka	Versus	Africa

Group 1 experiments have 4 equations :

(1) $\frac{\text{North Indian}}{\text{North Indian + Sri Lanka}} = f\left(\frac{\text{Darjeeling price}}{\text{High Grown price}}, \text{Time}\right)$

(2) $\frac{\text{North Indian}}{\text{North Indian + Sri Lanka}} = f\left(\frac{\text{Assam price}}{\text{High Grown Price}}, \text{Time}\right)$

(3) $\frac{\text{North Indian}}{\text{North Indian + Sri Lanka}} = f\left(\frac{\text{Cachar price}}{\text{Medium Grown Price}}, \text{Time}\right)$

(4) $\frac{\text{North Indian}}{\text{North Indian + Sri Lanka}} = f\left(\frac{\text{Dooars price}}{\text{Medium Grown Price}}, \text{Time}\right)$

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Left hand side denotes ratio of respective sales in million Kgs in London auction.

Group 2 experiments are the followings :

$$(5)\quad \frac{\text{South India}}{\text{South India + Sri Lanka}} = f\left(\frac{\text{Cochin Leaf Price}}{\text{High Grown Price}}, \text{Time}\right)$$

$$(6)\quad \frac{\text{South India}}{\text{South India + Sri Lanka}} = f\left(\frac{\text{Cochin Leaf Price}}{\text{Medium Grown Price}}, \text{Time}\right)$$

$$(7)\quad \frac{\text{South India}}{\text{South India + Sri Lanka}} = f\left(\frac{\text{Cochin Leaf Price}}{\text{Low Grown Price}}, \text{Time}\right)$$

In Group 1 and Group 2, the prices are as of respective domestic auctions.

Group 3 reports the following functions :

$$(8)\quad \frac{\text{South India}}{\text{South India + African}} = f\left(\frac{\text{London South India Price}}{\text{London African Price}}, \text{Time}\right)$$

$$(9)\quad \frac{\text{South India}}{\text{South India + Kenya}} = f\left(\frac{\text{London South India Price}}{\text{London Kenya Price}}, \text{Time}\right)$$

$$(10)\quad \frac{\text{South India}}{\text{South India + Uganda}} = f\left(\frac{\text{London South India Price}}{\text{London Uganda Price}}, \text{Time}\right)$$

$$(11)\quad \frac{\text{South India}}{\text{South India + Tanzania}} = f\left(\frac{\text{London South India Price}}{\text{London Tanzania Price}}, \text{Time}\right)$$

$$(12)\quad \frac{\text{South India}}{\text{South India + Malawi}} = f\left(\frac{\text{London South India Price}}{\text{London Malawi Price}}, \text{Time}\right)$$

$$(13)\quad \frac{\text{South India}}{\text{South India + Mozambique}} = f\left(\frac{\text{London South India Price}}{\text{London Mozambique Price}}, \text{Time}\right)$$

Group 4 has only one equation :

$$(14)\quad \frac{\text{Sri Lanka}}{\text{Sri Lanka + Africa}} = f\left(\frac{\text{London Sri Lanka Price}}{\text{London African Price}}, \text{Time}\right)$$

4.4.3 Results and Conclusions :

Results are summarised in Tables 6, 7 and 8 below :

The fourteen estimated equations can be categorised into two groups depending on some general characteristics. The first group consists of equations (1) through (4) and equations (11) through (13). Coefficient of the price-ratio variable, in each of these equations, comes out with a wrong positive sign indicating a mis-specification of the model. Durbin-Watson Statistic is inconclusive in case of equation (1), and indicates the presence of positive autocorrelation in case of equations (11), (12) and (13). Significantly, the first four equations, i.e., equations (1) through (4) in this group, relate to the so-called 'quality' teas, prices of which are, in general, higher than the other teas sold in London. These four equations represent the 'quality' group. The last three equations, i.e. equations (11), (12) and (13), on the other hand, represent the 'lowest grade' teas sold in London auction market. No 'substitution' between teas falling in these two categories, i.e. of 'high-quality' and 'low quality' teas is indicated by the experiments reported below(Table 6).

In contrast, the case of 'medium-quality' teas is different. The second group, with equations (5) through (10), represents such 'medium-quality' teas sold in London auctions. In each of these equations, price has the correct sign, although the level of statistical significance varies from equation to equation. It is significant to note that price-ratio is important in case of equation (5) representing the substitution between Cochin 'Leaf' tea and Sri Lanka 'High Grown' tea.

TABLE 6

Substitution Experiments with the 'Highest' and 'Lowest' Quality Teas (Equations 1, 2, 3, 4, 11, 12 and 13)

(Period : 1952-71)

Equation Number	Independent Variables[1]			$\bar{R}^2$	S
	Constant	Price-Ratio	Trend	F	DW
(1)	(2)	(3)	(4)	(5)	(6)
1	0.7277	+ 0.1901	- 0.0252	0.6012	0.0827
	(0.3665)	(0.0806)	(0.0067)	15.325	1.1024
	(10.940)	(1.354)	(3.752)	(2,17)	
2	0.6213	+ 0.1924	- 0.0184	0.7602	0.0642
	(0.0566)	(0.0509)	(0.0025)	31.109	1.8743
	(10.986)	(3.783)	(7.351)	(2,17)	
3	0.6482	+ 0.1901	- 0.0213	0.8725	0.0468
	(0.0329)	(0.0294)	(0.0019)	66.027	1.8822
	(19.707)	(6.474)	(11.094)	(2,17)	
4	0.6806	+ 0.1671	- 0.0222	0.8472	0.0512
	(0.0329)	(0.0295)	(0.0022)	53.670	2.2354
	(20.671)	(5.670)	(10.221)	(2,17)	
11	1.1562	+ 0.0092	- 0.0315	0.7183	0.1136
	(0.0581)	(0.0161)	(0.0044)	25.220	0.2770
	(19.902)	(0.572)	(7.090)	(2,17)	
12	0.7263	+ 0.0859	- 0.0196	0.5756	0.0993
	(0.1918)	(0.1511)	(0.0040)	13.883	0.8220
	(3.788)	(0.568)	(4.976)	(2,17)	
13	0.9061	+ 0.0961	- 0.0313	0.7477	0.1075
	(0.2450)	(0.1798)	(0.0043)	29.148	0.8936
	(3.698)	(0.534)	(7.337)	(2,17)	

[1] Bracketed figures in the first line under the coefficients denote the 'standard errors', and in the second line 't-ratios'.

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Furthermore, time trend is accompanied by statistically significant negative coefficients in all these equations indicating that market trends in these teas had been against India over the last two decades. Price ratios of the varieties of teas, South Leaf and Sri Lanka High Grown, are close to each other (Table 7) which provides with a quantitative assertion of the statement made above in the first section of this Chapter : 'South Indian teas, especially when grown in the higher districts ..... are sometimes used in blends in place of similar-tasting Sri Lanka'. (Table 7)

Experiments with South India/Sri Lanka 'medium-quality' substitution, as reported through equations (8), (9) and (10), also tell a similar story (Table 8). It appears that 'Kenyan' teas are probably the best substitutes for the South Indian 'Leaf' teas and the U.K. Blenders might have been substituting South Indian teas mainly with Kenyan teas and, to some extent, with the other varieties of teas from the other African growths. Again, the price differentials between Kenyan and South Indian Leaf varieties are the least of all other combinations. Results in this group have, however, to be interpreted with caution since the price-ratio variables, although having correct signs have low levels of significance. Moreover, the Durbin-Watson Statistic indicates presence of autocorrelation in all the three equations. But, the equations are acceptable on other statistical criteria . Values of $\bar{R}^2$ are reasonably high, and the standard error of estimates are low.

TABLE 7

Substitution Experiments with the 'Medium' Quality Teas
(Equations 5, 6 and 7)

(Period 1952-71)

Equation Number	Independent Variables			$\bar{R}^2$ F DF	S DW
	Constant	Price-ratio	Time		
(1)	(2)	(3)	(4)	(5)	(6)
5	0.4420	- 0.1192	- 0.0093	0.7737	0.0412
	(0.0425)	(0.0544)	(0.0022)	33.473	0.5237
	(10.396)	(2.192)	(4.239)	(2,17)	
6	0.3625	- 0.0023	- 0.0126	0.7098	0.0467
	(0.0348)	(0.0279)	(0.0019)	24.237	0.3348
	(10.402)	(0.081)	(6.696)	(2,17)	
7	0.4071	- 0.0645	- 0.0098	0.7554	0.0429
	(0.0338)	(0.0632)	(0.0023)	30.333	0.3639
	(12.034)	(1.781)	(4.233)	(2,17)	

TABLE 8

Substitution Experiments with the 'Medium' Quality Teas
(Equations 8, 9 and 10)

(Period 1952-71)

Equation Number	Independent Variables			$\bar{R}^2$ F DF	S DW
	Constant	Price-Ratio	Trend		
(1)	(2)	(3)	(4)	(5)	(6)
8	0.7543	- 0.0296	- 0.0296	0.8634	0.6810
	(0.2368)	0.1831	(0.0039)	61.072	0.9138
	(3.185)	(0.161)	(7.557)	(2,17)	
9	1.5003	- 0.2593	- 0.0492	0.8608	0.1051
	(0.2493)	(0.2078)	0.0056	59.751	0.4169
	(6.019)	(1.248)	(8.693)	(2,17)	
10	1.2091	- 0.0782	- 0.0268	0.5723	0.1265
	(0.3018)	(0.2518)	(0.0062)	13.712	0.2059
	(4.006)	(0.311)	(4.310)	(2,17)	

CHAPTER 5

World Tea Imports : Dynamics of Importer Behaviour

5.1 Dynamic Adjustment Processes in Tea Imports and Consumption

5.1.1 Sources of dynamic adjustments :

Three factors necessitate dynamic adjustments in tea imports and consumption. First is importer's requirement to maintain an 'optimal' stock to even out the effects of fluctuations in auction prices. This is stock adjustment by importers. Importers in different countries are likely to differ in their stock adjustment behaviour. An importer from a low-income country enjoys lesser facilities for warehousing, clearing and credit-availability than his counterpart in a high income country. A 'traditional' importer may be more efficient in handling her stocks than a 'new' importer having limited experience in this field.

Second, dynamic processes are sometimes initiated by the adjustments between the auction and retail prices. No country likes to experience or allow wide fluctuations in domestic retail prices and the tea-importing countries try to minimise retail-price fluctuations of tea vis-a-vis the fact that fluctuations in auction prices of tea are generally beyond their control. In the U.K., there is, on the one hand, a system of 'Resale price maintenance'[1] in retail markets where Blenders

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[1] Miss Cohen R., Kahen R.F., Reddaway W.B. and Robinson J : Statement submitted to the Committee on Resale Price Maintenance (Oxford Economic Papers, Vol 26, No 2, May 1964) pp 113-21:

'The object of the system of resale price maintenance is precisely to prevent the emergence of competition in prices, and its consequences is to foster a high and gradually rising level of retail margins'.

and Packers fix up a 'statutory' price below which the retailers are not allowed to sell and, on the other, there is a consistent resistance from the U.K. government to any move by the Blenders to raise the retail prices.[2] These imperfections hinder fluctuations in auction prices to be quickly translated into fluctuations in consumer prices and give rise to a process of 'lagged' adjustments in time between these two sets of prices.

Third, consumption of a beverage, like tea, depends largely on taste and habit patterns of the society developed over a long span of time. These established habits change only if a basic change occurs in the market structure in terms of pricing and/or distribution of the product. The U.K. Blenders and Packers, for example, have probably been substituting the 'quality' Indian tea in Indian blends by 'common' varieties of Indian tea so as to counteract the effects of rise in relative prices of Indian 'quality' teas as compared to Sri Lanka and African teas. Such an action surely results in a deterioration of the overall quality of Indian blends which are likely to be quickly identified by the 'seasoned' consumers of 'Indian blends' in the U.K. Due to long-standing consumption habits, such actions by blenders may not lead to an immediate shift from Indian to the other blends of teas. The shift may come about only after a certain lag in time resulting in a dynamic response pattern of consumers to the situation.

Stock and/or habit adjustments are, therefore, as important an economic variable as price and income in explaining tea imports and consumption in a country over a long range of time. More so, because

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[2] E. Brahmah : op. cit; p 98 and p 158

such habit adjustments may lead to a shift in the demand curve as a whole and may open up the possibility[3] of export growth in primary commodities even in the face of price-inelasticity.

5.1.2 Consumption Demand Function for Tea : Estimation Problems

Stock adjustment in tea is essentially a behaviour of importers, not of the 'actual consumers'. Tea is a highly perishable commodity - its fragrance and aroma appear to be the quickest to suffer on storage - and consumers do not maintain domestic stocks in substantial amount. Importers' stock-adjustment behaviour can be explained by estimating two sets of demand functions for tea :

(a) Import demand function with 'auction prices' as one of the explanatory variables, and

(b) Consumer demand function with 'retail prices' as an explanatory variable.

Estimation of Import demand functions for tea does not pose too many problems, but, the consumption demand functions do.

There are many problems to estimate a dynamic model for consumption. First, in any such dynamic set-up use of 'stocks' is essential. But, absence of data on 'stocks in retail channels' makes it impossible to compile the series for 'actual consumption' for most countries. Second, data on 'retail prices of tea in most importing countries are

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3 R. Nurkse : Dynamic Aspects of Trade Theory in Haberler G. and R.M. Stern (ed) : Economic Essays by R. Nurkse (Harvard U.P., Cambridge, Mass, 1962) p 321 :

'Price inelastic demand is not an obstacle to growth through primary commodity exports if the demand schedule itself is vigorously upward shifting'.

not available. Demand functions are thus constrained to use the auction prices, which, at best, reflect the fluctuations in auction demand. It is true that auction demand is 'derived' from consumer demand, but due to the presence of 'engineered distortions' in market structures in most countries consequent to controls like 'resale Price maintenance', auction prices are poor substitutes for 'retail' prices in consumption functions.

Import, and not consumption demand functions have, therefore, been estimated and reported in this chapter. It may be noted that in countries where systems similar to that of Resale Price maintenance are not in force, fluctuations in auction prices are likely to be reflected in 'retail' prices without any appreciable time-lag. Import demand functions, in such cases, are virtually identical to the consumption demand functions.

5.2 The Methodology

5.2.1 Dynamic Set-up of Houthakker and Taylor :

Houthakker and Taylor's 'dynamic model expresses the generally accepted idea that current decisions are influenced by past behaviour. To make this idea operational, a particular type of relationship between the past and the present is postulated. The effect of past behaviour is assumed to be represented entirely by the current values of certain 'state variables', of which inventories are a concrete (but not the only) example. These state variables themselves are in turn changed by current decisions, and the net result is that of a "distributed lag" : Current behaviour depends on all past values of the predetermined variables, though more on recent values than on very

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remote ones'.[4]

The hankering ... [illegible] ... variable ... three ... equation model which, ... [illegible] ... time ... [illegible] ... Data. The model is formulated in ... [illegible] ... and a discrete ... [illegible] ... is used to derive the estimating ... [illegible] ...

Let us define :

$M(t)$ = Rate of consumer demand at time t

$P(t)$ = Price paid at time t

$Y(t)$ = Rate of income of the consumer at time t

$S(t)$ = Value of the 'state variable' at time t

$$(1) \qquad M(t) = a + b\,S(t) + c\,Y(t) + e\,P(t)$$

The model assumes that current demand is dependent on current income and price as well as on current values of the 'state variable' which represents the past behaviour.

The state variable, $S(t)$, requires some explanation. In case of durable goods, $S(t)$ indicates the 'accumulated stock' of the commodity. The greater the level of accumulated stock of such a commodity the lower is the rate of current demand for it. As a result, we may expect the sign of the coefficient of the state variable to be negative, i.e. $b < 0$.

The state variable, on the other hand, may be interpreted as "psychological stock" of perishable consumer items whose consumption

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[4] H.S. Houthakker and L.D. Taylor : Consumer Demand in the United States, 1929-1970 (Harvard U.P., Cambridge, Mass, 1966) p 8

largely depends on already-established habit of the consumers. Other things remaining the same, the greater the level of this "psychological stock", the higher may be the current rate of demand (or consumption) of such habit-forming commodities; consequently, $b > 0$.

Apart from these two general classes of commodities, there may be a third one where neither inventory-accumulation nor habit-formation holds good. In this case, $b = 0$, and we would be back to the world of 'static' demand functions.

A more difficult problem is encountered when the question of 'measurability' of the state variable is looked into. Though the physical stocks of durables can be measured easily, the 'psychological stocks' as depicted by the habit-formation are not amenable to such quantification. 'Even for durables, where the state variable has a concrete interpretation, it is desirable to eliminate it'. Stock-formation in a market generally follows complicated non-linear structures not easily specifiable in a model and oversimplification of the process through straightforward, linear approximations brings in an element of mis-specification in the model. It is, therefore, desirable to 'catch' the effects of stocks indirectly and to avoid explicit occurrence of a stock-variable in models where description of stock-formation is not the primary objective.

Houthakker and Taylor eliminate the stock (equivalently, the 'state') variable from the model through a series of assumptions. First, they postulate the following 'accounting identity' :

(2) $\dot{S}(t) = X(t) - Y(t)$, where

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$\dot{S}(t)$ denotes the rate of change of physical (or psychological) stocks around time t and $W(t)$, the rate of 'depreciation' of that stock at the same time.

Next, a constant depreciation rate is assumed, thereby implying the 'declining balance' method of depreciation :

(3) $W(t) = d\,S(t)$; with $-\infty < d < \infty$

Now, from (3) one can rewrite (2) as

(4) $\dot{S}(t) = M(t) - d\,S(t)$

Eliminating $S(t)$ from (4) using (1),

(5) $\dot{S}(t) = M(t) - \frac{d}{b}\,[\,M(t) - a - c\,Y(t) - e\,P(t)\,]$

Differentiating (1) with respect to time and substituting (5) for $\dot{S}(t)$,

(6) $\dot{M}(t) = b\,M(t) - d\,[\,M(t) - a - c\,Y(t) - e\,P(t)\,] + c\,\dot{Y}(t) + e\,\dot{P}(t)$

On simplification, this reduces to :

(7) $\dot{M}(t) = ad + (b-d)\,M(t) + c\,\dot{Y}(t) + cdY(t) + e\,\dot{P}(t) + deP(t)$

This is a first-order differential equation involving only the observable quantities M, P and Y.

Equation (7) to be estimable needs to be transformed into a discrete difference equation. This is done by Houthakker and Taylor through a series of algebraic manipulations[5] after which the following

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[5] Houthakker H.S. and Taylor L.D. : op. cit.

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estimating equation containing only observable variables M, P and Y is obtained :

$$(8) \qquad M_t = B_0 + B_1 M_{t-1} + B_2 \Delta Y_t + B_3 Y_{t-1} + B_4 \Delta P_t + B_5 P_{t-1}$$

Here 't' is written as subscript to indicate the 'discrete nature' of the equation. 'Δ' denotes the first difference of the relevant variables over t^{th} and $(t-1)^{th}$ time-periods.

