NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, tests publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30.
The Political Economy of "Suppressed Markets": Controls, Rent-Seeking and Interest-Group Behaviour in The Indian Sugar and Cement Industries

by

Shyam Janardhan Kamath
B.A (Hons.), University of Delhi, 1973
M.B.A., Indian Institute of Management, 1974
M.A, Simon Fraser University, 1981

Thesis Submitted in Partial Fulfillment of The Requirements for The Degree of Doctor of Philosophy in The Department of Economics.

© Shyam Janardhan Kamath 1996
Simon Fraser University

All rights reserved. This work may not be reproduced in whole or in part, by photocopy or other means, without permission of the author.
Permission has been granted to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film.

The author (copyright owner) has reserved other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without his/her written permission.

L'autorisation a été accordée à la Bibliothèque nationale du Canada de microfilmér cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur (titulaire du droit d'auteur) se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation écrite.

Name: Shyam J. Kamath

Degree: Ph.D. (Economics)

Title of Thesis: The Political Economy of "Suppressed Markets": Controls, Rent-Seeking and Interest-Group Behaviour in the Indian Sugar and Cement Industries

Examinining Committee:

Chairman: Lawrence A. Boland

Herbert G. Grubel
Professor
Senior Supervisor

John F. Chant
Professor

James W. Dean
Professor

George Lermer
Professor
School of Management
University of Lethbridge
External Examiner

Date Approved: August 11, 1986
PARTIAL COPYRIGHT LICENSE

I hereby grant to Simon Fraser University the right to lend my thesis, project or extended essay (the title of which is shown below) to users of the Simon Fraser University Library, and to make partial or single copies only for such users or in response to a request from the library of any other university, or other educational institution, on its own behalf or for one of its users. I further agree that permission for multiple copying of this work for scholarly purposes may be granted by me or the Dean of Graduate Studies. It is understood that copying or publication of this work for financial gain shall not be allowed without my written permission.

Title of Thesis/Project/Extended Essay

The Political Economy of "Suppressed Markets: Controls, Rent-Seeking and Interest Group Behaviour in the Indian Sugar and Cement Industries".

Author:

(signature)

S.J. Kamath

(name)

August 11, 1986

(date)
This thesis examines the economic consequences of controls in what are for convenience called "suppressed markets." Suppressed markets are markets where the imposition of regulations and controls result in distortions to market behaviour and where alternative mechanisms are developed to substitute for free market activity. A significant feature of such markets is the rent-seeking and directly unproductive economic activity that results from the imposition of controls. Models of economic behaviour in two different kinds of suppressed markets are developed and empirically tested using data on the Indian sugar and cement industries.

The first part of this thesis examines consumer and producer behaviour in "partially suppressed" markets where government controls are imposed in a manner that attempts to replace market forces in a designated subset of a total market for a commodity, leaving "free" market forces to operate in the residual subset.

Models of economic behaviour in partially suppressed markets are developed and empirically estimated using data for the period 1951-82 for the Indian sugar industry. Elasticity estimates obtained from the empirical analysis of constrained demand and supply functions are then used to calculate the
costs of protection and rent-seeking using Harberger and Tullock-type measures. Estimates of "leakage" or diversion of output from the controlled to the uncontrolled free-sale market are also developed using the properties of Engel Curves. Interest-group behaviour in the Indian sugar industry is then examined in order to investigate the possibility of "capture" of the regulators by the regulated.

The second part of the thesis investigates economic behaviour in "completely suppressed" markets where government price and quantity controls are applied to the complete output of the industry, both on the demand and supply side. Demand and supply functions for the Indian cement industry, a typical example of a completely suppressed market, are then estimated for the 1951-82 period. The magnitude of output black marketed is estimated by an indirect procedure using input-output coefficients. Interest group behaviour in the Indian cement industry is also examined. Controls in such markets result in the development of black markets and other directly unproductive profit-seeking activity.
TO MY FAMILY
Acknowledgements

I would like to thank my supervisor, Dr. Herbert Grubel for his advice at various stages of the dissertation and especially for allowing me the laxity and freedom to explore a difficult and sometimes elusive topic. I would also like to thank the other members of my committee, Drs. John Chant and James Dean for their encouragement and criticism. John was very generous with his time and was instrumental in shaping a number of key ideas and pointing out fruitful directions for further investigation. Steve Laston was instrumental in providing some much needed focus at an early stage of the dissertation by suggesting a specific industry focus.

Numerous friends and colleagues at Simon Fraser University, Dalhousie University and elsewhere provided criticism and advice. Shamsul Alam, Kelly Dusche, Thom Kerr, Dennis Maki, Chitra Namaswamy and Art Todd were especially helpful in clarifying a number of points. I would like to thank Dr. Alan Rugman, Director of the Centre for International Business Studies at Dalhousie University for financial and other clerical support in getting the dissertation completed. I would also like to thank the trustees of the William and Ada Isabelle Steel Memorial Fund and Simon Fraser University for a travel scholarship to India.
in Spring, 1984 when most of the research for this paper was undertaken.

A number of individuals in India were extremely helpful in providing data and other kinds of help for this study. Especially helpful were L.R. Gupta (Sugar Directorate), M. Ezekiel (Economic Times), R. C. Jhamtani (Planning Commission), S.V. Joshi (CMA), K. C. Jhunjhunwala (Indian Press Service), L. Kumar (Government of India), V.N. Kusnur (Economic Times), A. Luthra (Income Tax Office), H.N. Pathak (Indian Institute of Management), P. Namarakhian (Government of India), C. Nengarajan (Reserve Bank of India), N.K. Roy (Economic Times), S. Sankaran (Ministry of Industries), N. Shah (Centre for Monitoring the Indian Economy), S. Srichand (Economic Times), S. J. Vasani (Vyapar), R.D. Vasudev (Cement Controller's Office), C.D. Wadhwa (Indian Institute of Management) and A. Yumnam (Bombay University). I am also grateful to various people at the Indian Sugar Manufacturers Association, (ISMA), the Cement Manufacturers Association (CMA), The Cement Controllers Office, the Delhi School of Economics Library and the Ministry of Industrial Development Library for making various documents available to me to complete the research. My father, N.J. Kamath was especially helpful in getting access to a number of documents. In Canada, Sylvia Bell of the Simon Fraser Library Interlibrary...
Loans Division worked wonders to make available a number of books and articles from all over the North American continent.

I would also like to acknowledge the support and encouragement of my wife Kiran whose patience and help made this thesis possible.
# Table of Contents

<table>
<thead>
<tr>
<th>PART I</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Framework of Controls and Policy Intervention in the Indian Economy</td>
<td>11</td>
</tr>
<tr>
<td>3.</td>
<td>A Brief Overview of Protection and Controls in the Indian Sugar Industry</td>
<td>47</td>
</tr>
<tr>
<td>4.</td>
<td>Models of Economic Behaviour in Partially Suppressed Markets</td>
<td>62</td>
</tr>
<tr>
<td>5.</td>
<td>Empirical Estimates of Demand and Supply Functions for Sugar under Dual Pricing and Nationing</td>
<td>97</td>
</tr>
<tr>
<td>6.</td>
<td>The Costs of Rent-Seeking and Protection</td>
<td>126</td>
</tr>
<tr>
<td>7.</td>
<td>Empirical Estimates of the Costs of Protection and Rent-Seeking</td>
<td>145</td>
</tr>
<tr>
<td>9.</td>
<td>Estimates of Leakage of Sugar</td>
<td>239</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART II</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>A Brief Overview of Protection and Controls in the Indian Cement Industry</td>
<td>254</td>
</tr>
<tr>
<td>11.</td>
<td>Models of Economic Behaviour in Completely Suppressed Markets</td>
<td>272</td>
</tr>
<tr>
<td>12.</td>
<td>Empirical Estimates of Demand and Supply Functions for Cement in Completely Suppressed Markets</td>
<td>313</td>
</tr>
</tbody>
</table>


15. Summary and Conclusions .......................................................... 391

REFERENCES .................................................................................. 413
LIST OF TABLES

Table 2.1  Annual Growth Rates of GNP and per capita NNP—India (1951-83) .................. 43
Table 3.1  A Chronology of the Control Regime for the Indian Sugar Industry .................. 60
Table 5.1  Indian Sugar-Results for Annual Data-Constrained Demand Function for Sugar .. 121
Table 5.2  Indian Sugar-Results for Quarterly Data-Constrained Demand Function for Sugar ........................................... 123
Table 5.3  India-Sugar Supply Function Results .... 124
Table 6.1  Estimates of the Value of Rents in India, 1964. ........................................ 126
Table 7.1  Indian Sugar-Welfare Costs of Protection-Production Cost Calculations ..................... 155
Table 7.2  Indian Sugar-Welfare Costs of Protection-Consumption Cost Calculations I .................................................. 156
Table 7.3  Indian Sugar-Welfare Costs of Protection-Consumption Costs Calculations II ....................................................... 157
Table 7.4  Indian Sugar-Total Costs of Protection . 158
Table 7.5  Indian Sugar-Welfare Costs of Protection-Rent-Seeking (Tullock) Costs of Protection ........................................... 159
Table 7.6  Indian Sugar-Welfare Costs of Protection-Combined Costs of Protection and Rent-Seeking ....... 160
Table 7.7  Indian Sugar-Welfare Costs of Protection-Aggregate Loss Due to Export Subsidy ......................... 161
Table 8.1  Indian Sugar-Capture Analysis Results .... 233
Table 9.1  Leakage of White Sugar Calculations .... 251
| Table 10.1 | Summary of Growth of the Indian Cement Industry | 269 |
| Table 10.2 | A Chronology of the Control Regime for the Cement Industry | 270 |
| Table 12.1 | Indian Cement-Results for Annual Data for Demand Functions (Results for APGCON variable) | 333 |
| Table 12.2 | Indian Cement-Results for Annual Data for Demand Functions (Results for CALGCON variable) | 335 |
| Table 12.3 | Indian Cement-Results for Annual Data for Supply Functions | 336 |
| Table 13.1 | Indian Cement-Compiled Series of Black Market Prices | 359 |
| Table 13.2 | Indian Cement-Indirect Estimates of Quantity and Value of Cement Black Marketed | 360 |
| Table 13.3 | Indian Cement-Estimated Costs of Rent-Seeking Due to Price Controls | 361 |
| Table 13.4 | Indian Cement Industry-Capital Intensity Indices | 362 |
| Figure 3.1 | Schematic Diagram of Partial Control Regime | 58 |
| Figure 4.1 | Consumer Choice Under Full Levy-Quota Utilisation | 64 |
| Figure 4.2 | Consumer Choice Under Less Than Full Levy-Quota Utilisation | 69 |
| Figure 6.1 | Costs of Protection and Rent-Seeking Under Import Controls | 131 |
| Figure 6.2 | Rent-Seeking Costs Due to Price Controls | 141 |
| Figure 10.1 | Schematic Diagram of Full Control Regime | 267 |
| Figure 11.1 | Consumer Choice Under Completely Suppressed Markets | 274 |
| Figure 11.2 | Demand and Supply in Completely Suppressed Markets | 278 |
| Figure 11.3 | Black Market Supply in Completely Suppressed Markets | 288 |
| Figure 13.1 | Rent-Seeking Costs Due to Price Controls | 350 |
INTRODUCTION
CHAPTER 1

INTRODUCTION

Background

The theoretical analysis of price controls and regulation have both received considerable attention from economists over the years. In recent years, economists have directed their attention to analysing the unintended consequences of monopoly and governmentally regulated markets in terms of rent-seeking type socially unproductive activity. Tax and tariff evasion, lobbying, regulation evasion and revenue and tariff-seeking are some of the areas that have been examined in price-theoretic terms. Bhagwati (1982) has generically termed such activities as Directly Unproductive Profit-seeking (DUP) activities. The common element in all these analyses has been the identification of hitherto ignored margins where government price control, quantity control or other "command" regulation diverts economic behaviour.

This study focusses on what for convenience I call "suppressed markets". Suppressed markets are markets where the imposition of regulations and controls distorts normal market behaviour and where alternative mechanisms replace or substitute for free market activity. Thus any market where market forces are severely constrained or prevented from operating and where individual maximising behaviour manifests itself in
the circumvention of the artificially imposed constraints can be classified as a suppressed market. The adjective suppressed is used in the usual sense of restraining or not giving overt vent to any activity that would have normally taken place in the absence of external controls.

This study of suppressed markets incorporates perspectives from industrial organisation theory, the economics of law and crime and public choice. It goes beyond these more traditional sub-divisions in economics by examining phenomena such as black markets, rent-seeking behaviour and what has been called the "underground economy". It has a political economy focus in that it emphasises interest-group behaviour and the political process as an important element in explaining observed economic behaviour.

Antecedents

The study of suppressed markets can thus be seen as a synthesis and application of the principles and insights of some of the major sub-divisions of contemporary economics. The early post-war literature on black markets was largely confined to the analysis of price and output behaviour in the presence of price and quantity control regimes under perfect and imperfect competition and was mainly aimed at explaining the consequences of war-time controls (cf. Boulding (1947), Bronfenbrenner (1947, 1949) and Michaely (1954)). Subsequent developments in the theory of regulation in the late sixties
and early seventies examined the behaviour of economic agents under regulatory constraints but did not specifically examine suppressed market behaviour. The focus in this literature was to explain the pattern of government intervention and regulation in the market (cf. Stigler (1971) and Posner (1974)). The economics of law and crime has been concerned with the application of the theories and empirical methods of economics to the legal system and to the question of how offences result and should be dealt with under such a system. Industrial organisation theory in turn has been primarily concerned with different market structures and how the productive activity can be made congruent with society's demand for goods and services through some coordinating mechanism such as a free market. This subdiscipline has examined how variations and imperfections in market organisation affect productive success (cf. Scherer (1980)). And the theory of public choice has been concerned with the study of the economics of nonmarket decision-making especially that of political choice (cf. Mueller (1979)). All these sub-divisions of economics have provided economists with powerful tools to examine economic behaviour in nontraditional contexts and their integrated application to the study of what I have called suppressed markets represents a potentially useful and interesting exercise.

Perhaps the most fruitful antecedents to the present study are the theory of rent-seeking and transactions cost
economics. The theory of rent-seeking (i.e. the expenditure of scarce resources to capture an artificially created transfer) has attempted to look at the unintended consequences of individual maximising behaviour under institutions which generate social waste rather than social surplus as free markets do. Rent-seeking is seen as a significant social phenomenon which emerges when free markets are replaced by direct political action or other non-market types of allocative mechanisms (cf. Tollison (1982)). The study of rent-seeking has provided potentially rich insights for the study of suppressed market behaviour since it studies the political economy of regulation-induced behaviour. Papers by Bhagwati and Srinivasan (1980) and Krueger (1974) have examined the economic repercussions of rent-seeking behaviour on commercial policy and have provided testable implications for suppressed market behaviour.

The "transactions cost" school has also examined the implications of price and other regulatory restraints on economic behaviour. Harzel (1974, 1976) and Cheung (1974, 1975, 1979) have looked at the consequences of regulatory constraints for the contracting behaviour of economic agents and have argued that since commodities and services are complex, regulations cannot cover all margins subject to optimisation. Hence regulatory constraints will cause predictable substitutions away from the regulated attributes.
towards others. The distinguishing feature of these analyses is that the transaction is made the basic unit of analysis and attention is focussed on explaining economic outcomes as the result of transaction costs that characterized the situation examined. Transaction cost economics thus provides potentially powerful tools to examine the political economy of suppressed markets. Consequently, this study develops a theory of suppressed market behaviour which combines insights from all the areas discussed above but especially incorporates rent-seeking and transactions cost economics into the study of interest-group politics and maximising behaviour under externally imposed distortions on free markets.

Outline and Contents

The first part of the study focusses on a relatively restricted set of phenomena related to what are for convenience called "partially suppressed" markets. Such markets can be said to exist where governmental controls and regulations are imposed in a manner that attempts to replace market forces in a designated subset of a total market for a commodity or service leaving "free" market forces to operate in the residual sub-set. Economic behaviour in such "dual" markets in commodities has received considerably less attention than that in fully controlled or "completely suppressed" markets under rationing or price control. Many developing countries are characterised by such partially suppressed mar-
Kets in a variety of commodities such as foodstuffs, edible and mineral oils, sugar and various types of "essential" consumer goods. In these markets, the government typically allocates to every potential or pre-selected consumer a predetermined proportion or fixed quota of the commodity in question at a fixed (subsidised) price, leaving prices free to vary and clear according to demand and supply conditions in the residual "open" market. Such partially suppressed markets are usually accompanied by other constraints on external trade, production, procurement and distribution such as prohibitive or excessive tariffs, input procurement and price controls, production restrictions and regulations and government control over market distribution channels, typically through what are termed "fair price" shops. The network of controls in the primary partially suppressed markets and the related sectors of economic activity gives rise to uncontrolled margins where DUP activities produce both direct and indirect welfare costs.

This part of the study examines both the conventional costs of suppressing free markets such as the production and consumption costs of protection, and the more unconventional hidden costs of DUP activities such as rent-seeking (lullock) costs. The contribution of the partially suppressed market regime to these costs is incorporated by using estimates of domestic demand and supply elasticities obtained from models
of demand and supply in such partially suppressed markets. The Indian sugar industry has been selected since it provides a classic example of a partially suppressed market and combines in a single product some of the textbook features of a set of agricultural commodities subject to such control. The availability of a sufficiently long time series of data and the detailed information available as a result of both industry and government monitoring of production, distribution and regulation activity makes the Indian sugar industry an ideal candidate for study.

Chapter 2 provides a brief background on the framework of controls and policy intervention in the Indian economy. As an introduction to the contents of Part I an overview of protection and the nature of controls in the Indian Sugar Industry is provided in Chapter 3. Chapter 4 models economic behaviour under price and quantity controls in "partially suppressed" markets. Demand and supply functions are derived in a choice-theoretic framework. Empirical estimation of the demand and supply functions is discussed in Chapter 5. The costs of protection and rent-seeking are briefly reviewed in Chapter 6. Empirical estimates are presented and discussed in Chapter 7. Chapter 8 contains an analysis of interest group behaviour in the Indian sugar industry and Chapter 9 contains some tests of the "capture" of regulation in the industry of its main participants.
In Part 11 of this study, we examine economic behaviour in a completely suppressed market, namely the Indian cement market. Controls in this sector have been characterised by price and distribution controls over the entire output of the industry. This has led to the development of black markets and rent-seeking activity quite different from that seen in the sugar industry. Chapter 10 provides an overview of protection and controls in the Indian cement industry. Models of economic behaviour in completely suppressed markets are provided in Chapter 11. Empirical estimates of demand and supply functions are contained in Chapter 12. The theory and estimates of the costs of rent-seeking and black markets are discussed in Chapter 13. Chapter 14 analyses interest-group behaviour in the Indian cement industry in terms of the consequences of regulation in completely suppressed markets. Chapter 15 contains some conclusions and a summary of the study.

This study thus examines the implications and consequences of different regulatory regimes in situations where market forces are severely limited or circumscribed by controls. By analysing such markets, this study hopes to provide analytical insights and empirical evidence with regard to the debate on the public policy implications of regulation and controls.
Overview

Economic development in India since independence in 1947 has been achieved under a policy framework of intensive regulation and control of all facets of economic activity. Beginning in 1951-52, a series of Five-Year Plans have provided a planning framework within which private and public enterprise and industry have been allowed to function subject to numerous physical, financial and non-economic constraints. A bewildering variety of interlinking controls and policy interventions have constrained market forces in a manner quite unlike that experienced in western developed economies.

The planning and control framework adopted in India grew out of a conviction of the Indian elite in the years preceding independence that economic growth was not possible through the reliance on unfettered market forces because of the "objective" conditions of underdevelopment. According to this view, equitable growth could only be achieved by systematic planning. The establishment of the planning framework followed the recommendations of the officially appointed Advisory Planning Board (1946) and its
endorsement by the Economic Programme Committee of the Congress party (1948). The directions for establishing the Indian Planning Commission to develop and coordinate the economy-wide planning effort were provided by these documents. The subsequent Industrial Policy Resolution of April, 1948 outlined the complex of controls that would regulate industrial activity. It was the first of a series of policy resolutions and regulatory interventions that followed.

Fundamentally, the Planning Commission (set up in 1950) at the apex of the planning and control system was given the task of directing and controlling the process of resource generation and allocation. The basic decisions with which the Planning Commission was entrusted were:

1. Determining the size of the investment (savings) outlays.
2. Allocating the investment outlays among alternative uses.

In order to finance this planned developmental effort, increasing government efforts were directed to raising the proportion of savings and taxes to G.N.P. A multitude of policy instruments were designed and implemented to guide economic activity in directions congruent with the planning objectives and targets. The policy instruments were to comprehensively cover both the domestic and foreign sectors of economic activity. The domestic policy instruments mainly consisted of the following:
1. A comprehensive industrial licensing system.
2. Controls over the financial system.
3. Capital market controls over monopoly houses and restrictive trade practices.
4. Price and distribution controls on agriculture, industry, and tertiary sector activity.
5. Active encouragement of the public sector (particularly public sector enterprises (PSE's) to dominate the 'commanding heights' (critical sectors) of the economy.

The successive Industrial Policy Resolutions (IPR's) provided the strategic framework for selectively applying these policy instruments to the industrial sector. Various ministries and governmental agencies at the central and state levels were entrusted with the task of refining, implementing and monitoring the network of domestic controls.

The foreign sector policy instruments were designed to support the domestic efforts and included the following:
1. Quantitative restrictions (QR's) for shielding domestic production automatically from foreign competition.
2. An intensive and extensive framework of import licensing policies and controls.
3. Foreign exchange restrictions and rationing.
4. Export control and promotion policies.

Before I provide a detailed review of these and other policy instruments and controls, I briefly review India's
economic performance in the planning era in the next section.

**Economic Performance**

As Bhagwati and Desai (1970) point out, India's economic performance "has been both remarkable and disappointing." The Indian economy grew at an average rate of 3.6% for real G.N.P. over the first four Five-Year Plan periods (1961-74) including the period of the three Annual Plans (1966-69). It has subsequently grown erratically but nevertheless averaged 4% annually over the next nine-year period (1974-83). Per capita national product has, however, grown at a much lower rate in real terms as can be seen from Table 2.1. The annual growth rate averaged 1.4% over the whole period.

India has done well in comparison to other developing countries. Improvements in agriculture have made the country self-sufficient in food. It has a historically well-evolved entrepreneurial class and industrial structure along with a growing supply of educated citizens. Its progress in recent years has also been hailed by the World Bank as very impressive. Unlike the countries of South America and Africa, it has not had any difficulty in servicing its $27 billion external debt.

Against the list of impressive achievements, however, lie a number of weaknesses and problems. The major problem remains the sheer size of the population below the officially-defined poverty line which has grown with time and at present
is estimated to constitute about 35% of the total population (unofficial estimates put the proportion at nearer 50%). However, other fundamental structural problems exist which act as a restraint on growth and prevent an alleviation of the poverty problem. The major ones among these problems include:

1. A highly protected and inefficient industrial base in many key sectors which has made India a high-cost economy unable to grow faster domestically and in the international economy. Indian exports and their share in world trade grew smaller in the thirty-five years since independence. It accounts for less than 0.5 per cent of world trade and grew at a rate considerably lower than the rate of expansion of world trade.

2. A number of economists have criticised Indian economic policy and planning for

   a. Unrealistic planning in terms of overall investment leading continually to bigger and bigger plan outlays that were inadequately implemented.

   b. Overinvestment in 'heavy' industry leading to excess capacity, inefficient technology, lack of modernisation due to large size of funds required and structural imbalances and bottlenecks.

   c. Underinvestment and overprotection of agriculture leading to inefficient, high-cost farming techniques (though the 'Green Revolution' of the sixties has
been widely hailed as the originator of current self-sufficiency in food).

d. "A paradox of inadequate and excessive attention to detail". (Bhagwati and Desai (1970)). The inadequacy related to the failure to work out detailed implementation programmes. The failures on account of excessive attention to detail were embodied in the proliferation of ill-conceived controls over agriculture, investment and trade.

3. The interlinking system of comprehensive but ill-conceived controls were often contradictory and contributed significantly to economic inefficiency, widespread rent-seeking oriented unproductive activities and political and economic corruption.

4. A large and inefficient public sector which absorbed a major share of plan investment but did not produce an economic return sufficient to sustain its growth.

5. The Indian economy, being a mixed economy with a large private sector, is not able to take advantage of market forces and economic efficiency due to the framework of controls for regulating private market activity while simultaneously not being able to exploit the advantages of planning because of the existence of the private sector.

A detailed analysis of these and other problems is not
Policy Interventions and Controls - A Discussion

As indicated earlier, a wide variety of interlinking controls and policy interventions were resorted to as instruments for implementing the strategy of planned development. These controls and interventions can be broadly grouped under domestic and foreign sector interventions. The major features of these controls are discussed below under these two headings.

There were ostensibly three major policy aims of government economic policy which were to be achieved through the policy interventions and controls. These were:

1. To achieve the best possible allocation of investible resources while at the same time reduce the concentration of ownership of productive assets.

2. To raise the maximum of investible resources by way of taxation.

3. To provide essential consumer goods at low prices for the benefit of the poor while keeping the prices of intermediate and capital goods down in order to stimulate
investment and achieve 'a low-cost economy'.

The framework of controls and interventions described below can be viewed against these avowed policy aims of the government.

5 Domestic Controls and Interventions

Domestic controls and interventions include a variety of controls such as industrial licensing, restrictions on capacity expansion, financial system and interest rate controls, price and distribution controls, labour market and employment controls and controls on monopoly and restrictive trade practices. Controls on agriculture and the tertiary services sectors constitute other major areas of regulation. Policy interventions include central allocation of major investments, encouragement of and preference for public sector enterprises, industrial location policy and public sector control over distribution of major commodities. While the controls have been modified over the years and there has been a move towards economic liberalisation in recent years, the majority of the restrictions continue to apply for major sectors of the economy.

The details and evolution of these categories of controls are described below.
Industrial Licensing Controls

The most comprehensive set of capital market controls relate to the industrial licensing system. Under this system, any investment in plant and machinery, structures or other capital equipment above a certain limit must be approved by the government through various agencies and departments set up for this purpose. The policy aim of these controls is to regulate investment and the allocation of resources and provide preferences for cottage, village and small industries which do not fall within the ambit of the licensing procedures.

The industrial licensing procedures were supposed to apply to both the private and public sectors. However, public sector companies are typically exempt from a number of provisions. As already outlined above, the IPR of 1956 provided for different lists which specified industries that were to be in the exclusive domain of the public sector and those that were to be in the mixed sector, the public sector having the prerogative of entry.

The industrial licensing procedure as originally envisaged sometimes takes years and has been found to be cumbersome and inefficient. Consequently, the government appointed a number of committees to review and streamline the procedures. A number of industries have been delicensed (though some have subsequently been relicensed) and expansions and diversifications up to 25 per cent of existing capacity have been per-
mitted. Unlimited expansion of capacity has been permitted in certain industries. The license exemption limit has been raised and currently stands at Rs 30 million (about $3 million). Other modifications have also been made in license allocation procedures such as granting preferential treatment for soft loans, import licenses, etc., for small scale units with capital investment in plant and equipment of less than Rs 2 million (about $200,000).

The industrial licensing policy and system has been criticised for stifling the economic growth of the country and for creating unemployment, imbalances and bottlenecks. On the other hand, academicians and politicians on the left have criticised the policy for favouring big business and increasing the degree of concentration of economic power. The major criticisms on efficiency and distributive grounds can be summarized as:

1. The licensing policy has been criticised for incorporating too many, often contradictory, objectives, e.g., promoting industrial growth and efficiency but by favouring small scale and cottage industries; attempting to check the concentration of economic power while allowing the preemption of licensing capacity by large business houses; demanding export promotion and growth while progressively requiring (high-cost) import substitution, etc.
2. Multiplicity of overlapping controls and procedures leading to a proliferation of licensing agencies and inordinate time delays in clearances.

3. Absence of explicit criteria for evaluating license applications in terms of 'social', as distinct from private, profitability and the consequent ad hoc criteria adopted in licensing approval. Bhagwati and Desai (1970) for example criticise "the absence of explicit economic criteria as also the weighting of different objectives, in the grant or rejection of industrial licenses (which) was matched, through the period by the generally poor quality of the 'techno-economic' examination of proposed industrial investments which the DGTD was supposed to carry out in each case." (1970, p. 255, brackets mine). The lack of criteria even today is evident from the number of committees that have been set up in recent years to examine issues of industrial and import licensing.

4. An overemphasis on 'targetted' capacity and the sanctioning of such capacity without regard to techno-economic or market viability. This had simultaneously resulted in the setting up of non-economic units, the preemption or 'foreclosure' of licensed capacity and the non-realization of large volumes of licensed capacities in certain areas. According to the Hazari
Committee (1967) and the Dutt Committee (1969) this had led to the perpetuation of monopolies in certain key sectors and the chronic shortage of certain 'essential' commodities like fertiliser, aluminium, etc. The deliberate preemption of capacity by the practice of making multiple applications in different names for the same item had been viewed by these committees as being helped and abetted by the lending policies of the public financial institutions thus levelling the accusation of large business houses building private empires with public money.

5. The administrative exemptions and restrictions were without economic rationale. For example, arbitrary exemption limits established (e.g. units under Rs 30 million investment being exempt) often interfered with the objectives and efficiency of the planning process itself as conceived by the authorities. This made the whole planning process self-contradictory. With regard to restrictions, the position was even worse. The severe restrictions on the manufacture of 'new articles' effectively prevented innovation and efficiency and protected existing products excessively. The emphasis on administrative rules of allocation had a built-in bias against efficiency.

The industrial licensing system has been a major source
of graft and corruption. No estimates of the value of rents are available (except for Krueger's (1974) estimate discussed later) but the magnitude would seem to be large given the real rate of return earned by savers and estimates of the real rate of return on capital.

**Capital Market and Interest Rate Controls**

A number of specialised governmental financial institutions have been set up to provide concessional loans and other kinds of financial services to 'priority' sectors. The most important institutions are the Industrial Finance Corporation of India (IFCI) set up in 1948, the National Industries Development Corporation of India (NIDCI) founded in 1954, the Industrial Credit and Investment Corporation of India (ICICI) set up in 1956, and the Industrial Development Bank of India (IDBI) and the Unit Trust of India (UTI), both set up in 1964. In addition, there are corporations for financing individual industries (small scale industries, tea plantations, etc.). Beginning in 1951, each state has also set up its own industrial and investment corporations. In 1969, the largest twenty private sector banks were nationalised and have since been regarded as a major instrument of State financial development effort and policy. These financial system interventions and controls are used to target funds to chosen sectors.
Interest rate controls are evident in the regulation of deposit and lending rates of the commercial banks. In addition, the rates of cooperative banks, public sector financial institutions and other types of financial institutions are also regulated. Interest rate ceilings apply selectively to certain classes of borrowers such as agriculture, small sector units, export units, etc. Lending rates of commercial banks are currently controlled to a maximum of 18% while the ceiling on deposit rates is around 10%. Similarly ceilings are imposed on government company deposit rates depending on the period of deposit (currently 8-14%) and public limited companies rates of deposit (currently 10-13%). Besides this there are lending rate ceilings on export, small-scale industry, food procurement and interbank loans.

Price and Distribution Controls

Price and distribution controls in India are pervasive. The Essential Commodities Act (1965) empowers the central government to control, regulate or prohibit the production, distribution, transport, trade, consumption or storage of a large number of commodities. All foodstuffs, principal raw materials, iron and steel products, consumer goods like paper, sugar, vegetable and mineral oils, textiles, etc., inputs like fertilizer, cement, etc., and the import of industrial
components are under some kind of distribution controls. The Act also empowers the Government to set prices and to take over stocks on conditions set by itself. A total of eighty-three control orders and enactments have been put on the statute-books by Parliament since 1947. There is a good deal of overlap between the provisions of the Essential Commodities Act and Section 18(g) of the IDR Act (1951) which empowers the Central Government to regulate supply and distribution of and trade and commerce in any article relating to a 'scheduled' industry. Other goods such as cars, trucks, scooters, drugs and pharmaceuticals, etc., are also price-controlled but are distributed through non-governmental channels. Prices are set by the Indian Tariff Commission so as to limit profits to 8-12 per cent of invested capital for the representative firm.

Distribution controls have been primarily applied by the establishment of a public distribution system for foodgrains and 'essential' commodities such as kerosene, cooking oil, sugar, etc. The system consists of Government procurement agencies, storage and distribution agencies and a vast urban network of Fair Price Shops (FPR's) operated by the private trade but with government control and monitoring. The distribution controls vary from product to product and include restrictions on inter-regional movements, purchase and processing restrictions and a ban on certain kinds of trading such as forward markets in a number of commodities. The
distribution controls have been most often combined with a system of formal statutory rationing for all the urban centres (in the latter sixties, for example) and a system of informal rationing in rural areas.

Price controls fall into two categories: statutory and informal. Statutory price controls apply to commodities whose prices are fixed by a semi-judicial body such as the Tariff Commission and whose enforcement are imposed by statutes. Items include sugar, cement, steel and newsprint. Prices are thus administered directly by the Government. With regard to informal price controls, prices are set by means of an understanding between industry and the Government to 'maintain existing prices as far as possible.' Revision of prices are possible only after obtaining Government approval. The Government is vested with such strong controlling power that defacto these informal controls become of the nature of formal controls. Items in this category include bicycles, soap and other 'essential' consumer items. There are many variations of these price controls with controls on 'retention' or ex-factory prices as well as controls only at the consumer level. At times, uniform consumer prices are regulated throughout the country by systems of central freight equalisation pools. The system of price and distribution controls thus becomes costly and requires an elaborate administrative structure to implement.
A number of acts apply to specific commodities such as coffee, tea, sugar, rubber, coir, etc. Agencies like the Coffee Board, the Rubber Board, the Tea Board, etc., have been set up to promote exports and the development of these industries but act as production and marketing boards to control and regulate their activities. Unproductive rent-seeking activity and corruption are the rule rather than the exception. Capture of the regulators by the regulated and black-market activity are widely prevalent. A common practice is to secure allocations of the controlled commodity on some pretext and to resell the item on the open (or black) market at a substantial premium.

The nature of the price and distribution controls can be illustrated by taking the case of foodgrains. The government fixes procurement and support prices to ensure fair prices to farmers. The result of such a policy appears to have been to elevate agricultural prices above what free market prices might have been. A substantial proportion of the foodgrains produced are procured directly by the government for distribution through the public system. In addition, the government through the Food Corporation of India (FCI) maintains a buffer stock of around 15-20 million tons on a total harvest of around 140 to 150 million tons. The interstate movement of foodgrains is controlled along with prices so as to control private trader's profits in deficit.
areas. In addition, the government subsidises a portion of consumption in urban areas by selling foodgrains at a lower price than that ruling in the open market. This practice allegedly leads to diversion of controlled supplies, especially of better quality foodgrains to the open market.

Labour Market and Employment Controls

As mentioned briefly above, no comprehensive formal system of controls exist in the labour market. However, minimum wage laws have been enacted in urban areas though these are largely inoperative due to the overabundant supply of labour and the impossibility of effectively policing the large labour market. The only major area of labour market intervention is in the public sector. Government employees on the average receive significantly higher wages than those in comparable jobs in the private sector. This becomes the source of considerable rent-seeking behaviour in obtaining government jobs through investment in human capital and by other unproductive means. Another area of policy intervention in labour markets is in the area of reservation of a certain percentage of jobs for identified groups in Indian society.

An important area of labour market control is in regard to the appointment and renumeration of managerial personnel under the Companies Act (1956) amended from time to time. Restrictions cover the nature of appointments that can be made
and their approval, the number of directorships an individual may hold and limits on managerial remuneration. These provisions have led to some very creative ways of remunerating and appointing top company personnel. The provisions have also been alleged to have caused the departure of quality managers abroad to more remunerative and less restrictive environments.

**Monopoly Controls**

Controls on monopolies, large business and 'restrictive trade practices' are exercised under the MRTP Act (1969) under the aegis of the Monopolies Commission. The major thrust of these controls is to limit the "concentration of economic power" and prevent monopolistic and restrictive practices as functions of such concentration. The controls have been implemented through the regulation of investment by large industrial houses. The intent of these controls has been the denial of new licenses to large firms and the setting up of public sector capacity or uneconomic small capacity in areas where economies of scale and large economic size are techno-economic prerequisites (e.g. cement, fertilizers, paper, heavy engineering). The provisions of the Act have often been a preemptive barrier for large industrial houses setting up capacity in key areas while simultaneously being the source of considerable rent-seeking activity. (As already mentioned the restrictions have been circumvented by other means, like pre-
emption of capacity by "shell" corporations.)

On the other hand, the MRTP Act has been claimed to have not stood in the way of investment and industrial progress because its provisions apply to only about ten per cent of the industrial license cases. However, since the majority of these cases are in key sectors of the economy and involve large investments and capacities the effect has been considerably greater than envisaged. Even though the government has in recent years granted licenses to large firms in selective areas and has revised the list of industries covered the deterrence and efficiency effects of the provisions of the MRTP Act have been claimed by a number of observers to be considerable.

Agricultural and Tertiary Sector Controls

Some of the price and distribution controls that apply to the agricultural sector have already been described. In addition there is substantial government price and physical control of the transportation, banking, insurance and other services sectors. Air and rail travel is completely operated by the government while other land transportation is controlled at the State level. Banking and insurance services are largely 'nationalised' in the public sector with the private sector portion being highly regulated.

In the agriculture sector itself, other interventions
include large subsidy programmes for land development, and for inputs like water, seeds and fertilizer. Subsidies and cheap credits have also been provided for new production techniques involving high-yielding varieties of seeds, use of mechanized equipment such as tractors, tillers, etc. Land-ceiling laws enacted as a part of more general land reforms have attempted to redistribute land to landless farmers. These seem to have largely been avoided through artificial transfers of land in the names of relatives.

15 External Sector Controls

Controls on the external sector of the economy include quantitative restrictions (QR's) mainly in the form of an elaborate import licensing system and the use of prohibitive tariffs. A number of restrictions on foreign investment also shield domestic production. Throughout the post-independence period an elaborate exchange policy regime has been in place which, along with the import controls, has been aimed at comprehensive, direct control over foreign exchange utilization. Export policy, on the other hand has grown from a position of almost complete neglect in the early fifties to a position of escalating subsidization, proliferating incentive schemes and increasing direct government promotion and involvement.

The details of each category of external sector controls
Import Licensing and Tariffs

The most important of the external sector controls is the system of import licensing. These controls are both comprehensive and complex and have the following general objectives:

1. To allocate 'scarce' foreign exchange to various users in order to meet the input requirements of priority sectors.
2. To enable progressive import substitution in order to reduce the deficits on the balance of payments over a few years.
3. To enable domestic industry to grow to the exclusion of competition from foreign industries.

Items for which licenses are issued are subject to different degrees of restrictions and different forms of licensing. There are items on the Open General License, restricted items, banned items, items subject to quota for 'Established Importers' and even 'free licensed' items. There are sixteen main types of licences with various sub-categories to cater to the specific requirements of each type of importer. Each type of licence is governed by a different set of procedures and carries its own list of items, each subject to different forms of restrictions.
The form and degree of these quite extraordinary restrictions also change over time. Categories are changed without any clear economic rationale and often create conflicts with other license categories and items.

Economists, administrators and committees appointed by the government have pointed out the following adverse effects of the import licensing system:

1. Inordinate procedural delays.
2. Multiplicity of agencies and lack of co-ordination.
3. High administrative and other costs.
4. Inflexibility in policies and procedures.
5. Discrimination against small entrepreneurs.
6. Inherent bias in favour of industries based on imported rather than domestic inputs.
7. Pervasive rent-seeking activity and corruption.
8. Absence of market competition for protected industries.
9. Anticipatory and automatic protection given to certain industries regardless of costs.
10. Discrimination against exports vis-a-vis domestic sales and consequent loss of revenue and foreign exchange.
11. Encouragement of the indiscriminate growth of non-economic industries on the basis of import substitution.
12. Adverse distributional effects of administrative allocation.
Two prominent economists, Bhagwati and Srinivasan (1975) point out the kinds of economic costs and inefficiencies involved as follows:

"The elaborate bureaucratic machinery for operating the licensing mechanisms involved direct costs as also the costs resulting from the necessity for actual and potential entrepreneurs to maintain elaborate and frequent 'contacts' with the licensing authorities. Admittedly, alternative allocation mechanisms also must necessitate 'administrative' and information gathering costs. But the specific type of 'command' mechanism involved in the Indian QK and industrial licensing regimes added to these costs by making necessary expenditures to ensure 'file-pushing' by bribe-seeking bureaucrats at lower levels, for example.... And if we could only disentangle (as we cannot) the job expansion in the bureaucracy which has resulted from the licensing machinery, much of the enormous expansion on current governmental expenditures during 1956-71 may turn out to be a net cost of the regime." (Bhagwati and Srinivasan, 1975, p. 42-43).

A number of State Trading or Canalisation agencies have also been set up as an important element of the external trading system. There are at present close to 25 canalisation agencies which together handle over 200 products. The products handled by canalisation agencies include steel, petroleum products, fertilizer, cement, metals and minerals, pharmaceuticals, chemicals, electronics, film, newsprint and silk and cotton. The major canalization agencies include the State Trading Corporation, the Mines and Minerals Trading Corporation and the Handlooms and Handicrafts Corporation. A considerable amount of rent-seeking activity in the area of
external trade involves private and public sector agencies seeking the rents allocated by other government agencies.

A protective tariff system operated concurrently with the import licensing system. Tariff rates range up to 450 per cent; with around 40% of imports having tariffs imposed on them of between 75 to 120 per cent. The Alexander Committee (1978) analysed 626 restricted items and found that 252 items received a "high" degree of protection both through the licensing system and the tariff system assuming that tariff rates above 100 per cent implied a high degree of tariff protection; 230 items were subject to less rigorous licensing controls and tariff levels below 100 per cent; while 39 items had either rigorous import controls or "high" tariff levels above 100 per cent.

In recent years, a number of relaxations in the import control policies and procedures have been attempted with the improvement in India's foreign exchange reserve position. A number of items have been delicensed up to a certain limit irrespective of indigenous availability. Export-oriented industries have been given special import clearance exemptions and incentives. Procedures have been simplified and even eliminated in a few cases. However, an extensive framework of controls continues to exist considerably hampering the efficient operation of economic activity and providing scope for extensive rent-seeking activity and corruption.
The extent of rent-seeking activity in the area of import policies and procedures has been on a massive scale. In spite of the high duties and quantitative restrictions (QH's) it is more profitable to import commodities and market them in India on the black market than to produce and sell the same good in the country. A number of governmental committees have analysed and detailed the types of malpractices resorted to in the import-export trade. These include smuggling, imports of prohibited items, imports through bogus firms' licenses, underinvoicing and overinvoicing practices and trafficking in licenses. The most widespread illegal practice has been the profiteering on import licenses. Data obtained by the author from trade sources indicates that premia on import licenses varied from 20 percent to 500 percent of the value of goods during the period 1958 to 1982. It has been estimated that in the sixties approximately Rs. 5,500 million (US$550 million) worth of import licenses were annually available in the black market. Krueger (1974) estimated the value of rents for imports to be around Rs. 10,271 million (about US$1000 million) in 1964.

Foreign Exchange Controls and Rationing

The exchange policy regime in India has, along with the QH and tariff regimes, been explicitly directed at control over the utilization of foreign exchange and its
The Foreign Exchange Regulation Act (FERA), 1947 states that "it is expedient in the economic and financial interests of India to provide for the regulation of certain payments, dealings in foreign exchange and the import and export of currency and bullion." The Act empowers the Reserve Bank of India to secure foreign exchange transactions by recording, controlling and channelling all such transactions. The Central Government is empowered to set and change the rules for the RBI to act upon.

The permission of the RBI is required for all investment made abroad by Indian residents as well as for investment in India by non-residents. The latter rules are quite stringent and effectively exclude foreign investment from India. The Foreign Investment Board (FIB) is the single agency within the government to deal with all matters relating to foreign investment and collaboration. Foreign participation in certain consumer goods industries were completely banned till recently. There are policies controlling the list of industries where foreign collaboration is permitted and where no foreign participation is permitted. Transfer of any security or creating any interest in a security in favour of a non-resident as well as issuing an Indian security to a non-resident requires Reserve Bank approval.

Other general provisions of the Act include:
1. No person resident in India, other than an authorised
dealer' can buy or otherwise acquire any foreign exchange except with the permission of the RBI.

2. An Indian company cannot, except with the permission of the RBI, open an account in foreign countries.

3. A company resident in India cannot make any payment to a non-resident out of the money held by it abroad excepting in a case where the account was in existence prior to 1947.

4. All business and vacation travel outside India requires approval of the RBI on release of foreign exchange for such travel. In addition, there are ceilings to the amounts that can be taken abroad.

All these provisions of FERA have resulted in a thriving black market for foreign exchange. Foreign exchange can be purchased or sold on the black market in any major city or town. The scale of illegal practices involving foreign exchange can be judged by the Finance Ministry's finding that during 1964-65 there were 14,300 violations of the foreign exchange rules detected as against 5,192 in 1959-60. Considering that only a small percentage of the actual violations are actually detected, the practice must be really widespread.

Export Controls and Promotion

Policy intervention on the export side of the external
sector involves controls and bans on the export of certain items, along with export incentives for other products. Both types of intervention generate rent-seeking and have been attributed by various economists and committees as being the source of illegal activity.

The executive authority for export control is vested in the Office of the Chief Controller of Imports and Exports (CCI&E). The list of items subject to export control consists of items considered 'essential' for domestic consumption, many of which are in short supply due to the price and other domestic controls. Items completely banned include certain oil seeds, paraffin wax, poultry and sugar-cane. However, the restrictions on other items such as gold, silver, minerals, etc. have been quite onerous and the continual changes can make export planning difficult.

Starting from the years of neglect of export promotion in the First and Second Plan Periods (1951-61), the Government has embarked on a policy of escalating subsidisation and export encouragement and participation. Export subsidization policies essentially take two major forms, (i) fiscal measures and (ii) import entitlement schemes which entitle exporters to premium-carrying import licenses. Other promotional activities adopted include the setting up of various trade development agencies and bodies as well as budgetary appropriations for market development, indirectly
raising the profitability of foreign sales to domestic traders and producers.

Among the major fiscal measures adopted for export promotion are cash subsidies, excise and customs duty drawbacks on inputs, sales tax exemptions on final sales, direct tax concessions, other outright subsidies and rail freight concessions. Other indirect incentives include cheap export-credit facilities through the Export Credit Guarantee Corporation, the supply of raw materials at international prices, and tax holidays and investment rebates to export-oriented units. The scope and coverage of these export incentive schemes has continued to expand and in 1982-83 and 1983-84 new incentives have been awarded to both export houses and what are called '100 percent export-oriented-units'. A 5 year tax holiday has also been granted to such units.

The import replenishment schemes through the REP licenses remains the principal instrument of export promotion. These licenses attract high import premia pro-rata to the value of exports effected. The import entitlement scheme, unlike the simpler exchange retention schemes of countries like Pakistan, is complicated by the wide variety of entitlement rates, the segmentation of the market from transferability of REP licenses, the differences in premia on entitlements and their fluctuations over time, the widespread over-invoicing of exports and changes in coverage of the
entitlement schemes.

The government has set up a number of agencies and entities for export promotion such as the Market Development Fund (1963) for grants-in-aid to the various Export Promotion Councils; the Market Development Assistance Committee; the ECGC; the RBI's Standing Committee on Export Finance and the Export Credit Cell; the Export Houses Scheme for providing incentives to registered Export Houses; the Trade Development Authority (TDA); and various Commodity Boards like the Tea Board, the Coffee Board and the Tobacco Board. The public sector corporations are also directed to export a certain percentage of their output under various promotion schemes.

Concluding Observations

The framework of controls and policy interventions in the Indian economy are therefore complex, pervasive and sustaining. They generate a large scope for rent-seeking activity. Indirect estimates of the black economy by Gupta and Gupta (1982) and others, which show the size of the black economy to be as large as 50% of GNP, seem to provide support for this contention. The estimation of the rent-seeking costs, however, is a hazardous task given the illegal, concealed nature of such activity. However, the clear specification of the various controls and allocational rules and the identification of the various rent-generating margins
would seem to make the calculation of these costs feasible. Combined with the existence of active black markets, the scope for rent-seeking activity makes the examination and estimation of this 'underground' activity an important academic and policy task.
<table>
<thead>
<tr>
<th>Period</th>
<th>Real GNP (percentage)</th>
<th>Real NNP per capita (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Plan</td>
<td>3.6</td>
<td>1.7</td>
</tr>
<tr>
<td>(1951-55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Plan</td>
<td>4.0</td>
<td>2.0</td>
</tr>
<tr>
<td>(1956-61)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third Plan</td>
<td>2.5</td>
<td>0</td>
</tr>
<tr>
<td>(1961-66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Plans</td>
<td>4.1</td>
<td>1.3</td>
</tr>
<tr>
<td>(1966-69)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth Plan</td>
<td>3.4</td>
<td>1.0</td>
</tr>
<tr>
<td>(1969-74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974-75</td>
<td>1.2</td>
<td>(-0.7)</td>
</tr>
<tr>
<td>1975-76</td>
<td>9.6</td>
<td>7.2</td>
</tr>
<tr>
<td>1976-77</td>
<td>0.8</td>
<td>(-1.6)</td>
</tr>
<tr>
<td>1977-78</td>
<td>8.8</td>
<td>6.7</td>
</tr>
<tr>
<td>1978-79</td>
<td>5.8</td>
<td>3.4</td>
</tr>
<tr>
<td>1979-80</td>
<td>(-5.1)</td>
<td>(-7.7)</td>
</tr>
<tr>
<td>1980-81</td>
<td>7.9</td>
<td>5.6</td>
</tr>
<tr>
<td>1981-82</td>
<td>5.2</td>
<td>2.7</td>
</tr>
<tr>
<td>1982-83</td>
<td>1.8</td>
<td>(-0.4)</td>
</tr>
</tbody>
</table>
FOOTNOTES TO CHAPTER 2

1 Bhagwati and Desai (1970) provide an excellent review and analysis of Indian economic planning and performance for the first three plan periods (1951-66) and remains the locus classicus on the subject of industrial policy, control and plan implementation difficulties and failures.

2 For a detailed discussion of India's export performance and policies since 1947 see Nayyar (1976) and Singh (1964).

3 These criticisms are summarised and later analysed in detail by Bhagwati and Desai (1970). For an early detailed, critical review of planning techniques see Bhagwati and Chakravarti (1969). Streeten and Lipton (1968) provide a review of failures in primary and tertiary sector and other developmental areas. For more recent studies of the problems and failures of Indian economic development see Chaudhuri (1978) and Jha (1980).


6 The various Industry Policy Resolutions and other industrial controls are documented and detailed in the Ministry of Industries' "Guidelines for Industry" (1983).