From the B-coefficients of equation (8), we can recalculate the original parameters a, b, c, d and e of the basic equation (1). There is a problem of over identification, however, of the original parameters, which has been taken care of by Houthakker and Taylor by the use of a special type of estimating procedure, which we call 'Constrained Least Squares' method (CLS) and which has been used in the empirical exercises reported below :

5.2.2 The Bergstrom Set-up

An alternative dynamic model of demand where the 'state' variables do not appear has been suggested by A.R. Bergstrom and has been used by Houthakker and Taylor in their work[6] cited above. Bergstrom views the dynamics of consumption as a process wherein consumers attempt to bring the 'actual' consumption close to a 'desired' level, rather than as a process of adjustments of physical or psychological stocks : Symbolically, Bergstrom formulates the model as :

$$(9) \qquad \dot{M} = \theta (\bar{M} - M) \ ,$$

$$(10) \qquad \bar{M} = a + c\,Y + e\,P, \quad \text{where}$$

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[6] Houthakker H.S. and Taylor L.D. : op. cit.

M is the rate of consumption overtime, $\hat{M}$, the actual level and M, the desired level, of consumption.

As in Houthakker's model, similar problems of estimation are encountered here too. The difficulty is overcome with the help of some assumptions and an 'estimable' equation whence the original parameters can be recalculated is worked out. This 'estimating equation' is given below :

$$(11) \quad M_t = B_o + B_1 M_{t-1} + B_2 (Y_t + Y_{t-1}) + B_3 (P_t + P_{t-1})$$

5.2.3 Estimated Demand Functions

The foregoing outlines our approach for analysis of demand behaviour in importing countries. We go about estimating demand relationships countrywise. For each of these countries, several versions of static and dynamic demand models have been estimated as detailed in Table 1.

Equations 4, 5 and 6 of Table 1 are estimated using the special method named 'Constrained Least Squares' (CLS), since the original parameters of the basic models are overidentified in these equations; 'ordinary Least Squares' (OLS) estimates of these equations are also obtained ignoring the problem of overidentification. Equations 1 through 3 and 7 through 13 have been estimated by OLS. For some of the countries, a dummy variable is used – the nature of the dummy is explained while discussing the relevant country. For each of the countries, 16 variants of demand functions are fitted to the data, and when the dummy variable is used, this set of sixteen equations are repeated with the dummy. Period covered in the study is 1951-68, both

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TABLE 1

S No	Nature of the Model		Form of the Equation
(1)	(2)		(3)
1	Static, Linear	(1)	$M_t = B_o + B_1 Y_t + B_2 P_t$
2	Static, Non-Linear	(1)	$M_t = B'_o Y_t^{B_1} P_t^{B_2}$ $(B_o = \ln B'_o)$
3		(2)	$e^{M_t} = B'_o Y_t^{B_1} P_t^{B_2}$ $(B_o = \ln B'_o)$
4	Dynamic, State-Adjustment (Houthakker-Taylor)	(1)	$M_t = B_o + B_1 M_{t-1} + B_2 Y_t + B_3 Y_{t-1} + B_4 P_t + B_5 P_{t-1}$
5		(2)	$\Delta M_t = B_o + B_1 \Delta Y_t + B_2 Y_{t-1} + B_3 \Delta P_t + B_4 P_{t-1}$
6		(3)	$\Delta M_t = B_o \Delta Y_t + B_1 Y_{t-1} + B_2 \Delta P_t + B_3 P_{t-1}$
7		(4)	$\Delta M_t = B_o \Delta Y_t + B_1 \Delta P_t$
8		(5)	$M_t = B_o + B_1 M_{t-1} + B_2 Y_t + B_2 P_t$
9		(6)	$M_t = B_o + M_{t-1} + B_1 \Delta Y_t + B_2 \Delta P_t$
10		(7)	$M_t = B_o + B_1 M_{t-1} + B_2 Y_{t-1} + B_3 P_{t-1}$
11		(8)	$M_t = B_o + B_1 M_{t-1} + B_2 \Delta Y_t + B_3 Y_{t-1}$
12		(9)	$M_t = B_o + B_1 M_{t-1} + B_2 \Delta P_t + B_3 P_{t-1}$
13	Dynamic, Flow Adjustment (Borgstrom)	(1)	$M_t = B_o + B_1 M_{t-1} + B_2 (Y_t + Y_{t-1}) + B_3 (P_t + P_{t-1})$

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years inclusive.

Attention should be drawn at this stage to a limitation of the study. Table 1 above records thirteen variants of Static and Dynamic demand models fitted to the data. Nonetheless, one can think of the Inverse Semi-Logarithmic equation given by

$$(12) \qquad M_t = e^{(B_o + B_1 Y_t + B_2 P_t)}$$

or, of Bergstrom-type model where only one variable – let us say, income, is significant :

$$(13) \qquad M_t = B_o + B_1 M_{t-1} + B_2 (Y_t + Y_{t-1})$$

It has not been possible to include all such variants. Shortage of computer time is the main reason for the omission of these admissible functions from our experimental set. Moreover, the computer at our command was of a low core storage capacity so that even with the thirteen equations, the computer programme became quite complicated and operation became very cumbersome, and so, we abandoned the idea of experimenting with any other functional forms. Nevertheless, it may be emphasised that the set of included equations is fairly exhaustive.

In case of some countries more than one variant of the above demand models seem to have explained the data almost equally well. This poses a problem of choice to us : How to pick up the best function ? There are the accepted criteria of 'corrected coefficient of determination' and 'simplicity of functional form'. But we have put more importance to the dynamic structure and have sacrificed 'simplicity' and even the strength of the determination coefficient' to some

extent in some cases to pick out the dynamic models. Dynamic models - in most cases - provide us with both 'Long Run' as well as 'Short Run' elasticities of price and income, apart from the quantitative estimate of the strength of stock-behaviour. From our stand point, we need a long view more than mere simplicity.

5.2.4 Substitution between Tea and Coffee : An Important Issue

Dynamic demand models, described above, have not taken the effects of substitution between Tea and Coffee into consideration. It is not easy to incorporate a variable denoting substitution in these models. The estimation procedure is iterative and hence cumbersome and time-consuming. Addition of one more variable in the 'original' equation of Houthakker and Taylor or Borgstrom would bring in two more variables in the 'estimating function'. This would import a number of complications in the CLS (Constrained Least Squares) method of estimation. Therefore, the following 'Static' import demand functions have been estimated with a suitable 'Coffee Price' as one of the explanatory variables to see if there has been any element of substitution between Tea and Coffee.

(1) $M_t = B_o + B_1 Y_t + B_2 P_t + B_3 P_t^c$

(2) $M_t = B_o + B_1 \text{Log } Y_t + B_2 \text{Log } P_t + B_3 \text{Log } P_t^c$

(3) $\text{Log } M_t = B_o + B_1 \text{Log } Y_t + B_2 \text{Log } P_t + B_3 \text{Log } P_t^c$

where

P_t^c = Wholesale Coffee Prices in New York Spot market, US ¢/lb, year t.

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5.3 Data and Variables

5.3.1 The Dependent Variable :

M_t^i is the dependent variable, where

M_t^i = Imports for Consumption, Country i, year t, physical units (10^6 lbs)

M_t^i is computed from the 'Total Exports from all sources' to country i with suitable adjustments for 'stocks in bonded warehouses' and 're-export flows'.

5.3.2 Independent Variables : Price and Income

London auction prices have been used as the price variable in the analysis. The price series for the following five regions have been aggregated using 'value weights' as elaborated below :

(1) North India

(2) South India

(3) Sri Lanka

(4) Africa, and

(5) Malaysia.

African prices are simple averages of prices of Tea from Kenya, Uganda, Tanzania, Malawi, South Rhodesia, Cameroon, Congo and Mozambique (P.E.A.). For each of the above five regions, quantities of tea sold in London auction are available. So, total money earnings of the suppliers can be calculated. These money earnings are used as weights as follows :

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Let

P_t^i = Price (Pence/lb) of tea sold in London, country i, year t
($i = 1, 2, \ldots, m$), ($t = 1, 2, \ldots, n$)

T_t^i = Quantity of Tea of country i sold in London, year t.

E_t^i = Total Money Earnings of country i, year t, from London Auction Sales.

V_t = Total Money Earnings from All Suppliers from London Sales, year t.

Then

$$(1) \qquad E_t^i = P_t^i \quad T_t^i$$

and

$$(2) \qquad V_t = \sum_{i=1}^{m} E_t^i$$

An weighted-average series of prices of tea sold in London is then obtained from the following formula :

$$(3) \qquad \bar{P}_t = \frac{\sum_{i=1}^{m} (P_t^i \cdot E_t^i)}{V_t}$$

Instead of using 'earnings weights' as in (3) above, one could use 'tea sold' par se as 'quantity weights' and could construct the weighted average price series as follows :

$$(4) \qquad \bar{P}_t = \frac{\sum_{i=1}^{m} P_t^i \quad T_t^i}{\sum_{i=1}^{m} T_t^i}$$

It is felt that 'value weight' in comparison to 'quantify weight' gives a more appropriate representation of the market share of a supplier. The price series as given in (3), $\bar{P}_t$, is deflated by importing country i's Cost of Living Index and this price series is used in Import Demand function for country i. That is, the series is obtained as follows :

$$(5) \qquad P_t^i = \bar{P}_t \cdot (L_t^i)^{-1} \cdot 100$$

where

L_t^i = Cost of Living Index (1958 = 100), Country i, year t.

The income variable used in the model is computed as follows :

$$(6) \qquad Y_t^i = \bar{Y}_t^i \cdot (L_t^i)^{-1} \cdot 100$$

where

$\bar{Y}_t^i$ = National Income of the i^{th} Importing Country, National Currency Units, year t, 10^6 units.

Y_t^i is used in the Import Demand functions.

Population correction on M_t^i and Y_t^i is done to obtain 'per caput import for consumption' and 'per caput income', M_t^{pi} and Y_t^{pi}, which are used in the 'Per Caput Import Demand Functions' :

$$(7) \qquad M_t^{pi} = M_t^i \cdot (POP_t^i)^{-1}$$

$$(8) \qquad Y_t^{pi} = Y_t^i \cdot (POP_t^i)^{-1}$$

where

POP_t^i = Population (10^6), year t, country i.

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London auction prices are given in Pence/lb. For Import Demand function for country i, this is converted to country i's national currency/lb using the following two series of Rates of Exchange :

RTX_t^i = Rate of exchange, Country i's national currency units/US $, year t.

$RTX_t^{\$£}$ = Rate of Exchange, US $/UK £, year t.

Data have been collected from various issues of the following three publications :

(1) Annual Bulletin of Statistics (International Tea Committee, London).

(2) International Financial Statistics (International Monetary Fund).

(3) Tea Statistics (Tea Board, India).

5.3.3 Countries Considered :

The following non-tea-producing countries of the world are considered :

A. Asia

1.1. Iraq
2.2. Israel
3.3. Philippines
4.4. Thailand (Siam)

B. Africa :

5.1. U.A.R. (Egypt)
6.2. Morocco
7.3. South Africa

C. Europe :

8.1. Belgium and Luxemburg
9.2. France
10.3. Germany (West)
11.4. Italy
12.5. Netherlands
13.6. Austria
14.7. Denmark
15.8. Norway
16.9. Portugal
17.10. Sweden
18.11. Switzerland
19.12. United Kingdom
20.13. Finland
21.14. Greece
22.15. Spain
23.16. Yugoslavia
24.17. U.S.S.R.

D. America :

25.1. Canada
26.2. U.S.A.
27.3. Jamaica
28.4. Mexico
29.5. Chile

E. Oceania :

30.1. Australia
31.2. New Zealand

Apart from these 31 countries, we have estimated demand functions for a number of other countries for which no reliable series of National Income are available. In these functions, 'proxy' variables for their incomes have been used. As the Cost of Living Indices

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and the Exchange Rates are available for these countries, construction of Price Series does not pose a problem. The weighted average prices in Pounds/lb as given by the series $P_j(t)$ are converted to the national currency units of the country j, deflated with country j' Cost of Living Index. We have the following countries in this category :

F. Asia :

32.1. Jordan
33.2. Syria
34.3. Lebanon

G. Africa :

35.4. Algeria
36.5. Libya
37.6. Sudan
and 38.7. Tunisia

for all of which U.A.R. 'money' Income Index is used :

39.8. Iraq (Asia)
for which Thailand Income Index is used;
40.9. Hong Kong (Asia)
for which Japan National Income Index is the proxy;
41.10. Iran (Asia), and
42.11. Arabia (Africa)
for which Turkey - Income Index is substituted for,
43.12. Afghanistan (Asia)
for which Indian Index of National Income acts as the income variable.

Many objections can be raised in regard to the applicability of such a procedure of using proxies for income. We note that only 'indexes' have been used as proxies with the assumption that the 'fluctuations' in income indexes of the two countries in question are

of similar nature. Admittedly, this is a very crude approximation to the reality, and there is a scope for improvement of these functions as and when reliable income data can be compiled.

Per caput demand functions have not been estimated for these countries for obvious reasons.

For the 12 countries in the second group the choice of income proxy is based on rather common sense knowledge of the country concerned. For some of the countries a few observations on time series of income are available and these have given some guidance as to the choice of the other country whose income series has been deemed representative of the former in regard to its variation.

Above list includes all types of countries; developed, underdeveloped, densely populated, sparsely populated, democratic, socialist, centrally planned etc. To facilitate analysis, these countries are grouped under following three heads :

(a) The United Kingdom

(b) Countries having bilateral trade agreements with India

(c) Countries not included in (a) or (b)

The United Kingdom is placed in a separate category for self-evident reasons. The demarcation between countries having trade agreements with India and the other countries is also self-explanatory. It may be noted that India had trade agreements, during the period of study - 1951-1968, with the U.S.S.R., the East European countries and the U.A.R. With the exception of the U.A.R., all the other countries in this group are 'Centrally-Planned'. Thus the above two groups, (b)

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and (c), can be renamed as

(b) Centrally Planned economies and the U.A.R.; and

(c) The Free market economies other than the U.K.

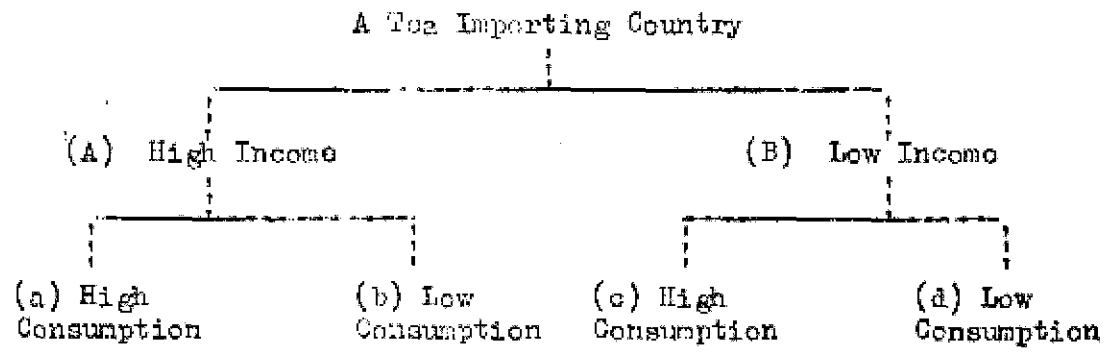
Data collection and compilation for the Centrally Planned countries pose many problems. We, in fact, could construct time series on relevant variables only for two countries in this group : (1) Yugoslavia and (2) the U.S.S.R. Available data on the USSR, however, are not adequate to estimate per caput demand functions and functions for Total Consumption only have been estimated. The details of data and allied issues will be discussed when the U.S.S.R. demand relationships are reported.

Tea importing countries may also be classified on two other criteria :

(a) Per Caput Income level of the importing country, and

(b) Per Caput level of consumption of tea in the importing country.

Schematically, the situation may be visualised as follows :



The United Kingdom falls in group (Aa) where both price and income are expected to be unimportant to explain fluctuations in

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imports; 'habit' is likely to be the most influential variable in this case. As one goes from groups (Aa) to (Pd), the importance of both income and price - and particularly price - is likely to increase.

Table 2 shows that the United Kingdom has a very high per caput intake of tea, and per caput consumption has a low coefficient of variation over eighteen years ranging from 1951 to 1968. This possibly imply that per-head tea-consumption in this country has reached its 'saturation' level and there is not much scope of increasing per caput tea absorption. Considering the low rate of population growth in the U.K., it can be argued that there is little prospects of any substantial rise in tea-sales in the United Kingdom and it may not be a wise policy for an exporter to concentrate its efforts to increase exports to such a saturated market. Further, as per caput income level in the United Kingdom is high, price may be a relatively unimportant determinant of tea sales. In general, in countries with high per caput income level, price may be expected to have low influence on consumption. 'If income is high enough, it is possible for nearly all commodities to become subject of habit formation, and of course, price become less of a factor'[7]. In case of a commodity like Tea which may even be an Inferior Good in some countries depending on the income level and taste-pattern of the inhabitants, this observation assumes a special significance. Owing to the 'high habit' nature of consumption in the United Kingdon, which is a high-income country, income may also turn out to be a variable having little influence in determining the level of consumption. Import demand functions with only Income and Prices as

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7 [illegible] and Taylor : op. cit, pp. 195-196

TABLE 2

Mean, m, Standard Deviation, s, and Coefficient of Variation, s/m, of 1951-68 Yearly Per Caput Consumption of Tea (in descending order of the mean) in non-producing and producing countries

Sl No	Country	m (lbs)	s (lbs)	s/m
(1)	(2)	(3)	(4)	(5)
1	United Kingdom	9.566	0.565	0.05906
2	Ireland(Republic)	8.580[1]	-	-
3	New Zealand	6.990	1.499	0.21445
4	Australia	5.948	0.482	0.08104
5	Iraq	4.862	0.882	0.18141
6	Canada	2.548	0.333	0.13069
7	Morocco	2.536	0.655	0.25828
8	Sri Lanka+	2.027	1.146	0.56534
9	South Africa	1.931	0.137	0.07095
10	U.A.R.	1.805	0.247	0.13684
11	Netherlands	1.643	0.136	0.08278
12	Japan+	1.602	0.287	0.17915
13	Israel	0.970	0.179	0.18454
14	Taiwan+	0.797	0.768	0.96361
15	Turkey+	0.670	0.351	0.52388
16	U.S.S.R.	0.645	0.055	0.08527
17	India+	0.632	0.147	0.23259
18	Denmark	0.608	0.103	0.16941
19	Switzerland	0.475	0.041	0.08632
20	Pakistan+	0.464	0.134	0.28879
21	Swedon	0.358	0.068	0.18994
22	Finland	0.333	0.480	1.44144
23	Argentina++	0.298	0.125	0.41946
24	Norway	0.241	0.047	0.19502
25	Jamaica	0.196	0.046	0.23469
26	Austria	0.175	0.028	0.16000
27	Thailand	0.132	0.026	0.19697
28	France	0.087	0.020	0.22989
29	Italy	0.068	-	-
30	Portugal	0.043	0.010	0.23256
31	Yugoslavia	0.036	-	-
32	Greece	0.035	0.010	0.28571
33	Peru++	0.022	0.019	0.86364
34	Philippines	0.020	0.005	0.25000
35	Spain	0.014	0.011	0.78571
36	Mexico	0.001	0.001	1.00000

[1] Annual Average for 1963-1968

Notes: + Producing Country, Consumption = (Production + Imports - Exports)

++ Producing Country, Per Caput Imports, not consumption

independent variables may not give a good fit to the United Kigdom consumption data. But any measure of 'habit formation', as incorporated in the dynamic models used here, should show up its influence in the demand equation.