7 See the Hazari Committee Report (1967) and the Dutt Committee Report (1969).

8 The important committees include the Committee on Industries Development Procedures (1965) (The Swaminathan Committee), the Committee on Industrial Licensing and Policy (1967) (The Hazari Committee), the Industrial Licensing Policy Inquiry Committee (1969) (The Dutt Committee) and the Committee on Import-Export Policies and Procedures (1978) (The Alexander Committee).

9 See particularly Chapter 5 of the Dagli Committee Report (1979) for the confusion in this area.

10 For a discussion on money market controls see Kamath (1985a, 1985b).
Estimates of the size of the black-market in India vary from 15% to over 50% of GNP. For a recent survey see Gupta and Gupta in Monga and Sanctis (1984). Official reports on the black-market and rent-seeking activity are the Wanchoo Committee Report (1971) and the Dagli Committee Report (1979). The Raj Committee on Steel Control (1963) documents cases of graft and gross misuse of the control mechanism for steel.

For a discussion on foodgrains distribution policy see Swamy (1979). Krishnaji (1975) discuss the nature and impacts of foodgrains price policy.

A number of committees have reviewed and modified the monopoly provisions of the IDR Act of 1951. These include the reports of the Committee on Distribution of Incomes and Levels of Living (1960) (The Mahalonobis Committee), the Committee on Industrial Planning and Licensing Policy (1967) (The Hazari Committee), the Monopolies Inquiry Commission (1969) and the Industrial Licensing Policy Inquiry Committee (1969) (The Dutt Committee).

For a clear statement of this view see Dasgupta and Sengupta (1978).


Data was obtained from the vernacular newspaper "Vyaapar" (Business) published daily in Bombay. The paper fairly regularly publishes data on import license and commodity
'black market' premia by polling traders in the market as well as by occasionally bidding in the market through other business concerns. The Santhanam Committee Report (1964) stated that import licenses were worth 100 to 500 percent of their face value.

19 See Shenoy (1968).

20 Regular series for black-market exchange rates are to be found in various issues of the Far Eastern Economic Review and Pick's Currency Year Book. For an excellent, detailed study of black market exchange rates in India and other countries see Gupta (1982).


22 See Bhagwati and Desai (1970), Bhagwati and Srinivasan (1974) and the reports cited in footnote 15.

23 Possible factors for the neglect of exports during the first planning decade (1951-61) are discussed in Chapter 18 of Bhagwati and Desai (1970). It is interesting to note that they attribute this neglect to the investment strategy adopted by the Indian planners. The emphasis in the Second Plan towards investments in capital goods industries and the implicit -export pessimism entailed therein may have been due to the most influential planner at that time, Prof. Mahalanobis being a physicist and not an economist and hence not seeing the foreign trade transformation possibilities as a way of procuring capital goods. Bhagwati and Desai point out that the adoption of a material balances oriented Soviet-type planning model ('the Mahalanobis Model') seems to have been due to the influence of Soviet thinking on Prof. Mahalanobis.

24 See Bhagwati and Desai (1970), Chapter 19 for a detailed discussion of the characteristics and deficiencies of these schemes in the 1960's.

25 Bhagwati and Desai (1970) calculated the implied effective subsidisation at premia of about 70-80 percent in 1963-64 to be around Rs. 500 million, which significantly exceeded the subsidy from any or all of the other measures of export promotion. As already mentioned in footnote 16 data collected by the author showed the existence of higher premia on import licenses.
CHAPTER 3
A BRIEF OVERVIEW OF PROTECTION AND CONTROLS IN THE SUGAR INDUSTRY

Background on the Indian Sugar Industry

India is by far one of the largest sugar-cane producers in the world today. In 1982-83, it accounted for over 15 percent of world cane output. However, because of its relatively low average extraction rate, it accounted for only about 8.9 percent of world centrifugal sugar production in 1982-83. Of the total cane harvested, about 30-40 percent is processed into centrifugal sugar in any given year, with the major proportion being accounted for by the non-centrifugal indigenous sugar called "gur" (45-55 percent). India's production of gur accounts for about 55-60 percent of world non-centrifugal sugar. This plays an important role, not only as a cottage or village product, but also in determining cane prices, the flow of cane to the sugar mills and consequently centrifugal sugar production and prices and the area planted to cane.

The three sweetening agents commonly used in India are gur, khandsari and sugar which is also known as factory or vacuum-pan sugar to explicitly differentiate it from gur and khandsari. The basic source of sucrose for all three sweeteners is cane with a small amount of gur being made from
the effluence of certain types of palm trees. Gur is a village-made product which is like caked brown sugar and does not enter into international trade. Khandsari or khand (from which the word candy originates) is a partially refined sugar made by small-scaled units. It forms a very small part (3-5 percent) of total cane processed.

The modern centrifugal sugar-processing industry in India has developed under considerable protection from cheaper imported sugar culminating in a complete ban on imported sugar after the adoption of the Five-Year Planning System in 1950-51. The first Indian sugar mill was established in 1902 after the Indian government passed the Countervailing Sugar Duties Act in 1899. During the first two decades of the twentieth century, the industry grew at a modest rate, with production totalling 28,000 tonnes in 1921-22 and 120,000 tonnes in 1930-31. Gur was the more important sweetener with 2.2 million tonnes produced in 1930-31. Gur was the more important sweetener with 2.2 million tonnes produced in 1930-31. About 299,000 tonnes of khandsari were also produced in the same year. Imports of centrifugal sugar meanwhile went up from 410,000 tonnes in 1921-22 to 900,000 tonnes in 1930-31.

Protection and the Indian Sugar Industry

The Sugar Industry Protection Act passed by the Indian Legislature in 1932 imposed a very high duty on imported sugar
and was originally intended to be in force for an initial period of fourteen years till March 1946. The growth of the Indian Sugar industry subsequent to the grant of this protection was from thirty-two working units producing 162,000 tonnes in 1931-32 to one hundred and thirty units producing 947,000 tonnes in 1935-36. Only a very small amount equal to 24,000 tonnes was imported. This growth (somewhat paradoxically) given the intent of the original legislation led to greater protection to the industry with the extension and enlargement of protective regulation.

The dramatic growth of the number of producers and the amount produced led to a slump in sugar prices in 1936-37. Subsequently in 1937-39 the sugar crop failed and per capita production and consumption of both sugar and gur fell substantially. These events led to the establishment of the Indian Sugar Syndicate, a cartel established by the sugar producers to regulate the amount and price of sugar sold by member factories in order to lessen competition and raise profits. The state governments of the sugar-producing regions gave formal sanction by denying other non-member producers manufacturing licenses in the (mistaken) belief that the Syndicate would benefit both producers and consumers. The subsequent dramatic increases in prices led to the state governments rescinding their legislation with a subsequent break-up of the cartel, a dramatic slump in prices and a
number of bankruptcies. Subsequently the state governments re-recognised the Syndicate as a selling arm of the producers but with government control over prices and quantities sold. This was the first formal government control over the production and sales of sugar. In 1942 the Indian Government passed the wartime Sugar Control Order which gave it sole control over prices and distribution. Rationing of sugar at the consumer level was imposed in 1943. Gur was similarly brought under control but with little success because of its dispersed village-production characteristic.

Sugar Policy After Independence (1947)

In December 1947, following the end of the war and the attainment of independence, the Central Government decontrolled sugar and the Sugar Syndicate was allowed to resume operations. Subsequent friction between the Syndicate and the state Government controlled Sugar Commission led to the ultimate liquidation of the Syndicate in 1949-50 and reimposition of control over production, prices, and distribution by the Government. With the promulgation of the Industries (Development and Regulation) Act, 1951 of the newly-independent republic, the Government adopted a policy of "partial" control allowing sugar producers to sell half of any amount they produced over the Government-set quota on the uncontrolled free market. Production in 1951-52 soared to 1.5
million tonnes as against 1 million tonnes in 1949-50.

What followed in the next thirty-five years was an on and off policy of price, quota and distribution controls with protection from the world market (see Table 3.1 for a chronological summary of the control regime during the period). The period 1952-53 to 1957-58 saw a decontrol of prices but overall licensing of production capacity, granting of preference to co-operatives in the matter of licensing, and various labour policies being brought within the purview of Government's control. The Government also maintained partial control over releases of sugar (25 percent of production was reserved as the prerogative, not necessarily exercised, of the Government for release). The slump in the domestic production of sugar in 1953-54 and 1954-55 led to the Government importing a large amount of sugar. However, protection from imports continued in the years thereafter. The Government also prohibited ordinary futures and options trading in sugar on the (mistaken) grounds that trading in futures may lead to speculation, market rigging and volatile prices. But during this period by and large sugar prices were free to vary in line with market demand and supply.

The Government during this period embarked on a scheme of compulsory export of sugar (2-1/2 percent of output of each factory was initially earmarked for export) and in 1952 reintroduced price control and direct allocation of sugar.
stocks on the grounds that sugar prices had risen unreasonably following the announcement that India would be exporting 50,000 tonnes. The controls that were clamped on the industry were continued till 1961-62 when the good availability situation led to decontrol for a year and a half whence once again controls were reimposed till the year 1967-68. The production in 1966-67 declined sharply by almost 40 percent due to drought conditions and reduction in cane acreage.

On industry pressure and based on a realisation that "in case the policy of control that prevailed in 1966-67 was continued, production would register a sharp decline" the Government adopted a policy of "partial decontrol" whence 60 percent of total output was procured as levy sugar and sold at the Government controlled rate and the remaining 40 percent could be sold on the free-sale market at the ruling market price. Other licensing and import controls were maintained.

This policy of "partial control" with dual pricing has been followed up to the present with brief periods of decontrol (25.5.71 to 31.12.71; 16.8.78 to 4.6.79), a "scheme of voluntary distribution (1.1.72 to 30.6.72) and a period of full price control (1.10.78 to 4.6.79). The levy proportion has varied from 60 to 70 percent but has been stabilised at 65 percent during the last five years. India has also been an exporter of sugar since 1957-58 but these exports have been made at a loss made up from domestic sales.
Other control and policy measures include the imposition by the Central Government of statutory minimum prices for sugarcane to be paid by sugar factories. However, here too there is considerable flexibility in actual implementation since the state Governments can announce their own minimum prices which gives rise to another margin where rent-seeking activities come into play at both levels of Government. Fiscal policies favour gur and khandsari production which are exempt from the sugarcane purchase tax, the cane tax and other local levies. Gur is exempt from excise duty while lower excise taxes are levied on khandsari as compared to sugar. Differential levy sugar procurement prices are paid to sugar manufacturers in different regions of the country because of differences in the cost of production, transportation, etc.

Industrial licensing controls apply to the sugar industry in the setting up of new capacity and the expansion of existing capacity. This has played a critical role in determining the locational pattern of sugar capacity.

The imposition of dual prices, protection from foreign competition, the nature of licensing of new capacity and the system of minimum support prices for sugarcane has pushed up the domestic price of sugar so that the controlled levy-sugar price has been at times higher than the world CIF price and the open market price has been two to four times the international prices.
A significant feature of the Government's policies has been their partial nature. Besides the existence of a controlled and an open market within the "partially suppressed" market for sugar, there is the lack of application of these policies to the gur and khandisari sectors (constituting 60 percent of cane output) so that the partially suppressed nature of the market becomes quite evident. This gives rise to a number of interesting features which are discussed in later chapters.

An interesting feature of the imposition of Government control over the industry has been the many times active instigation and support by the sugar producers. Many of the original restrictions imposed by the Government on free-market distribution and pricing of sugar were first initiated by the Sugar Syndicate, the monopolistic trade association set up by the industry in 1936-37 with respect to control over releases and prices. The Syndicate's objective was to raise prices whereas the Government ostensibly sought to keep them at a low level. In fact, in 1940, the Syndicate asked the Government to assume control over releases in return for formal recognition of the trade group. The import duties and subsequent virtual prohibition of imports was also actively lobbied for by the industry as an ostensibly temporary measure but was subsequently extended and tightened on the industry's insistence and active pressure. The policy of prohibiting
futures sales was originally introduced by the Sugar Syndicate. Post-independence controls have also been encouraged by the producers when specific features suited them. For example, the Report of the Committee on Controls and Subsidies (1979) (the Dagli Committee Report) states on the basis of evidence tendered that,

"Sugar producers in the South and Maharastra (the more efficient tropical regions, have been in favour of decontrol; but even they have been demanding the setting up of a buffer stock to be maintained by the Government. The Indian Sugar Mills Association (dominated by the less-efficient North Indian Private sector) has pleaded that control, if relaxed, should be accompanied by decontrol of sugarcane prices. The sugar mills of Bihar and Eastern U.P. (the least efficient) have pleaded for the continuance of control—and different "retention prices" (levy procurement prices) for sugar mills in different regions...some state Governments have pleaded for increased licensing of sugar mills to match the increased capacity for cane growing in irrigated areas" (Dagli Commission Report, p. 169, brackets mine).

Two recent episodes of Government control of the sugar industry because of favourable production and stock conditions were followed by active lobbying by the industry for the reintroduction of controls. After complete decontrol in May, 1971 the industry introduced a system of voluntary distribution and price controls until the Government reintroduced the "partial" control regime in July, 1972. Similarly, faced with an all time record sugar production of around 6.5 million tonnes and a high carryover stock level of 3.3 million tonnes at the beginning of the 1977-78 cane-
crushing season, the Government completely decontrolled sugar in August, 1978. The subsequent decline in sugar prices and profitability led to all three sectors of the sugar industry namely the joint-stock, public and cooperative scheme sectors adopting a joint-price regulation of monthly releases of sugar in March, 1979. With intensive lobbying and industry pressure, the Central Government reintroduced statutory price and distribution controls in June-September, 1979.

The network of overlapping controls and policies has resulted in the creation of other interest groups besides sugar producers. These include a strong farm lobby, gur and khandsari producers, the cooperative producers, the distribution trade and significant regional interests. Dual pricing which was originally intended as a cross-subsidisation consumption scheme for poor consumers at the expense of the rich has led to ever-escalating demands for more levy sugar and increases in the levy sugar price unrelated to economic factors or the original intent of subsidising the poor. The leakage of levy sugar from the controlled to the open market has led to an interest group of wholesalers and retailers. A whole class of "sugar-baron" politicians are alleged to control the sugar-producing states' legislatures and constitute a powerful pressure group in the Parliament as has been documented by academic studies (e.g. Baviskar (1980)) and the lay press.
Nature of the Partial Control Regime in the Indian Sugar Industry

In order to facilitate an understanding of the analysis presented in subsequent chapters, it is necessary to detail the operating structure of the regime of partial control in the Indian sugar industry. This is done in this section.

As already mentioned, the regime of partial control in the Indian sugar sector has entailed the government procuring a predetermined 'levy' proportion of sugar at a fixed price from sugar producers. Sugar is then 'released' in the form of a predetermined fixed ration quota (not equal in aggregate to the levy amount procured) at a fixed price to consumers on the demand side of the market. The balance proportion of sugar produced but not procured by the government could then be sold on the 'free-sale' open market at whatever price the market would bear. This is to be contrasted with a regime of "full control" when the government procures the full amount of sugar produced at a fixed price and then releases a part or all the sugar so procured to consumers through the public distribution system.

The various components of the regime of partial control are shown in Figure 3.1.
It can be seen from Figure 3.1 that the government effectively separates the demand and supply sides of the Indian sugar market. It does this by its actions in the procurement of the levy quota, management of buffer stocks and stocks with the sugar mills and the use of the subsidised export mechanism as a vent for any 'surplus' sugar stocks. The monthly release mechanism is essentially the instrument by which the government controls the quantity of levy sugar (and free-sale sugar) sold through the distribution system. As
Baru (1977) notes,

"To sum up, ...... the sugar economy has been controlled fairly 'efficiently' so as to maintain prices at a high level. The movements in monthly releases and exports (not forgetting stocks) have amply corroborated the hypothesis that, inspite of comfortable production, open-market prices have been consistently rising (during periods of control). Further, despite the fact that nearly two-thirds of the total output is sold through the public distribution system, the open market dependence of the average urban and rural consumer is still fairly high." (Baru 1977, pp. 39-40, brackets mine).

These features of the Indian sugar economy need to be taken into account when estimating demand and supply functions for the Indian sugar industry and in the estimation of the costs of protection and rent-seeking. These features are specifically incorporated in the analysis that follows.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>POLICY</th>
<th>YEAR</th>
<th>POLICY</th>
<th>LEVY%</th>
<th>FREE SALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1941-42</td>
<td>Control</td>
<td>1967-68</td>
<td>Partial Control</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>1942-43</td>
<td>Control</td>
<td>1968-69</td>
<td>Partial Control</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>1953-44</td>
<td>Control</td>
<td>1969-70</td>
<td>Partial Control</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>1944-45</td>
<td>Control</td>
<td>1970-71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1945-46</td>
<td>Control (a)</td>
<td>1.10.70</td>
<td>Partial Control</td>
<td>60</td>
<td>40*</td>
</tr>
<tr>
<td>1946-47</td>
<td>Control</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1947-48</td>
<td>Decontrol</td>
<td>24.5.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1948-49</td>
<td>Decontrol (b)</td>
<td>25.5.71</td>
<td>Decontrol</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1949-50</td>
<td>Control</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950-51</td>
<td>Partial Control</td>
<td>30.9.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1951-52</td>
<td>Partial Control</td>
<td>1971-72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1952-53</td>
<td>Decontrol (a)</td>
<td>1.10.71</td>
<td>Decontrol</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1953-54</td>
<td>Decontrol</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1954-55</td>
<td>Decontrol</td>
<td>31.12.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1955-56</td>
<td>Decontrol (b)</td>
<td>1.1.72</td>
<td>Scheme of voluntary distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1956-57</td>
<td>Decontrol</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957-58</td>
<td>Decontrol</td>
<td>30.6.72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1958-59</td>
<td>Control</td>
<td>(c) 1.7.72</td>
<td>Partial Control</td>
<td>60</td>
<td>40*</td>
</tr>
<tr>
<td>1959-60</td>
<td>Control</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960-61</td>
<td>Control</td>
<td>30.9.72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1961-62</td>
<td>Decontrol</td>
<td>1972-73</td>
<td>Partial Control</td>
<td>70*</td>
<td>30</td>
</tr>
<tr>
<td>1962-63</td>
<td>Decontrol</td>
<td>1973-74</td>
<td>Partial Control</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>1963-64</td>
<td>Control</td>
<td>1974-75</td>
<td>Partial Control</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>1964-65</td>
<td>Control</td>
<td>1975-76</td>
<td>Partial Control</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>1965-66</td>
<td>Control</td>
<td>1976-77</td>
<td>Partial Control</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>1966-67</td>
<td>Control</td>
<td>1977-78</td>
<td>Partial Control</td>
<td>65</td>
<td>33</td>
</tr>
<tr>
<td>(a)</td>
<td>1.10.77</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.8.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>16.8.78</td>
<td>Complete Decontrol (also discontinuance of monthly release mechanism)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to</td>
<td>1978-79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>1.10.78</td>
<td>to</td>
<td></td>
<td></td>
<td>-30-</td>
</tr>
<tr>
<td>(b)</td>
<td>4.6.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.6.79</td>
<td>Monthly release mechanism reintroduced by Government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>12.9.79</td>
<td></td>
<td>Government introduced full price control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>on wards</td>
<td>1979-80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>1.10.79</td>
<td>Full Price Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to</td>
<td>16.12.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>17.12.79</td>
<td>Partial Control</td>
<td>65</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>onwards</td>
<td>1980-81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1981-82</td>
<td>Partial Control</td>
<td>65</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>onwards</td>
<td>1982-83</td>
<td>Partial Control</td>
<td>65</td>
<td>35</td>
</tr>
</tbody>
</table>

Decontrol for a part of season
*3.5% for export.
FOOTNOTES TO CHAPTER 3

1. For a discussion on the historical developments in the Indian Sugar industry see Hirsch (1961) and the 1982-83 Indian Sugar Yearbook (Vol.1).

2. The details of the evolution of protection in the Indian Sugar industry can be found in Hirsch (1961) and the various reports of the Tariff Commission and the Sugar Inquiry Commissions listed in the bibliography.


4. The interest-group aspects of the control regime are discussed in detail in Chapter 8.

5. This section is based on the Indian Sugar Yearbook (1981-82), the Bhargava Commission Report (1974), Baru (1977) and various issues of the Economic and Political Weekly.

6. Even here, each sugar factory is directed to sell its free-sale quota to authorised wholesale dealers for sale on the open market. The government has usually announced the amount that can be released for free-sale but there is no compulsion for the factory or dealer to actually sell this amount.
CHAPTER 4

A MODEL OF ECONOMIC BEHAVIOUR IN PARTIALLY SUPPRESSED MARKETS

Introduction

All economic transactions are complex in that they are made up of many characteristics. Consequently, any action taken by a government to control, regulate, tax or subsidise any transaction will fall short of covering every relevant margin because the costs of determining these characteristics are positive. Typically, substitution will take place away from the controlled margin to other uncontrolled margins and generate incentives for DUP-type behaviour. When market transactions are partially controlled as in the case of Indian sugar and similar commodities, this gives rise to "constrained" economic behaviour in the "controlled" segment of the market but essentially leaves a number of margins uncovered where there is scope for avoidance or evasion of the relevant control and diversion of activity to the uncontrolled sector. In addition, to the extent that aspects of the control process itself are susceptible to "capture" by the regulated or the controlled, lobbying activity leads to the annulment or attenuation of the original purpose of the control.

The analysis of economic behaviour in partially suppressed markets thus becomes an interesting task. The
The economics literature has more traditionally examined economic behaviour under conditions of price control and rationing where all economic actors in a particular market are subject to the imposed constraints without there being two prices and two markets in the presence of partial price-control and rationing. Mukherji, Pattanaik and Sundrum (1980) and Pal and Reddy (1977) are the only two papers that have modelled the kind of partially suppressed markets that pertain to India and other developing countries.

In this section, I derive demand and supply functions for a partially controlled commodity (sugar in this case) in the absence of lobbying and capture-type DUP behaviour. Then I briefly examine the behaviour of the firm under the partial control regime and derive some implications regarding diversion of economic activity to other uncontrolled margins. Finally, an attempt is made to provide some qualitative implications when the controllers and the control process are "captured" by the controlled.

Derivation of Demand Functions in Partially Suppressed Markets

The consumers choice problem can be depicted by the situation in Figure 4.1. The situation of a consumer who consumes his full levy quota and also buys some sugar in the free-sale market is shown in this diagram. Two goods, sugar and gur can be purchased with available income I. A quota of
OX is allocated to the consumer at the levy price relative to St given by the slope of segment KL (slope $= - \frac{P_S}{P}$ where $P_S = \frac{G}{P}$, levy price of sugar and $P = $ price of St). In addition to the levy quota, the

![Graph showing consumer choice under full levy-quota utilisation](image)

**Figure 4.1**

**CONSUMER CHOICE UNDER FULL LEVY-QUOTA UTILISATION**

The consumer purchases an addition amount given by $X^L_X$ determined by the tangency of his highest indifference curve with the relative price line of free-sale sugar and St (slope $= - \frac{P_S}{P}$ where $P_S$ is the free-sale price of sugar). The values of $K$ and $M$ are given in the usual fashion by looking at the
equation of the budget line,
\[ I = P_X X + P_X X + P_X X \]  
\[ S \quad S \quad S \quad S \quad G \quad G \]  
which gives
\[ X_G = \frac{I}{P} \quad \text{ (for point K) } \]  
\[ G \]  
and \[ X = I + X \left( P - P_s \right) \]  
\[ S \quad S \quad S \quad S \quad F \quad L \]  
where \[ X = \chi + \chi \text{ and } P > P_s \]  
\[ S \quad S \quad S \quad S \quad F \quad L \]  
In the usual fashion, assuming that the income effect is positive, and aggregating overall consumers, we can derive demand curves for sugar and gur as
\[ X = f(P, P, X, P, I) \]  
\[ S \quad S \quad S \quad S \quad G \]  
and \[ X = f(P, P, X, P, I) \]  
\[ G \quad S \quad S \quad S \quad G \]  
The comparative static properties of the demand curve can be shown to be,
\[ \frac{\partial X}{\partial P_L} < 0 \]  
\[ \frac{\partial X}{\partial X} > 0 \]  
\[ \frac{\partial X}{\partial P} < 0 \]  
\[ \frac{\partial P}{\partial P} > 0 \]  
\[ \frac{\partial X}{\partial G} \]
\[
\frac{\delta X_S}{\delta l} > 0
\]  
\[
\frac{\delta X_S}{\delta l} > 0
\]

Similarly, for the gur demand function we can derive corresponding comparative static derivatives. The derivatives are similar except for the result that the demand for any good (not only gur) would increase irrespective of whether it is a substitute or complement to gur when the levy quota is increased, as long as the income effect for that good is positive. Intuitively, this holds because any increase in the quota is like an income subsidy and ceteris paribus should increase the amount consumed of every other good. For the consumer group as a whole, the income effect can be positive only if each consumer does not pay an equivalent amount in taxes to finance the subsidy (in the case of the Indian sugar consumer this is so because a majority of those who pay taxes do not consume sugar at all but instead consume gur).

A demand function similar to (4.4) can be derived for free-sale sugar, \( X^F \). The arguments will be identical to (4.4) and the comparative static derivatives similar except for the derivative \( \frac{\delta X^F}{\delta l} \). It can be shown that this derivative

\[ \frac{\delta X^F}{\delta l} \]

has to be greater than minus one, (this is done in Appendix 4.1). Intuitively, this happens because an increase in the
ration quota is like an increase in income. In the extreme case of zero income elasticity of the controlled good, the free market quantity demanded will decrease exactly by the amount of the increase in the levy quota. In other words, the limiting value of \( \frac{\delta X}{\delta} = -1. \) In general, for any positive income elasticity this coefficient will be greater than minus one and could be positive. While the income effect is unlikely to be important for commodities which are a minor part of the consumer's budget (like sugar), they are likely to play an important role for other commodities accounting for a major portion of the budget like foodgrains. In the analysis of the Indian sugar economy that is contained in the following chapter this effect is likely to be very small since sugar constitutes only about 3-4% of the Indian consumers average total monthly consumption expenditure.

Figure 4.1 also shows the effect of a decrease in the ration quota from \( X \) to \( X \). Given no change in either the levy or free-sale price, the consumer will experience a fall in real income and achieve equilibrium at a lower level of satisfaction, B.

With regard to the sugar industry analysis that follows in subsequent chapters, it should be noted that because of the small weight of sugar in consumers budgets the existence and size of the income and substitution effects of a price change
is going to vary depending upon the type of consumer involved. For the consumer who consumes all his quota and purchases additional quantities in the open market (as shown in Figure 4.1), these effects can be summarised as,

\[
\frac{X}{P_S} = 0 \quad \text{due to only an income effect which is small}
\]

\[
\frac{X^S}{P^F_S} < 0 \quad \text{due to both a small income effect and a substitution effect}
\]

The situation of the consumer who does not purchase the full amount of his quota but does not resell the excess on the free-sale market is shown in Figure 4.2. In the case of this consumer, small changes in quota will have no effect on his optimal choice bundle. A considerable reduction in quota from \( X \) to \( X^S \) will however have the effect of forcing the consumer to buy sugar in the free-sale market. In the case of this consumer the income and substitution effects of a price change are different from those for the first type of consumer. These effects are as follows,

\[
\frac{\delta X}{\delta P^L_S} < 0 \quad \text{due to a large income and substitution effect}
\]

\[
\frac{\delta X^S}{\delta P^F_S} = 0 \quad \text{since no free-sale quantity is consumed}
\]

It is interesting to note that if this type of consumer resells the unused portion or more of his ration quota in the free-sale
market, the free-sale price also becomes relevant and there will be an income and substitution effect due to a price change as before.

**CONSUMER CHOICE UNDER LESS THAN FULL LEVY-QUOTA UTILISATION**

There is a third kind of consumer who always consumes the full amount of his ration but does not buy any quantity on the free-sale market. This is the consumer whose indifference curve is always tangent to point L (a corner solution) in Figure 4.2. The effect of a change in either the levy or the free-sale price is unlikely to change the amount of the partially controlled commodity consumed by this individual. However, the analysis of this case is complicated as in the case of most corner solutions and one way to get around this is to assume that this case is not important from an empirical viewpoint.
Thus the aggregate effect on the demand for sugar as a result of a change in price or levy quota change in price or levy quota of all three (or the two important) types of consumers cannot be determined completely a priori but will depend on the distribution of the types of consumers in the economy.

This consideration would imply that the correct way to estimate a demand curve for a partially suppressed commodity would be to account for the three different kinds of consumers in the estimation either by estimating separate demand curves for each if disaggregated data is available (this is highly improbable) or weight the relevant magnitudes by the total numbers of consumers of each type (I will return to this issue in the next chapter).

Pal and Reddy (1977) have discussed the consumer's choice problem under dual price-controls, for foodgrains. Appendix 4.1 presents the relevant mathematical derivation of the consumer's choice problem. Based on the results derived there, the following propositions hold:

**Proposition 1** A unit increase in the levy quota of the controlled commodity ceteris paribus would reduce the "free" market demand for the commodity by less than one unit.

**Proposition 2** The demand for any commodity other than the partially controlled commodity would increase irrespective of whether it is a complement or a substitute to the partially
controlled commodity (provided the income effect of this other commodity is positive) if the levy quota is increased.

Proposition 3 For a normal good an increase in the price of the partially controlled commodity (as long as $P_L > P_S$) would reduce the demand for that commodity.

These propositions can be used to demonstrate that:

(1) A unit increase in the levy quota of the partially controlled commodity will raise the "free" market price of the commodity. Pal and Reddy (1977) recognise this aspect.

(2) The lower the issue price of the levy quota the higher will be the free-sale demand for the controlled commodity (assuming a positive income effect) and given the fixed supply of the controlled commodity the higher will be the "free" market equilibrium price. This is likely to lead to a greater incentive to divert supplies from the levy to the free-sale market in the subsequent time period. As Pal and Reddy point out this implies that the government's objective of an equitable distribution of "essential" commodities and its objective of keeping prices from rising and maintaining their stability may be mutually contradictory. They suggest that the elimination of higher income groups from the purview of rationing will contribute to price stability because of
the implications of \( \frac{F}{S} > -1.5 \)

They also suggest that the alternative of a "dual price" system with different levy prices for different income classes would resolve the contradiction. Though they are skeptical about the actual implementation of these policies on practical grounds, they ignore the phenomenon of diversion ("leakage") from the levy to the free-sale market. With multiple markets for the controlled commodity the number of margins for "diversion" and rent-seeking activity will increase relative to the existing dual market situation and the scheme will become increasingly difficult to administer and police. From the seller's point of view such diversion will imply higher revenues and up to a point greater profits (as long as the costs and penalties of such diversion do not equal or exceed the additional revenue obtained). A multiple-price levy scheme of the type proposed by Pal and Reddy is likely to increase greatly the magnitude of rent-seeking activity and the complexity of system management resulting in conceivably much higher resource costs to the economy. A better solution would be to dismantle the partial rationing system completely and provide a direct income subsidy to consumers of the controlled commodity as a second-best but more desirable
(3) Any increase in the levy quota of the controlled commodity will lead to an increase in demand for all other controlled commodities (irrespective of whether they are substitutes or complements) as long as the income effect for those other commodities is positive. Given a fixed supply of those commodities, this will lead to a higher equilibrium price for those commodities and ceteris paribus, a higher price level in the economy. Extending the argument, widening the ambit of controls in order to ensure the objectives of equitable distribution and price stability may paradoxically result in greater price increases than in the absence of such controls. Of course, this result depends on the relative proportion of controlled outputs for various commodities in total output. Thus the government's objective of price control (cf. Sugar Inquiry Commission (1965, 1973)) of reducing the inflation rate at a high level of employment and output could conceivably have been violated during the period of controls.

Derivation of Supply Functions in Partially Suppressed Markets

Producer behaviour in partially suppressed markets is going to be determined by the prices in the levy and free-sale markets and the costs of production. If the partial rationing scheme involves the government procuring a fixed proportion of
the total output of the industry (as has been the case with the Indian sugar industry), the producer will choose a level of output which maximises his profit after accounting for costs involved in the production of the said commodity. This will give a supply curve which is a function of prices in the levy and free-sale market and the proportion of total output that is procured by the government at the levy price. Once again, it is assumed that there is no diversion of supply from the levy to the free-sale market. The levy itself is a fixed percentage of total output, fixed before the actual period of production.

The producer's supply function for refined sugar can thus be derived by looking at his profit function. The sugar producer will solve the following maximisation problem:

$$\text{Maximise } \pi = \frac{L}{i} \prod \frac{F}{3} \prod (1-L)P - C(X_S) \prod $$

where

- \( X = \text{Total amount of partially controlled commodity } S \)
- \( S_i = \text{amount produced for the levy market plus amount produced for the free-sale market} \)
- \( L = \text{levy quota proportion of total output directly produced by the government for distribution through the public distribution system} \)
- \( C(X_S) = \text{costs} \)

\( S_i \)
= cost of production (which may include cost of fines, penalties etc. in a more general analysis)

\[ P_L = \text{levy price} \]

\[ P_F^S = \text{free-sale price} \]

The first-order condition for maximisation is obtained by setting the first partial derivative of \( X \) with respect to \( P_L^S \) equal to zero (assuming \( P_F^S \) is fixed by the government & \( P_L^S \) is parametric)

\[ \frac{\delta \pi}{\delta X} = \left( \frac{\delta P_L^S}{\delta X} + (1-\lambda) \frac{\delta P_F^S}{\delta X} \right) - C'(X) = 0 \]  \hspace{1cm} (4.11)

or \( \frac{\delta P_L^S}{\delta X} + (1-\lambda) \frac{\delta P_F^S}{\delta X} = C'(X) \)  \hspace{1cm} (4.12)

where \( C'(X) = \frac{\delta C}{\delta X} \)

This gives us the following supply curve,

\[ \frac{\delta P_L^S}{\delta X} + (1-\lambda) \frac{\delta P_F^S}{\delta X} = C'(X) \]

Since \( LX \) is levied by the government for controlled distribution, the free market supply function can be written as

\[ X = \xi \left( \frac{\delta P_L^S}{\delta X} + (1-\lambda) \frac{\delta P_F^S}{\delta X} \right) \]  \hspace{1cm} (4.13)

By summing over all producers the aggregate free-sale supply function can be written as

\[ X = \sum_i \xi \left( \frac{\delta P_L^S}{\delta X} + (1-\lambda) \frac{\delta P_F^S}{\delta X} \right) \]  \hspace{1cm} (4.14)

If we assume that what is procured is distributed through the controlled distribution system i.e. \( L^\xi = X \), then the aggregate free-sale supply function can be written as
\[
X = \xi [ \text{LP} + (1-L)P ] - X
\]

(4.16)

Then we have the following results

\[
\frac{\delta X}{\delta S} = \frac{\delta X}{\delta P} \quad \frac{\delta Y}{\delta S} = (1-L) \frac{\delta \xi}{\delta Y}
\]

(4.17)

where \( \gamma = \xi [ \text{LP} + (1-L)P ] \)

We also have,

\[
\frac{\delta X}{\delta S} = \frac{\delta X}{\delta P} \quad \frac{\delta Y}{\delta S} = \frac{L \delta \xi}{\delta Y}
\]

(4.18)

If the supply function has a normal positive slope then

\[
\frac{\delta X}{\delta S} > 0 \quad \text{and this in turn would imply that} \quad \frac{\delta X}{\delta P} \quad \frac{\delta \xi}{\delta Y}
\]

we thus have the following important proposition:

**Proposition 4** An increase in the levy price, ceteris paribus, would raise the quantity supplied in the free-sale market.

This seemingly paradoxical result can be rationalised in the following manner. An increase in the levy price, ceteris paribus increases the total amount \( X \) \( = X + X \) produced of the partially controlled commodity which, given the fixed levy quota proportion actually procured by the government results in an increase in the amount supplied to the free-sale market. If in the limit the public authorities were to raise the levy price to the free-sale market level then total output would be maximised. This implies the following proposition:

**Proposition 5** The imposition of partial control usually
results in an output less than that under a free market (unless the levy price is higher than the free market price) and if the commodity under controls is an "essential" one (i.e. a necessity) this result will constitute a undesirable consequence of controls.

From (4.16) we get,

\[ \frac{\delta X_S}{\delta L} = \zeta \left( \frac{P_F - P_S}{X_S} \right) - \zeta < 0 \] (4.19)

Since \( P_F > P_S \) and \( \zeta > 0 \)

This is consistent with expectations and says that the amount supplied in the free-sale market will decline for any increase in the levy proportion. However, this decline in the amount supplied in the free-sale market could ceteris paribus be greater than proportional to the increase in the levy amount procured if the change in \( L \) reduces \( X_S \) significantly. Thus the proposition:

**Proposition 6** Increasing the levy proportion ceteris paribus would reduce the total amount supplied in both markets (consistent with proposition 5).

Of course, what happens to the final amount supplied in both markets depends on the structure of demand and the behaviour of the free-sale price. Mukherji, Pattanaik and Sundrum (1980) have modelled producer behaviour taking into consideration the demand conditions and diversion of controlled output to "black markets" and come to similar
conclusions. Their model is summarized in Appendix 4.2 for the case of the monopolist.

Other Qualitative Implications of Partially Suppressing Markets

The analysis of previous sections has been carried out along the conventional lines of standard microeconomic theory. However, the analysis has largely ignored the other DUP activity type behaviour resulting from the imposition of partial controls.

The imposition of controls along with tariff protection creates a host of interests which then have an incentive to influence as well as cheat on the controls. The important margins on which DUP-type activity would appear would be:

1. Lobbying for the continuation of tariff protection as long as the weighted average price of levy and free-sale sugar remains above the world price.

2. Lobbying for the imposition of certain types of controls that are typically going to benefit the major interest groups. In the case of the Indian sugar industry for example producers have usually demanded recontrol or voluntarily imposed controls and quotas when the government has decontrolled the industry. Similarly, powerful sugarcane growing interests which have become dominant as a result of the sugarcane farmer-co-operative
producer-politician nexus have influenced minimum cane price controls. Producer interests have also attempted to control entry through pre-emption of licensed capacity by existing producers in the industry and frequent requests for the continuation of the industrial licensing regime.

(3) Diversion of output by producers from the levy to the free-sale market. This phenomenon has been documented in a number of reports especially the Dagli Committee Report (1979) for most of the commodities subject to price controls in India. This is what I have called "leakage" and an attempt has been made in a later chapter to estimate the magnitude of such leakage in the Indian sugar industry.

(4) Generation of bribery, corruption and other such rent-seeking "underground" activity in the process of influencing the controllers to impose interest-group beneficial controls and in order to divert output from the controlled to the uncontrolled free-sale market (or in other cases black markets). This has also been documented for partially suppressed markets in India.

Other aspects include high administrative and other costs; absence of market competition for protected industries with consequent effects on quality, output and price; encouragement of the indiscriminate growth of non-economic industries on the basis of import substitution; adverse
distributional effects of administrative allocations and pervasive inefficiencies and loss of revenue.

A major aspect hitherto ignored in the literature on price and distribution controls especially in partially suppressed markets is the creation of incentives for and the possibility of "capture" of the controllers by the controlled. The literature on regulation has documented cases where such capture can be shown to exist. I have attempted to test the hypothesis of capture in the Indian sugar industry through the use of qualitative dependent variable models and other tests in a later chapter.

2. If the consumer were to resell the excess of quota over consumption in the free-sale market the analysis would need to be modified to account for this by explicitly introducing the likelihood of detection of such activity and the probability of being punished. The analysis would then be similar to that in the case of fully suppressed markets with the development of a black market (see the chapter on cement). I set aside this complication for simplicity of exposition.

3. According to Pal and Reddy (1977), "A unit increase in the ration quota would reduce the open market demand not by one unit, but by less than one unit. On the other hand, a unit increase in the ration quota in the closed economy (without any stock) is possible only through a corresponding decrease in the open market supply. Thus, while the supply is decreased by one unit the demand is reduced by less than one unit. The open market equilibrium price will then be higher than what it would have been without the additional ration quota." (1977, p.47)

4. To quote Pal and Reddy (1977), "... it is clear that a unit reduction in the ration quota would increase the demand in the open market by less than one unit. On the other hand, a unit reduction in the ration quota in our model, implies an increase in the open market supply by one unit ..." other things
remaining the same, this would result in a lower equilibrium price in the open market. Thus the exclusion of some people from the purview of partial rationing would, the ration quota remaining the same, contribute to price stability."

(1977, pp 47-48)

6. This result is actually not surprising since this problem is identical to the joint product production problem (see Henderson and Quandt, 1971, pp. 89-95.

7. The interest group aspects of controls in the Indian sugar industry are detailed in Chapter 8.

8. See Chapter 9.


11. See chapter 9.
APPENDIX 4.1

Model of Consumer Behaviour in a "Partially Suppressed" Market

Following Pal and Reddy (1977), the consumer's maximisation problem can be formalised for the two-commodity case as:

Maximise \( U(X_1, X_2) \)  \quad (A4.1)

s.t. \( X_2 = X_2^F + X_2^L \)  \quad (A4.2)

& \( P_1 X_1 + P_2 X_2 = I - \frac{\bar{P}_2}{2} = I' \)  \quad (A4.3)

where

\( U \) = Consumer's Utility Function

\( X_1 \) = Uncontrolled commodity 1

\( X_2 \) = "Partially Suppressed" commodity 2

\( X_2^L \) = Fixed "Levy" quota for commodity 2

\( X_2^F \) = "Free-sale" (open) market amount purchased of commodity 2

\( P_1 \) = Price of commodity 1

\( \bar{P}_2 \) = Fixed "Levy" (controlled) price for commodity 2

\( P_2 \) = "Free-sale" (open) market price for portion of commodity 2 sold in the open market

\( I \) = Total Income of the Consumer

\( I' \) = Income of the Consumer Available for spending in the uncontrolled market
(N.B.: It is assumed that the consumer consumes the full amount of the "levy" quota allocated to him.)

Setting up the Lagrangian,

\[ \text{Max } L = U(X_1, X_2^{\text{F}} + \bar{X}_2) + (P_1 X_1 + P_2^{\text{F}} X_2 - I') \]  

(A4.4)

First order conditions:

\[ \delta L \]
\[ \frac{\delta L}{\delta X_1} = U_1 + \lambda P_1 = 0 \]  

(A4.5)

\[ \frac{\delta L}{\delta X_2^F} = U_2 + \lambda P_2^F = 0 \]  

(A4.6)

\[ \frac{\delta L}{\delta \lambda} = P_1 X_1 + P_2^{\text{F}} X_2 - I' = 0 \]  

(A4.7)

Second order condition:

\[
\begin{bmatrix}
U_{11} & U_{12} & P_1 \\
U_{21} & U_{22} & P_2^F \\
P_1 & P_2^F & 0
\end{bmatrix} \preceq 0
\]  

(A4.8)

Taking the total differential of (A4.5), (A4.6), (A4.7):

\[ U_{11} dX_1 + U_{12} dX_2^F + U_{12} d\bar{X}_2 + P_1 d\lambda + \lambda dP_1 = 0 \]  

(A4.9)

\[ U_{21} dX_1 + U_{22} dX_2^F + U_{22} d\bar{X}_2 + P_2^{\text{F}} d\lambda + \lambda dP_2^F = 0 \]  

(A4.10)

\[ P_1 dX_1 + X_1 dP_1 + P_2^{\text{F}} dX_2 + X_2^{\text{F}} dP_2^F = dI' \]  

(A4.11)

Rearranging and rewriting this in matrix form, we get
\[
\begin{bmatrix}
U_{11} & U_{12} & P_1 \\
U_{21} & U_{22} & P_2^F \\
P_1 & P_2^F & 0
\end{bmatrix}
\begin{bmatrix}
dx_1 \\
dx_2^F \\
d\lambda
\end{bmatrix}
= \begin{bmatrix}
\lambda dP_1 - U_{12} dx_2^L \\
\lambda dP_2 - U_{22} dx_2^L \\
\lambda dP_2^F - U_{22} dx_2^L
\end{bmatrix}
\begin{bmatrix}
dx_2 \\
dx_2^L \\
d\lambda
\end{bmatrix}
= \begin{bmatrix}
\lambda dP_2 - U_{22} dx_2^L \\
\lambda dP_2^F - U_{22} dx_2^L \\
\lambda dP_2^F - U_{22} dx_2^L
\end{bmatrix}
\begin{bmatrix}
dx_2 \\
dx_2^L \\
d\lambda
\end{bmatrix}
\]

\[dx_1 = \begin{bmatrix}
(-\lambda dP_1 - U_{12} dx_2^L)D_{11} + (-\lambda dP_2 - U_{22} dx_2^L)D_{21} \\
+ (dI' - X_1 dP_1 - X_2^F dP_2^F) D_{31}
\end{bmatrix}
\]

\[dx_2^F = \begin{bmatrix}
(-\lambda dP_1 - U_{12} dx_2^L)D_{12} + (-\lambda dP_2 - U_{22} dx_2^L)D_{22} \\
+ (dI' - X_1 dP_1 - X_2^F dP_2^F) D_{32}
\end{bmatrix}
\]

Comparative Statics

\[\frac{\delta x_1}{\delta x_2} = \begin{bmatrix}
-U_{12} D_{11} + U_{22} D_{21} + P_2^L D_{31} \\
\end{bmatrix}
\]

\[\frac{\delta x_2^L}{\delta x_2} = \begin{bmatrix}
-U_{12} D_{21} + U_{22} D_{21} + P_2^L D_{31} + (P_2^F - P_2^L) D_{31} \\
\end{bmatrix}
\]

(since \(U_{12} = U_{12} \) & \(U_{22} = U_{22}\))

\[= \begin{bmatrix}
-U_{12} D_{11} + U_{22} D_{21} + P_2^L D_{31} \\
\end{bmatrix}
\]

All the expressions in the first term on the R.H.S. are in terms of expansions of alien cofactors and therefore equal to 0.

\[\frac{\delta x_1}{\delta x_2} = \frac{(P_2^F - P_2^L) D_{31}}{D} > 0 \quad (A4.15)
\]

85
since we assume $p_2^F > p_2^L$ and $D_{31}$ is the income effect of the first commodity i.e. $\delta x_1 = \frac{D_{31}}{\delta I}$ and is assumed to be non-zero and positive. Other comparative statics results are,

\[
\frac{\delta x_1}{\delta p_1} = \left[ \frac{-1}{|D|} \left( \frac{D_{11} - x_1 D_{31}}{|D|} \right) \right] = \frac{-\left( \frac{D_{11} + x_1 D_{31}}{|D|} \right)}{< 0} \quad (A4.17)
\]

\[
\frac{\delta x_1}{\delta p_2} = \left[ \frac{-1}{|D|} \left( \frac{x_2 D_{31}}{|D|} \right) \right] < 0 \text{ if } \frac{\delta x_1}{\delta I} > 0 \quad (A4.18)
\]

\[
\frac{\delta x_1}{\delta p_2^F} = \left[ \frac{-1}{|D|} \left( \frac{D_{21} - x^F_1 D_{31}}{|D|} \right) \right] = \frac{-\left( \frac{D_{21} + x^F_1 D_{31}}{|D|} \right)}{> 0} \quad (A4.19)
\]

similarly,

\[
\frac{\delta x_2^F}{\delta x^L_2} = \left[ \frac{-1}{|D|} \left( \frac{U_{12} D_{12} + U_{22} D_{22} + p^F_{22} D_{31}}{|D|} \right) + \left( p^F_2 - p^L_2 \right) D_{32} \right]
\]

\[
\frac{-1 + \left( p^F_2 - p^L_2 \right) D_{32}}{|D|} \quad (A4.20)
\]

since the first term cancels out.

Therefore, $\frac{\delta x_2^F}{\delta x^L_2} > -1$ even though we started off with $\frac{\delta x_2^F}{\delta x^L_2} = -1$.

This result is true because of the positive income effect of the "partially suppressed" commodity and $p_2^F > p_2^L$.

Other comparative statics results for commodity 2 are
(This analysis can be generalised to the n-good case)
The following propositions are therefore true:

**Proposition 1:** A unit increase in the "levy" quota of the controlled commodity, ceteris paribus, would reduce the "free" market demand for the commodity by less than one unit.

**Proposition 2:** The demand for any other good other than the controlled commodity would increase irrespective of whether it is a complement or a substitute to the commodity (provided that the income effect of the "other" commodity is positive) if the "levy" quota is increased.

**Proposition 3:** For a normal good an increase in the price of the controlled commodity would reduce the demand for that commodity as long as the "free-sale" price exceeds the "levy" price.

The "total" effect of a change in any parameter (in our case focuses may be placed on changes in the "levy" quota) can be similarly examined. Using the total derivative approach we get for example
\[ \frac{dx_1}{dx_2} = -\left[ U_{12}D_{11} + U_{22}D_{21} + P^F_{31} \right] \left[ \frac{p^F - p^L}{D} \right] + \frac{1}{2} \frac{d^2}{dx_2^2} \]

\[ \frac{d^2}{dx_2^2} \left[ \frac{d^2}{dx_2^2} \right] \]

\[ \cdot \frac{d^2}{dx_2^2} \]

\[ \frac{d^2}{dx_2^2} \cdot \frac{d^2}{dx_2^2} \]

which latter term is typically of uncertain sign and requires empirical justification. Similar results are obtained for the other total derivatives.