Table 2 also brings out that the tea drinking and per caput income level do not seem to have any distinguishable inter-relationship. Countries where per caput consumption is low, the coefficient of variation of consumption is expected to be high, since habit is likely to be weak in such countries. But, there are exceptions with low per caput consumption and simultaneously low variance in consumption indicating that in these countries tea-drinking may not be widespread but is limited to a particular section of the population in which habit has been strongly imbedded. In some other countries, tea-drinking may be widespread, but no section of the populace may have any special affinity for tea. Most such countries have taken to tea-drinking recently and are not exposed long enough time to form any strong habit structure. In such countries, per caput intake may be low, but variance of per caput consumption may be comparatively high. All these facts regarding tea-drinking in various countries indicate that countries differ widely in their modes of consumption of tea and, as a result, despite similarities in income level and such other things, one may expect different responses of consumption demand to changes in prices of tea and in income levels in different countries. Lumping all such diverse countries into a 'world' and then estimating an aggregate world import demand function, as many researcher[8] have done, invariably miss these individual peculiarities.

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[8] Ramgopal Aggarwala : An Econometric Model of India : 1948-1961 (Frank Cass & Co Ltd, 1970) pp 118-125

5.3.4 Parameters estimated, notations and terms used :

Statistical parameters estimated are the followings :

$\bar{R}$ = Multiple correlation coefficient corrected for the degrees of freedom

DF = Degrees of Freedom

F = Value of F-ratio

T = Value of t-ratio

S = Standard error of estimate

DW = Durbin - Watson Statistic

U = Theil U

Some remarks on some of these parameters are in order here. The Durbin Watson Statistic is defined as

$$DW = \frac{\sum_{t=2}^{N} (e_t - e_{t-1})^2}{\sum_{t=1}^{N} e_t^2}$$

where e's are residuals from an estimated regression, and N is the sample size.

This statistic is applicable only when following two conditions hold : (i) the constant term is included in the equation, and (ii) the set of independent variables does not contain the lagged dependent variable as an explanatory variable. These conditions necessitate that in case of dynamic models estimated here, Durbin-Watson statistic has to be carefully interpreted. Durbin[9] has suggested an alternative test-statistic in such cases. However, this

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J. Durbin : Testing For Serial Correlation In Least Square Regression When Some Of The Regressions Are Lagged Dependent Variables (Econometrica, 38 No 3, May 1970) pp 410-21

has not been computed here.

The 'Theil U' coefficient also needs an explanation. 'The Theil U is a statistic that measures the goodness of fit of a set of forecasts with the actual values and is defined as

$$U = \frac{\left[\sum (P_i - A_i)^2\right]^{\frac{1}{2}}}{\left[\sum P_i^2\right]^{\frac{1}{2}} + \left[\sum A_i^2\right]^{\frac{1}{2}}}$$

where P is the predicted value and A is the actual value. U must lie between zero and one. A value of Zero denotes a prefect forecast, while One denotes the other extreme[10].

The second set of estimated coefficients are the elasticities. The following notations have been used for the elasticity - coefficients :

L_P = Long Run Price Elasticity

S_P = Short Run Price Elasticity

L_Y = Long Run Income Elasticity

S_Y = Short Run Income Elasticity

The terms 'Long-run' and 'Short-run' needs an explanation. Houthakker-Taylor[11] states '..... " Short term " in this context is taken to mean the instantaneous adjustment in consumption before the state variables have a chance to adjust. The " Long Term ", in contrast, means 'the entire change in demand associated with a once-and-for-all change in income, including any indirect effects through changes in the state variables'.

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[10] H.S. Houthakker and L.D. Taylor :- op. cit. p 50

[11] Op. cit. : p 10

The high per caput intake of tea and the slow growth of imports ch is comparable to the low growth of population possibly indicate it in a high income country like the U.K. the tea consumption is termined entirely by habit and taste established over a long span of e and that economic demand-determinants, income and price, may not ve much significance under such a situation. Empirical exercises port this view.

One of the estimated models runs as follows :

Total Imports

$$\hat{M}_t = 50.3028 + 0.2597\ M_{t-1} + 0.0586\ \Delta Y_t + 0.1226\ Y_{t-1}$$

(t-value) (1.5165) (0.8929) (0.0845) (0.7412)

$$+ 0.0224\ \Delta P_t + 0.0468\ P_{t-1}$$

(0.1703) (0.2979)

$\bar{R}$ = 0.4111 $\bar{r}$ = 0.5374 DF = (5, 12)

U = 0.0263 S = 5.9596 DW = 1.8908

[Per Caput function is similar and hence not reported.]

This equation does not explain much. Both income and price statistically insignificant; price, moreover, turns out with a g sign. One interesting fact, however, is the small value of atistic, which indicates high predictive power of the equation. rently, this is an anomaly with low $\bar{R}$ - value of the equation. rtheless, this can be explained and we shall do it later in this ter.

Econometric estimation of demand can be frustrated on account of a host of reasons, the most important being : (a) Mis-specification of the model and/or (b) presence of multicollinearity in the independent variables.

One possible source of mis-specification in our dynamic models is the exclusion of the substitution effect between tea and coffee. As already pointed out, many complications in specification and estimation of dynamic models arise when the 'substitution variable' is explicitly included in the model. Therefore, an attempt to estimate the substitution effect has been made through the following alternative set of demand models, all of which are Static in nature :

(1) $M = f (Y, P, P^C)$

(2) $M = f (Y, P/P^C)$

(3) $M^P = f (Y^P, P, P^C)$

(4) $M^P = f (Y^P, P/P^C)$

(5) $M = f (\log Y, \log P, \log P^C)$

(6) $M = f (\log Y, \log (P/P^C))$

(7) $M^P = f (\log Y^P, \log P, \log P^C)$

(8) $M^P = f (\log Y^P, \log (P/P^C))$

(9) $\log M = f (\log Y, \log P, \log P^C)$

(10) $\log M = f (\log Y, \log (P/P^C))$

(11) $\log M^P = f (\log Y^P, \log P, \log P^C)$

(12) $\log M^P = f (\log Y^P, \log (P/P^C))$

Where

M/M^P = Total/Per Caput, Imports for Consumption

Y/Y^P = Total/Per Caput, National Income of UK

P = Price of Tea

P^c = Price of Coffee

None of these estimated equations brought out 'Coffee Price' as a statistically significant variable in determining tea imports in the U.K. In determining total inflow of tea into the UK, substitution between tea and coffee may not have played an important role during the period under study.

Next problem is of multicollinearity. A simple, although not decisive, test of the presence of multicollinearity is to look at the correlation matrix of the data. The simple correlations between Imports, Income and Price is given below :

cor. coef (P, Y) = - 0.7670882

cor. coef (M, Y) = 0.4361766

cor. coef (M, P) = - 0.2751193

The correlation coefficient between income and price is quite igh. But, the coefficients between the dependent variable and each f the two explanatory variables are rather low. Use of these two riables separately in two separate equations yields the following o equations :

Total Imports

2) $M_t = 57.5013 + 0.2752\ M_{t-1} + 0.0528\ \Delta Y_t + 0.0825\ Y_{t-1}$

(t-values) (2.6264) (1.0535) (0.0852) (0.8970)

$\bar{R}$ = 0.0560 F = 1.0168 DF = (3, 13)

U = 0.0264 S = 5.5031 DW = 1.8885

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Parameters of the 'Original' model :

a = 12.6143 b = 6.0126

c = 0.0181 d = 7.1495

S_y = 0.0216 L_y = 0.1358 [Income Elasticities]

With only price as explanatory variable, estimated equation is the following :

(3) $M_t = 65.3452 + 0.3348\ M_{t-1} - 0.0277\ \Delta P_t - 0.0470\ P_{t-1}$

(2.5786) (1.3400) (0.2489) (- 0.5286)

$\bar{R}$ = 0.1902 F = 0.8138 DF = (3, 13)

U = 0.0269 S = 5.6104 DW = 1.9318

'Original' Parameters :

a = 8.7489 b = 10.1946

c = - 0.0063 d = 11.1914

S_p = - 0.0063 L_p = - 0.0703 [Price Elasticities]

Per caput functions yield implausible estimates; hence, not reported.

From standard statistical criteria, equations (2) and (3) are bad. Although price and income coefficients have correct signs, $\bar{R}$ is dismally low and Durbin-Watson statistic is inconclusive. The values for 95 per cent confidence interval corresponding to sample size 18 and four parameters are 0.72 and 1.74 as estimated by Durbin and Watson[13].

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[13] J. Durbin and G.S. Watson : " Testing for Serial Correlation in Least Squares Regression". (Biometrika, Vol 38, 1951) pp 159-177

The critical interval for test being inconclusive is given by

(0.72 , 2.26)

and both DW - Statistics of equations (2) and (3) lie in this interval. Note, however, that the Durbin-Watson Statistic is strictly not applicable in these models, as the lagged dependent variable is included as one independent variable.

The 'Theil U' coefficients are close to zero, pointing, thereby, to a high predictive power of the functions. This may be due to the presence of strong trends in consumption demand. Statistically significant t-values for the 'constant term' and the 'Lagged Dependent Variable' lend support to this hypothesis.

Lagged dependent variable in the dynamic models may have been another source of multicollinearity. The U.K. imports have remained at a fairly constant level over the past two decades and, so, the Lagged Imports are likely to have a high correlation with the constant term. There are two ways to deal with the situation : (1) omission of one of the two terms from the dynamic model and (2) rejection of the dynamic set-up in favour of static models.

In one of the dynamic equations, the constant term has been omitted. Both the total as well as the Per Caput demand functions yield similar results. Since total imports function has a higher $\bar{R}$ - value, the Total Import functions are reported below :

Total Imports

$$(4) \qquad M_t = \underset{(33.3457)}{1.0151}\ M_{t-1} - \underset{(-0.2101)}{0.1626}\ \triangle Y_t + \underset{(0.0935)}{0.0121}\ \triangle P_t$$

$\bar{R}$ = 0.9974 , F = 1548.70 , DF = (2, 14)

U = 0.0336 , S = 6.7512 , DW = 2.3820

a = indeterminate

b = 0.0150 , c = − 0.1614 , d = 0, e = 0.0120

S_y = −0.1924 , S_p = 0.0120 [Elasticities]

The fit of this equation is remarkable from $\bar{R}$ - stand point. The Durbin-Watson statistic is also plausible. Nonetheless, we reject the equation on a number of reasons. First, the price-coefficient has a wrong sign which results in positive price-elasticity. The sign of the income coefficient is also suspect. For, the equation shows Tea to be an 'inferior' good in the U.K. which is doubtful. Second, high $\bar{R}$ is misleading since the constant term has been omitted. Note also that the coefficient of the lagged dependent variable is practically 1. Third, d = 0 is assumed and hence the long run interpretation of the model breaks down. Fourth, although b-value is positive indicating habit-formation, it is nearly zero. Thus the dynamic effect is shown to be small. This contradicts the a priori expectation that the U.K. consumption should show a high habit-formation.

Since the value of the co-efficient of the lagged dependent variable does not significantly differ from 1, the dependent variable itself may be redefined by transferring the lagged dependent variable to the left hand side of the equation. Thus the following functions are estimated.

Total Imports

(4a) $\triangle M_t = 0.1427 \triangle Y_t - 0.0070 \triangle P_t$

(0.3105) (− 0.0581)

$\bar{R}$ = 0.2440, F = 0.1009, DF = (1,15)

U = 0.9213, S = 6.5797, DW = 2.2976

a = b = d = 0, c = 0.1427 ; e = - 0.0070

S_y = 0.1196 ; S_p = - 0.0070 [Elasticities]

Per Caput Imports

(4b) $\triangle M_t^p$ = 0.0118 $\triangle Y_t^p$ - 0.0009 $\triangle P_t$

(0.0222) (- 0.0076)

$\bar{R}$ = 0.2581 , F = 0.0005 ; DF = (1,15)

U = 0.9940 ; S = 6.4818 ; DW = 2.3034

a = b = d = 0 ; c = 0.0118 ; e = - 0.0009

S_y = 0.0100 ; S_p = - 0.0009 [Elasticities]

$\bar{R}$, with the redefinition of the dependent variable, drops considerably. However, considering that the relationship is in the first differences, the $\bar{R}$ is not alarmingly low. Also, income and price coefficients come out with correct signs. But, again as in the other case, here also with the assumption of b = d = 0, the dynamic set-up totally breaks down.

Experiments with static model have not yielded any better results. The static linear model, has, for example, the following form : (Since Per Caput function has the highest $\bar{R}$ among all the static models, this function is reported here. However, Total Imports function is similar to the per caput function.)

Per Caput Imports

$$(4c) \quad M_t^P = 80.7958 + 0.0249\ Y_t^P + 0.0672\ P_t$$
$$(3.1743) \quad (0.1571) \quad (0.5921)$$
$$\bar{R} = 0.3195 \ ; \quad F = 0.02590 \ ; \quad DF = (2,14)$$
$$U = 0.0280 \ ; \quad S = 5.5415 \ ; \quad DW = 1.4024$$

Again, Price has a wrong sign. The function is static in nature, so, nothing can be ascertained about the effect of habit-formation which, in a consumer like the U.K., must be playing a major role in determining consumption.

We, thus, see that the equations (2) and (3), although have low values of $\bar{R}$ - and 'a low R^2 does not necessarily imply that the regression equation is inappropriate'[14] - satisfy the other apriori properties of the demand function. The income and price coefficients have correct signs. The coefficient, b, has a positive sign indicating habit formation. The statistics like D.W. and S, the standard error of the estimate, are reasonable. As expected, price and income both turn out to have little influence on imports. This, in itself, is not a totally disappointing result. In fact, a closer look at these two equations reveals some interesting feature of the tea-drinking habit in the U.K. One should note the high values of b and d coefficients obtained from equations (2) and (3) :

Equation (2) (with only Income)

b = 6.0126

c = 7.1495

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[14] P. Rao and R.L. Miller : Applied Econometrics (Prentice-Hall of India, New Delhi 1972) p 16

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Equation (3) (with only price)

$b = 10.1946$

$d = 11.1914$

Evidence of habit-formation, judged from these b and d - values is definitely very strong. The coefficient, b, is positive and has very high values in both the equations. Values of d, the rate of depreciation, are also very high. This high value of d denotes that the habit wears off fast. It should be noted that in both these functions, values of d are higher than those of b. This shows an interesting trend in the present tea-drinking habit of the Britishers, especially of the younger generations. Britishers had been addicted, so-to-say, to tea-drinking for the last hundred years. The young members of the average British family are, therefore, quick to adopt the habit of tea drinking. But due to present trends of shift to soft drinks, this habit wears off even more rapidly.

Some questions are likely to be asked at this point in regard to our foregoing analysis of consumer habit in the United Kingdom and the method through which these conclusions were arrived at. Is it meaningful to compare the coefficients of different variables in an equation for their 'bigness' or, 'smallness' ? Is it possible to draw valid conclusions about the relative importances of those variables in terms of the relative sizes of their coefficients ? These are important questions. In our empirical exercises all variables are expressed as 'indexes' to take into consideration only the 'fluctuations' therein; difficulties regarding comparison, as posed in the first question, are thus taken care of. In regard to the problem raised in the second

question, we may submit that since the evaluation of relative importance has been done for the coefficients of the 'original' model as derived from the coefficients of the 'estimating' model, the best course of action would have been to calculate the summary statistics such as $\bar{R}$, F, DW etc. of the 'original' equation from the statistics of the 'estimating' equation. This is possible; but, the associated problems of estimation are cumbersome and time-consuming; and so this has not been attempted. Nevertheless, it may be pointed out that since the data is in 'indexed' form, and since price and income enter both the 'original' and the 'estimating' models, it is possible to form fairly-accurate ideas about the relative importances of these variables vis-a-vis 'habit' by a careful inspection of the 'sizes' and 'standard errors' of the coefficients of these variables and the 'dynamic term' of the 'estimating' equation. From such an inspection, 'habit' turns out to be the most important determinant of demand in the U.K. In fact, one can surmise that since, in case of the U.K. habit is very strong, if it were possible to quantify the 'psychological' factor, habit, and use a time series of this habit-variable to estimate the original dynamic model, this might have yielded a function acceptable on all statistical criteria.

Another point in regard to the determinants of tea sales in the U.K. is worth mentioning at this stage. In the foregoing discussion, we have in effect, argued that the stocks have little influence on tea sales in the U.K. The nature of auction-marketing of tea, the limited number of participants in these sales and their age-long

association with the production, supply and consumption of the commodity,[15] together with the limited variability of supply strongly support the notion that the importing agencies have acquired from their experience adequate knowledge of the total requirements of the country, have at their command sufficient storing and ware-housing facilities and nearly all the time maintain, and have resources to sustain, adequate stocks in hand to meet the demand. Nonetheless, the speculative role of 'physical stocks' in bonded warehouses in the U.K. in determining the total imports in a particular year needs to be put to an analytical test.

Symbolically, this hypothesis may be presented as the following simple relationship between the imports and the physical stocks available at the beginning of a period :

(5a) $M_t = f(S_t)$, where

M_t = U.K. imports of tea from all sources, year t

S_t = Physical stocks held in Bonded Warehouses in the U.K., beginning of year t.

We note, that if the proposed hypothesis of imports being primarily determined by the already-established habit of the consumers, as exemplified by the high per caput intake vis-a-vis the income and price insensitivity, is a truth, then the hypothesis symbolised in equation (1) should be found to be invalid under empirical tests. We have made a preliminary experiment in this direction and found that

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[15] Roy H : Tea Price Stabilisation - The Indian Case (The World Press Private Ltd, Calcutta, 1968) Chapters 2, 3 and 4, pp 15-69

stock-imports relationship does not come out with significant statistical strength, although the coefficients come out with correct signs. The following equation is estimated from the imports and stock data :

(5b) $M_t = a + b\ S_t$,

Where we postulate, $b < 0$.

From empirical exercise, we get the following equation :

(5c) $M_t = 548.62 - 0.35\ S_t$

(s.e.) (36.44) (0.24)

$R^2 = 0.0576$ $S^2 = 1235.97$

where M_t and S_t are 'physical' Imports, year t, and stocks at beginning of year t.

5.4.2 Countries having Bilateral Trade Agreement with India :

India had bilateral trade-treaties with the U.A.R., the U.S.S.R. and all the East European Countries sometime during the period under study. These treaties sought to promote trade between India and these countries by means of special payment-arrangements wherein hard-currency transactions were minimised. Also, these agreements made attempts to pick out products for promotion. Of late, owing to the changing political reality of the world, these treaties are being replaced by new ones or forthrightly rejected. But in the initial years, they had done much to strengthen economic and political ties between the countries involved. The U.A.R., the U.S.S.R. and Yugoslavia are the most important allies to India in this group and these three countries have been brought under the purview of this study.