The desired "free-sale" demand function for the controlled commodity can be obtained from (1), (2), (3) as

\[ X^F_2 = X^F_2(p_1, p^L_2, p^F_2, \lambda^L_2) \]  

(A4.25)

where \( \delta x^F_2 < 0 \), \( \delta x^F_2 < 0 \), \( \delta x^F_2 < 0 \), \( \delta p^F_2 < 0 \), \( \delta p^L_2 < 0 \), \( \delta p^L_2 < 0 \), \( \delta x^F_2 > -1 \), \( \delta x^F_2 > -1 \).
Model of Producer Behaviour in a "Partially Suppressed" Market
(Monopolist Case)

Mukherji, Pattanaik and Sundram (1980) have modelled a monopolistic industry subject to price controls which take the form of a certain proportion of the total output being sold at the controlled price with the remaining sold on a legal uncontrolled market. (Black-markets in their model arise from a portion of the controlled market quota being diverted to the open market). Following Mukherji et al. (1980), we have

\[
P^C, Q^C = (\alpha Q)^C = \text{price and quantity sold in the controlled market}
\]

\[
P^U, Q^U = (1-\alpha)Q^U = \text{price and quantity sold in the uncontrolled market}
\]

\[
Q^C = Q^U + Q^C
\]

\[
Q^U = D(P^U, Q^U) = D(P^U) - Q^C
\]

\[
= D(P^U) - \alpha Q^C
\]

where, \(D(P^U)\) is the total demand at the uncontrolled price \(P^U\) and \(Q^C\) is obtained by subtracting \(Q^C = \alpha Q^U\) from this demand.

\[
C^U = C(Q^C + Q^U) = \text{cost function of the monopolist}
\]

The maximand for the firm be written as

\[
\pi = P^C \alpha Q^C + P^U (1-\alpha)Q^U - C(Q^U)
\]
The firm chooses $P_\text{mr_hk}$, the market clearing price at which $Q_\text{mr_hk} = (1-\alpha)Q$ is sold in the uncontrolled market, so as to maximise (A4.28) i.e.

$$\text{Max } \pi = P \alpha Q + P (1-\alpha)Q - C(Q)$$

(A4.29)

The first order conditions for a maximum are given by

$$\delta \pi = P \alpha D'\langle P_U \rangle + P_U (1-\alpha)D'\langle P_U \rangle + (1-\alpha)D\langle P_U \rangle - C'.D'(P_U) = 0$$

$$\delta P$$

$$\delta^2 \pi$$

(A4.30)

and

$$\frac{\delta^2 \pi}{\delta P^2} < 0$$

By taking differentials w.r.t. $\alpha$ and $P$ in (A4.30) and solving for $dP$ we get

$$dP = \frac{2}{\delta P / \delta P^2} = \frac{\delta^2 \pi / \delta P^2}{\delta^2 \pi / \delta P^2}$$

$$d\alpha$$

(A4.31)

$$\frac{dQ}{d\alpha} = \frac{D'(P_U)}{\delta P / \delta P^2} = \frac{\delta}{\delta \alpha} \delta^2 \pi / \delta P^2$$

(A4.32)

since $\frac{\delta^2 \pi}{\delta P^2} < 0$ by assumption, $D'(P_U) < 0$

and since $P < P_C$ it is clear from (A4.32) that
If \( D'\left(P_U\right)\left(P - P\right) > D(P) \) then the introduction of price control or increase in the degree of price control can reduce the total output. If to start with \( \alpha > 0 \) and if an increase in \( \alpha \) reduces \( Q \) significantly, the quantity \( \alpha Q \) sold in the controlled market may fall despite the increase in \( \alpha \). This may be undesirable in the case of essential commodities like sugar and cement.

However, the monopolist will have an incentive to divert supplies from the controlled market to the uncontrolled market by deliberately understating his output, bribery of officials or other forms of concealment. In order to model this, Mukherji et al. (1980) define \( Q - Q \) as the amount black-marketed. With the probability of detection with police resources defined as \( P(Q - Q, r) \) and the penalty function with penalty defined as \( f(Q - Q, 1) \) with signs on the various derivatives indicated, the following maximisation problem is obtained.

The monopolist maximises his expected utility

\[
E = \left(1 - P(Q - Q, r)U(\bar{Q}, 0) + P(Q - Q, r)U(\bar{Q}, -f(Q - Q, 1))\right)
\]

where \( \bar{Q} = P \cdot Q + P \cdot (1 - \alpha)Q - C(Q) \)

with respect to \( \alpha \) and \( P \) where \( U \) is a strictly concave function of \( -f(Q - Q, 1); U > 0, U > 0 \). This would imply risk-
Recognising that is a function \( (P) \) of \( P \), the price of the output sold in the controlled market and that \( Q = (1-\alpha)Q \) is therefore also a function of \( P \), write \( E \) as a function of \( P \), \( Q - Q \), \( r \), \( 1 \) and maximise \( E \) with respect to \( C \). The maximand can be written as,

\[
E = (1-P(Q - Q, r)) U [\langle P \alpha Q + P (1-\alpha)Q - C(Q) \rangle, 0] \\
+ P(Q - Q, r) U [\langle P \alpha Q + P (1-\alpha)Q - C(Q) - f(Q - Q, 1) \rangle]
\]

\[
(A4.34)
\]

The first order conditions of such maximisation are given by

\[
dE = U_1(\pi, 0)d\pi - P(Q - Q, r)d\pi U_1(\pi, 0) - U_1(\pi, -f(Q - Q, 1)) - P(Q - Q, r) U(\pi, -f(Q - Q, 1)) f(Q - Q, 1) \\
+ P(Q - Q, r) [U(\pi, 0) - U(-f(Q - Q, 1))] = 0
\]

\[
(A4.35)
\]

and

\[
dE < 0
\]

\[
(A4.36)
\]

Equation \( (A4.35) \) can be solved for the optimal value of \( \pi \) given \( P \), \( Q \), \( r \) and \( 1 \) and then the equilibrium values of \( P(Q - Q, r), P, Q, Q \) and \( (Q - Q) \) can be determined.

It is instructive to examine the comparative static properties of the proportion when \( r \) and \( 1 \) are allowed to change.

Using the implicit function rule
\[ \frac{d\alpha}{dr} = \frac{F_r}{F_\alpha} \]

\[ \left[ -P_2(Q_C-Q_C, r) \frac{d\pi}{d\alpha} \left( U(\pi, -f(Q_C-Q_C, 1)) - U(\pi, 0) \right) \right] \]

\[ + U_2(\pi, -f(Q_C-Q_C, 1)) f_1(Q_C-Q_C, 1) + \frac{P_{12}(Q_C-Q_C, r)}{P(Q_C-Q_C, r)} \]

\[ \left[ x U(\pi, 0) - U(\pi, -f(Q_C-Q_C, 1)) \right] \]

\[ = \frac{d^2E}{d\alpha^2} \]

since the denominator \( d^2E \) \[ \frac{d^2E}{d\alpha^2} \] < 0 by (A4.36) we have

\[ \frac{0}{d^2E} \frac{d^2E}{d\alpha^2} \] > 0

\[ (A4.38) \]

Hence we have to consider the term in curly brackets in the numerator to determine the sign of \( \frac{d\alpha}{dr} \)

Now, \[ \frac{P_{12}(Q_C-Q_C, r)}{P(Q_C-Q_C, r)} \] \[ \left[ u(\pi, 0) - U(\pi, -f(Q_C-Q_C, 1)) \right] \] > 0

by assumption as also \[ \frac{0}{2 C C} \frac{0}{1 C C} \] \[ \left[ U(\pi, -f(Q_C-Q_C, 1)) - U(\pi, 0) \right] \]

so that the sign of the numerator is determined by the term

\[ \frac{0}{2 C C} \frac{0}{1 C C} \] \[ \left[ U(\pi, -f(Q_C-Q_C, 1)) - U(\pi, 0) \right] \]

However one cannot a priori or by assumption fix the absolute
value or sign of this term so that the sign of \( \frac{d^x}{dr} \) is

indeterminate leaving the counter-intuitive possibility that increased police detection and vigilance activity may not reduce the amount of black-market diversion activity but instead may have precisely the opposite effect.

Similarly,

\[
\begin{align*}
\frac{d\alpha}{dl} &= -\frac{F}{F_\alpha} \\
\frac{d^2E}{d\alpha^2} &= \frac{\partial}{\partial \alpha} \left[ -P(Q - Q', r) \langle Q - Q', 1 \rangle \ U \langle \pi, -f(Q - Q', 1) \rangle d\pi \ U \langle \pi, -f(Q - Q', 1) \rangle \right] \\
+ \frac{\partial}{\partial \alpha} \left[ -P(Q - Q', r) \langle Q - Q', 1 \rangle \ U \langle \pi, -f(Q - Q', 1) \rangle \right]
\end{align*}
\]

or

\[
\begin{align*}
\frac{d\alpha}{dl} &= -\frac{P(Q - Q', r)}{d^2E} \\
\frac{d^2E}{d\alpha^2} &= -\frac{\partial}{\partial \alpha} \left[ -P(Q - Q', r) \langle Q - Q', 1 \rangle \ U \langle \pi, -f(Q - Q', 1) \rangle \right] \\
+ \frac{\partial}{\partial \alpha} \left[ -P(Q - Q', r) \langle Q - Q', 1 \rangle \ U \langle \pi, -f(Q - Q', 1) \rangle \right]
\end{align*}
\]
For the terms within the square brackets we have

\[ U(\pi, -f(Q - Q', 1)) \]

where \( Q' \) is substituted in the Edgeworth-Pareto sense i.e.

\[ U < 0. \]

This result has been shown by Mukherji et al. (1980)

in the case of price controls which requires the seller to

sell a certain minimum absolute quantity at the controlled
price.
EMPIRICAL ESTIMATES OF DEMAND AND SUPPLY FUNCTIONS
FOR SUGAR UNDER DUAL PRICING AND RATIONING

Introduction

A theory of demand and supply under conditions of partial control has been developed in the previous chapter. In this chapter I estimate annual demand and supply functions for sugar for the period 1951-83. I also estimate quarterly demand functions for sugar for the period 1968-I to 1983-IV in order to capture the pattern of demand over a shorter period of averaging to account for the seasonality of demand (as well as to obtain greater confidence in our model over a longer period of time). The quarterly regressions also enable the assessment of the impact of the regime of "partial control" (1968-I to 1983-IV) when the government adopted the policy of dual pricing throughout the period. Earlier periods (1951-1968) had seen a frequent switching of control regimes from full control with no dual pricing, partial control with dual pricing, physical control with no pricing controls and full decontrol.

A quarterly or monthly analysis for the supply function was not possible because of a lack of such production data on sugar. This would have thrown considerable light on the quarterly pattern of what has been characterised in the
tendency of the area under sugarcane as well as the production of sugar persistently fluctuating in a fairly regular fashion. It would also have been interesting to examine the variables determining supply behaviour over shorter periods of averaging.

I first estimate constrained demand functions for sugar under various functional forms for both annual and quarterly data. I use a logarithmic specification to obtain estimates of elasticities of demand for sugar. I then estimate both sugar and sugarcane supply functions using annual data. Supply elasticity estimates are also obtained.

Data and Sources

A variety of sources were used to obtain the data for the regressions. Since regressions were run on both annual and quarterly data, sufficiently disaggregated time series on a number of variables had to be obtained.

For the annual data the following sources were used. Sugar consumption data for the years 1951-1952 to 1981-82 was obtained from the International Sugar Organisation's International Sugar Yearbook. Sugar and sugarcane production data was obtained from various issues of Indian Sugar, Cooperative Sugar and the annual yearbooks of both the Indian Sugar Mills Association and the National Federation of Cooperative Sugar Factories Ltd. Price data was obtained from
a variety of sources including the Wholesale Price Statistics published by the Economic and Scientific Research Foundation and various issues of Indian Sugar and Cooperative Sugar. Consumption expenditure data was obtained from the Reserve Bank of India's Report on Currency and Finance. Yearly population data was also obtained from the same source. Proportions of free-sale and levy sugar releases were obtained from Indian Sugar. Similarly, data on free-sale and levy sugar prices and gur prices were obtained from the same source. Quarterly consumption expenditure data was not available. Hence, a truncated constrained demand function was estimated. The lack of quarterly production data prevented the estimation of a quarterly supply function for sugar or sugarcane.

It is important to note some of the limitations of the data. For proper estimation of constrained demand functions, the actual retail price of the commodity should be one of the appropriate right-hand side arguments. Among the data sources available, however, only wholesale prices (both levy and free-sale) were available. To the extent that trade and transport margins and local sales taxes vary (central excise duties are included in the wholesale price), use of the wholesale price data is likely to produce biased results. However, since trade and transport margins are not likely to be biased in a particular direction, the use of wholesale data can be
rationalised. The consumption expenditure data also suffers from the deficiency that it had to be imputed from the R.B.I. statistics for some of the years, multiplying the Net National Product by one minus the ratio of domestic savings to net domestic product.

Estimates of Constrained Demand Functions

In the previous chapter the demand function for a partially controlled commodity under dual pricing had been derived as the following:

\[ Q_t = f(P_{ft}, P_{ct}, P_{lt}, P_{lt}, Y_t) \]  

(5.1)

where

- \( Q_t \) = Quantity of commodity demanded in the "free-sale" (uncontrolled) market at time \( t \)
- \( P_{ft} \) = Price of commodity in the "free-sale" market at time \( t \)
- \( P_{ct} \) = "Levy" (controlled) price of the commodity at time \( t \)
- \( P_{lt} \) = Quantity of commodity released as "levy" quota at time \( t \)
- \( S_t \) = Price of uncontrolled substitute at time \( t \)
- \( P_{ot} \) = Price of other commodity at time \( t \)
- \( Y_t \) = Consumption expenditure or income at time \( t \)

Rewriting this function, ignoring the effects of other commodities,
\[ Q = f(P_t, P_{t+1}, P_{t+2}, Q_t, Y_t) \] (5.2)

Since the controlled "levy" price of sugar in India is held invariant for extended periods of time, (it has changed appreciably only ten times over the 1951-82 period), this lack of variation is likely to lead to \( P_t \) not being significant in the regression. An additional complication that is introduced is that the regime of price control before 1968-69 varied considerably and continuous time-series data on \( Q_t \) is not available for the 1951-68 period. Consequently \( Q_t \) must be dropped from the final estimation form.

From the analysis of the three types of consumers presented in the previous chapter, the aggregate demand curve for sugar must account for the distribution of consumers among the three types because of the quite different effects that result as a consequence of a price (or quantity) change for each type of consumer. Ideally, the quantity and price variables necessary for estimation of the total demand for sugar should be constructed by using the proportions of consumers below, on and beyond just levy quota consumption. Since such data was not available, some alternative weighting scheme had to be used.

The alternative adopted was to use the proportion of levy to free-sale sugar as the weights for combining \( Q_t \) and \( Q_t \) and \( P_t \) and \( P_t \) during control years and the unweighted quantities \( T_t \) and \( T_t \).
and prices during no-control years. However, the choice of this weighting scheme effectively forces the different types of consumers to behave in an identical manner thus undermining the intent of the underlying indifference curve analysis. The quite different income and substitution effects characteristic of each type of consumer—would then be forced to be the same (akin to the consumer who consumes both levy and free-sale amounts). This would result in the underestimation of the parameters of the ‘true’ underlying relation since the income and substitution effects of a levy price change for example would be forced to be small while the income and substitution effects of such a change for a consumer who consumes less than his full quota are likely to be large.

Alternatively, the free-sale parameter estimates could be used to estimate elasticities but these are likely to be even further underestimates since this is considering only type 1 consumers and there too only partially to the extent of their free-sale consumption. The income and substitution effects of a price change for total consumption for even this one type of consumer are only partially captured while completely ignoring those for the other type of consumer.

Given these difficulties, it was decided to use the levy/non-levy proportions as weights as a second best option to using the proportions of each type of consumer as weights. This gave the following equation for estimation.
\[ Q = f(P, P, Y) \]  
where

\[ Q = \text{Quantity of sugar ("levy" and "free-sale") demanded at time } t \]
\[ P = \text{Weighted average price of sugar at time } t \]
\[ P = \text{Price of "gur" (substitute) at time } t \]
\[ Y = \text{Income (or consumer expenditure)} \]

Equation (5.3) was run on both annual and quarterly data while a variant of equation (5.2) was run on quarterly data.

The alternative weighting scheme adopted thus has the effect of underestimating the coefficients attached to the price and income variables because the regression forces all consumers to the mould of a consumer who consumes both levy and free sale amounts of sugar.

Some of the limitations of using parameter estimates from running a regression using equation (5.3) may be summarised as: (i) The estimates effectively represent only the Type 1 consumer who consumes his full levy quota and then purchases some quantity in the free-sale market.

(ii) The estimates of elasticities obtained will therefore be underestimates of the "true" underlying elasticities.

(iii) The interpretation of the coefficients particularly for the price elasticities is not conventional since some include an uncompensated income effect different from that usually encountered in the conventional analysis of price effects.
This is because the levy amount acts like an income subsidy for the Type 1 consumer.

**Estimation Form: Demand Under Partial Control**

It is to be noted that simultaneity is unlikely to be a problem in such controlled markets because the releases of levy sugar are exogenously controlled by the government and because as mentioned in Chapter 3 the price of levy sugar is established by the government before a particular year's harvest, processing and production takes place. Consequently, the supply and demand sides of the market can be examined separately. The left-hand side variables in the demand and supply regressions estimated for the sugar industry are also different, one being the quantity of sugar actually released/consumed (demand) and the other the actual production (supply). The government's actions on procurement and distribution effectively permit the separate estimation of demand and supply functions.

Ideally, in order to properly estimate the demand and supply functions, the behaviour of the stocks with the government should also be specified and the whole system should be modelled as a simultaneous equation system. However, data on stocks held by the government was not directly available but could have been constructed from the available series of production, monthly releases and exports. The problem, however, lay in the identification of the underlying decision.
variables used by the government in deciding on the magnitude of these stocks. Enquiries with the Sugar Directorate in the Indian Ministry of Food and Agriculture and a detailed examination of government and industry reports provided no information on how the stock was determined. Consequently, any attempt to incorporate this important feature of the Indian sugar situation proved to be unsuccessful and the separation property resulting from the government's role had to be relied on to separately estimate the demand (and supply) curve(s).

Equation (5.2) and (5.3) were estimated in both linear and log-linear forms. The estimation forms for (5.3) were thus:

\[ W G Q = a_0 + a_1 P_t + a_2 P_t + a_3 Y_t + a_4 C_t + e_t \]  

and

\[ \log W G Q = a_0 + a_1 \log P_t + a_2 \log P_t + a_3 \log Y_t + a_4 C_t + e_t \]  

A dummy variable, \( C_t \) to capture the effect of periods of control and decontrol was included in equations (5.4) and (5.5). This variable was included as a shift variable reflecting the change in expectations of consumers independent of the effect of the other independent variables when a regime change took place. It is reasonable to expect that there will be a change in the structure of demand between the two kinds of regimes. Consumers change their expectations regarding sugar availability because of their previous experience with such controls when there has been a decrease in such
availability. Baru (1977) points out that there has been such a decrease in availability whenever controls have been clamped on. Consequently, one would expect that the sign of the coefficient on this variable would be negative due to the dampening effects of controls on consumer demand. Equations (5.4) and (5.5) were estimated both in aggregate terms and per capita terms. This has been done to check on the reliability of the estimates when the regressions are run in per capita terms. Various definitions of income were also used but aggregate consumer expenditure (per capita) was found to provide the best fit. The same procedure was followed in the estimation of the quarterly demand function.

The empirical estimation was done on both annual and quarterly data. The results of the regressions on annual data are presented and discussed first. Regressions were run for both linear and log-linear functional forms.

The annual regressions were run in a number of stages. In order to check whether total weighted sugar consumption was related to weighted prices and the other arguments, the following regression was first run (see 5.4) above

\[ W = a + aP + aP + aY + aC + e \]

where \( C \) = dummy variable where 1 = control, 0 = decontrol.

At the next stage, the regression on the "free market" constrained demand function under partial controls was run. This consisted of regressing the following,
with the variables interpreted as before. Finally, the analysis was modified to account for the speculative demand for sugar which is due to speculative hoarding or dehoarding by consumers. This is claimed to be a significant phenomenon under conditions of partial rationing as in India (see Joshi (1973)). Due to the existence of an open or "free" market and fluctuating prices in this market it is claimed that consumers speculate on the rationed commodity by hoarding the commodity when prices in the free-market have continued to rise in the past and are expected to do so in future and vice versa. This effect is independent of the other variables especially C. The latter variable reflects the change in expectations t following a change in regime while the speculative price variable reflects the hoarding behaviour of consumers due to a rise in not related in any direct way to a change in control regime. This would be reflected in the a priori expectations of the sign of the coefficients attached to each variable, the former (Ct) variable being expected to exhibit a negative sign as already discussed while the latter variable (Pt) would be expected to bear a positive sign. While this may very well have a stabilising influence on the market, this was modelled by including the rate of change in the weighted price (ΔPt) and the rate of change in the free-market price in the two cases just discussed. This gave two more equations.

\[ Q = b_0 + b_1P_t + b_2P_{t-1} + b_3Q_{t-1} + b_4Y_t + b_5C_t + e_t \]  

(5.7)
for estimation
\[ W = W + G + W \]
\[ F = F + L + G + F + L \]
\[ Q = d + d P + d P + d P + d P + d Q + d Y + d C + e \]  \hspace{1cm} (5.8)
\[ t \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \]

All the regressions were run in total and per capita terms and in linear and log-linear form. Ordinary Least Squares was used and GLS regressions were run wherever appropriate. The results are reported in Table 5.1 and discussed below.

For the quarterly regressions, the constrained partial controls regression was of the form (5.7) above without the consumption expenditure variable. The cruder weighted form (5.4, 5.6) run on the annual data was dropped. The formulation with the speculative price variable was run in the partial control framework. The regressions were not run in per capita terms because of a lack of data on quarterly population. Only the linear functional form was used. The results are reported in Table 5.2.

A number of caveats regarding the regressions are in order which have to do with the structure of the regime of partial controls. As already noted, the use of the levy-non levy proportion weights in the weighted regressions suppresses the differences in the type of consumers analysed in the previous chapters. This procedure also has the effect of underestimating the coefficient values because it forces all consumers to be
of Type 1 (i.e. those who consume some amount of free-sale sugar in addition to their ration quota). As pointed out, the correct procedure would have been to use as weights the proportions of consumers who are on the purely levy and on the levy-free sale consumption margins but this was precluded by the non-availability of such data. The existence of only a very negligible pure income effect for the \( P \) variable with no substitution effect makes the interpretation of the coefficient of the \( P \) variable unconventional also and this has to be kept in mind while interpreting the coefficient as an elasticity in the log-linear regressions.

With regard to the free-sale regressions (equations 5.7 and 5.9), the effect of \( L' \) on \( Q \) is in the form of a conventional price effect while the effect of \( L' \) combined with \( Q \) is in the form of an income subsidy effect. One way to deal with this issue would have been to adjust the income variable by the amount of the income subsidy effect. However, the adjustment would have been necessary for each type of consumer separately since in general the effects of the income subsidy are different for each type as discussed previously. Since such data was not available, the \( P \) and \( Q \) variables were included separately so as to capture the independent effect of these variables on the free-sale demand in equation (5.7) while recognising that the interpretation of the coefficient of the \( L' \) variable was not to be seen as a cross-price effect. This
limitation and the caveats discussed above need to be kept in mind when the results are discussed.

**Empirical Results - Demand Under Partial Control**

The results of the various demand regressions are given in Tables 5.1 (annual data) and 5.2 (quarterly data). Coefficient values, t-statistics and other relevant statistics are reported.

As regards the results on annual data, it can be seen from Table 5.1 that the independent variables explain over seventy percent of the variation in the independent variable in the aggregate formulation and over sixty percent in the per capita formulation. In the regressions with the weighted price variable \( P \) all the signs on the variables are as expected and \( P \), \( Y \) and \( C \) are statistically significant. It is interesting that the price of gur \( (P) \), a substitute, has the right sign but is insignificant in the regressions. This is a surprising result since gur is a substitute for sugar for the majority of the rural population and is used in the urban areas among the poorer segments of that population. The result obtained may however be rationalised on the grounds of the existence of a "segmented" market for sugar and gur. Gur is a much cheaper and inferior quality commodity as compared to sugar and it may well be that the price difference has to narrow considerably before sugar consumers shift to the use of gur. In addition, there are many uses where sugar and gur
cannot be easily substituted e.g. in beverages, certain mass-produced varieties of foodstuffs etc. which may account for a significant proportion of sugar consumption.

The results of the per capita regressions are consistent with those for the aggregate formulation in terms of the signs and significance of the variables. The values of the coefficients are also broadly consistent. A priori, one would expect that the coefficients of the price and income variables would not be very different or would be a or related in a consistent way to each other. As Theil (1965) points out, as long as "microvariables" like the prices paid by a particular consumer, his ration quota and income are linear functions of the corresponding "macrovariables" like market prices, aggregate ration quantities and national income, the estimated coefficients of the aggregate demand function will be a weighted average of the actual coefficients of the individual consumers.

An examination of the values of the coefficients shows that the per capita variable coefficients \( e.g. \frac{Y}{P_{tU}} \) have almost the same values as the original aggregate formulation \( Y_{t} \) coefficient. This is consistent since the dependent variable has also been deflated by population. The aggregate \( P_{t} \) coefficients are a multiple of the per capita coefficients consistent with a priori expectations as is the \( C_{t} \) variable. With regard to the elasticity estimates, these are also
consistent.

The results of the regressions with the speculative price variable ($\Delta P$) are also good. The speculative price variable takes on the right positive sign and is statistically significant at the .01 level. All other variables except $P_t$ and $C_t$ retain their significance. The result with regard to the control dummy variable $C$ would seem to point towards the possibility that the speculation during periods of transition of controls is quite major, overpowering the effect of the control dummy in the regression. Thus the variation in the control dummy is captured by the speculative price variable.

The log-linear formulations also perform well with all the variables having expected signs and significance except $G$ for $P$, again which has the right sign but is insignificant. The explanatory power of the per capita formulation is however low in the log-linear regressions. The estimate of the price elasticity of demand from the total formulation is $-0.41$ while it is $-0.22$ for the per capita formulation. An approximation to the expenditure elasticity is provided by the consumption expenditure ($Y$) variable. The expenditure elasticity estimate is $1.64$ as given by the total demand function regression and $1.48$ by the per capita regression.

It is necessary to reiterate here some notes of caution regarding the elasticity estimates. With regard to the significance of the magnitudes of these elasticities in the
aggregate and per capita regressions it can be seen that the income elasticities are quite robust with respect to the kind of formulation adopted. However the expenditure elasticities are different because the \( P \) variable is not in per capita terms and hence shows a smaller coefficient estimate for the per capita left-hand side variable. For purposes of assessing the costs of protection and rent seeking for the economy as a whole it is the aggregate estimate which is relevant and consequently this is used in subsequent chapters.