It may be noted that of the three countries, only USSR is a fully developed industrialised nation. The other two are developing; United Nations' country classification describes them as 'low-income' countries. From apriori considerations, we may, therefore, expect that both prices and income would jointly determine the total demand for tea in the U.A.R. and Yugoslavia. In case of the USSR, price may not have much economic importance.

Static, rather than dynamic demand models are likely to explain the U.A.R. and Yugoslavia tea imports, as in these low income developing countries the possibility of large-scale stock-adjustment may be ruled out. Nonetheless, the U.A.R. per caput consumption of 1.805 lbs per years (annual average for 1951-1968 as noted in Table 2) suggests there may be slight habit-formation in this country. Yugoslavia per caput annual average consumption for 1951-68 is very low, 0.36 lbs, and, as such, a priori logic does not favour the hypothesis of habit-formation in this country.

The U.A.R.

As expected, a static linear model with both Income and Price as statistically significant variables gives the best fit :

Total Imports

(1) $M_t = 73.7169 + 0.4487\ Y_t - 0.3439\ P_t$

$(3.4286)\quad (4.5741)\quad (-2.1852)$

$\bar{R} = 0.8758 \quad F = 24.0571 \quad DF = (2,12)$

$U = 0.0480 \quad S = 10.1427 \quad DW = 2.4890$

$S_y = 0.5294$: Income Elasticity

$S_p = -0.3269$: Price Elasticity

To test if there is any habit formation, experiments with dynamic models yield the following equation :

$$(1a) \quad M_t = \underset{(2.7005)}{73.4094} + \underset{(0.0201)}{0.0054}\, M_{t-1} + \underset{(2.8188)}{0.4463}\, Y_t - \underset{(-1.9892)}{0.3429}\, P_t$$

$\bar{R}$ = 0.8637 F = 14.7022 DF = (3,11)

U = 0.0480 S = 10.5935 DW = 2.4987

a = 73.0143 b = 0.0215 c = 0.4439

d = 2 e = 0.3411

S_y = 0.5238 L_y = 0.5295 : Income Elasticities

S_p = - 0.3241 L_p = - 0.3276 : Price Elasticities

Equation (1a) suggests that the static equation (1) is the more specious one. In fact, the dynamic term, M_{t-1}, in (1a) has no significance at all. The value of b coefficient shows very slight formation of habit and habit seems to wear off very speedily, as indicated by the very high value of 'd' as compared to 'b'. Another feature of the function is the low demand elasticities. Inclusion of coffee price does not improve the fit, nor coffee price has a significant coefficient.

The per caput demand function corroborates the findings from the Total Import Functions, except that the price-coefficient turns out with a higher t-value than the income-coefficient. Value of $\bar{R}$ goes down, but the predictive power of the equation, as indicated by the Theil U statistic, seems to rise. Both Total and Per-Caput functions show no auto-correlation. The per-caput function is given below :

Per Caput Imports

(1b) $M_t = 92.0288 + 0.2226\ Y_t - 0.3016\ P_t$

$(3.9618) \quad (1.5711) \quad (-2.0696)$

$\bar{R} = 0.6314 \quad F = 5.6412 \quad DF = (2, 12)$

$U = 0.0493 \quad S = 9.9391 \quad DW = 2.5046$

$E_Y = 0.2601$: Income Elasticity

$E_p = -0.2992$: Price Elasticity

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Static equations seem to give better fits than the Dynamic equations confirming our a priori observation that low-income and low-per-caput-consumption countries are not likely to show any dynamic adjustment underlying their import patterns. Price and Income both seem to have significant influence on demand.

The equations are :

Total Imports

(2) $\log M_t = -5.0779 + 2.7020\ \log Y_t - 0.5705\ \log P_t$

$(-3.1118) \quad (12.4835) \quad (-2.3456)$

$\bar{R} = 0.9577 \quad F = 89.5410 \quad DF = (2,15)$

$U = 0.0272 \quad S = 0.3352 \quad DW = 2.2701$

Per Caput Imports

(2a) $\log M_t^p = -6.1065 + 2.9544\ \log Y_t^p - 0.6037\ \log P_t$

$(-3.4216) \quad (11.5232) \quad (-2.4278)$

$\bar{R} = 0.9510 \quad F = 76.6155 \quad DF = (2,15)$

$U = 0.0280 \quad S = 0.3437 \quad DW = 2.2304$

The most remarkable feature of this function is the very high statistical significance level of Income. This is possibly because of the presence of a trend factor. The short run income elasticity comes out to be nearly 3, which may be high because the effect of the 'excluded' trend factor has probably been 'captured' by the income effect.

Substitution between Tea and Coffee may be another important factor which have been omitted in equation (2) and (2a). It is possible that the Income has subsumed, apart from the trend effect, the 'substitution effect' also to come out with such a high level of statistical significance. Inclusion of Coffee Price as an Independent variable shows that the substitution effect is present; although the effect does not appear to be very strong.

Total Imports

$$(2b) \quad \log M_t = -5.9769 + 2.7643 \log Y_t - 0.9390 \log P_t + 0.492 \log P_t^c$$
$$(-3.8764)(12.3313) \quad (-2.0353) \quad (1.0190)$$
$$\bar{R}^2 = 0.9359 \quad F = 83.8053 \quad DF = (3,14)$$
$$DW = 2.4738$$

Where P^c = Price of Coffee in New York Spot Market.

Per Caput function has similar properties to the Total function. The notable feature is again the high statistical significance of Income coefficient and the relative low importance of Price. Both Price and Substitution elasticities are less than unity, while the income-elasticity is very high.

One version of Dynamic, State-Adjustment model shows evidence of habit-formation. The equation is acceptable on other statistical

criteria also. However, price turns out to be an unimportant variable, which prompts us to accept the static functions as a more appropriate description of Yugoslav tea demand. The dynamic function for Total Imports is reported below, as it gives both short and long-run elasticities. It is interesting to note that the static function has approximated the long-run elasticities of the dynamic functions.

Total Imports

(2c) $M_t = -135.9359 + 0.5380\ M_{t-1} + 4.0548\ Y_t - 1.3435\ P_t$

$(-0.9416)\ (2.5838)\ (2.7207)\ (-0.8665)$

$\bar{R}$	= 0.9338	F	= 37.3398	DF	= (3,13)
U	= 0.1146	S	= 153.9195	DW	= 2.5658
a	= -127.3973	b	= 1.3992	c	= 2.6364
		d	= 2	e	= -0.8736
S_y	= 0.8379	L_y	= 2.7893	:	Income Elasticities
S_p	= -0.1742	L_p	= -0.5797	:	Price Elasticities

The U.S.S.R.

Paucity of published data is the main hindrance in estimating a demand function for the U.S.S.R. which is itself a producer of tea. The annual production of Tea in the USSR is not negligible. But inspite of this, it imports a large quantity of tea from abroad. In such a situation, no country would ordinarily export a commodity which it imports for supplanting domestic production. But it is not so in case of the U.S.S.R.. The U.S.S.R. exports some part of its tea-production to its East European allies primarily for political reasons and, to add to the difficulty of the empirical researcher, no

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information on the USSR exports of tea are published. In the absence of this data, the econometrician can do no better than assuming such exports to be nil and compile the consumption series as

$$C_t = Q_t + M_t \quad , \quad \text{for all } t .$$

Where

C = U.S.S.R. Annual Consumption of Tea

Q = U.S.S.R. Annual Production of Tea

M = U.S.S.R. Annual Imports of Tea

Nevertheless, this approximation may not distort the analysis to any great extent, since exports from the USSR are possibly a negligible percentage of her total consumption.

Some problems are also encountered in compiling a series for the USSR 'Income' and a suitable 'Deflator' for Income and Price. Again no USSR-official statistics on these variables are available, and, at last, Americans have come to our rescue ! The series for Soviet GNP and GNP-deflator have been compiled from the data given in some papers in an American official publication.[16] In this anthology of papers, Stanley H. Cohn[17] in an article records the Growth Trends in Soviet GNP (Average Annual Rate in per cent) as follows :

Period	Growth Rate
1951-55	5.8
1956-60	6.5
1961-65	5.2
1966-67	5.6

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16 Economic Performance and the Military Burden in the Soviet Union - A Compendium of Papers submitted to the Subcommittee on Foreign Economic Policy of the Joint Economic Committee of the Congress of the United States (U.S. Government Printing Press, Washington, '70)

17 S.H. Cohn : General Growth Performance of the Soviety Economy: p 10

In the same article[18] Cohn tabulates an index of Soviet GNP as follows :

Year	Soviet GNP Index (1959 = 100)
1950	58.0
1955	76.8
1958	95.4
1959	100.0
1960	105.0
1961	111.6
1962	115.4
1963	118.3
1964	127.8
1965	135.5
1966	144.2
1967	151.5
1968	158.1
1969	161.7

With the help of these growth-rates of GNP, a time series of the Index of Soviet GNP for the period 1950-1969 has been compiled, and is converted to a series with 1958 as base.

Cohn, in another paper[19] in the abovementioned anthology compiled the 'Deflators for Expenditure Components' (Viz, Consumption, Investment, Defence and Administration) of Soviet GNP (with 1955=100) for the year 1950, 1952, 1955, 1958, 1960, 1963, 1965 and 1967. First of all, a simple average of the deflators for the four expenditure components has been computed and then by means of interpolation and extrapolation, a time series of 'Deflators' for 1950-1969 has been

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[18] S.H. Cohn : op. cit., p 17

[19] S.H. Cohn : The Economic Burden of Soviet Defence Outlay, p 185

compiled. This 'Deflator' has been used for Income as well as Price series.

Price series is the weighted average London auction prices as described before and is in US ¢/lb which is converted to the USSR Rouble/lb by the rates of exchange of US ¢ and Rouble, compiled from the U.N. Statistical Year Books (1965 and 1970).

Only static models have been fitted to the data. Earlier, when the experiments on dynamic models were done, the income data were not available, and we used a proxy variable for the U.S.S.R. income, the proxy being Yugoslav real national income converted to the U.S.S.R. Roubles. However, a comparison between the static models containing the U.S.S.R. GNP and the static models with Yugoslav income proxy has clearly shown that Yugoslav income, though used as an index, is not a good proxy variable for the U.S.S.R. income. The dynamic models with Yugoslav income proxy are, therefore, not reported here.

The following are the three demand functions estimated for the U.S.S.R. tea consumption :

(3) $C_t = -18.6990 + 0.9939\ Y_t + 0.0517\ P_t$

$(-0.6784)\quad (5.3642)\quad (0.3832)$

$\bar{R}^2 = 0.8022 \quad F = 35.4690 \quad DF = (2,15) \quad DW = 0.7435$

(3a) $C_t = -482.0478 + 118.2965 \log Y_t + 6.6771 \log P_t$

$(-4.3615)\quad (6.1932)\quad (1.0221)$

$\bar{R} = 0.8552 \quad F = 51.1991 \quad DF = (2,15) \quad DW = 1.2143$

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$$(3b) \quad \log C_t = -3.6015 + 1.6170 \log Y_t + 0.1429 \log P_t$$
$$(-2.3472) \quad (6.0979) \quad (1.5761)$$
$$\bar{R} = 0.8273 \quad F = 41.7285 \quad DF = (2,15)$$
$$DW = 1.1629)$$

Equations (3), (3a) and (3b) are equally acceptable but for the wrong sign of the Price coefficient. Nevertheless, the coefficient of price is not significantly different from zero in equations (3) and (3b) and in all three equations price-coefficients have very low statistical significance levels. It may be argued that for a high income country like the Soviet Union price is expected to be unimportant and the wrong sign of a statistically insignificant and apriori unimportant variable need not effect the analysis in a fundamental way. The important feature is the high statistical significance of the Income Coefficient. The income elasticity of demand turns out to be 1.6170 from equation (3b). From exporters' point of view this is an important observation.

Experiments with dynamic models of 'Import' behaviour of the USSR also support the a priori hypothesis of income being the major determinant of demand. Dynamic models also indicate a 'stock adjustment' in the USSR imports. The USSR, being a centrally administered economy, such stock adjustment in consumer item is justifiable. One of the dynamic models, given below, brings out this stock-adjustment clearly through a negative b-value :

Total Imports

(3d) $M_t = 0.8873\ M_{t-1} + 0.8729\ \Delta Y_t - 0.1218\ \Delta P_t$

$(10.1694) \qquad (1.8077) \qquad (-0.5467)$

$\bar{R} = 0.9590 \qquad F = 92.5633 \qquad DF = (2,14)$

$U = 0.1350 \qquad S = 23.6596 \qquad DW = 1.5920$

$a =$ indeterminate $\qquad b = -0.1194 \qquad c = 0.9250$

$d = 0. \qquad e = -0.1291$

$S_y = 1.7186$: Income Elasticity

$S_P = -0.1505$: Price Elasticity

5.4.3 Free Market Economies

Table 3 ranks forty countries according to their total Imports for consumption in 1968. Out of them, the U.K. alone has imported 42 % of the total World tea-imports of 1,386,300 thousand lbs in that year. The first twenty countries in this list account for more than 80 % of the total world imports. We have estimated Demand functions for all of them and for many more. However, in some cases owing to the non-availability of data, 'proxy variables' have been used. This is, from theoretical considerations, not a very satisfactory procedure and these functions have not been reported in the text, unless found to be particularly interesting for our analysis.

The U.S.A.

The U.S.A., after the U.K., is the biggest bulk importer of tea, although it ranks only fifteenth in per caput consumption (Table 2 and Table 3). Choice of an appropriate function has offered quite a

TABLE 3

Countries Ranked according to the Total Imports from all Sources in 1968 Vis-a-vis their ranks in India and Sri Lanka Exports :

(000 lbs)

Rank	Country	Total Imports	Rank on Indian Exports	Rank on Sri Lanka Exports
(1)	(2)	(3)	(4)	(5)
1	U.K.	549,720	1	1
2	U.S.A.	154,704	6	3
3	Australia	64,756	9	4
4	U.A.R.	51,414	5	10
5	Canada	46,527	10	7
6	South Africa	41,845	X	5
7	Iraq	40,034	8	2
8	Morocco	34,138	-	-
9	Aden and Arabia	31,100	12	6
10	Spanish N. Africa	29,418	-	-
11	Ireland (Republic)	28,958	7	16
12	U.S.S.R.	27,800	2	15
13	Afghanistan	25,533	4	-
14	West Germany	19,031	11	14
15	Libya	18,664	25	9
16	New Zealand	18,186	19	8
17	Netherlands	17,767	13	12
18	Chile	15,804	24	27
19	Poland	14,385	16	18
20	Iran	13,976	14	11

....(Contd.)

TABLE 3 (CONTD.)

Rank	Country	Total Imports	Rank on Indian Exports	Rank on Sri Lanka Exports
(1)	(2)	(3)	(4)	(5)
21	Hong Kong	13,535	-	22
22	Japan	11,637	20	13
23	Algeria	7,211	-	-
24	France	6,925	23	23
25	Jordan	5,873	15	24
26	Syria	5,474	-	17
27	Italy	4,867	-	21
28	Sweden	4,026	-	-
29	Israel	3,913	-	-
30	Lebanon	3,756	-	20
31	Denmark	3,677	-	26
32	Thailand	3,494	-	-
33	East Germany	3,287	-	-
34	Switzerland	2,957	-	-
35	Somalia	2,950	-	-
36	Czechoslovakia	2,414	-	-
37	Yugoslavia	2,249	-	-
38	Malay & Singapore	1,855	-	-
39	Austria	1,403	-	-

Note : Total Imports from all sources are adjusted for Re-export flows, while Indian and Sri Lanka exports are not. So, they are not strictly comparable.

Source : Annual Bulletin of Statistics (International Tea Committee, London) 1970, p 13, p 15 and pp 24-7.

challenge in this case. First, from the 'goodness of fit' consideration, the following equations seem to be the best :

Per Caput Imports

(1) $M_t^p = 55.1982 + 0.5685\ M_{t-1}^p + 0.0819\ Y_t^p - 0.1686\ P_t$
(1.8971) (1.7054) (0.3063) (- 0.9434)

$\bar{R} = 0.6561$ F = 5.0311 DF = (3,13)

U = 0.0273 S = 6.9452 DW = 2.2389

a = 35.1921 b = 1.4498 c = 0.0522

d = 2 e = - 0.1075

$S_y = 0.0526$ $L_y = 0.1912$: Income Elasticities

$S_p = - 0.0877$ $L_p = 0.3190$: Price Elasticities

Total Imports

(1a) $M_t = 36.6052 + 0.4902\ M_{t-1} + 0.2954\ Y_t - 0.1162\ P_t$
(1.6380) (1.4247) (1.0809) (- 0.6538)

$\bar{R} = 0.9066$ F = 25.6178 DF = (3,13)

U = 0.0265 S = 7.0249 DW = 2.1532

a = 24.5644 b = 1.3158 c = 0.1982

d = 2 e = - 0.0780

$S_y = 0.2008$ $L_y = 0.5868$: Income Elasticities

$S_p = - 0.0616$ $L_p = - 0.1800$: Price Elasticities

Price is not important. There is some evidence of habit formation, though the high value of d indicates that habit wears off very fast. This appears consistent with the high income economy and highly dynamic society of the U.S.A.

There is a source of mis-specification in equation (1a) as coffee may be a strong competition to Tea in the U.S.A. When we have experimented with some static models without including coffee price, the income coefficients have shown very high t-values, indicating that the substitution effect might have been swallowed by the income coefficient and has inflated the latter. Thus the log-linear model yields the following estimates :

Per Caput Imports

$$(1b) \quad \log M_t^p = 2.9585 + 0.3966 \log Y_t^p - 0.0268 \log P_t$$
$$(2.2278) \quad (2.1061) \quad (-0.2177)$$

$\bar{R} = 0.5632$ F = 4.7156 DF = (2,15)

U = 0.0065 S = 0.0675 DW = 1.3297

Total Imports

$$(1c) \quad \log M_t = 1.7156 + 0.6396 \log Y_t - 0.0027 \log P_t$$
$$(1.8049) \quad (5.7885) \quad (-0.0231)$$

$\bar{R} = 0.8810$ F = 28.7274 DF = (2,15)

U = 0.0064 S = 0.0670 DW = 1.3990

It can be seen that the t-value for the income - coefficient is very high. The effect of the left-out variable, coffee price, might have been captured mainly by the income variable. However, inclusion of coffee prices does not improve the situation. Thanks to multicollinearity, the fit becomes poorer. Since the linear equation gives the highest $\bar{R}$, below the linear equation is reported :

Per Caput Imports

$$(1d) \quad M_t^p = 39.3099 + 0.0855\ Y_t^p - 0.1500\ P_t + 0.2260\ P_t^c$$

(2.5519) ([illegible]) (− [illegible]) (2.6136)

$\overline{R}$ = 0.4845 F = 3.7339 DF = (3,14)

S = 7.2294 DW = 1.2518

Total Imports

$$(1e) \quad M_t = 54.9265 + 0.3304\ Y_t - 0.0234\ P_t + 0.1276\ P_t^c$$

(2.2670) (3.4106) (− 0.1591) (1.3762)

$\overline{R}$ = 0.6683 F = 5.5760 DF = (3,14)

S = 7.3215 DW = 1.2624

where P_t^c = Price of coffee, New York Spot Market.