The interpretation of the elasticities for both types of regressions has to be approached with caution. Firstly, these are likely to be underestimates for reasons already discussed. Secondly, the effect of \( P \) along with \( Q \) is in the nature of an income effect and including the component parts of this effect into the weighted variables suppressed this fact. Thirdly, the second best weighting scheme adopted forces the elasticities to be representative of an economy with only Type 1 consumers. Nevertheless the elasticities from the weighted regressions are used in subsequent calculations since they constitute the upper bound of an underestimate vis a vis the free sale demand regression. This is also done because the relevant elasticity for sugar consumption as a whole should be the elasticity of the total demand for sugar with respect to a change in the weighted price. The free-sale elasticity is likely to be of less relevance here because free sale consumption is a smaller
proportion.

For the non-weighted "free-sale" constrained demand regressions, it can be seen that all the variables except \( P_L \) are significant and that the explanatory power is over 95 percent. The reason for \( P_L \) not being significant is that the price of levy sugar is not related to the quantity of free-sale sugar released (consumed) since the levy price is set by the government on "cost considerations" and has not been varied too much over the period studied. The speculative price variable (\( P^t \)) is significant at the .10 percent level of significance.

The results of the non-weighted constrained demand regressions on quarterly data, as shown in Table 5.2, are also encouraging. The independent variables explain over 80 percent of the variation in the dependent variable. All variables have the expected sign and significance except \( Q_L \) (the amount of levy sugar) released. The government's target proportion may be the cause of this result even over the shorter time-horizon. The \( P^t \) variable is once again insignificant.

Estimates of Constrained Supply Functions

In a previous section I had derived a supply function for a partially controlled commodity under dual pricing as:

\[
Q = f(P^t, P^t, P^t, K) \tag{5.10}
\]

where
Quantity of commodity produced at time \( t \)

Market procurement price at time \( t \)

Procurement or "levy" price fixed by the government at time \( t \)

Price of substitute at time \( t \)

Proxy variable for costs/incentives for production in time \( t \)

The \( P \) variable has been added since in the case of the Indian sugar industry a larger proportion of the sugarcane output goes towards gur (and khandsari) production than for sugar. This implies that the price of gur is likely to be an important argument in the aggregate supply function for sugar. The wholesale price of gur has oscillated around 50-60 percent of the ex-factory price of centrifugal sugar. But the tendency has been that a rise in the gur to centrifugal sugar price ratio has led to a rise in the proportion of harvested cane crushed for gur and to a fall in the proportion processed for centrifugal sugar production.

A truncated version of this supply function can be formulated with the weighted average price of the commodity, \( W \), used instead of \( P \) and \( P^L \). Thus we have,

\[
Q_t = f(P_t, S_t) \quad (5.11)
\]

where \( P_t = \) weighted average price of commodity at time \( t \) and the other variables are defined as before. This equation and
its variants were also run on annual data in addition to equation (5.10) above.

**Estimation Form - Supply Under Partial Control**

In addition to estimating a supply function for sugar under conditions of partial control, a sugarcane supply function can also be estimated. Such a function would incorporate the relative weighted price of sugar and gur/khadsari as compared to an alternative crop (say wheat) as important influencing variables. Thus, a simple sugarcane supply function was first regressed as follows:

\[ Q = a + a_1 P_{t-1} + a_2 P_{t-1}^{WH} + a_3 t + e_t \]  \hspace{1cm} (5.12)

where

- \( Q \) = Quantity of sugarcane produced in year \( t \)
- \( W \) = Weighted average price of sugar in year \( t-1 \)
- \( G \) = Price of gur in period \( t-1 \)
- \( WH \) = Price of wheat (competing crop) in year \( t-1 \)
- \( t \) = Time trend \( (t=1, 2...) \)

Equation (5.11) was then run in truncated form in both linear and log-linear formulations (with and without a time-trend variable) as

\[ Q = b_0 + b_{1t} + b_{2t} + b_{3t} + b_{4t} + e_t \]  \hspace{1cm} (5.13)
\[
\begin{align*}
\text{and } \log Q &= d_0 + d_1 \log P_t + d_2 \log P_{t-1} + d_3 \log P_{t-2} + d_4 C_t + e_t \\
\text{Then, the minimum statutory price for sugarcane was included as a proxy for the cost incentive variable and the following linear and log-linear regression run;}
\end{align*}
\]

\[
\begin{align*}
Q &= c_0 + c_1 P_t + c_2 P_{t-1} + c_3 P_{t-2} + c_4 C_t + e_t \\
\text{and } \log Q &= e_0 + e_1 \log P_t + e_2 \log P_{t-1} + e_3 \log P_{t-2} + e_4 C_t + e_t
\end{align*}
\]

where \( P_t^c \) = minimum statutory price for sugarcane fixed in year \( t \) and the other variables as before.

Once again, the \( C_t \) variable was included as a shift variable to capture the effect of the change in the control regime on supply independent of the other variables. This variable once again is intended to capture the expectations of sugar producers regarding a change in the control regime. Given their previous experience with the control regime, sugar producers would expect that they could sell an increased output at every price because of the government's behaviour regarding levy procurement, management of stocks and export subsidisation. The \( C_t \) variable was thus intended to capture this behaviour of producers in increasing output at every price since a change in the control regime would give them the opportunity to sell additional amounts through their captured agents, the government. This caused the control variable to represent
Empirical Results - Supply Under Partial Control

The empirical results of running the supply regressions are given in Table 5.3. It can be seen that in all the regressions, a significant proportion of the variation in the dependent variable is explained by the postulated independent variables. The estimated sugarcane supply function shows that over 85 percent of the variation in the dependent variable is explained by the independent variables. The estimates also reveal the feature mentioned earlier that gur is a major determinant of what happens to sugarcane. Since over 65 percent of cane production goes towards the production of gur, the price of gur should have a dominant influence on the supply of cane. This is what the coefficients of the relative weighted sugar price and relative gur price variables show. The relative gur price variable is significant while the relative sugar price variable is not (though both exhibit the right sign). This result bears out the observations of many experts that the sensitivity of cane supply to the vicissitudes of the unregulated gur economy defeat the purpose of the minimum sugarcane price and sugar price controls.

The explanatory power of the sugar supply regressions is also high. All the variables are significant and bear the
right signs. The gur price variable is significant unlike in the demand function because of the link to sugar production through the supply of sugarcane. As the price of gur rises, this diverts the supply of cane to the gur sector reducing the supply of cane available to the sugar industry and hence production. The minimum price of cane variable, \( P \) exhibits a positive sign as expected since an increase in this statutory price almost automatically results in the government raising the levy price leading to an increase in the quantity produced of the commodity. This is one reason why the sugar producers have consistently lobbied the government for higher cane prices to "ensure a fair price to the farmer." However, the presence of this variable in the regression equation introduces some problems of interpretation. Since the minimum price of cane is one of the determinants of the levy price, the inclusion of this variable implies collinearity between the \( P \) and \( P_{MC} \) variables. While this leaves the \( R^2 \) statistic unaffected and the desirable properties of the OLS/GLS estimator unaffected, it creates problems in terms of the interpretation of the coefficients since the variances of the collinear variables are large. However, since the \( t \) statistics of the collinear variables are greater than two the regression is reported. This is also because the increase in \( P \) when \( P_{MC} \) increased is not automatic since the Tariff Commission may deem not to pass the increase in minimum cane prices on in
terms of higher sugar prices. However, because of the causal link between the two right-hand side variables and the problem of interpreting the coefficients, these estimates are not used in the subsequent analysis. Elasticity estimates from the supply regression excluding the cane price variable are used.

Thus the estimates obtained from regressing both the demand and supply functions derived in the last chapter are entirely satisfactory and provide support for the applicability of price theory in partially suppressed markets.
Table 5.1
INDIAN SUGAR – RESULTS FOR ANNUAL DATA
CONSTRAINED DEMAND FUNCTION FOR SUGAR

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables (coefficients with t-statistics)</th>
<th>( R^2 )</th>
<th>( R^2 )</th>
<th>F-Stat.</th>
<th>D.W.</th>
<th>Type of Regr./Pd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q_t^W )</td>
<td>( a_0 ) ( a_1^W ) ( a_2^G ) ( a_3^V ) ( a_4^C ) ( a_5^C )</td>
<td>0.702</td>
<td>0.656</td>
<td>15.29</td>
<td>1.86</td>
<td>G.L.S. (1951-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(7.461) (2.058) (5.411) (1.879)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( Q_t^P )</td>
<td>( b_0 ) ( b_1^P ) ( b_2^P ) ( b_3^P ) ( b_4^C ) ( b_5^C )</td>
<td>0.695</td>
<td>0.631</td>
<td>10.93</td>
<td>1.99</td>
<td>G.L.S. (1952-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(7.606) (3.652) (2.871) (1.383)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( Q_t^P )</td>
<td>( c_0 ) ( c_1^P ) ( c_2^P ) ( c_3^P ) ( c_4^C ) ( c_5^C )</td>
<td>0.983</td>
<td>0.972</td>
<td>92.83</td>
<td>2.13</td>
<td>O.L.S. (1968-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(8.515) (1.707) (5.733)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( Y_t )</td>
<td>( d_0 ) ( d_1^Y ) ( d_2^Y ) ( d_3^Y ) ( d_4^C ) ( d_5^C )</td>
<td>0.975</td>
<td>0.961</td>
<td>85.22</td>
<td>2.08</td>
<td>O.L.S. (1968-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(8.879) (1.514) (4.541)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. AGGREGATE FORMULATION – LINEAR

2. PER CAPITA FORMULATION – LINEAR

\( e_0 \) \( e_1^P \) \( e_2^P \) \( e_3^{Pop} \) \( e_4^C \)
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables (coefficients with t-statistics)</th>
<th>$R^2$</th>
<th>$R^2$</th>
<th>F-Stat.</th>
<th>D.W.</th>
<th>Type of Regr./Pd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\log Q^W_{it}$</td>
<td>$\beta_0 \log Q^W_t \beta_2 \log P^G_t \beta_3 \log Y_t \beta_4 C_t$</td>
<td>0.664</td>
<td>0.613</td>
<td>12.85</td>
<td>2.01</td>
<td>G.L.S. (1951-82)</td>
</tr>
<tr>
<td>coeff. (t-stat.)</td>
<td>3.312 -0.409 0.005 1.633 -0.126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\log Q^F_{it}$</td>
<td>$\beta_0 \log Q^F_t \beta_2 \log P^L_t \beta_3 \log Y_t \beta_4 C_t$</td>
<td>0.985</td>
<td>0.922</td>
<td>26.72</td>
<td>2.28</td>
<td>O.L.S. (1968-82)</td>
</tr>
<tr>
<td>coeff. (t-stat.)</td>
<td>2.887 -0.177 0.002 -0.002 1.495 -0.806</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\log Q^F_{it}$</td>
<td>$\beta_0 \log Q^F_t \beta_2 \log P^L_t \beta_3 \log Y_t \beta_4 C_t$</td>
<td>0.961</td>
<td>0.928</td>
<td>29.06</td>
<td>2.10</td>
<td>O.L.S. (1968-82)</td>
</tr>
<tr>
<td>coeff. (t-stat.)</td>
<td>8.212 -0.052 -0.052 -0.001 -0.002 0.0002 -0.761</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\log Q^W_{it}$</td>
<td>$\beta_0 \log Q^W_t \beta_2 \log P^G_t \beta_3 \log Y_t \beta_4 C_t$</td>
<td>0.452</td>
<td>0.367</td>
<td>5.36</td>
<td>2.0</td>
<td>G.L.S.</td>
</tr>
<tr>
<td>coeff. (t-stat.)</td>
<td>1.461 -0.218 0.016 1.483 -0.125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. AGGREGATE FORMULATION - LOG-LINEAR

4. PER CAPITA FORMULATION: LOG-LINEAR
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables (coefficients with t-statistics)</th>
<th>$R^2$ $R^2$ F-Stat. D.W. Type of Regr./Pd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Q_t^F$</td>
<td>$a_0 \quad a_1 t \quad a_2 t^2 \quad a_3 t^3 \quad a_4 t^4$</td>
<td>0.834 0.822 70.39 1.91 0.L.S. (1968-1) to 1983-1)</td>
</tr>
<tr>
<td>coeff.</td>
<td>(7.857) (-0.666) (0.334) (0.0604) (-830.597)</td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(4.982) (0.315) (5.821)</td>
<td></td>
</tr>
<tr>
<td>$Q_T^F$</td>
<td>$b_0 \quad b_1 t \quad b_2 t^2 \quad b_3 t^3 \quad b_4 t^4$</td>
<td>0.837 0.823 56.30 1.89 0.L.S. (1968-1) to 1983-1)</td>
</tr>
<tr>
<td>coeff.</td>
<td>(7.896) (2.769) (4.333) (0.909) (5.513)</td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(4.333) (0.909) (5.513)</td>
<td></td>
</tr>
<tr>
<td>$Q_T^F$</td>
<td>$c_0 \quad c_1 t \quad c_2 t^2 \quad c_3 t^3 \quad c_4 t^4$</td>
<td>0.815 0.794 38.99 1.99 0.L.S. (1968-2) to 1983-1)</td>
</tr>
<tr>
<td>coeff.</td>
<td>(6.744) (2.800) (4.092) (0.869) (4.716)</td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(6.744) (2.800) (4.092) (0.869) (4.716)</td>
<td></td>
</tr>
<tr>
<td>Independent Variables (coefficients with t-statistics)</td>
<td>1. SUGAR SUPPLY FUNCTION</td>
<td>2. SUGAR SUPPLY FUNCTION</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>ICBN: 509.90 336.691 24/23,909 32.3760 (2.142) (0.776)</td>
<td>a_0 b_0 c_0 d_0 e_0 f_0</td>
<td>a_1 b_1 c_1 d_1 e_1 f_1</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(1.36) (3.95)</td>
<td>(1.54) (3.56)</td>
</tr>
<tr>
<td>R^2</td>
<td>0.852</td>
<td>0.861</td>
</tr>
<tr>
<td>F-Stat. D.F.</td>
<td>0.386</td>
<td>0.840</td>
</tr>
<tr>
<td>Type of Regr./PL.</td>
<td>G.L.S. (1951-82)</td>
<td>G.L.S. (1951-82)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>1. SUGAR SUPPLY FUNCTION</th>
<th>2. SUGAR SUPPLY FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>q</td>
<td>a_0 b_0 c_0 d_0 e_0 f_0</td>
<td>a_1 b_1 c_1 d_1 e_1 f_1</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(1.22) (1.84)</td>
<td>(1.05) (1.25)</td>
</tr>
<tr>
<td>R^2</td>
<td>0.701</td>
<td>0.655</td>
</tr>
<tr>
<td>F-Stat. D.F.</td>
<td>0.701</td>
<td>0.555</td>
</tr>
<tr>
<td>Type of Regr./PL.</td>
<td>G.L.S. (1951-82)</td>
<td>G.L.S. (1951-82)</td>
</tr>
</tbody>
</table>

124
1. See Joshi (1973) for a discussion on the sugar cycle.

2. It may be argued that the result is uncertain since the final effect depends on what happens simultaneously to the free-sale price. However, the dominance of the levy output in the total supply should generally lead us to expect this result.

3. See chapter 9 for a discussion of this aspect.
CHAPTER 6

THE COSTS OF RENT-SEEKING AND PROTECTION

Introduction

The existence of a comprehensive system of controls and protection from imports has been the source of large rents in the Indian economic system. Krueger (1974) estimated the value of the rents on account of five kinds of controls on economic activity to be around Rs. 15,000 million ($1,500 million or about 7 percent of GNP) in 1964. The rents she calculated were in the areas of public investment, imports, controlled commodities, credit rationing and operation of the railways. The break-up of her estimate is shown in Table 6.1 below.

Table 6.1

Estimates of the Value of Rents in India, 1964

<table>
<thead>
<tr>
<th>Source of Rent</th>
<th>Amount of Rent (Rs. million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Investment</td>
<td>365</td>
</tr>
<tr>
<td>Imports</td>
<td>10,271</td>
</tr>
<tr>
<td>Controlled Commodities</td>
<td>3,000</td>
</tr>
<tr>
<td>Credit Rationing</td>
<td>407</td>
</tr>
<tr>
<td>Railways</td>
<td>602</td>
</tr>
<tr>
<td>Total</td>
<td>14,645</td>
</tr>
</tbody>
</table>

Source: A.O. Krueger (1974) Table 1, p. 294.
Krueger showed that the opportunity cost of the rent-seeking activity generated by the existence of these rents is equal to the value of the rents themselves. The assumption she used to arrive at this result was that in equilibrium the average return including rents of a factor engaged in rent-seeking must equal the return this factor earns in alternative employment.

Krueger's pioneering albeit crude estimates have not been followed up by an systematic analysis of rent-seeking costs and efficiency losses due to the control regime in India except for a recent paper by Mohammed & Whalley (1984). It would seem particularly important to measure not only the dead-weight losses but also the DUP activity losses imposed on society by the imposition of the controls. In addition, on the assumption that resources would be expanded to procure the higher profits at home due to protection in terms of lobbying for the activities generated by government import-duty revenues would seem to be another source of DUP activity costs. Estimation of the dynamic costs of controls would also be another major area of investigation if in fact such costs could be calculated.

In this section and the next, I attempt to develop estimates of the static costs of protection of the sugar industry in terms of production and consumption triangle losses on the basis of the elasticity estimates calculated in
rent-seeking costs and estimates of the secondary rent-seeking costs of lobbying etc. for government protection in the form of tariffs/quotas. No attempt is made to separately estimate the rent-seeking costs due to domestic "partial" controls alone because of the difficulties associated with finding a benchmark competitive price for the domestic economy different from the international price. However, the costs of both kinds of controls (i.e. the prohibitive tariff and the partial controls) are jointly estimated using the elasticities from the constrained demand and supply curves along with the world price to calculate the consumption and production costs of protection.

To the extent that these estimates are joint estimates and no separate estimate has been made of the costs of domestic controls, the estimates so obtained will be biased estimates. The correct procedure for estimating the costs of the domestic controls separately would have been to estimate uncontrolled demand and supply curves and compare these with the controlled demand and supply curves estimated in the previous chapter. The estimate of the impact of the controls would involve the difference between the two sets of demand and supply curves. However, the lack of data and a suitable procedure by which to obtain a useful analogue of the uncontrolled demand and supply curves precluded such estimation. In addition, the rents
generated by other controls such as licensing etc. would have to be estimated separately.

A limitation of using surplus triangles a la Harberger as done in this chapter is that the (contrained) demand and supply elasticities estimated in the previous chapter may apply over only the limited range of consumption and output values used in the estimation. Extrapolating the elasticity values obtained over regions for which there are no sample values may bias the estimates. The estimates of the costs of protections obtained here should therefore be interpreted keeping this in mind.

A further caveat needs to be made regarding the elasticity estimates. As discussed, the demand and supply curves shift over time as captured by the C variable in the regressions. Consequently, the elasticity estimates obtained can be interpreted as the partial effects of prices etc. on quantity demanded or supplied taking into account the shifts in the curves. Thus, to this limited extent the shifts in demand and supply as a consequence of the changes in control regime are taken into account. More precise estimation would require separate calculations for periods of controls and no controls, a task precluded by the lack of sufficient degrees of freedom during the different regimes and the lack of a suitable estimation method for the unobserved curves during periods of no controls. However, upper and lower-bound elasticities obtained from time-series and cross-section studies have been
used to check for the sensitivity of the estimates due to such shifts.

All the estimates are developed in a partial equilibrium framework under plausible assumptions about elasticities obtained in the previous section. A general equilibrium framework would perhaps be more appropriate but is not attempted because of modelling and data limitations.

Theoretical Aspects of the Costs of Protection and Rent-Seeking

According to the theory of comparative advantage, the value of national product at international prices is maximised when free trade takes place between perfectly competitive markets. Simultaneously, consumers can maximise their utilities from consuming the goods traded at international prices. Barriers to trade such as quotas, tariffs and non-tariff barriers reduce the gains from trade and specialisation and there is a consequent loss to society because of distortions in the efficient allocation of resources and in the pattern of consumption.

The effects of imposing barriers to trade are well-known and can be illustrated by means of the simple partial equilibrium diagram in Figure 6.1.
FIGURE 6.1.

COSTS OF PROTECTION AND RENT-SEEKING UNDER IMPORT CONTROLS

SS' and DD' represent the partial equilibrium domestic industry demand and supply curves for the import good X. At the given exchange rate and world price of the industry's good, the industry faces the perfectly elastic world supply curve PP' at the domestic currency price of OP rupees. Under conditions of free trade, domestic consumption is OC', domestic production is OP' and imports are P'C'. Consumer welfare is ODCF'O. The imposition of a tariff of T rupees per unit of the good, where T=OP*T and T is the ad valorem tariff rate results in a domestic currency price of OP_T rupees. Consumption reduces by CC'(=dC) units and domestic production increases by P'P (=dP) units and a new level of imports equal to PC is attained.

The imposition of the tariff reduces the consumers' surplus from the initial free trade level of P DF to P DE. 

131
However, of this JHBL is collected as tariff revenue by the government and $PPHG$ is additional producer surplus which represents transfers of income and cannot be treated as a social cost. However, there are deadweight-losses to society consisting of the two triangles GHJ and LEF. These can respectively be called the "production cost" of protection and the "consumption cost" of protection (Johnson (1960)).

The equivalence of tariffs and quotas has been established in the literature since Lerner (1936). In terms of Figure 6.1, the imposition of a quota on imports equal to $PC$ will produce exactly the same effects as a tariff except for the tariff revenue JHBL. If the government competitively auctions the rights to the quota (import licenses), then the revenue from the sales of the quota equal to this rectangular area will once again accrue to the government. If the quotas are allocated administratively free of charge then theoretically what will happen is that the revenue will accrue to the importers. (However, rent-seeking activity would inevitably result in such a case and under competitive rent-seeking all the revenue will be dissipated in the form of bribes, lobbying activity etc.)

In Figure 6. if the quota (or tariff) is prohibitive, the domestic currency price is raised to be the same as that under autarchy, $OP$. Here the production and consumption costs become equal to $GAK$ and $KAP$ and the rectangle JHBL is
completely eliminated. Also if an export subsidy equal to the difference between the autarchic price $O_P$ and $O_P$ is given \( A \), then we would expect no effect on the supply of a domestic competitive industry except to the extent that an enforceable export quota was simultaneously fixed. The producer would be indifferent to selling between the domestic and international market except when the export subsidy exceeded the import tariff or quota-equivalent price. In such a case the subsidy would produce an additional welfare cost over and above the production and consumption costs of import protection.

The conventional theory of the costs of protection is as described above except for the argument made about rent-seeking for government revenue in the case of the quota. In fact, in the presence of administrative allocation of the quota, resources will be spent by producers in order to capture the value of the quota. As already pointed out above, tariffs raise revenue for the government while quotas do not. Also, in many cases (particularly in developing countries like India), the quotas are allocated by government agencies on the basis of discretionary criteria. A similar situation exists with respect to the equivalent tariff. This creates the possibility of rents for government officials. Users of the quota will be prepared to pay officials up to the difference between the world and protected prices \( (O_P - O_P) \) per unit in seeking out a quota or tariff if such activity results is the
granting of quota or tariff-protection. Thus in Figure 6.1, producers and users will be prepared to pay an amount up to JHEL + P P HG in order to obtain quota or to maintain tariff protection. Area P P HG would represent the increase in W T producers' profits (the "subsidy" effect of the quota or tariff) and they would be willing to spend resources up to this amount to maintain tariff-protection. JHEL would be the amount quota-users or tariff-receivers would be collectively willing to spend in order to bribe officials, maintain contacts, in order to obtain quota or tariff-protection as already discussed above.

In the case of the prohibitive quota or tariff (no imports), area JHEL would be eliminated and the rent-seeking potential would be limited to area P P AG for producers in W A Figure 6.1. In this case, as already discussed, the production and consumption costs of protection would be equal to the area of triangles GAK and KAF.

The range of DUP-type activities could take varied forms. For users of import quota and tariff-receivers this could involve "bribery" and the concomittant resource use in preventing detection (while on the other hand resources spent on detection of corruption would have to be increased by the authority), hiring of additional inputs or establishment of excess capacity to qualify for quota, investment in resources for lobbying for tariffs and promoting the case for the
application submitted etc. In India, for example, almost every company involved in importing or exporting maintains an office and a large staff of "expediters" in the nation's capital so as to "follow-up" pending cases. For the producers, DUP-type activity could once again take the form of bribery and graft of government officials, lobbying and pay-offs to incumbent politicians, installation of excess capacity in order to pre-empt imports, use of excess labour in order to justify protection on employment grounds etc. It well known in developing countries that considerable amount of resources are spent in a socially wasteful manner in order to protect industries from foreign competition.

From the above discussion, it can be seen that the costs of protection when combined with costs of DUP-type activity can result in welfare losses considerably greater than those identified in conventional studies of the cost of protection. However, a number of qualifications are in order. The losses due to rent-seeking identified above in the quota case for example are postulated under competitive rent-seeking where quota allocations are made on the basis of resources expended per unit of quota awarded. If quotas are awarded in a manner which is not affected by rent-seeking activity, then these losses would be eliminated since no rent-seeking activity would take place. In addition, some of the types of rent-seeking activity described above need not be socially wasteful
as for example the installation of excess capacity or the hiring of excess labour. Further, Bhagwati (1980) and Bhagwati and Srinivasan (1980) demonstrate that under second-best conditions lobbying (and other rent-seeking activities) can be welfare improving if the shadow prices of resources used for lobbying are negative. However, this outcome does depend on the assumption that part of the resources available for rent-seeking are impounded as lump-sum transfers and are not subject to rent-seeking. This seems a difficult fiction to maintain in the face of the fact that due to the scarcity values created rents will be sought on some relevant margin if not on the one where shadow prices are negative. In my analysis in this section, I will ignore these three aspects and proceed as if all the rents potentially available after the imposition of a control will be dissipated by DUP-type activity.