The difference between the income responses in the Total and Per Caput functions (1d) and (1e) is noticeable. Also, in equation (1d), coffee price shows a high significance. The contrasts between equations (1d) and (1e) are remarkable. Equation (1d), depicting consumer behaviour, rightly points out that the U.S. consumers, enjoying a very high level of living, are indifferent to price and income factors. But equation (1e), which summarises the behaviour of the bulk importors, shows income to be an important determinant to total imports into the country.

A Bergstrom-type Dynamic Flow-adjustment model gives a good fit to the US-data. Such an equation for Total Imports is given below :

Table 41 contd.

(1f) $M_t = \underset{(2.9510)}{58.6759} + \underset{(2.3722)}{0.6283}\ Y_{t-1} + \underset{(0.7283)}{0.0753}\ (Y_t + Y_{t-1}) - \underset{(-2.1044)}{0.1643}\ (P_t + P_{t-1}^*)$

$\bar{R} = 0.9302$ $\quad F = 35.2732$ $\quad DW = (3,13)$

$U = 0.0231$ $\quad S = 6.1096$ $\quad DW = 2.5883$

$a = 194.5325$ $\quad c = 0.4019$ $\quad e = 0.8665$

$\theta = 0.4637$

$S_y = 0.3968$: Income Elasticity

$S_p = -1.0969$: Price Elasticity

This equation is specious; however, unimportant Income and significant 'dynamic' and Price terms cast a doubt on specification of the model. From Static experiments the apriori hypothesis that Coffee is a strong competitor to Tea in the USA stands out as a possibility. Exclusion of substitute-variable from (1f) might have introduced a specification error in the model. This gains strength from observations from a State-adjustment model where Income, and not Price, comes out as the most important variable with a fairly strong habit coefficient. Habit, however, seems to wear off quickly.

Sri Lanka is the main supplier of tea to the U.S.A. The import demand function for Sri Lanka tea as estimated by Potluri Rao and Roger LeRoy Miller[20] is quoted below :

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[20] P. Rao and R.L. Miller : Applied Econometrics (Prentice Hall of India Pvt. Ltd., New Delhi 1972) pp 38-40

$$(1g) \quad \log TEA = 2.84 + 0.19 \log P_{BZ} + 0.26 \log Y^d - 1.48 \log P_{cy} +$$

(St. errors) (2.00) (0.13) (0.37) (0.98)

$$+ 1.18 \log P_I$$

(0.69)

$$\bar{R}^2 = 0.56$$

where,

TEA = Demand for Ceylonese Tea in USA

Y^d = U.S. Disposable Income, Billion $

P_{BZ} = Import Price of Brazilian Coffee

P_{cy} = Import Price of Ceylonese Tea

P_I = Import Price of Indian Tea

All prices are relative to food prices in the U.S.

CANADA

Static models seem to give the best fit to the Canadian data. The following are the equations estimated :

Per Caput Imports

$$(2) \quad \log M_t^p = 10.8500 - 1.3080 \log Y_t^p - 0.5236 \log P_t + 0.4777 \log$$

(9.6329)(-8.6023) (- 5.2437) (6.2651)

$\bar{R}$ = 0.9730 F = 101.8301 DF = (3,14)

S = 0.0602 DW = 2.0777

Total Imports

$$(2a) \quad \log M_t = 6.5331 - 0.3745 \log Y_t - 0.2452 \log P_t + 0.2012 \log P_t^c$$

(12.6141)(-6.9198) (- 4.1865) (3.7833)

$\bar{R}$ = 0.9620 F = 77.6349 DF = (3,14)

S = 0.0346 DW = 1.8155

The most remarkable feature of these equations are the negative income coefficients. Per Caput function shows that the negative income elasticity is larger than one. Both own price and coffee price have significant t-ratios. But the demand is inelastic to both.

Coffee Price, as in the case of the U.S.A., is a major factor in determining demand. But coffee price seems to be important for both consumer and importer behaviour in Canada, while in case of the U.S.A. only importer behaviour seems to be affected by the substitute price. Unlike the U.S.A., both income and price have significant statistical strength for determination of imports and consumption. One State-adjustment Dynamic model indicates the presence of stock-adjustment in Importer behaviour. (Vide Summary Table 1 and Table 2, in Appendix II and Table 4 below.)

AUSTRALIA

Australia closely follows the U.S.-pattern : consumer responses seem to be determined more by coffee prices than by the own price of tea and per caput income. But importer behaviour as captured by the total demand function shows itself to be independent of income and tea price changes, although coffee price have the same effect on total imports.

Per Caput Imports

$$(3) \qquad \log M_t^p = \underset{(3.9375)}{6.1313} - \underset{(-1.8423)}{0.5145} \log Y_t^p - \underset{(-1.5709)}{0.1450} \log P_t + \underset{(3.7396)}{0.3379} \log P_t^c$$

$\bar{R} = 0.9256 \qquad F = 31.6392 \qquad DF = (3,14)$

$S = 0.0728 \qquad DW = 1.5167$

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Total Imports

(3a) $\log M_t = 4.5540 - 0.0756 \log Y_t - 0.0256 \log P_t + 0.1185 \log P_t^c$

(5.6114)(-0.6030) (-0.3870) (1.5165)

$\bar{R} = 0.7752$ F = 9.5285 DF = (3,14)

S = 0.0520 DW = 2.0049

In view of the lack of significance of the coefficients of income, own price and coffee price in the total import demand function, we have estimated dynamic models to measure the strength of dynamic adjustments. A priori, stock adjustment would be expected. One estimated equation does indicate stock adjustment, but it is not acceptable on many counts. This dynamic model is given below :

Total Imports

(3b) $M_t = 89.0686 + 0.2762\ M_{t-1} - 0.0003\ Y_{t-1} - 0.1576\ F_{t-1}$

(3.6471) (0.9610) (- 0.0029) (-1.8164)

$\bar{R}$ = 0.6276 F = 4.4663 DF = (3,13)

U = 0.0220 S = 5.2202 DW = 1.4818

a = -69.7908 b = -3.1342 c = 0.0002

d = - 2 e = 0.1235

S_y = 0.0003 L_y = - 0.0005 : Income Elasticities

S_p = 0.1179 L_p = - 0.2080 : Price Elasticities

Apparently, exclusion of Coffee price has introduced a specification bias in the equation. Nevertheless, the high negative value of b coefficient is worth-mentioning. Note also that the value of d - coefficient is less, in absolute term, than the value of b .

NEW ZEALAND

Stock adjustments seems to be the characteristic of New Zealand Imports. Income is of some significance and price is unimportant for total as well as per caput imports.

Total Imports

(4) $M_t = 0.6019\ M_{t-1} + 3.8729\ \Delta Y_t - 0.3857\ \Delta P_t$
(3.9426) (2.2440) (- 0.8789)

$\bar{R} = 0.9752$ F = 156.6378 DF = (2,14)

U = 0.1045 S = 22.1853 DW = 1.6676

a = indeterminate b = - 0.2198 c = 4.2986

d = 0 e = -0.4281

$S_y = 5.0973$: Income Elasticity

$S_p = -0.3806$: Price Elasticity

Per Caput Imports

(4a) $M^p_t = 0.8432\ M^p_{t-1} + 4.4998\ \Delta Y_t - 0.4455\ \Delta P_t$
(12.2566) (2.2799) (- 0.9259)

$\bar{R} = 0.9673$ F = 117.2989 DF = (2,14)

U = 0.1204 S = 24.2950 DW = 1.7071

a = indeterminate b = - 0.1701 c = 4.8825

d = 0 e = -0.4834

$S_y = 5.7518$: Income Elasticity

$S_p = 0.4487$: Price Elasticity

Stock adjustment characterises both total and per caput functions. However, this dynamic behaviour is weak. High significance of the lagged dependent variable is probably due to the presence of a

positive trend or due to the exclusion of the substitute variable. Income elasticity is very high. The substitution effect of coffee and the positive trend-effect might have been captured by the income coefficient also. However, Coffee price, in static models, is only marginally significant.

IRAQ

It is rather surprising that none of the models could explain Per Caput Imports of Iraq. The Static semi-log linear model gives the only plausible equation for the total imports. Use of coffee price has not helped, as all the coefficients have come out with wrong signs in all the equations having coffee price as an explanatory variable. The only specious equation is given below :

Total Imports

(5) $M_t = -259.7565 + 83.8251 \log Y_t - 1.0944 \log P_t$
$(-1.3317) \quad (3.8652) \quad (-1.0285)$

$\bar{R} = 0.7071 \quad F = 7.5 \quad DF = (2,12)$

$U = 0.0799 \quad S = 22.8055 \quad DW = 1.1791$

$S_y = 0.7859$: Income Elasticity

$S_p = -0.0116$: Price Elasticity

Iraq's total tea-demand appears to be inelastic to both income and price. Nevertheless, Iraq's demand for 'Indian tea' indicates the presence of dynamic adjustment with a positive value for b. Also Income and Price both seem some statistical significance as indicated by the t-values. The equation is given below :

Total Imports from India

(5a) $M_t = 169.7111 + 0.4941\ M_{t-1} + 1.6428\ Y_t - 2.5548\ P_t$
(0.9883) (1.0553) (1.3703) (- 1.6787)

$\bar{R} = 0.7970$ F = 8.5436 DF = (3,11)

U = 0.1628 S = 85.6228 DW = 1.9848

a = 113.5851 b = 1.3228 c = 1.0995

d = 2 e = -1.7099

$S_y = 0.6341$ $L_y = 1.8730$: Income Elasticity

$S_p = - 0.8741$ $L_p = - 2.5817$: Price Elasticity

NETHERLANDS

Inclusion of Coffee Price introduces wrong signs to the parameter estimates. Static models do not explain demand. In the dynamic models, when both income and price are used as regressors we face a problem of indentification as price coefficient has a negative sign, while when only income is included and price excluded, the fit is extremely poor. Although, per caput imports are high in Netherlands, a stock-adjustment, rather than habit formation, in Importer behaviour reveals itself. The Per Caput imports could not be explained adequately. The equation for total imports is given below :

Total Imports

(6) $M_t = 78.4878 + 0.0639\ M_{t-1} + 0.1664 \triangle Y_t + 0.0963\ Y_{t-1}$
(3.2345) (0.2049) (0.2502) (0.8675)

$\bar{R} = 0.1567$ F = 0.8721 DF = (3,17)

U = 0.0408 S = 9.0281 DW = 2.0337

a = 181.3317 b = -0.4560 c = 0.2224

d = 0.8137

$S_y = 0.2721$ $L_y = 0.1258$: Income Elasticities

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JORDAN, SYRIA, LEBANON and LIBYA

Demand for tea in these countries show a remarkable similarity. In all of them, dynamic adjustment of any kind seems to be unimportant. Static functions explain imports fairly well. In all these countries, income is a very significant variable; although this high significance may be a result of the presence of a substitution factor which is not included in the equation. Demand is income elastic in Jordan, Syria and Lebanon, but not in Libya. Demand responses to price changes are not elastic in any of the countries.

Income-proxy has been used in case of all these countries, since time series on income are not available. The UAR income index has been used as the proxy, after conversion into the respective country's national currency units and deflated by respective country's cost of living index. The underlying assumption in using the Index is that the fluctuations in, not the absolute magnitudes of, the real income, are similar in these countries. Obviously, interpretation of the demand functions should be made keeping this in mind. No per caput demand function is estimated. Below the functions for 'Total Imports' are reported :

Jordan

(7) $M_t = -299.1013 + 143.9486 \log Y_t - 55.7009 \log P_t$
$(-1.3863) \quad (6.1179) \quad (-1.7809)$

$\bar{R} = 0.8965 \quad F = 29.6662 \quad DF = (2,12)$

$U = 0.0794 \quad S = 25.0727 \quad DW = 2.1695$

$S_y = 1.3197$: Income Elasticity

$S_p = -0.6340$: Price Elasticity

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Syria

(8) $M_t = -285.0087 + 164.5930 \log Y_t - 80.4382 \log P_t$
$(-1.1336) \quad (5.8226) \quad (2.1406)$

$\bar{R} = 0.8950 \quad F = 29.1646 \quad DF = (2,12)$

$U = 0.0982 \quad S = 30.1222 \quad DW = 2.9322$

$S_y = 1.5090$: Income Elasticity

$S_p = -0.9155$: Price Elasticity

Lebanon

(9) $M_t = -261.5711 + 205.1594 \log Y_t - 121.3224 \log P_t$
$(-0.8140) \quad (5.6784) \quad (-2.5261)$

$\bar{R} = 0.8980 \quad F = 30.1672 \quad DF = (2,12)$

$U = 0.0999 \quad S = 38.4998 \quad DW = 1.3556$

$S_y = 1.3484$: Income Elasticity

$S_p = -0.5774$: Price Elasticity

Libya

(10) $\log M_t = 3.4651 + 0.7089 \log Y_t - 0.4573 \log P_t$
$(3.7736) \quad (6.8659) \quad (-3.3322)$

$\bar{R} = 0.9304 \quad F = 46.1015 \quad DF = (2,12)$

$U = 0.0104 \quad S = 0.1100 \quad DW = 2.7946$

$S_y = 0.7089$: Income Elasticity

$S_p = -0.4573$: Price Elasticity

The static semi-log function also gives a good fit to Libyan data. But, the double log equation is more acceptable both on $\bar{R}$ and Durbin-Watson criteria. More interesting, feature of Libyan equation is, however, the inelasticity of demand to both income and price changes. In case of the other three countries, demand is elastic to

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income fluctuations.

A Dynamic State-adjustment model seems to suggest some habit-formation in Libyan imports. However, habit seems to wear off very quickly as indicated by the relatively higher value of d -coefficient (= 2) than the b- coefficient (= 0.1777) in this model. (See Summary Tables 1 and 2 in Appendix II and Table 4 below).

FRANCE, WEST GERMANY, SWEDEN and SWITZERLAND

Out of the many marginal importers of tea whose demand functions are estimated, the above four countries are chosen. It is often proclaimed that proper promotional measures can improve imports to these countries substantially.[21] Country demand functions are reported below :

France

Total Imports

$$(11)\quad \log M_t = \underset{(2.2086)}{1.6662} + \underset{(9.7500)}{0.8451} \log Y_t - \underset{(-1.2180)}{0.2094} \log P_t$$

$\bar{R}$ = 0.9498 F = 74.7888 DF = (2,14)

U = 0.0082 S = 0.0860 DW = 2.0074

S_y = 0.8451 : Income Elasticity

S_p = - 0.2094 : Price Elasticity

West Germany

Total Imports

$$(12)\quad M_t = \underset{(2.0192)}{21.7117} + \underset{(1.3196)}{0.3024}\, M_{t-1} + \underset{(1.2342)}{0.7804}\, \Delta Y_t + \underset{(2.2982)}{0.4310}\, Y_{t-1}$$

[21] M. Das Gupta : Promotion of Tea Exports (Statesman, May 5, 1971)

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$\bar{R}$ = 0.9010 F = 24.0025 DF = (3,13)

U = 0.0481 S = 11.7678 DW = 2.5045

a = 43.6987 b = - 0.3083 c = 0.8675

d = 0.7630

S_y = 0.9711 L_y = 0.6916 : Income Elasticities

Sweden

Total Imports

(13) M_t = - 240.6384 + 79.7456 log Y_t - 6.3577 log P_t
(- 0.9282) (2.4877) (- 0.2386)

$\bar{R}$ = 0.7584 F = 11.8336 DF = (2,14)

U = 0.0618 S = 15.0700 DW = 1.4104

S_y = 0.6845 : Income Elasticity

S_p = - 0.0725 : Price Elasticity

Switzerland

Total Imports

(14) log M_t = 1.9905 + 0.4549 log Y_t + 0.1210 log P_t
(2.0232) (4.3108) (0.9218)

$\bar{R}$ = 0.7591 F = 11.8798 DF = (2,14)

U = 0.0083 S = 0.0859 DW = 2.5984

S_y = 4.3108 : Income Elasticity

[Per Caput import functions for all these countries follow the pattern of the total import functions and hence are not reported.]

There are many interesting points to note in these equations. First, three out of four countries do not appear to have any 'Dynamic Adjustment' operating in their importing processes of tea. Among

these three countries - France, Sweden and Switzerland - the latter two do not yield any reportable dynamic equation, the other one, i.e., France does have a good equation. But, again, the coefficient of the 'lagged dependent variable', the dynamic term, turns out to be insignificant. The dynamic equation is reported below :

France

Total Imports

(15) $M_t = \underset{(0.9790)}{25.5409} + \underset{(0.6593)}{0.2057}\ M_{t-1} + \underset{(2.7767)}{0.7779}\ Y_t - \underset{(-1.2180)}{0.2494}\ P_t$

$\bar{R} = 0.9452 \qquad F = 45.7093 \qquad DF = (3,13)$

$U = 0.0401 \qquad S = 11.2544 \qquad DW = 1.9624$

$a = 21.1837 \qquad b = 0.6824 \qquad c = 0.6452$

$d = 2 \qquad e = -0.2069$

$S_y = 0.6269 \qquad L_y = 0.9516$: Income Elasticities

$S_p = -0.1370 \qquad L_p = -0.2080$: Price Elasticities

This equation can be easily seen to be the long-run version of the static equation (14). The coefficients and elasticities are virtually the same in these two equations — 'long run' elasticities from equation (15) are very close to the elasticities estimated from equation (14). Another interesting feature of habit-formation in France is the low positive value of b and comparatively large value of d. This combination indicates that habit is not strongly imbedded in consumption. A 'per caput' demand function corroborates this inference with a similar set of values of b and d as given by equation (15).

West Germany, in contrast to the above equations, show the presence of stock adjustments in imports in the dynamic models reported above. Price has no significance and has been excluded. Income is the dominant variable; the 'Lagged' Income is statistically more significant than the 'contemporaneous' Income indicating the process of adjustment in time.

Nearly twenty countries demand functions have been analysed above; the others have not been brought under elaborate scrutiny. All these functions are tabulated and reported in Table 4 and Summary Tables 1 and 2 in Appendix II at the end of this essay. They offer a wide variety in functional forms and it is not easy to draw any specific inferences from them. Nonetheless, some broad conclusions about the general nature of tea-consumption in the world can be drawn from a study of these functions. It may be argued that the future potential for growth of tea-consumption in the world is not negligible. Majority of the countries have reported weak price-influence on their tea-demand and many others are characterised by significant income-elasticities of demand. Furthermore, habit does not seem to be strongly imbedded in the demand-structure of the low-income countries. The key to future export-growth of tea, thus, appears to lie in the capacity of the tea-producers to activate upward shifts in demand in the importing countries, where price is unimportant as well as income-elasticity is high, through adequate promotional capaigns. All this, however, is true from the stand-point of the 'total demand' for tea in these countries. Growth of demand for tea of a 'particular producer' is linked to many other factors like 'Quality' and 'Domestic demand' in the producing countries. In the next chapter some problems of Indian export supply vis-a-vis the domestic demand are analysed and reported.