Algebraic Estimation of the Costs of Protection and Rent-Seeking

The estimation of the costs of protection requires knowledge about demand and supply elasticities, domestic and international prices, export subsidies and quantities demanded and supplied. Numerical estimation of these costs is feasible if suitable algebraic formulations can be derived which are in terms of observable entities. I derive the relevant formulas in this section.
The Indian sugar producers were protected with a prohibitive tariff for the period examined with no imports permitted (except in a few years of drastic shortfall when imports were made by the government to make up the shortfall). The situation then was one where the autarchic price $O_P^A$ prevailed. The costs of protection can thus be captured by the area $GHJ + LEF$ while the area $PPAG$ gives the costs of rent-seeking. In addition, the Indian authorities earmarked a certain percentage (a 2.5 percent of the output target in the case of sugar) for exports with a subsidy equal to the ex-factory price of the commodity. This was done to earn scarce foreign exchange but resulted in a welfare loss to the domestic economy. Consequently the costs of protection should incorporate these losses too.

The production costs of protection are given by the triangular area $GHJ$. This area can be expressed symbolically as $1/2 \cdot dP$ where $dP$ is the increase in domestic production from tariff imposition and $T$ is the difference ($O_P - O_P^A$) representing the amount of the quota-equivalent tariff. Since $dP$ is not directly recorded it can be approximated as follows:

$$dP = OP' \cdot \frac{O_P - O_P^A}{S}$$

$$= OP' \cdot \frac{\varepsilon \cdot \tau^A}{S}$$

where $\varepsilon_S = \text{the elasticity of supply with respect to price } P^A$
and \( \frac{OP_A - OP_W}{OP_A} = \tau = \text{the quota equivalent tariff rate expressed as a percentage of the domestic price.} \)

The formula for the production costs of protection thus can be derived as

\[
PCP = \frac{1}{2} \tau dP^2 = \frac{1}{2} \left( \frac{OP_A - OP_W}{OP_A} \right) (OP') S
\]

(6.2)

However since the export subsidy has also to be taken into account, equation (6.2) actually represents an underestimate of the actual costs of protection if subsidised exports are also considered. The costs of protection need to be increased by the magnitude of the subsidy since the domestic economy actually subsidises foreign consumption by the full amount of the subsidy. The estimates provided later in the tables do not do this in order to be conservative. The use of the difference between the ex-factory price paid to the exporting factories and the actual export realisation price in the formula provides an estimate.

The consumption cost of protection is given in Figure 6.1 by the area LEF. This can be expressed symbolically as \( \frac{1}{2} dC \) where \( \tau \) is the difference between domestic and world price as before and \( dC \) is the compensated increase in demand following the withdrawal of protection. Since \( dC \) is not directly
observable it has to be estimated from a knowledge of the compensated arc-price elasticity of demand for the importable.

This elasticity can be shown algebraically to be,

\[
\varepsilon = \frac{dC}{C} \cdot \frac{OP-OP}{A} = (\epsilon - \gamma \mu)
\]

or

\[
\frac{dC}{C} = (\epsilon - \gamma \mu)
\]

or

\[
\frac{dC}{C} = \frac{C \cdot \tau \cdot (\epsilon - \gamma \mu)}{D}
\]  \hspace{1cm} (6.3)

where

\[\varepsilon = \text{compensated arc-price elasticity of demand for importable}\]

\[\varepsilon = \text{own price elasticity of demand}\]

\[\mu = \text{income elasticity of demand}\]

\[\gamma = \text{proportion of total expenditure spent on the commodity.}\]

The corresponding formula for the consumption cost of protection (CCP) then becomes,

\[
\text{CCP} = \frac{1}{2} \tau \cdot C \cdot D \cdot (\epsilon - \gamma \mu)
\]  \hspace{1cm} (6.4)

As already discussed, the costs of rent-seeking are given by the area of trapezium PP AK. The formula for this area can be derived as follows:

Area of Rectangle PP MG = \text{Area of} PP \ A W \ W A \ = \ [OB-dP][P-P_1]

\[
= \ [OB-dP][P-P_1]
\]

Area of Triangle GMA = \text{Area of} \ A W \ W A \ = \ \frac{1}{2} dP(P-P_1)

\[
= \ \frac{1}{2} \ OB \cdot (P-P_1)
\]  \hspace{1cm} (6.5)

\[
= \ \frac{1}{2} \ OB \cdot \tau \cdot (P-P_1)
\]  \hspace{1cm} (6.6)
Adding (6.5) and (6.6), we get

\[
\text{Area of Trapezium } P \text{ } P \text{ } A \text{ } G = \left[ \text{OB-OB}_c \cdot \tau \right] (P - P')_{WA}^\tau + \left[ 1/2 \text{OB}_c \cdot \tau \right] (P' - P)_K
\]

\[
= \left[ \text{OB-1/2 OB}_c \cdot \tau \right] (P - P')_{WA}^\tau
\]

(6.7)

The area of \( P \text{ } P \text{ } A \text{ } G \) therefore represents the value of rents \( W \text{ } A \) generated by protection. The costs of rent-seeking given by area \( P \text{ } P \text{ } A \text{ } G \) are predicated on the assumption that competitive rent-seeking results in all the rents being sought and dissipated. Thus the estimates of this area provide an upper bound for the costs or rent-seeking. Depending on the actual situation existing in the economy, these costs may be some fraction of the total rents available.

Thus the costs of protection and rent-seeking that result from the system of controls in the external sector could be quite large as shown by the foregoing analysis. To these costs must be added the costs of rent-seeking in the domestic sector. In the case of the sugar industry these costs would comprise the extra rents generated by the higher prices resulting from the "capture" of the regulators by industry participants (discussed later) and the rent-seeking activity these rents initiate. The analysis attempted to incorporate the effect of partial controls only to the extent of incorporating the constrained demand and supply elasticities in the cost of protection analysis. Other costs could arise from the sale of allocations obtained at a controlled price in a price
control situation and the sale of the quantities so obtained on the black market. Yet other costs could arise from the allocation process for industrial licenses, capital market controls, labour market controls etc. I ignore the separate estimation of these costs for the economy as a whole since data on individual industries such as sugar was unavailable.

The effect of price controls on the cement industry where there is complete price control for example can be shown simply as in Figure 2.

\begin{center}
\begin{tabular}{|c|c|c|}
\hline
\textbf{Figure 6.2} & & \\
\hline
\textbf{PD} & \textbf{SS'} & \\
\hline
\textbf{PE} & \textbf{OP} & \\
\hline
\textbf{PC} & \textbf{QB} & \\
\hline
\textbf{OQ} & & \\
\hline
\end{tabular}
\end{center}

RENT-SEEKING COSTS DUE TO PRICE CONTROLS

In Figure 6.2, DD' and SS' represent the free-market demand and supply curves for cement respectively. \( O_P \) and \( Q_Q \) are the free-market equilibrium price and quantity. \( O_P^E \) represents the government-controlled price while \( O_P^C \) is the black-market price. Rents are created by obtaining allocations at the controlled price \( O_P^C \) and reselling the quantity \( Q_Q \) or a fraction thereof so obtained in the black market. The maximum size of the rents generated are given by the area of rectangle \( P.CAP. \) With competitive rent-seeking,
these will be dissipated as a result of bribes, payoffs, lobbying, concealment and policing costs.

In the case of partially controlled markets with dual pricing the rent-seeking costs are similar to those described in the previous paragraph. Potential rents are created by the leakage or diversion of the controlled commodity to the open market, though there is a built-in mechanism here for the open market price to fall with increased leakage up to the point where it is no longer profitable to divert quantities. Once again the rents are dissipated by bribery, corruption, lobbying, concealment and detection - i.e. by the expenditure of resources on what Bhagwati (1982) has called DUP activities and their prevention.

An additional set of costs are generated by the "capture" of the regulators of the controlled product by the interest groups seeking "beneficial" regulation. The capture (or interest group) theory describes the situation where producers are able to overcome free-riding costs and organise to wield wealth-maximising influence over regulators. Consumer interests have no rational incentive to organise to resist the regulations in favour of producers because the costs of organisation exceed the benefits for them. Stigler (1971) presented this theory in terms of the costs and benefits to various groups of using the state to increase their wealth. Instances of capture under price control would
occur when controlled prices are set in such a fashion that they generate a monopoly profit. In the case of the Indian sugar industry for example, controlled prices have exceeded the imported c.i.f. price of sugar by a substantial amount in quite a number of years suggesting either a capture of the price-controllers or the use of high-cost techniques of production because of the protection afforded. The social costs of the monopoly perpetrated by such plausible capture should also be added to the rent-seeking costs since the very existence of these monopoly profits would generate rent-seeking activity. As pointed out earlier, the estimation of the magnitude of such rent-seeking activity would involve calculating the impact of the difference between controlled and uncontrolled demand and supply curves and calculating the extent of any such monopoly profits. This has not been done because of the difficulties pointed out earlier and is a limitation. However, a later chapter contains empirical tests of capture in the Indian sugar industry.
1. See Corden (1957) and Johnson (1960).

2. See the papers in Buchanan, Tollison and Tullock (1980) and the survey by Tollison (1982) for a discussion.

3. See Johnson (1960) for a derivation of the costs of protection. Estimates of the aggregate cost of protection can be found in Basevi (1968), Magee (1972) and Stern (1964) for the U.S., Johnson (1958) for Britain; and Williams (1976) and Young (1957) for Canada. A summary of the literature up to the early seventies is provided by Corden (1975), Economic Council of Canada (1975) and Wonnacott (1975). All these studies have found the size of the welfare loss due to protection to be small. General equilibrium approaches to measuring the cost of protection are contained in Brown and Whalley (1980), Broadway and Tredennick (1979), Cox and Harris (1983) and Deardoff and Stern (1979, 1981) and Harris and Cox (1983). Estimates of the costs of protection for particular industries are relatively less numerous. There are three major estimates for the world sugar industry contained in Johnson (1966) and Snape (1963, 1969). Rakshit (1980) has calculated the costs of protecting the Indian sugar industry for the 1963-72 period.
EMPIRICAL ESTIMATES OF THE COSTS OF PROTECTION AND RENT-SEEKING

Introduction

In this chapter I estimate the costs of protection and rent-seeking in the Indian sugar industry using data from various sources for the period 1951-1982. This period has been selected because consistent data was available and it constituted a relatively long period after the attainment of Indian independence when both complete control and partial control regimes were in operation. Data on earlier years was not available on a consistent basis. Even for the period considered in this study data had to be collected from a variety of sources.

Data Sources

The calculations presented in the next section have been made using data from a variety of sources. Domestic production and wholesale weighted price data have been obtained from various issues of *Indian Sugar* and the *Indian Sugar Yearbook* published by the Indian Sugar Mills Association (ISMA) and various issues of the *Cooperative Sugar Yearbook and Directory* published by the National Federation of Cooperative Sugar Factories Ltd. (NFCSF). The export data were the most difficult to obtain and have been obtained from a variety of
sources:


(2) 1955-56 to 1959-60 - From Table 52 on p.94 of the Planning Commission's *Basic Statistics Relating to the Indian Economy*, 1963

(3) 1960-61 to 1982-83 - Computed from various issues of the DGCI&S Monthly Foreign Trade Statistics

Each source differs on the exact magnitude of the exports in any one year but overall consistency has been maintained as far as possible. Actual C.I.F. prices obtained were computed from the same sources as above with cross-checks between sources. The export subsidy oriented ex-factory price was obtained as follows:

(1) 1951-52 to 1960-61 - This was calculated from the domestic wholesale price as (Domestic Wholesale Price) / (1 + Excise Duty)

(2) 1961-62 to 1982-83 - This was calculated from the export subsidy data in the Central Government Budget.

Two sets of elasticities were used for the elasticity of supply in the production cost calculations. The elasticity of supply of 1.18 was the one obtained in the log-linear regression of sugar output on the weighted wholesale price of sugar, the price of gur and the control dummy. The lower
estimate of 0.50 was based on the cane output regression and was chosen as a lower bound so as to bias the results downward.

In the consumption costs calculations, the import parity price used was obtained from various issues of the International Sugar Yearbook published by the International Sugar Organisation. Domestic consumption data for sugar was also obtained from the same source except for the 1951-52 to 1952-53 data which was obtained from Viton and Pignalosa's (1961) *Trends and Forces of World Sugar Consumption*. Aggregate consumption expenditure was obtained from various issues of the Reserve Bank of India's *Report on Currency and Finance*. The estimates of demand elasticities used were those suggested by the National Sample Survey (NSS) data for the upper bound (-1.67) and from my own estimates for the lower bound (-.41). The income elasticity of 1.64 was also based on my own results while the alternative estimate of 2.07 was based on NSS calculations. (See *Indian Institute of Public Opinion*, 1977). The NSS estimates are based on cross-section sample data of a consumer expenditure survey conducted by the I.I.P.O. in 1977 and represent the elasticities obtained at the means of the responses obtained from the consumer survey.
Numerical Estimates of the Costs of Protection and Rent-Seeking

The calculation of the costs of protection and rent-seeking due to protection for the sugar industry are given in Tables 7.1 to 7.7.

The production cost calculations are shown in Table 7.1. Column (2) gives the domestic production of sugar while column (3) gives the wholesale domestic price for centrifugal sugar. The C.I.F. import price of sugar is given in column (4). Column (6) gives the percentage mark-up of the domestic price over the corresponding import price. The quantity of inefficient production generated by the prohibitive tariff is given in column (7) under the two different supply elasticity assumptions. In column (8) I calculate the production cost due to the import restriction under the two assumptions regarding supply elasticities in order to get a lower bound on the production cost. To this can be added the loss of exports (see Table 7.7) to obtain an estimate of the production cost of protection together with the export subsidy. As shown the production cost numbers work out to be substantial for most of the years except the years in which imports were more expensive than domestic production 1974-75, 1975-76, and 1980-81. It can be seen that the costs are large under both elasticity values.

Table 7.2 gives the consumption costs of protection. The calculations reflect the consumption costs due to the
import restriction and export subsidy taken together. In this table the elasticity of demand estimate \( \varepsilon \) of -0.41 obtained in the log-linear function estimation in Chapter 6 has been used in order to obtain lower bound estimates of the consumption cost. Both the income elasticity estimates \( \mu = 1.64 \) and \( \mu = 2.07 \) have been used separately in the calculations. This table thus presents the lower bound estimates of the consumption cost under different elasticity assumptions. Column (2) gives the domestic wholesale price while column (3) gives the lower of the export or import price. The percentage mark-up of the domestic over the corresponding import/export parity price is given in column (5). Columns (6), (7) and (8) provide the numbers necessary for the calculation of \( \gamma \), the proportion of total expenditure spent on sugar. This is used in the calculation of the compensated demand elasticity in column (9). The reduction in total consumption due to protection is given in column (10) and this is used to obtain the consumption cost of protection in column (11).

The upper bound consumption cost calculations are shown in Table 7.3 based on NSS and cross-section data elasticity estimates of demand \( \varepsilon = -1.67 \). Once again both supply elasticity estimates \( \lambda = 0.50 \) and \( \lambda = 1.18 \) have been used separately. It can be seen that the costs are large under both elasticity assumptions. The consumption cost in fact exceeds the production costs for most years by a substantial amount.
Table 7.4 adds up the two kinds of costs of protection under alternative assumptions. The total cost of protection as a percentage of the value of sugar output varies from nothing to anywhere near fifty percent of the value of sugar output, an exceedingly large amount by any standards. This may be considerably reduced if effective rates are used but since the major inputs, namely sugarcane (over 50 percent of cost of production) and labour (over 8 percent of cost of production) are not imported, the effect of accounting for effective rates will not change the amounts obtained by much.

The rent-seeking "Tullock" costs of protection are given in Table 7.5. They lie between zero to around 55 percent of the value of sugar output suggesting that in some years the costs of protection plus the rent-seeking costs may have been greater than the value of sugar output. This is a striking result suggesting that if all the rents were competed away the sugar industry would have produced a total negative value added in terms of welfare. Of course, on my assumptions this result only represents a plausible upper bound.

The combined costs of protection and rent-seeking as a percentage of the value of sugar output are given in Table 7.6. These are upper-bound estimates. It can be seen from the table that in selected years (e.g. 1962-63, 1965-66 and 1966-67), the upper-bound costs of protection and rent-seeking almost equalled the value of sugar output for those years.
Even if all the rents available during these years were not competed away, the combined costs nevertheless would still be quite high.

The aggregate loss to the economy due to the subsidisation of exports is given in Table 7.7. The government subsidised the quantity of exports given in column (4) to the extent given in column (5). The aggregate loss incurred by the economy is given in column (6) and constitutes an income transfer to foreign residents buying the exports. Since these exports were made to earn foreign exchange, the amount of the loss should be reduced by a factor representing the premium on the foreign exchange earned. However, counter balancing this are the rent-seeking costs associated with producers influencing the government to continue the export subsidisation scheme.

One important feature of the estimates of the cost of protection and rent-seeking needs to be emphasised. As pointed out in earlier chapters, the elasticity estimates of demand used in the calculation of these costs are underestimates because of the weighting scheme used in the demand curve estimation. Thus the dead weight and rent-seeking costs of the domestic and external distortions are likely to be even higher because the "true" demand curve is more elastic. Thus even the upper bound estimates reported are likely to be even higher because of this feature.
Limitations and Caveats

A distinctive feature of the results is the tendency for the costs of protection and rent-seeking to fluctuate drastically from year to year. This feature would seem to undermine the reliability of the estimates. However, the fluctuating costs themselves are the results of the shifting balance of world sugar prices, domestic levy and free-sale prices, export subsidies and the fluctuating quantities of sugar that have characterised the growth of the sugar industry in India. Quite clearly, the empirical estimates have fluctuated with the shifting constellation of these forces given the method that has been adopted for estimating the costs. For example, in the years 1974-75, 1975-76, and 1980-81 in Table 7.1 to 7.6 the costs of protection are zero because the import/export parity price of sugar exceeded the domestic price. This was due to the disastrous failure of the world sugar crop during these years. These three years represent an aberration when seen against the general trend of the costs of protection but can be expected to produce the fluctuating estimates because of the relative isolation of the Indian sugar economy from the rest of the world.

In order to smooth out the fluctuation in the estimates, the yearly costs could be averaged out. Excluding the years in which the costs were zero due to the world sugar situation, the average combined costs of protection and rent-seeking are
around 50% of the value of sugar output. This constitutes a substantial social cost to the economy.

Another element of variability which is not incorporated in the analysis presented here is the shift in the demand and supply curves over time with concomitant changes in elasticities. I have used upper and lower bound elasticities based on time-series and cross-section data to check for the sensitivity of the estimates to such shifts.

The estimates are essentially static in nature. Easton and Grubel (1983) have shown that the costs of protection should be considered to grow at the rate at which international trade grows while the benefits can be expected to grow at the rate of growth of real output. Under the assumption of the real growth of output being less than the rate of growth of international trade (as has been the case historically and is likely to be the case in future because of reduced transportation costs and economies of scale in production), the present value of costs over benefits are likely to be an increasing function of time and could become quite large in the long run. While my analysis has not explicitly considered the benefits of protection, the costs of protection can be expected to increase substantially over time in a growing world. Such dynamic changes are not captured in the analysis.

The analysis does not also explicitly consider the
premium attached to foreign exchange in terms of import substitution and export subsidisation. This has not been done for the simple reason that any such premium is likely to be arbitrary as also because the distortions in the domestic and foreign sectors of the Indian economy make the calculation of such a premium a highly questionable issue.

Despite these caveats and limitations, the estimates provided in this chapter emphasise the costs involved in the protection and partial control of the Indian sugar industry. To the extent that the purely domestic costs of the partial control regime have not been incorporated into the analysis (except to the extent of including constrained elasticities), the actual costs of both the domestic and external regimes combined would exceed the estimates presented here. It needs to be reemphasised that the estimates contained in this chapter are joint estimates of the domestic control and external tariff regimes to the extent of using the constrained demand and supply elasticities. A more detailed study would require the separation of the costs of the two kinds of regimes if an appropriate method and data series can be constructed. The policy-makers would do well to take into consideration these costs and the other distortions that have resulted from the regime of protection and partial controls. Allowing market forces greater play would considerably alleviate these costs and distortions.
### Table 7.1: Indian Sugar-Welfare Costs of Protection