TABLE 4

Coefficients of Stock or Habit Adjustment and Elasticities of Price and Income as estimated by the Total Import Demand Functions

SAD = State Adjustment Model; FAD = Flow Adjustment Model; DLS = Double Log Static Model;
SLS = Semi-Log Static Model; LNS = Linear Static Model; SR = Short Run; LR = Long Run

Country / Nature of Function	b	d	Income Elasticity		Price Elasticity		$\bar{R}$	DW
			SR	LR	SR	LR		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 France a) DLS	x	x	0.9451	x	-0.2094	x	0.9498	2.0074
b) SAD	0.6824	2	0.6269	0.9516	-0.1370	-0.2080	0.9452	1.9624
2 Belgium SAD	0.0918	1.3179	1.1097	1.1928	x	x	0.9968	2.0549
3 W. Germany SAD	-0.3083	0.7630	0.9711	0.6916	x	x	0.9010	2.5005
4 Italy SAD	-0.3890	-0.1592	-1.9318	1.3374	x	x	0.9562	1.6022
5 Netherlands SAD	-0.5460	0.3137	0.2721	0.1258	x	x	0.1567	2.0337
6 Austria SAD	-0.0936	0.3199	x	x	-0.0677	-0.0524	0.7257	3.1476
7 Denmark SAD	0	0	1.4388	x	0.4056	x	0.5449	2.7781
8 Norway SAD	0	0	0.9918	x	-0.7600	x	0.4381	2.9707
9 Portugal SAD	-0.3090	0	6.8926	x	-0.2264	x	0.9492	2.2681
10 Sweden a) SLS	x	x	0.6845	x	-0.0725	x	0.7584	1.4104
b) SAD	-2.2577	-0.6785	-2.1895	0.9407	x	x	0.8122	2.1505
11 Switzerland DLS	x	x	4.3108	x	0.1210	x	0.7591	2.5984

.... (Contd)

TABLE 4 (CONTD.)

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12 U.K.	a SAD	6.0126	7.1495	0.0216	0.1358	x	x	0.0560	1.8885
	b SAD	10.1946	11.1914	x	x	- 0.0063	- 0.0703	0.1902	1.9318
13 Finland	- SAD	0	- 0.0600	0.5163	x	0.3101	x	0.9547	2.4420
14 Greece	- SAD	- 2.3051	- 0.4383	- 2.2610	0.5308	x	x	0.4564	2.0395
15 Spain	a FAD	0.9649	x	5.5537	x	- 6.4978	x	0.9566	2.1591
	b SAD	1.1954	2	1.1283	2.8047	- 0.0471	- 0.1179	0.9498	2.2108
	c SLS	x	x	3.3709	x	- 1.5907	x	0.9229	1.6062
16 Yugoslavia									
	a DLS	x	x	2.7020	x	- 0.5705	x	0.9577	2.2701
	b SAD	1.3992	2	0.8379	2.7693	- 0.1742	- 0.5797	0.9338	2.5558
	c DLS+	x	x	2.7643	x	- 0.9390	x	0.9359	2.4738
17 U.S.A.	a FAD	0.4687	x	0.3968	x	- 1.0969	x	0.9302	2.5833
	b SAD	1.3158	2	0.2008	0.5868	- 0.0616	- 0.1000	0.9066	2.1532
18 Canada	a DLS	x	x	- 0.3745	x	- 0.2452	x	0.9529	1.8155
	b SAD	- 0.0005	0	0.0432	x	- 0.2004	x	0.9590	2.5283
19 Jamaica	a DLS	x	x	1.0906	x	- 0.1680	x	0.9605	1.9513
	b SAD	2.4156	3.6046	0.4192	1.2710	x	x	0.9276	1.8636
20 Mexico	LNS	x	x	- 0.5925	x	- 0.4535	x	0.3041	0.3887
21 Chile	a LNS	x	x	0.3283	x	- 0.1632	x	0.3451	1.7833
	b SAD	5.5257	4.1035	x	x	- 0.0537	- 0.2088	0.2480	1.8356

.... (Contd)

TABLE 4 (CONTD.)

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
22 Australia	a DLS	x	x	- 0.0760	x	- 0.0260	x	0.7750	2.0050
	b SAD	- 3.1342	- 2	0.0003	- 0.0005	0.1179	- 0.2080	0.6276	1.4918
23 New Zealand	SAD	- 0.2198	0	5.0973	x	- 0.3806	x	0.9752	1.6676
24 Morocco	SAD	0	0	1.0950	x	- 0.1460	x	0.1428	2.7824
25 S Africa	LNS	x	x	0.6218	x	- 0.0485	x	0.9545	2.3980
26 U.A.R.	a LNS	x	x	0.5294	x	- 0.3269	x	0.8758	2.4890
	b SAD	0.0215	2	0.5238	0.5295	- 0.3241	- 0.3276	0.8637	2.4937
27 Iraq	SLS	x	x	0.7859	x	- 0.0116	x	0.7071	1.1791
28 Israel	SAD	1.7804	2	0.1208	1.0999	- 0.0732	- 0.6664	0.9482	2.2007
29 Phillipines	SAD	1.2654	2.3887	0.5445	0.9452	x	x	0.6247	1.9068
30 Thailand	SAD	- 0.5924	0.6389	0.9823	0.3648	x	x	0.7479	1.0128
31 Jordan	SLS	x	x	1.3197		- 0.6340	x	0.8965	2.1695
32 Lebanon	DLS	x	x	1.7972		- 0.1371	x	0.9189	2.1586
33 Syria	SLS	x	x	1.5090	x	- 0.9155	x	0.8950	2.9322
34 Algeria	SAD	- 0.2197	0	2.7083	x	- 0.3232	x	0.9204	2.1879
35 Libya	a DLS	x	x	0.7089	x	- 0.4573	x	0.9304	2.7945
	b SAD	0.1797	2	0.6899	0.7580	- 0.3925	- 0.4312	0.9067	2.1692

...(Contd)

TABLE 4 (CONTD.)

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
36 Sudan	LNS	x	x	0.4671	x	- 0.3217	x	0.6538	2.7623
37 Tunisia	SAD	- 0.1912	0	2.7018	x	- 0.9034	x	0.9651	1.9638
38 Malay	SAD	- 1.2279	- 0.1660	3.5674	0.5579	x	x	0.6360	2.3751
39 Hong Kong	SAD	- 0.6012	0.6124	1.1345	0.5723	x	x	0.8675	2.1741
40 Iran	SAD	- 0.8775	0.0939	1.7958	0.1736	x	x	0.1854	1.3565
41 Arabia	LNS	x	x	1.0586	x	- 0.4997	x	0.7780	2.8890
42 Afghanistan	SLS	x	x	3.6286	x	- 1.0430	x	0.8140	2.3653
43 U.S.S.R. a	SAD	- 0.1194	0	1.7186	x	- 0.1505	x	0.9590	1.5920
b	DLS	x	x	1.6170	x	0.1429	x	0.8273	1.1629

Notes 1 + Indicates 'Per Caput' Import Demand Function

2 For full descriptions of these models, see Summary Tables 1 and 3 in Appendix II below

CHAPTER 6

Tea Supply from India : Problems and Prospects

6.1 Problems of Export Supply vis-a-vis Domestic Demand of Tea in India :

6.1.1 Movements of auction prices and some observations :

Rising prices in domestic auctions are an indirect evidence of rising domestic demand in India. (Vide Table 3a, Chapter 3). Further, Table 1 below shows that relative rate of growth of production has been much slower than the growth of 'apparent' consumption (= Opening Stocks + Production - Exports - Closing Stocks) in India. This pull of domestic demand on supplies has risen prices in domestic auctions much faster than in international auctions with a consequent dampening effect on Indian producers' willingness to export. As a matter of fact, due to competition from other world-suppliers of tea, international prices of tea in London market have actually registered a decline over the last two decades. (Vide Table 3a, Chapter 3). From the beginning of the sixties till 1967, Sri Lanka and African tea prices in London auctions have always been lower than Indian tea prices in the same auctions. What is more significant, during the two decades of fifties and sixties, Sri Lanka tea prices in Colombo auctions have consistently been lower than the Indian tea prices in both Calcutta and Cochin auctions. (Table 3b, Chapter 3). It is already pointed out that disposal of Indian tea to London has been dwindling at a fast rate (Table 3) making it imperative for International Blenders and Packers to buy Indian teas in domestic Indian auctions. As a

Production, Consumption and Exports of Indian Tea

Year	Production		Apparent Consumption		Export		Opening Stock	Closing Stock	Exports as % of Production
	Quantity Mlln. Kgs	Index 1957-58	Quantity Mlln. Kgs	Index 1957-58	Quantity Mlln. Kgs	Index 1957-58	Mlln. Kgs	Mlln. Kgs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1953-54	279	89.7	83	74.1	214	111.4	49	32	76.7
1954-55	296	95.1	79	70.5	208	108.3	32	40	70.3
1955-56	308	99.0	100	89.3	184	95.8	40	63	59.7
1956-57	309	99.0	87	77.7	223	116.1	63	52	72.2
1957-58	311	100.0	112	100.0	192	100.0	52	58	61.7
1958-59	325	104.5	109	97.3	217	113.0	58	57	66.8
1959-60	328	105.5	116	103.5	215	112.0	64	60	65.5
1960-61	332	106.8	127	113.4	196	102.0	60	60	59.0
1961-62	355	114.1	140	125.0	205	106.8	60	70	57.7
1962-63	344	110.6	136	121.4	221	115.1	70	58	64.2
1963-64	345	110.9	141	125.8	209	108.8	58	53	60.5
1964-65	373	119.9	149	133.0	212	110.4	53	65	56.8
1965-66	376	120.9	166	148.2	197	102.6	65	77	52.4
1966-67	369	118.6	184	164.2	190	98.9	77	70	51.5
1967-68	387	124.4	181	161.6	203	105.7	70	74	52.4
1968-69	398	127.9	186	166.0	201	104.6	74	85	50.5
1969-70	401	128.9	203	181.2	174	90.6	85	109	43.4
1970-71	421	135.3	213	190.0	199	103.6	109	118	47.3

Source : Tea Statistics 1971-72 (Tea Board, Calcutta) p 85

consequence to this, Indian teas have been bought by the international blenders from both London and Indian auctions at prices relatively higher than the prices of teas from Sri Lanka or from Africa. Production costs of 'Indian blends' must have, therefore, gone up relative to the 'other' blends. As a short-term palliative to such cost-increases, Blenders and Packers - in the U.K. market particularly - might have been substituting relatively lower-grade Indian teas in 'high-quality' Indian Blends with obvious deterioration in the quality of the blend which might ultimately turn the consumers away from this particular Indian blend. In the long run, however, Blenders might be tempted to substitute 'Indian Blends' altogether by 'Blends from other countries' tea', if the price situation continues to be what it has been for the last two decades. Such inter-country substitution of tea may have already started and the only long-run solution to this problem for India lies in the capacity of Indian suppliers to maintain a stable supply of Indian tea in the world market at 'competitive' prices. It is true that teas from different regions and growths have distinct quality characteristics different from each other and it is not easy, and sometimes not at all feasible, to substitute one quality-tea by another in a blend. International substitution so far has possibly been restricted only to the medium-quality 'fillers' which do not have any individualistic characters to be the 'main constituent' of a blend. But it is true that given sufficient time to and willingness on the part of Blenders, substitution of a 'quality blend' prepared from another quality-type teas produced in another country, can not be ruled out. Therefore, India can not have a short-cut solution. The remedy lies in 'competitive supply' and judging from the domestic demand and

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production situation at home, India appears to be in a weak position and if present trends of consumption and production continue India may continue to lose her market abroad. Next two sections make an attempt to quantify domestic demand in India and show that this has operated as a brake to export-growth of tea from India during the last two decades.

6.1.2 Export Supply Function of Tea : Methodology

Conceptually, a supply function for exports may be symbolised as follows :

$$(1) \quad \frac{X_t}{Q_t} = f\left(p_t^x / p_t^h \ , \ D_t^x \right)$$

where

X_t = Exports, physical units, year t.

p_t^x = Export price, year t.

Q_t = Output, year t.

p_t^h = Domestic price, year t.

D_t^x = Export Duty (if any), year t.

The following conditions should hold :

$$(a) \quad \frac{d\,(X/Q)}{d\,(p^x/p^h)} > 0 \quad , \quad \text{and}$$

$$(b) \quad \frac{d\,(X/Q)}{d\,(D^x)} < 0$$

Equation (1) can be modified to include a variable representing the 'Pressure' of domestic demand :

$$(1a) \quad \frac{X_t}{Q_t} = f\left(\frac{p_t^x}{p_t^h} \ , \ D_t^x \ , \ Y_t \right)$$

where Y_t = 'Pressure' variable, year t.

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For equation (1a), apart from conditions (a) and (b), the following condition also should hold :

(c) $\frac{d(A/Q)}{d(Y)} < 0$.

6.1.3 Problems of Data :

Estimation of equation (1) or (1a) poses two problems : First, the construction of 'representative' price series for tea 'for exports' and 'for domestic consumption', and second, the choice of a 'pressure' variable.

Construction of 'Export Prices' to be used in the above model is rather tricky because of the following reasons :

(a) Only 'Leaf' tea is generally exported, but domestic market consumes both 'leaf' as well as 'dust' teas,

(b) Prices for 'Leaf tea for export' and 'Leaf tea for domestic consumption' are separately available only upto 1961[1]. From 1962 onwards, no distinction is made between 'leaf tea sold for exports and that 'for domestic consumption in India' and thus no separate data on prices of these two categories are available after 1962.

Therefore, although the 'quantity' of leaf tea for domestic consumption and for exports sold at the domestic auctions can be computed separately, corresponding price data are not available. This difficulty is overcome by using a 'proxy' variable for prices, the rationale of its construction will be clear from a scrtiny of Table 2.

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[1] 'Though export auctions and internal auctions are held separately, there is no prohibition against a buyer in the export sale selling the tea within the country, disposing off the export quota-right separately or the buyer in an internal sale exporting the tea after getting duly covered with the necessary export rights'. (Report of the Plantation Inquiry Commission, 1956, Part I - Tea) p 173.

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TABLE 2

Annual Average Prices of Tea Sold in Auctions in India
(Excluding Excise & Export Duties and Cesses)

Auction Centre	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 CALCUTTA : (Simple average of Assam, Cachar, Darjeeling, Doears, Terai and Green Tea prices)										
a For Export :										
Leaf	1.40	1.99	3.10	2.09	2.39	2.13	2.18	2.29	2.42	2.11
b For Domestic Consumption :										
1 Leaf	1.09	1.78	2.24	1.27	1.61	1.42	1.56	1.80	1.96	1.71
2 Dust	1.35	1.80	2.46	1.99	2.14	1.89	1.99	2.13	2.35	2.20
2 COCHIN										
a For Export :										
Leaf	1.60	1.91	2.82	2.30	2.22	1.93	2.10	2.19	2.13	NA
b For Domestic Consumption :										
1 Leaf	1.35	1.66	2.28	2.19	1.94	1.64	1.92	1.98	1.85	NA
2 Dust	1.31	1.49	2.14	1.95	1.74	1.61	1.56	1.80	1.96	NA

Source : Annual Bulletin of Statistics (International Tea Committee, London) 1967, p 50

The followings may be argued from Table 2 to be broadly true in case of Indian tea trade :

(a) 'Dust' teas sold at Calcutta fetch higher price than the 'leaf teas for domestic consumption'.

(b) In Calcutta auction, 'high quality leaf' teas go for exports while 'lower grade leaf' teas are sold for internal consumption.

(c) In Cochin auction too, 'high quality leaf' are sold for exports and the 'low quality leaf' is internally consumed. However, unlike Calcutta, in Cochin 'leaf teas for domestic consumption' are priced higher than the 'dust' teas, although the price-differentials between the two types are not as wide as in Calcutta.

(d) From (a), (b) and (c) it follows that in both the auctions, in general, 'high quality leaf' teas are sold for exports and 'lower grades' for domestic auctions. Also, qualitatively, 'leaf teas for domestic consumption' and 'dust' teas are not very different from each other.

Following the argument of observation (d) above, in estimating the export-supply model 'Leaf tea' prices are used as a proxy to the 'export prices' and 'Dust' tea prices as the 'domestic prices'.

An alternative to the above prices would be to use 'London prices' as the export prices and 'wholesale prices' in India as the domestic prices. This has not been done for two reasons. First, the use of London auction prices as export prices is not very satisfactory. London auction now deals only with a small part of total Indian exports: its importance has been fast dwindling over the last decade - 34 % of total production in 1970 has been exported through domestic auction, while only 12 % has moved through London, whereas these percentages in 1966 were 26 % and 19 % respectively (Table 3). Domestic auction prices have steadily risen, thereby raising the prices of teas 'for export' from India as well as teas 'for domestic consumption' in India. Since, more and more teas are exported through domestic auctions in India, the major portion of Indian teas for exports has become

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TABLE 3

Tea Sold for Domestic Consumption and Exports as Percentages of Total Production

Year	Domestic Consumption	Tea for Domestic Consumption sold through		Tea for Exports sold through		
		Auction	Ex-garden	Domestic Auction	London Auction	Private Direct Sale
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1966	52.4	32.5	19.9	26.9	17.7	3.0
1967	44.5	26.5	18.0	30.7	21.2	3.6
1968	48.1	30.0	18.1	29.9	19.0	2.9
1969	57.1	34.2	22.9	29.9	10.4	2.6
1970	52.0	24.8	27.2	32.2	12.2	3.6
1971	47.6	18.6	29.0	38.5	9.9	4.0

Source : Tea Statistics, 1970-71 and 1971-72 (Tea Board, Calcutta)

progressively costlier over years in the world market. Use of London prices as export prices would not show this at all since London auction prices have steadily declined. Second, the use of 'wholesale prices' as domestic prices is also not satisfactory. Producers are not necessarily wholesalers; Blenders and Packers are the wholesalers. Wholesale prices in India thus include Blender's and Packer's processing charges too - but auction prices for export do not ordinarily include those charges. Considering these factors, choice of 'leaf' and 'dust' prices (simple averages of Calcutta and Cochin) in domestic auctions appears to be the most appropriate method to represent 'export' and 'domestic' prices respectively.

Data on variables used in the model have been collected from various issues of the Annual Bulletin of Statistics (International Tea Committee, London), Tea Statistics (Tea Board, India) and International Financial Statistics (International Monetary Fund). The variables X , and Q are in Million Kgs and p^x , p^h and D^x are in Rupees per lb. The 'pressure' variable, Y, used is the 'National Income of India' deflated by the General Price Index (1958 = 100); Y is measured in Billion rupees. It may be noted that 'Real National Income' (at constant 1960-61 prices) as computed and published by the Central Statistical Organisation (CSO) of the Government of India could have been used as Y , instead of our 'deflated' National Income figures. The deflated series is used just to keep in line with the use of deflated series in Import Demand functions for different countries (Chapter 5). We must, however, emphasize that the choice of deflated series does, in no way, jeopardize the empirical exercise or the theoretical interpretation of the model, since the correlation coefficient between the two series is virtually unity.

The following notations are used in subsequent pages :

$\bar{R}^2$ = Multiple Correlation Coefficient Squares, corrected for Degrees of Freedom

S = Standard Error of the Estimate

DW = Durbin-Watson Statistic

F = F-Statistic

DF = Degrees of Freedom

s = Standard Error of the Coefficients

t = t-value of the coefficients

6.1.4 Empirical results and conclusions :

Estimated Model (1) is as follows :

$$(2)\quad \frac{X_t}{Q_t} = -0.4048 + 0.9164 \frac{p_t^x}{p_t^h} - 0.0777\ D_t^x$$

(s) (0.3661) (0.3277) (0.0558)

(t) : (-1.106) $(2.797)^{\beta}$ $(-1.391)^{\alpha}$

$\bar{R}^2$ = 0.2554 , F = 4.2590 DF = (2,17)

S = 0.0878 DW = 1.1446 Period : 1952-71

Estimated Model (1a) with 'Demand Pressure' variable is :

$$(2a)\quad \frac{X_t}{Q_t} = 0.4481 + 0.4786 \frac{p_t^x}{p_t^h} - 0.0281\ D_t^x - 0.0026\ Y_t$$

(0.3062) (0.2390) (0.0390) (0.0006)

$(1.464)^{\alpha}$ $(2.002)^{\alpha}$ (-0.720) $(-4.665)^{\beta}$

$\bar{R}^2$ = 0.6648 F = 13.562 DF = (3,16)

S = 0.0589 DW = 2.6864 Period : 1952-71

Inclusion of the 'Pressure' variable, Y, improves equation (2) remarkably. While equation (2) is statistically 'unsatisfactory' - low - $\bar{R}^2$ does not necessarily imply that the equation is 'unacceptable' equation (2a) is acceptable on all statistical criteria. Value of $\bar{R}^2$ is fairly high, F-statistic denotes 90 % significance for $\bar{R}^2$. Durbin-Watson Statistic indicates no serial correlation. Both Price-ratio and the 'Pressure' variable have acceptable significance levels. Both have correct signs. Export Duty variable, however, though having correct sign indicating its inverse relationship with exports, is not statistically significant.

$^{\alpha}$ 90 % significance $^{\beta}$ More than 95 % significance

Log-transformation on equation (2a) improves the statistical fit to some extent :

$$(2b)\quad \log \frac{X_t}{Q_t} = \underset{(0.2892)\ (4.463)^{\beta}}{1.2911} + \underset{(0.4391)\ (1.687)^{\alpha}}{0.7406} \log \frac{P^x_t}{P_t} - \underset{(0.0163)\ (-1.194)}{0.0194} \log D^x_t - \underset{(0.1315)\ (-5.551)^{\beta}}{0.7302} \log Y_t$$

$$\bar{R}^2 = 0.6855 \qquad F = 14.805 \qquad DF = (3,16)$$

$$S = 0.0411 \qquad DW = 2.5414 \qquad \text{Period} : 1952\text{-}71$$

Log-transformation reduces the strength of the price-ratio variable and increases the strength of the export duty. But the coefficient of the last-named is not very different from zero. Elasticities of export-share in output with respect to price ratio as well as demand pressure fall within [0, 1] range :

Demand Elasticities of Export-share in Total Output

Model	Price Ratio	Demand Pressure
Linear	0.8995	- 0.6249
Double Log Linear	0.7406	- 0.7302

From these export supply functions it appears that the rise in domestic demand has caused an adverse impact on Indian international prices through the rise in domestic prices. Vis-a-vis the stagnant export prices of other producers in the world markets (vide Table 3a and 3b in Chapter 3), this rise in Indian prices in domestic auctions and the relatively lesser decline of Indian prices in London auctions

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[α] 90 % significance ; [β] More than 95 % significance

than others, have surely increased the cost of production of Indian blends with resulting adverse impact on quality tea exports from India.

6.1.5 Consumption Demand in India :

A simple linear model to quantify the price and income effects on aggregate consumption of tea in India is reported below. The model in symbols is the following :

(1) $C_t = a + b P_t + c Y_t$

(1a) $b < 0$,

(1b) $c \gtrless 0$

where

C_t = Consumption of Tea in India, lbs, indexed with 1958 =100, year t.

P_t = Weighted average price of 'North Indian' tea sold at Calcutta and 'South Indian' tea sold at Cochin, weights being the quantity sold, Rupees per lb., year t.

Y_t = National Income of India in Rupees million, Indexed with 1958 = 100, year t.

and Y_t are deflated with General Price Index (1958 = 100) in India.

There are some limitations of the above model. First, substitution between Tea and Coffee has been ignored. However, it should be ted that in India Tea is the cheapest drink for the poorer section of e population. Coffee is not a substitute for Tea for this section nce Coffee is relatively costlier than Tea. Tea-Coffee substitution likely to be important for the affluent class of the society which stitutes a minor part of the total tea drinkers in the country.

Furthermore, in most of North India, especially in rural North India, coffee has virtually no place as a drink. An aggregate demand function for tea may, therefore, ignore substitution between these two drinks.

The Aggregative character of the model may be pointed out as another limitation of the model and some may argue that per caput demand function should have been estimated. However, the basic idea in estimating the above model is to get an idea of the influence of the 'aggregate' income on tea-consumption in India to examine whether the results corroborate the findings of the Export-supply function reported in the foregoing section. It is thought that the aggregate demand function estimated should be adequate for our limited objective. The results reported support this view.

The estimated model is reported below :

$$(2) \quad C_t = -51.512 - 0.312\ P_t + 2.041\ Y_t$$
$$(t) \quad (-0.615) \quad (0.712) \quad (4.145)^{\beta}$$
$$\bar{R}^2 = 0.602 \quad F = 13.129 \quad DF = (2,15)$$
$$S = 27.175 \quad DW = 2.074 \quad \text{Period : 1951-68}$$

Semi-loglinear version of model improves the fit to some extent:

$$(2a) \quad C_t = -768.795 - 36.879 \log P_t + 230.306 \log Y_t$$
$$(-1.977) \quad (-0.821) \quad (4.343)^{\beta}$$
$$\bar{R}^2 = 0.625 \quad F = 14.406 \quad DF = (2,15)$$
$$S = 26.351 \quad DW = 2.201 \quad \text{Period : 1951-68}$$

[α] 90 % significance ; [β] More than 95 % significance

Functions are acceptable on standard statistical criteria. Price appears to have no significant influence on aggregate consumption. Income seems to be the primary determinant of consumption and the income elasticities of consumption demand are high.

Elasticities of Aggregate Consumption

	Model	Price	Income
1	Linear	- 0.240	1.623
2	Semi-loglinear	- 0.358	2.157

Several versions of dynamic models have also been fitted to the data to see if any stock/habit adjustments have been ingrained in the consumption behaviour in India. One of them, reported below, does not, however, show any strong habit-formation :

$$(2c) \quad C_t = \underset{(-0.571)}{-49.856} + \underset{(0.192)}{0.058}\, C_{t-1} \underset{(-0.612)}{-0.286}\, P_t + \underset{(2.526)}{1.932}\, Y_t$$

$\bar{R}$ = 0.757 F = 8.162 DF = (3,13)

U = 0.088 S = 28.161 DW = 2.167

a = -47.127 b = 0.219 c = 1.826

d = 2 e = -0.271

S_y = 1.452 L_y = 1.631 : Income Elasticities

S_p = - 0.208 L_p = - 0.233 : Price Elasticities

Note the low positive value of 'b' accompanied by the high value of d . Also, note that inclusion of the 'lagged dependent' variable has reduced the importance of Income; but, the significance level of the former is very low. Slight habit formation suggested by

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positive b-value loses its power vis-a-vis insignificant and near-zero coefficient of C_{t-1}. Also, high 'd' suggests fast wearing off of any habit that may be formed. Static equations seem to be more appropriate to explain aggregate Consumption of tea in India.

The two sets of estimated functions - export supply and Consumption demand - do give, despite their many limitations, some quantitative idea of the pressure of domestic demand operating against export growth of tea from India. There is another sector where Indian suppliers might have lacked the imagination and drive of their counterparts in the other producing countries. Next sections deal with some problems of international marketing strategies of different producers to see if India has done well in this area.

6.2 Marketing Strategies of Indian Exporters vis-a-vis the 'Others': A Comparative Account

6.2.1 Some Observations on 'Small Importers':

The 'potential' future market for tea need not necessarily be the high income countries or the traditional importers of tea. It is likely that the new countries which are developing tastes for tea hold the key for future export growth. These 'new' tea-importing countries are mostly under-developed having a low per capita income at their command. Any price difference between different suppliers will certainly influence their import policies of these countries and as a result the supplier having a slight edge in price over its rivals may register a substantial gain in the whole

Even if there is no evidence of the existence of substantial price competition between exporters, exporting countries' marketing policies may determine the flow of trade in the small but potential new importers. Despite all the clamours of stagnant exports, it should be realized that the world market for Tea is expanding and this expansion is mostly in the small and new importing countries. The true competition between the rival exporters is to capture this expanding part of the world market. If an exporter can not mould its policies and direct its export promotional activities in the best possible way, it may not be able to improve its market share whether or not the income and price elasticities of demand are low or high, and whether or not it offers competitive prices.

6.2.2 The Methodological Issues :

Any attempt at a comparative study of marketing strategies adopted by different exporters has an obvious snag in it. Although the shifts in the export policies of the Government of any producer-economy may manifest themselves through the change in export and excise duties levied on tea 'for export' and 'for home consumption' declared by the respective Governments from time to time, those changes are themselves 'endogenous' to the system in so far as they result from the success or failure of a particular variation of marketing strategy adopted by the exporters. Further, those changes are ad-hoc in nature and are often installed with a considerable time lag. Past experience may not always give enough insight into the present situation, unless a continuous watch is kept on the movements of all the variables linked to the system and policies are 'continuously modified' to take new

evelopments into consideration.

Variables that should be brought under study of the marketing trategies are :

(a) Campaigns and promotional measures taken up by the vernment and the individual exporters of a country,

(b) Measures taken by the producing countries' manufacturers to modernise their plants and machinery, and

(c) Other steps taken by the Blenders and Packers and Exporters to keep pace with the changes in taste and habit patterns of the consumers in the importing countries.

As for an example of the necessity for an exporter to keep abreast with time, one can cite the emergence of 'Instant Tea' which is an important development for World Tea Trade and Consumption. Producers who are quick to adopt measures to modernise their plants to produce instant tea are bound to gain from the resulting change in consumer taste arising out of the impact of this development. However, such variables are mostly 'qualitative' in nature. Quantitative proxies such as 'promotional expenditures' incurred by the Government are available only in some cases. But they are, in the first place, not available in enough details and, in the second, are very inadequate to represent the success or failure of a promotional campaign. A study of the 'qualitative' aspects of marketing poses many problems difficult to overcome in an empirical study. We, therefore, go about studying this question in an indirect way.

Albert O. Hirschman[2] has defined an 'Index of Geographical Concentration' of International trade of a country. Recently, Michael Michaely[3] has worked on similar lines and defined what he has named as the "Commodity Concentration" of international trade of a country. Following them, we have defined a new index termed as 'Geographical Concentration of a Particular Commodity Traded by a Country' as follows :

Let

X_{ijt} = Exports of a commodity from country 'i' to country 'j', year t.

$X_{i.t}$ = Total exports of commodity from country 'i' to all importing countries, year t.

Obviously

$$X_{i.t} = \sum_{j=1}^{n} X_{ijt}, \text{ where}$$

n = number of importing countries, importing from country 'i'

Now, let

G_{it} = the 'Index of Geographic Concentration of the Commodity in question exported from Country i' in the year t.

Then G_{it} is defined as

$$G_{it} = 100 \cdot \sum_{j=1}^{n} \left(\frac{X_{ijt}}{X_{i.t}} \right)^2$$

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[2] A.O. Hirschman : National Power and the Structure of foreign trade (University of California, Berkeley and Los Angeles, 1945)

[3] M. Michaely : Concentration in International Trade (N. Holland 1962)

Evidently,

$$0 \leq G_{it} \leq 100$$

Further, for the commodity exported from the exporting country i, following observations can be made :

$G_{it} = 0$ Implies that there are Infinitely many Importers of the Commodity from country i in year t.

$= 100$ Implies that there is Only one Importer of the Commodity from country i in year t.

The movement of G_i over years should be carefully interpreted on individual merits of the exporting country. The loss in geographical extent of the market may not always be due to marketing failures.

6.2.3 Empirical Findings and Conclusions :

The following eight tea-producing countries are brought under study :

1. India
2. Sri Lanka
3. Indonesia
4. Pakistan
5. Kenya
6. Uganda
7. Tanzania
8. Malawi

The first four of the producers are the so-called 'traditional' ones, while the last four are the 'new entries' to the field of tea production and exports. Table 4 records the results of our experiments.

TABLE 4

Concentration Indices

Country / Year	India	Sri Lanka	Indonesia	Pakistan	Kenya	Uganda	Tanzania	Malawi
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1951	68.83	43.36	44.40	90.91	44.89	42.02	55.04	83.47
1952	67.16	43.20	44.62	91.91	62.56	46.97	79.97	91.07
1953	73.58	42.84	44.33	93.14	46.03	50.22	58.66	97.20
1954	72.85	44.44	44.64	93.07	50.07	64.72	68.07	97.93
1955	70.82	40.49	45.61	91.56	63.31	73.13	60.57	97.84
1956	70.18	44.73	48.24	91.04	63.86	79.44	68.59	98.52
1957	66.91	41.99	48.90	75.39	62.27	73.23	71.15	98.20
1958	65.92	45.24	52.07	82.24	57.14	66.45	68.98	96.46
1959	62.56	41.93	49.12	82.36	49.39	52.84	69.26	92.08
1960	64.30	43.08	43.20	81.52	56.69	49.58	79.91	90.43
1961	61.29	43.24	43.78	82.11	54.70	45.82	75.64	85.55
1962	60.57	44.41	44.14	83.05	59.44	51.99	78.06	80.71
1963	58.96	43.63	44.05	99.99	58.37	46.16	79.67	74.10
1964	61.33	43.02	45.03	96.12	57.80	51.97	73.94	71.74
1965	56.62	42.52	59.26	89.71	58.70	52.67	75.69	65.83
1966	54.48	42.05	57.54	65.18	61.00	59.29	82.00	70.35
1967	55.88	43.86	56.61	30.83	61.10	53.50	72.94	70.38
1968	51.74	41.21	52.19	99.99	56.53	58.47	77.67	68.89

The first and the most important observation from Table 4 is that the difference in magnitude of the concentration indices of India and Sri Lanka is significantly wide. This indicates that Sri Lanka-tea flows to many more countries than does Indian tea. Sri Lanka exporters enjoy the advantage of a much more diversified market. This might have been the result of the poor marketing strategies of the Indian exporters who might have neglected the 'new' importers and, so, have missed the opportunity of export growth to these 'new' and small importers who may not singly be significant in the tea-world, but may count a lot when taken as a group. Sri Lanka seems to have made a very successful bid in capturing these markets through better promotional campaigns. It may be observed that there is a gradual decline in concentration index for India over years and this indicates a gradual expansion of market for the Indian product. But, the gap between Indian and Sri Lanka Index is still large at the end of sixties.

Another case in point is that of Indonesia. The figures for concentration in Table 4 indicate that Indonesia is losing her markets. This might have happened due to two reasons. First, the internal demand in Indonesia might have exploded limiting her 'exportable surplus', and second, due to the stoppage of trade during the political turmoil in the sixties some of the trade channels had dried up. Nonetheless, it is seen that the percentages share of exports in Indonesian Production increased during the period under study and, therefore, the hypothesis of internal demand pressure being the cause of contraction of export markets of Indonesian tea losses much of its force. The

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political factors might have played the decisive role in this case.

Indonesia is not an important supplier from the standpoint of future world exports of tea. For that matter, African producers are the potential source of worry to 'traditional' exporters like India and Sri Lanka. The four African tea-producers - Kenya, Uganda, Tanzania and Malawi - present two distinct trends. The first two - Kenya and Uganda - show some degree of diversification in the beginning of the period under study, while the other two, Tanzania and Malawi, always have a high degree of concentration in their exports. This implies that either Tanzanian and Malawi teas have not found favour with importing countries, or, with their meagre productions these two countries could not sell tea in a large number of markets; when their production increases they may be able to send more teas to more countries. However, it is important to note that all African producers are operating in geographically small markets and the growth rates of exports from the African exporters have been high mainly because they are 'new entry' to the market. Therefore, the 'potential' of African producers to increase their exports 'indefinitely' in future may be doubted if the growing awareness of the traditional exporters like India and Sri Lanka about the 'African Challenge' forces them to unite and initiate 'joint action' in the world export market. As such, the concentration indices divide the tea-supply sector into two distinct groups : (1) Sri Lanka and (2) the other suppliers. Sri Lanka certainly has better marketing plans and programmes to sell her tea in the world and commands the 'most expanded' geographical market among all the tea-exporters in the world.

APPENDIX I

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SUMMARY TABLE 1

Demand Elasticities and 'Original' Parameters of the Dynamic Models given in Summary Table 2

Country / Dependent Variable		a	b	c	d or θ	e	S(Y)	L(Y)	S(P)	L(P)
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 FRANCE	a	x	x	x	x	x	0.845	x	- 0.209	x
	b	21.184	0.682	0.645	2	- 0.207	0.627	0.952	- 0.137	- 0.208
2 BELGIUM		- 29.342	0.092	1.150	1.318	x	1.110	1.193	x	x
3 WEST GERMANY		43.699	- 0.308	0.868	0.763	x	- 0.971	0.692	x	x
4 ITALY		- 82.395	- 0.389	- 1.886	- 0.159	x	- 1.232	1.337	x	x
5 NETHERLANDS		181.332	- 0.546	0.222	0.814	x	0.272	0.126	x	x
6 AUSTRIA		140.370	- 0.094	x	0.320	- 0.077	x	x	- 0.068	- 0.052
7 DENMARK		0	0	1.459	0	0.573	1.439	x	- 0.406	x
8 NORWAY		0	0	0.937	0	0.966	0.992	x	- 0.760	x
9 PORTUGAL		Indeterminate	- 0.309	5.393	0	- 0.236	6.893	x	- 0.226	x
10 SWEDEN		- 34.276	- 2.258	- 2.043	- 0.675	x	- 2.190	0.941	x	x

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SUMMARY TABLE #1(CONTD.)

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
11 SWITZERLAND		x	x	x	x	x	4.311	x	0.121	x
12 U.K.	a	12.614	6.013	0.018	7.150	x	0.022	0.136	x	x
	b	8.749	10.195	x	11.191	- 0.006	x	x	- 0.006	- 0.070
13 FINLAND		Indeter-minate	- 0.060	0.561	0	0.489	0.516	x	0.310	x
14 GREECE		-265.810	- 2.305	- 2.218	- 0.438	x	- 2.261	0.531	x	x
15 SPAIN	a	-193.740	x	3.838	0.965	- 1.553	5.554	x	- 6.498	x
	b	-103.750	1.155	1.633	2	- 0.197	1.128	2.805	- 0.047	- 0.117
	c	x	x	x	x	x	3.371	x	- 1.591	x
16 YUGOSLAVIA										
	a	x	x	x	x	x	2.702	x	- 0.570	x
	b	-127.40	1.399	2.636	2	- 0.874	0.830	2.789	- 0.174	- 0.580
	c	x	x	x	x	x	2.764	x	- 0.939	x
17 U.S.A.	a	154.53	x	0.402	0.469	- 0.866	0.398	x	- 1.097	x
	b	24.155	1.316	0.198	2	- 0.078	0.201	0.587	- 0.062	- 0.180
18 CANADA	a	x	x	x	x	x	- 0.374	x	- 0.245	x
	b	Indeter-minate	- 0.001	0.033	- 0.213	0	0.043	x	- 0.200	x

....(Contd)

SUMMARY TABLE #1(CONTD.)

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
19 JAMAICA	a	x	x	xx	x	x	1.091	x	- 0.168	x
	b	- 7.794	2.416	0.436	3.605	x	0.419	1.271	x	x
20 MEXICO		x	x	x	x	x	- 0.592	x	- 0.454	x
21 CHILE	a	x	x	x	x	x	0.328	x	- 0.163	x
	b	x	x	x	x	x	x	x	- 0.054	- 0.209
22 AUSTRALIA	a	x	x	x	x	x	- 0.076	x	- 0.026	x
	b	-69.791	- 3.134	0.0002	- 2	- 0.124	0.0003	- 0.0005	0.118	- 0.208
23 NEW ZEALAND		Indeter-minate	- 0.220	4.299	0	- 0.428	5.097	x	- 0.381	x
24 MOROCCO		0	0	0.424	0	0.086	1.095	x	- 0.146	x
25 S. AFRICA		X	X	X	X	X	0.622	X	- 0.048	X
26 U.A.R.	a	x	x	x	x	x	0.529	x	- 0.327	x
	b	73.014	0.022	0.444	2	- 0.341	0.524	0.530	- 0.324	- 0.328
27 IRAQ		x	x	x	x	x	0.786	x	- 0.012	x
28 ISRAEL		12.523	1.780	0.116	2	- 0.098	0.121	1.100	- 0.073	- 0.666
29 PHILLIPINES		5.756	1.265	0.774	2.989	x	0.544	0.945	x	x
30 THAILAND		158.58	- 0.992	0.761	0.638	x	0.932	0.365	x	x

SUMMARY TABLE #1 (CONTD.)

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
31 JORDAN		x	x	x	x	x	1.320	x	- 0.634	x
32 LEBANON		x	x	x	x	x	1.797	x	- 0.137	x
33 SYRIA		x	x	x	x	x	1.509	x	- 0.916	x
34 ALGERIA		Indeter-minate	- 0.220	3.059	0	- 0.453	2.708	x	- 0.323	x
35 LIBYA	a	x	x	x	x	x	0.709	x	- 0.457	x
	b	72.410	0.180	0.744	2	- 0.525	0.699	0.758	- 0.392	- 0.431
36 SUDAN		x	x	x	x	x	0.467	x	- 0.322	x
37 TUNISIA		Indeter-minate	- 0.191	2.577	0	- 1.070	2.702	x	- 0.903	x
38 MALAY		-775.67	- 1.228	2.550	-0.166	x	3.567	0.558	.	x
39 HONG KONG		88.544	- 0.601	0.933	0.612	x	1.134	0.572	x	x
40 IRAN		28.081	- 0.877	1.048	0.094	x	1.796	0.174	x	x
41 ARABIA	a	x	x	x	x	x	1.058	x	- 0.500	x
										x
42 AFGHANISTAN		x	x	x	x	x	3.629	x	- 1.043	x
43 U.S.S.R.	a	Indeter-	- 0.119	0.925	- 0	- 0.129	1.719	x	- 0.150	x
	b	-	-	-	x	x	1.47			

SUMMARY TABLE 2

COUNTRY-WISE TOTAL IMPORT DEMAND FUNCTIONS

(t-values in brackets)

Country / Dependent Variable			Constant Term	M_{t-1}	Y_t	log Y_t	ΔY_t	Y_{t-1}	$(Y_t + Y_{t-1})$
(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 FRANCE	a	M_t	1.666 (2.209)	x	x	0.845 (9.750)	x	x	x
	b	M_t	25.541 (0.979)	0.206 (0.659)	0.778 (2.777)	x	x	x	x
2 BELGIUM[a]		M_t	-23.972 (-2.456)	0.240 (0.917)	x	x	1.183 (47.439)	0.940 (2.940)	x
3 W. GERMANY		M_t	21.712 (2.019)	0.302 (1.320)	x	x	0.780 (1.234)	0.431 (2.298)	x
4 ITALY		M_t	11.789 (1.001)	0.794 (2.902)	x	x	-1.557 (1.901)	0.269 (0.396)	x
5 NETHERLANDS		M_t	78.488 (3.234)	0.064 (0.205)	x	x	0.166 (0.250)	0.096 (0.868)	x
6 AUSTRIA		M_t	37.213 (1.369)	0.657 (3.683)	x	x	x	x	x
7 DENMARK	△	M_t	x	x	x	x	1.459 (2.056)	x	x
8 NORWAY	△	M_t	x	x	x	x	0.937 (0.982)	x	x

SUMMARY TABLE 2 (CONTD.)

Sl No of Country		P_t	log P_t	ΔP_t	P_{t-1}	$(P_t + P_{t-1})$	P_t^c	$\bar{R}$ U	F (D.F.)	S L.R.
		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	a	x	- 0.209 (- 1.218)	x	x	x	x	0.950 0.008	74.709 (2,14)	0.085 2.007
	b	- 0.249 (- 1.218)	x	x	x	x	x	0.945 0.040	49.709 (3,13)	11.254 1.952
2		-23x	x	x	x	x	x	0.997 0.029	828.630 (3,13)	17.537 2.055
3		x	x	x	x	x	x	0.901 0.048	24.002 (3,13)	11.768 2.504
4		x	x	x	x	x	x	0.955 0.044	57.033 (3,13)	13.192 1.602
5		x	x	x	x	x	x	0.197 0.041	0.872 (3,13)	9.029 2.034
6		x	x	- 0.074 (- 0.341)	- 0.020 (- 0.120)	x	x	0.726 0.047	5.935 (3,13)	10.664 3.148
7		x	x	0.578 (1.922)	x	x	x	0.545 0.513	7.758 (1,15)	17.025 2.778
8		x	x	0.966 (2.154)	x	x	x	0.438 0.583	4.800 (1,15)	22.639 2.971

.... (Contd)

SUMMARY TABLE 2 (CONTD.)

(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)
9 PORTUGAL		M_t	x	0.732 (4.605)	x	x	4.671 (1.807)	x	x
10 SWEDEN	a	M_t	12.995 (0.730)	0.118 (0.414)	x	x	-0.754 (-0.641)	0.775 (2.771)	x
	b	M_t	-240.638 (-0.928)	x	x	79.746 (2.433)	x	x	x
11 SWITZERLAND		log M_t	1.990 (2.029)	x	x	0.459 (4.311)	x	x	x
12 U.K.	a	M_t	57.501 (2.636)	0.275 (1.054)	x	x	0.093 (0.085)	0.343 (0.397)	x
	b	M_t	55.345 (2.579)	0.335 (1.340)	x	x	x	x	x
13 FINLAND		M_t	x	0.941 (9.728)	x	x	0.515 (1.288)	x	x
14 GREECE		M_t	60.252 (2.340)	0.039 (0.127)	x	x	-0.286 (0.593)	0.503 (2.204)	x
15 SPAIN	c	M_t	-119.598 (-1.429)	0.349 (1.432)	x	x	x	x	1.249 (2.720)
	b	M_t	-147.976 (-1.784)	0.426 (1.723)	2.329 (2.520)	x	x	x	x

SUMMARY TABLE 2 (CONTD.)

(Page 2 + Contd)

		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
9		x	x	- 0.205 (- 0.334)	x	x	x	0.949 0.150	73.840 (2,14)	30.462 2.268
10	a	x	x	x	x	x	x	0.812 0.053	11.342 (3,13)	13.487 2.159
	b	x	- 6.358 (- 0.239)	x	x	x	x	0.758 0.062	11.834 (2,14)	15.070 1.410
11		x	0.121 (0.929)	x	x	x	x	0.759 0.008	11.880 (2,14)	0.086 8.598
12	a	x	x	x	x	x	x	0.056 0.025	1.017 (3,13)	5.403 1.889
	b	x	x	- 0.028 (- 0.349)	- 0.047 (- 0.529)	x	x	0.190 0.027	0.914 (3,13)	5.619 1.932
13		x	x	0.475 (0.514)	x	x	x	0.955 0.142	93.443 (2,14)	40.795 2.442
14		x	x	x	x	x	x	0.456 0.098	2.316 (3,12)	25.331 2.040
15	a	x	x	x	x	- 0.506 (- 1.267)	x	0.957 0.079	58.442 (3,13)	36.455 2.159
	b	- 0.281 (- 0.457)	x	x	x	x	x	0.950 0.085	50.140 (3,13)	39.135 2.211
	c	x	- 62.137 (- 1.548)	x	x	x	x	0.923 0.109	46.958 (2,14)	45.158 1.606

..... (Contd)

SUMMARY TABLE 2 (CONTD.)

(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)
16	YUGOSLAVIA	a log M_t	- 5.078 (- 3.112)	x	x	2.702 (12.484)	x	x	x
		b M_t	-195.940 (-0.942)	0.538 (2.584)	4.055 (2.721)	x	x	x	x
		c log M_t	-5.977 (-3.876)	x	x	2.764 (12.331)	x	x	x
17	U.S.A.	a M_t	58.676 (2.351)	0.620 (2.372)	x	x	x	x	0.076 (0.729)
		b M_t	36.605 (1.638)	0.490 (1.425)	0.295 (1.081)	x	x	x	x
18	CANADA	a log M_t	6.533 (12.614)	x	x	- 0.374 (- 6.920)		x	x
		b M_t	x	0.999 (49.407)	x	x	0.038 (0.133)	x	x
19	JAMAICA	a log M_t	0.361 (0.439)	x	x	1.091 (11.064)	x	x	x
		b M_t	-17.620 (-1.259)	0.254 (0.660)	x	x	0.766 (0.950)	0.985 (2.291)	x
20	MEXICO	M_t	383.640 (1.417)	x	- 0.907 (- 0.802)	x	x	x	x
21	UNITED	a M_t	50.518 (0.748)	x	0.196 (0.325)	x	x	x	x
		b M_t	61.387 (0.572)	0.169 (0.534)	x	x	x	x	x

SUMMARY TABLE 2 (CONTD.)

		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
16	a	x	− 0.570 (− 2.346)	x	x	x	x	0.958 0.027	89.541 (2,14)	0.335 2.270
	b	− 1.344 (− 0.865)	x x	x	x	x	x	0.934 0.115	37.340 (3,13)	153.920 2.566
	c	x	x	− 0.939 (− 2.035)	x	x	0.492 (1.019)	0.936 −	83.805 (3,14)	− 2.474
17	a	x	x	x	x	− 0.164 (− 2.104)	x	0.930 0.023	35.273 (3,13)	6.110 2.583
	b	− 0.116 (− 0.454)	x	x	x	x	x	0.907 0.026	25.618 (3,13)	7.025 2.153
18	a	x	− 0.245 (− 4.126)	x	x	x	0.201 (3.783)	0.962 −	77.635 (3,14)	− 1.816
	b	x	x	0.213 (1.982)	x	x	x	0.959 0.021	386.020 (2,14)	4.739 2.628
19	a	x	− 0.168 (− 1.477)	x	x	x	x	0.960 0.002	90.590 (2,13)	0.086 1.951
	b	x	x	x	x	x	x	0.928 0.047	31.310 (3,12)	11.429 1.864
20		− 0.924 (− 0.534)	x	x	x	x	x	0.304 0.318	0.323 (2,14)	147.720 0.389
21	a	− 0.155 (− 1.159)	x	x	x	x	x	0.345 0.131	1.947 (2,12)	18.214 1.783
	b	−	x	− 0.112	− 0.165	x	x	0.248 0.129	1 306 (3,11)	18.801 1.836

SUMMARY TABLE 2 (CONTD.)

(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)
22	AUSTRALIA	a log M_t	4.554 (5.611)	x	x	- 0.076 (- 0.603)	x	x	x
		M_t	89.069 (3.647)	0.276 (0.961)	x	x	x	- 0.0003 (- 0.003)	x
23	NEW ZEALAND	M_t	x	0.802 (8.943)	x	x	3.873 (2.244)	x	x
24	MOROCCO	Δ M_t	x	x	x	x	0.424 (0.769)	x	x
25	SOUTH AFRICA	M_t	45.523 (3.294)	x	0.551 (7.101)	x	x	x	x
26	U.A.R.	a M_t	73.717 (3.429)	x	0.440 (4.574)	x	x	x	x
		b M_t	73.409 (2.700)	0.005 (2.020)	0.446 (2.819)	x	x	x	x
27	IRAQ	M_t	-259.760 (-1.332)	x	x	83.825 (3.965)	x	x	x
28	ISRAEL	M_t	22.568 (1.428)	0.802 (2.394)	0.208 (1.096)	x	x	x	x
29	PHILLIPINES	M_t	9.240 (0.206)	0.102 (0.305)	x	x	1.037 (0.472)	1.242 (2.748)	x
30	THAILAND	M_t	55.742 (3.501)	0.102 (0.566)	x	x	0.553 (1.334)	0.268 (2.519)	x

.... (Contd.)

SUMMARY TABLE 2 (CONTD.)

		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
22	a.	x	- 0.026 (- 0.387)	x	x	x	0.118 (1.516)	0.779 -	9.528 (3,14)	0.052 2.005
		x	x	x	- 0.158 (- 1.816)	x	x	0.628 0.022	4.466 (3,13)	5.220 1.432
23		x	x	- 0.386 (- 0.879)	x	x	x	0.975 0.104	156.640 (2,14)	22.185 1.668
24		x	x	0.086 (0.269)	x	x	x	0.143 0.081	0.680 (1,15)	18.170 2.782
25		- 0.072 (- 1.044)	x	x	x	x	x	0.964 0.021	107.179 (2,14)	5.095 2.398
26	a.	- 0.344 (- 2.185)	x	x	x	x	x	0.876 0.048	24.057 (2,12)	10.143 2.489
	b.	- 0.343 (- 1.989)	x	x	x	x	x	0.954 0.048	14.732 (3,11)	10.594 2.499
27		x	- 1.094 (- 0.028)	x	x	x	x	0.707 0.080	7.500 (2,11)	22.806 1.179
28		- 0.176 (- 1.458)	x	x	x	x	x	0.948 0.044	48.573 (3,13)	13.770 2.209
29		x	x	x	x	x	x	0.625 0.104	4.201 (3,12)	39.610 1.907
30		x	x	x	x	x	x	0.748 0.040	7.347 (3,12)	9.295 1.013

..... (Contd)

SUMMARY TABLE 2 (CONTD.)

(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)
31	JORDAN	M_t	-290.100 (-1.386)	x	x	143.950 (6.118)	x	x	x
32	LEBANON	log M_t	- 2.883 (- 1.418)	x	x	1.797 (7.864)	x	x	x
33	SYRIA	M_t	- 285.000 (-1.134)	x	x	164.590 (5.823)	x	x	x
34	ALGERIA	M_t	x	0.802 (6.574)	x	x	2.756 (1.412)	x	x
35	LIBYA a	log M_t	3.465 (3.774)	x	x	0.709 (6.866)	x	x	x
	b	M_t	75.816 (2.197)	0.047 (1.956)	0.779 (3.198)	x	x	x	x
36	SUDAN	M_t	98.702 (2.053)	x	0.494 (2.254)	x	x	x	x
37	TUNISIA	M_t	x	0.925 (9.202)	x	x	2.352 (2.000)	x	x
38	MALAY	M_t	84.137 (3.943)	0.306 (1.253)	x	x	1.527 (3.247)	- 0.277 (- 2.488)	x
39	HONG KONG	M_t	33.747 (2.306)	0.245 (0.950)	x	x	0.759 (0.768)	0.356 (1.727)	x
40	IRAN	M_t	28.081 (0.889)	0.346 (1.408)	x	x	0.738 (0.331)	0.066 (0.250)	x
41	ARABIA	M_t	56.130 (1.496)	x	1.332 (4.498)	x	x	x	x

.....(Contd)

SUMMARY TABLE 2 (CONTD.)

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
31	x	- 55.701 (- 1.731)	x	x	x	x	0.896 0.079	29.666 (2,12)	25.073 2.170
32	x	- 0.137 (- 0.451)	x	x	x	x	0.919 0.022	38.925 (2,12)	0.244 2.519
33	x	-80.438 (- 2.141)	x	x	x	x	0.895 0.098	29.165 (2,12)	30.122 2.932
34	x	x	- 0.438 (- 0.421)	x	x	x	0.920 0.187	39.785 (2,12)	57.765 2.188
35	x	- 0.457 (- 3.332)	x	x	x	x	0.930 0.010	46.102 (2,12)	0.110 2.794
	- 0.550 (- 2.205)	x	x	x	x	x	0.907 0.053	22.565 (3,11)	15.166 2.169
36	- 0.423 (- 1.201)	x	x	x	x	x	0.954 0.086	6.225 (2,12)	22.682 2.762
37	x	x	- 0.976 (- 1.707)	x	x	x	0.965 0.123	96.053 (2,12)	29.339 1.964
38	x	x	x	x	x	x	0.636 0.053	4.397 (3,12)	10.913 2.375
39	x	x	x	x	x	x	0.868 0.067	17.227 (3,13)	18.168 2.174
40	x	x	x	x	x	x	0.189 0.177	0.815 (3,13)	24.940 1.356
41	- 1.129 (- 2.747)	x	x	x	x	x	0.778 0.095	13.284 (2,14)	27.905 2.889

..... (Contd.)

SUMMARY TABLES (CONTD.)

(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)
42	AFGHANISTAN	M_t	-1315.400 (- 2.032)	x	x	408.920 (4.633)	x	x	x
43	U.S.S.R.	a M_t	=	0.887 (10.169)	x	x	0.873 (1.808)	x	x
		b $\log M_t$	- 3.302 (- 2.347)	x	x	1.617 (5.098)	x	x	x

Note : 'a' indicates 'Per Capita Import Function'.

SUMMARY TABLE 2 (CONTD.)

(Page 6 & Contd)

		(2)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
2		x	− 89.266 (− 1.129)	x	x	x	x	0.814 0.138	16.714 (2,14)	72.899 2.365
3	a	x	x	− 0.122 (− 0.547)	x	x	x	0.959 0.135	92.563 (2,14)	23.660 1.592
	b	x	0.143 (1.576)	x	x	x	x	0.827 -	41.728 (2,15)	- 1.163