#### Production Cost Calculations

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Domestic Producers of Sugar '000MT</th>
<th>Domestic Wholesale Price Rs./MT</th>
<th>Import Price C.I.F. Rs./MT</th>
<th>Rs./MT</th>
<th>Q*</th>
<th>p*</th>
<th>P.C.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52</td>
<td>1507</td>
<td>969</td>
<td>593</td>
<td>593</td>
<td>376</td>
<td>0.388</td>
<td>T = 0.50</td>
</tr>
<tr>
<td>1952-53</td>
<td>1336</td>
<td>878</td>
<td>606</td>
<td>606</td>
<td>272</td>
<td>0.310</td>
<td>T = 1.18</td>
</tr>
<tr>
<td>1953-54</td>
<td>1017</td>
<td>868</td>
<td>609</td>
<td>609</td>
<td>259</td>
<td>0.298</td>
<td>T = 0.50</td>
</tr>
<tr>
<td>1954-55</td>
<td>1615</td>
<td>829</td>
<td>593</td>
<td>593</td>
<td>236</td>
<td>0.275</td>
<td></td>
</tr>
<tr>
<td>1955-56</td>
<td>1829</td>
<td>888</td>
<td>609</td>
<td>609</td>
<td>314</td>
<td>0.334</td>
<td></td>
</tr>
<tr>
<td>1956-57</td>
<td>2059</td>
<td>846</td>
<td>657</td>
<td>657</td>
<td>274</td>
<td>0.316</td>
<td></td>
</tr>
<tr>
<td>1957-58</td>
<td>2009</td>
<td>928</td>
<td>605</td>
<td>605</td>
<td>323</td>
<td>0.348</td>
<td></td>
</tr>
<tr>
<td>1958-59</td>
<td>1969</td>
<td>877</td>
<td>608</td>
<td>608</td>
<td>269</td>
<td>0.307</td>
<td></td>
</tr>
<tr>
<td>1959-60</td>
<td>2460</td>
<td>927</td>
<td>604</td>
<td>604</td>
<td>323</td>
<td>0.348</td>
<td></td>
</tr>
<tr>
<td>1960-61</td>
<td>3028</td>
<td>970</td>
<td>610</td>
<td>610</td>
<td>360</td>
<td>0.371</td>
<td></td>
</tr>
<tr>
<td>1961-62</td>
<td>2730</td>
<td>1017</td>
<td>630</td>
<td>630</td>
<td>422</td>
<td>0.415</td>
<td></td>
</tr>
<tr>
<td>1962-63</td>
<td>7313</td>
<td>1052</td>
<td>644</td>
<td>644</td>
<td>438</td>
<td>0.416</td>
<td></td>
</tr>
<tr>
<td>1963-64</td>
<td>2562</td>
<td>1085</td>
<td>694</td>
<td>694</td>
<td>288</td>
<td>0.265</td>
<td></td>
</tr>
<tr>
<td>1964-65</td>
<td>3232</td>
<td>1128</td>
<td>666</td>
<td>666</td>
<td>466</td>
<td>0.411</td>
<td></td>
</tr>
<tr>
<td>1965-66</td>
<td>3532</td>
<td>1202</td>
<td>644</td>
<td>644</td>
<td>484</td>
<td>0.464</td>
<td></td>
</tr>
<tr>
<td>1966-67</td>
<td>2159</td>
<td>1221</td>
<td>1063</td>
<td>1063</td>
<td>158</td>
<td>0.129</td>
<td></td>
</tr>
<tr>
<td>1967-68</td>
<td>2247</td>
<td>1686</td>
<td>1059</td>
<td>1059</td>
<td>627</td>
<td>0.377</td>
<td></td>
</tr>
<tr>
<td>1968-69</td>
<td>3558</td>
<td>1421</td>
<td>1158</td>
<td>1158</td>
<td>263</td>
<td>0.185</td>
<td></td>
</tr>
<tr>
<td>1969-70</td>
<td>4251</td>
<td>1604</td>
<td>1187</td>
<td>1187</td>
<td>417</td>
<td>0.260</td>
<td></td>
</tr>
<tr>
<td>1970-71</td>
<td>3740</td>
<td>1591</td>
<td>1348</td>
<td>1348</td>
<td>243</td>
<td>0.153</td>
<td></td>
</tr>
<tr>
<td>1971-72</td>
<td>3108</td>
<td>1713</td>
<td>1367</td>
<td>1367</td>
<td>346</td>
<td>0.202</td>
<td></td>
</tr>
<tr>
<td>1972-73</td>
<td>3872</td>
<td>2197</td>
<td>1555</td>
<td>1555</td>
<td>642</td>
<td>0.292</td>
<td></td>
</tr>
<tr>
<td>1973-74</td>
<td>3969</td>
<td>2255</td>
<td>1735</td>
<td>1735</td>
<td>520</td>
<td>0.231</td>
<td></td>
</tr>
<tr>
<td>1974-75</td>
<td>4794</td>
<td>2682</td>
<td>5589</td>
<td>5589</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1975-76</td>
<td>4261</td>
<td>2564</td>
<td>4153</td>
<td>4153</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1976-77</td>
<td>4860</td>
<td>2676</td>
<td>2408</td>
<td>2408</td>
<td>268</td>
<td>0.100</td>
<td></td>
</tr>
<tr>
<td>1977-78</td>
<td>6457</td>
<td>2424</td>
<td>1609</td>
<td>1609</td>
<td>815</td>
<td>0.336</td>
<td></td>
</tr>
<tr>
<td>1978-79</td>
<td>5842</td>
<td>2135</td>
<td>1560</td>
<td>1560</td>
<td>575</td>
<td>0.269</td>
<td></td>
</tr>
<tr>
<td>1979-80</td>
<td>3838</td>
<td>2621</td>
<td>1870</td>
<td>1870</td>
<td>751</td>
<td>0.287</td>
<td></td>
</tr>
<tr>
<td>1980-81</td>
<td>5140</td>
<td>4249</td>
<td>3404</td>
<td>3404</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1981-82</td>
<td>8436</td>
<td>4036</td>
<td>3525</td>
<td>3525</td>
<td>511</td>
<td>0.127</td>
<td></td>
</tr>
<tr>
<td>1982-83</td>
<td>8232</td>
<td>3521</td>
<td>2099</td>
<td>2099</td>
<td>1422</td>
<td>0.404</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** P.C.P. = (2)(x)(6) x E, where E is Elasticity of Qw.r.t. p.
<table>
<thead>
<tr>
<th>Year (1)</th>
<th>Rs/MT</th>
<th>Rs/MT</th>
<th>Rs/MT</th>
<th>'000MT</th>
<th>Rs/MT</th>
<th>u1*</th>
<th>u2**</th>
<th>u1*</th>
<th>u2**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52</td>
<td>969</td>
<td>593</td>
<td>376</td>
<td>1002</td>
<td>93400</td>
<td>0.388</td>
<td>1.114</td>
<td>0.39</td>
<td>0.39</td>
</tr>
<tr>
<td>1952-53</td>
<td>878</td>
<td>606</td>
<td>272</td>
<td>1087</td>
<td>92010</td>
<td>0.310</td>
<td>1.024</td>
<td>0.39</td>
<td>0.38</td>
</tr>
<tr>
<td>1953-54</td>
<td>868</td>
<td>609</td>
<td>259</td>
<td>1011</td>
<td>98200</td>
<td>0.298</td>
<td>1.014</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1954-55</td>
<td>829</td>
<td>593</td>
<td>236</td>
<td>9800</td>
<td>86200</td>
<td>0.285</td>
<td>0.917</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1955-56</td>
<td>888</td>
<td>574</td>
<td>314</td>
<td>1094</td>
<td>89500</td>
<td>0.354</td>
<td>0.914</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1956-57</td>
<td>866</td>
<td>592</td>
<td>274</td>
<td>1056</td>
<td>85200</td>
<td>0.316</td>
<td>0.919</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1957-58</td>
<td>928</td>
<td>810</td>
<td>118</td>
<td>1027</td>
<td>95900</td>
<td>0.127</td>
<td>1.020</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1958-59</td>
<td>877</td>
<td>509</td>
<td>368</td>
<td>1073</td>
<td>10320</td>
<td>0.420</td>
<td>1.044</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1959-60</td>
<td>927</td>
<td>489</td>
<td>438</td>
<td>1102</td>
<td>11020</td>
<td>0.473</td>
<td>1.034</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1960-61</td>
<td>970</td>
<td>464</td>
<td>506</td>
<td>1123</td>
<td>12310</td>
<td>0.522</td>
<td>1.066</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1961-62</td>
<td>1017</td>
<td>497</td>
<td>520</td>
<td>1163</td>
<td>12630</td>
<td>0.522</td>
<td>0.208</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1962-63</td>
<td>1052</td>
<td>396</td>
<td>696</td>
<td>1248</td>
<td>13250</td>
<td>0.624</td>
<td>0.207</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1963-64</td>
<td>1085</td>
<td>675</td>
<td>410</td>
<td>1207</td>
<td>14640</td>
<td>0.378</td>
<td>0.205</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1964-65</td>
<td>1128</td>
<td>815</td>
<td>313</td>
<td>1256</td>
<td>18090</td>
<td>0.278</td>
<td>0.154</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1965-66</td>
<td>1202</td>
<td>370</td>
<td>832</td>
<td>1388</td>
<td>18330</td>
<td>0.688</td>
<td>0.184</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1966-67</td>
<td>1221</td>
<td>421</td>
<td>800</td>
<td>1374</td>
<td>21740</td>
<td>0.655</td>
<td>0.146</td>
<td>0.39</td>
<td>0.38</td>
</tr>
<tr>
<td>1967-68</td>
<td>1686</td>
<td>675</td>
<td>1011</td>
<td>1425</td>
<td>24710</td>
<td>0.600</td>
<td>0.154</td>
<td>0.39</td>
<td>0.38</td>
</tr>
<tr>
<td>1968-69</td>
<td>1421</td>
<td>971</td>
<td>450</td>
<td>1405</td>
<td>26710</td>
<td>0.317</td>
<td>0.142</td>
<td>0.39</td>
<td>0.38</td>
</tr>
<tr>
<td>1969-70</td>
<td>1604</td>
<td>958</td>
<td>646</td>
<td>1374</td>
<td>28550</td>
<td>0.403</td>
<td>0.183</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>1970-71</td>
<td>1591</td>
<td>764</td>
<td>827</td>
<td>1302</td>
<td>30260</td>
<td>0.520</td>
<td>0.212</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1971-72</td>
<td>1713</td>
<td>951</td>
<td>762</td>
<td>1345</td>
<td>32690</td>
<td>0.445</td>
<td>0.199</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1972-73</td>
<td>2197</td>
<td>1103</td>
<td>1094</td>
<td>1354</td>
<td>35560</td>
<td>0.498</td>
<td>0.217</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1973-74</td>
<td>2255</td>
<td>1687</td>
<td>568</td>
<td>1322</td>
<td>44840</td>
<td>0.252</td>
<td>0.177</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1974-75</td>
<td>2682</td>
<td>4873</td>
<td>--</td>
<td>3435</td>
<td>51930</td>
<td>0.343</td>
<td>0.167</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1975-76</td>
<td>2564</td>
<td>3933</td>
<td>--</td>
<td>3639</td>
<td>52740</td>
<td>0.398</td>
<td>0.167</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1976-77</td>
<td>2676</td>
<td>2552</td>
<td>124</td>
<td>3757</td>
<td>54210</td>
<td>0.395</td>
<td>0.175</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1977-78</td>
<td>2423</td>
<td>2786</td>
<td>--</td>
<td>4482</td>
<td>62920</td>
<td>0.173</td>
<td>0.38</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>1978-79</td>
<td>2333</td>
<td>1787</td>
<td>368</td>
<td>6214</td>
<td>67220</td>
<td>0.163</td>
<td>0.37</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>1979-80</td>
<td>2621</td>
<td>2123</td>
<td>498</td>
<td>5108</td>
<td>73150</td>
<td>0.190</td>
<td>0.38</td>
<td>0.37</td>
<td>0.38</td>
</tr>
<tr>
<td>1980-81</td>
<td>4249</td>
<td>5029</td>
<td>--</td>
<td>4902</td>
<td>87360</td>
<td>0.0238</td>
<td>0.37</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>1981-82</td>
<td>4036</td>
<td>3525</td>
<td>511</td>
<td>5501</td>
<td>100870</td>
<td>0.127</td>
<td>0.220</td>
<td>0.37</td>
<td>0.36</td>
</tr>
<tr>
<td>1982-83</td>
<td>3521</td>
<td>2099</td>
<td>1422</td>
<td>6471</td>
<td>113080</td>
<td>0.403</td>
<td>0.202</td>
<td>0.37</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Notes: \( \text{u1} = 1.64; \text{u2} = 2.07 \)
<table>
<thead>
<tr>
<th>YEAR</th>
<th>Weighted Export/Import Domestic Parity Price</th>
<th>Domestic Consumption of Sugar 0000 MT</th>
<th>Expenditure of Aggregate Sugar Exp. as a Prop.</th>
<th>Consumption Cost of Protection</th>
<th>C.C.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52</td>
<td>969</td>
<td>593</td>
<td>376</td>
<td>0.388</td>
<td>1002</td>
</tr>
<tr>
<td>1952-53</td>
<td>878</td>
<td>606</td>
<td>272</td>
<td>0.310</td>
<td>1287</td>
</tr>
<tr>
<td>1953-54</td>
<td>868</td>
<td>609</td>
<td>259</td>
<td>0.298</td>
<td>1690</td>
</tr>
<tr>
<td>1954-55</td>
<td>829</td>
<td>593</td>
<td>236</td>
<td>0.285</td>
<td>1840</td>
</tr>
<tr>
<td>1955-56</td>
<td>888</td>
<td>574</td>
<td>314</td>
<td>0.354</td>
<td>1964</td>
</tr>
<tr>
<td>1956-57</td>
<td>866</td>
<td>592</td>
<td>274</td>
<td>0.316</td>
<td>2189</td>
</tr>
<tr>
<td>1957-58</td>
<td>928</td>
<td>810</td>
<td>118</td>
<td>0.127</td>
<td>2156</td>
</tr>
<tr>
<td>1958-59</td>
<td>877</td>
<td>509</td>
<td>368</td>
<td>0.420</td>
<td>2256</td>
</tr>
<tr>
<td>1959-60</td>
<td>927</td>
<td>489</td>
<td>438</td>
<td>0.473</td>
<td>2310</td>
</tr>
<tr>
<td>1960-61</td>
<td>970</td>
<td>464</td>
<td>506</td>
<td>0.522</td>
<td>2113</td>
</tr>
<tr>
<td>1961-62</td>
<td>1017</td>
<td>497</td>
<td>520</td>
<td>0.511</td>
<td>2588</td>
</tr>
<tr>
<td>1962-63</td>
<td>1052</td>
<td>396</td>
<td>696</td>
<td>0.624</td>
<td>2486</td>
</tr>
<tr>
<td>1963-64</td>
<td>1085</td>
<td>675</td>
<td>410</td>
<td>0.378</td>
<td>2307</td>
</tr>
<tr>
<td>1964-65</td>
<td>1128</td>
<td>815</td>
<td>313</td>
<td>0.278</td>
<td>2469</td>
</tr>
<tr>
<td>1965-66</td>
<td>1202</td>
<td>370</td>
<td>832</td>
<td>0.688</td>
<td>2810</td>
</tr>
<tr>
<td>1966-67</td>
<td>1221</td>
<td>421</td>
<td>800</td>
<td>0.655</td>
<td>2601</td>
</tr>
<tr>
<td>1967-68</td>
<td>1686</td>
<td>675</td>
<td>1011</td>
<td>0.600</td>
<td>2215</td>
</tr>
<tr>
<td>1968-69</td>
<td>1040</td>
<td>958</td>
<td>646</td>
<td>0.403</td>
<td>3267</td>
</tr>
<tr>
<td>1969-70</td>
<td>1591</td>
<td>764</td>
<td>827</td>
<td>0.520</td>
<td>4025</td>
</tr>
<tr>
<td>1970-71</td>
<td>1713</td>
<td>951</td>
<td>762</td>
<td>0.445</td>
<td>3795</td>
</tr>
<tr>
<td>1971-72</td>
<td>2197</td>
<td>1103</td>
<td>1094</td>
<td>0.498</td>
<td>3514</td>
</tr>
<tr>
<td>1972-73</td>
<td>2255</td>
<td>1687</td>
<td>568</td>
<td>0.252</td>
<td>3522</td>
</tr>
<tr>
<td>1973-74</td>
<td>2682</td>
<td>4873</td>
<td>-</td>
<td>-</td>
<td>3635</td>
</tr>
<tr>
<td>1974-75</td>
<td>2564</td>
<td>3933</td>
<td>-</td>
<td>-</td>
<td>3639</td>
</tr>
<tr>
<td>1975-76</td>
<td>2676</td>
<td>2276</td>
<td>-</td>
<td>-</td>
<td>3757</td>
</tr>
<tr>
<td>1976-77</td>
<td>2424</td>
<td>2786</td>
<td>-</td>
<td>-</td>
<td>4482</td>
</tr>
<tr>
<td>1977-78</td>
<td>2315</td>
<td>1877</td>
<td>348</td>
<td>0.163</td>
<td>6216</td>
</tr>
<tr>
<td>1978-79</td>
<td>2621</td>
<td>2123</td>
<td>498</td>
<td>0.190</td>
<td>5108</td>
</tr>
<tr>
<td>1979-80</td>
<td>4249</td>
<td>5029</td>
<td>-</td>
<td>-</td>
<td>4902</td>
</tr>
<tr>
<td>1980-81</td>
<td>4036</td>
<td>3525</td>
<td>511</td>
<td>0.127</td>
<td>5501</td>
</tr>
<tr>
<td>1981-82</td>
<td>3521</td>
<td>2099</td>
<td>1422</td>
<td>0.403</td>
<td>6471</td>
</tr>
<tr>
<td>1982-83</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>110850</td>
</tr>
</tbody>
</table>

Legend:
- **Pw**: Weighted Export Price
- **P**: Domestic Parity Price
- **c**: Domestic Parity Price
- **Pw**: Wholesale Price
- **E**: Expenditure
- **C**: Consumption
- **dc**: Domestic Consumption
- **C.C.P.**: C.C.P.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>(1) Production Cost of Protection (P.C.P.)</th>
<th>(2) Consumption Cost of Protection (C.C.P.)</th>
<th>(3) Total Cost of Protection (2) + (3)</th>
<th>(4) Value of Sugar Output</th>
<th>(5) Total Cost of Protection as a Percentage of Value of Sugar Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52</td>
<td>54.9 129.7</td>
<td>132.6 132.6</td>
<td>187.5 262.3</td>
<td>1460.3</td>
<td>12.8 18.0</td>
</tr>
<tr>
<td>1952-53</td>
<td>28.2 66.5</td>
<td>90.2 89.7</td>
<td>117.9 156.7</td>
<td>1173.0</td>
<td>10.1 13.4</td>
</tr>
<tr>
<td>1953-54</td>
<td>19.7 46.4</td>
<td>107.6 107.0</td>
<td>126.7 154.0</td>
<td>863.1</td>
<td>15.0 18.3</td>
</tr>
<tr>
<td>1954-55</td>
<td>27.1 64.1</td>
<td>101.5 100.9</td>
<td>128.0 165.6</td>
<td>1338.8</td>
<td>9.6 12.4</td>
</tr>
<tr>
<td>1955-56</td>
<td>50.9 119.9</td>
<td>179.0 177.9</td>
<td>228.8 298.9</td>
<td>1624.2</td>
<td>14.1 18.4</td>
</tr>
<tr>
<td>1956-57</td>
<td>44.5 105.2</td>
<td>155.4 154.5</td>
<td>199.0 260.6</td>
<td>1783.1</td>
<td>11.2 14.6</td>
</tr>
<tr>
<td>1957-58</td>
<td>56.5 131.2</td>
<td>26.5 26.3</td>
<td>82.8 139.7</td>
<td>1864.4</td>
<td>4.4 8.6</td>
</tr>
<tr>
<td>1958-59</td>
<td>40.2 45.0</td>
<td>285.9 284.2</td>
<td>324.4 380.9</td>
<td>1709.3</td>
<td>19.0 22.3</td>
</tr>
<tr>
<td>1959-60</td>
<td>69.1 163.1</td>
<td>392.4 390.0</td>
<td>459.1 555.7</td>
<td>2280.4</td>
<td>20.1 24.4</td>
</tr>
<tr>
<td>1960-61</td>
<td>101.6 238.7</td>
<td>457.7 452.7</td>
<td>550.3 696.4</td>
<td>2937.2</td>
<td>19.0 23.7</td>
</tr>
<tr>
<td>1961-62</td>
<td>119.6 282.1</td>
<td>563.9 560.5</td>
<td>680.1 866.0</td>
<td>2776.4</td>
<td>24.5 30.5</td>
</tr>
<tr>
<td>1962-63</td>
<td>97.2 229.5</td>
<td>885.3 880.0</td>
<td>977.2 1114.8</td>
<td>2246.0</td>
<td>43.5 49.6</td>
</tr>
<tr>
<td>1963-64</td>
<td>48.8 115.3</td>
<td>293.2 292.3</td>
<td>342.0 408.5</td>
<td>2779.8</td>
<td>12.3 14.7</td>
</tr>
<tr>
<td>1964-65</td>
<td>156.1 363.8</td>
<td>177.2 176.2</td>
<td>330.3 541.0</td>
<td>3645.7</td>
<td>9.1 14.8</td>
</tr>
<tr>
<td>1965-66</td>
<td>198.2 468.0</td>
<td>1326.6 1318.6</td>
<td>1516.8 1794.6</td>
<td>4245.5</td>
<td>35.7 42.3</td>
</tr>
<tr>
<td>1966-67</td>
<td>11.0 25.8</td>
<td>1124.4 1117.6</td>
<td>1228.6 1510.2</td>
<td>2636.1</td>
<td>42.8 43.6</td>
</tr>
<tr>
<td>1967-68</td>
<td>132.9 311.5</td>
<td>1099.9 1099.9</td>
<td>1232.8 1413.4</td>
<td>3788.4</td>
<td>32.5 37.3</td>
</tr>
<tr>
<td>1968-69</td>
<td>43.3 102.2</td>
<td>236.0 234.5</td>
<td>277.8 338.2</td>
<td>5055.9</td>
<td>5.5 6.7</td>
</tr>
<tr>
<td>1969-70</td>
<td>115.5 272.5</td>
<td>696.8 692.5</td>
<td>808.0 965.0</td>
<td>6834.6</td>
<td>11.8 14.1</td>
</tr>
<tr>
<td>1970-71</td>
<td>34.8 82.0</td>
<td>1419.3 1299.8</td>
<td>1334.6 1501.3</td>
<td>5950.3</td>
<td>22.4 25.2</td>
</tr>
<tr>
<td>1971-72</td>
<td>56.3 128.2</td>
<td>1055.2 1048.2</td>
<td>1103.1 1183.4</td>
<td>5324.0</td>
<td>20.7</td>
</tr>
<tr>
<td>1972-73</td>
<td>181.4 428.2</td>
<td>1560.3 1560.3</td>
<td>1741.7 1988.5</td>
<td>8906.8</td>
<td>20.5 23.4</td>
</tr>
<tr>
<td>1973-74</td>
<td>118.6 279.8</td>
<td>413.4 410.9</td>
<td>529.5 693.2</td>
<td>8905.0</td>
<td>5.9 7.8</td>
</tr>
<tr>
<td>1974-75</td>
<td>125.7 304.1</td>
<td>17.6 17.5</td>
<td>82.4 170.6</td>
<td>12857.5</td>
<td>-</td>
</tr>
<tr>
<td>1975-76</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1976-77</td>
<td>64.9 153.0</td>
<td>17.6 17.5</td>
<td>82.4 170.6</td>
<td>12951.8</td>
<td>0.6 1.3</td>
</tr>
<tr>
<td>1977-78</td>
<td>884.3 2086.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1978-79</td>
<td>451.9 1066.1</td>
<td>289.0 287.3</td>
<td>709.2 1355.1</td>
<td>12472.7</td>
<td>5.9 10.9</td>
</tr>
<tr>
<td>1979-80</td>
<td>416.1 981.3</td>
<td>396.3 393.9</td>
<td>810.0 1377.9</td>
<td>10111.8</td>
<td>8.0 13.6</td>
</tr>
<tr>
<td>1980-81</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1981-82</td>
<td>273.9 645.9</td>
<td>291.0 289.2</td>
<td>563.1 930.0</td>
<td>360007.3</td>
<td>1.7 2.8</td>
</tr>
<tr>
<td>1982-83</td>
<td>2364.8 5579.9</td>
<td>3022.5 3022.5</td>
<td>5387.3 8620.7</td>
<td>28984.8</td>
<td>18.6 29.7</td>
</tr>
<tr>
<td>YEAR</td>
<td>Domestic Production of Sugar '000 MT</td>
<td>Rs./MT</td>
<td>Producers of Sugar</td>
<td>Subsidy Gain &amp; Producer Surplus Loss</td>
<td>Production Cost of Protection = Producer of Sugar</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
<td>-------</td>
<td>--------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>1951-52</td>
<td>1507</td>
<td>376</td>
<td>0.388</td>
<td>566.6</td>
<td>54.9</td>
</tr>
<tr>
<td>1952-53</td>
<td>1336</td>
<td>272</td>
<td>0.310</td>
<td>363.4</td>
<td>28.2</td>
</tr>
<tr>
<td>1953-54</td>
<td>1017</td>
<td>259</td>
<td>0.298</td>
<td>263.4</td>
<td>19.6</td>
</tr>
<tr>
<td>1954-55</td>
<td>1615</td>
<td>236</td>
<td>0.285</td>
<td>381.1</td>
<td>27.1</td>
</tr>
<tr>
<td>1955-56</td>
<td>1829</td>
<td>314</td>
<td>0.354</td>
<td>574.3</td>
<td>50.8</td>
</tr>
<tr>
<td>1956-57</td>
<td>2059</td>
<td>274</td>
<td>0.316</td>
<td>236.8</td>
<td>18.7</td>
</tr>
<tr>
<td>1957-58</td>
<td>2009</td>
<td>118</td>
<td>0.127</td>
<td>237.1</td>
<td>7.3</td>
</tr>
<tr>
<td>1958-59</td>
<td>1949</td>
<td>368</td>
<td>0.420</td>
<td>732.7</td>
<td>117.7</td>
</tr>
<tr>
<td>1959-60</td>
<td>2460</td>
<td>438</td>
<td>0.473</td>
<td>1077.5</td>
<td>127.4</td>
</tr>
<tr>
<td>1960-61</td>
<td>3028</td>
<td>506</td>
<td>0.522</td>
<td>1532.2</td>
<td>200.0</td>
</tr>
<tr>
<td>1961-62</td>
<td>2730</td>
<td>520</td>
<td>0.511</td>
<td>1419.6</td>
<td>181.4</td>
</tr>
<tr>
<td>1962-63</td>
<td>2135</td>
<td>696</td>
<td>0.624</td>
<td>1486.0</td>
<td>231.8</td>
</tr>
<tr>
<td>1963-64</td>
<td>2562</td>
<td>410</td>
<td>0.378</td>
<td>1050.4</td>
<td>99.3</td>
</tr>
<tr>
<td>1964-65</td>
<td>3232</td>
<td>313</td>
<td>0.278</td>
<td>1011.6</td>
<td>70.3</td>
</tr>
<tr>
<td>1965-66</td>
<td>3532</td>
<td>832</td>
<td>0.688</td>
<td>2938.6</td>
<td>505.3</td>
</tr>
<tr>
<td>1966-67</td>
<td>2159</td>
<td>800</td>
<td>0.655</td>
<td>1727.2</td>
<td>282.8</td>
</tr>
<tr>
<td>1967-68</td>
<td>2247</td>
<td>1011</td>
<td>0.600</td>
<td>2277.1</td>
<td>340.8</td>
</tr>
<tr>
<td>1968-69</td>
<td>3558</td>
<td>450</td>
<td>0.317</td>
<td>1601.1</td>
<td>126.9</td>
</tr>
<tr>
<td>1969-70</td>
<td>4261</td>
<td>646</td>
<td>0.403</td>
<td>2752.6</td>
<td>277.3</td>
</tr>
<tr>
<td>1970-71</td>
<td>3760</td>
<td>827</td>
<td>0.520</td>
<td>3093.0</td>
<td>402.1</td>
</tr>
<tr>
<td>1971-72</td>
<td>3108</td>
<td>762</td>
<td>0.445</td>
<td>2368.3</td>
<td>263.5</td>
</tr>
<tr>
<td>1972-73</td>
<td>3872</td>
<td>1094</td>
<td>0.496</td>
<td>4236.0</td>
<td>527.4</td>
</tr>
<tr>
<td>1973-74</td>
<td>3969</td>
<td>368</td>
<td>0.252</td>
<td>2243.0</td>
<td>141.3</td>
</tr>
<tr>
<td>1974-75</td>
<td>4794</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1975-76</td>
<td>4261</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1976-77</td>
<td>4840</td>
<td>124</td>
<td>0.046</td>
<td>600.2</td>
<td>6.9</td>
</tr>
<tr>
<td>1977-78</td>
<td>6457</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1978-79</td>
<td>5842</td>
<td>348</td>
<td>0.163</td>
<td>2033.0</td>
<td>82.8</td>
</tr>
<tr>
<td>1979-80</td>
<td>3858</td>
<td>498</td>
<td>0.190</td>
<td>1921.3</td>
<td>91.3</td>
</tr>
<tr>
<td>1980-81</td>
<td>5140</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1981-82</td>
<td>8436</td>
<td>511</td>
<td>0.127</td>
<td>4310.8</td>
<td>136.9</td>
</tr>
<tr>
<td>1982-83</td>
<td>6232</td>
<td>1422</td>
<td>0.403</td>
<td>11705.9</td>
<td>1179.4</td>
</tr>
<tr>
<td>YEAR</td>
<td>Value of Sugar Output (Rs. Million)</td>
<td>Total cost of Protection as Percentage of Sugar Output Value</td>
<td>Rent-Seeking Costs as Percentage of Sugar Output Value</td>
<td>Combined Costs of Protection &amp; Rent-Seeking</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------</td>
<td>------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1951-52</td>
<td>1460.3</td>
<td>12.8</td>
<td>18.0</td>
<td>35.0</td>
<td></td>
</tr>
<tr>
<td>1952-53</td>
<td>1173.0</td>
<td>10.1</td>
<td>13.4</td>
<td>28.6</td>
<td></td>
</tr>
<tr>
<td>1953-54</td>
<td>843.1</td>
<td>15.0</td>
<td>18.3</td>
<td>28.9</td>
<td></td>
</tr>
<tr>
<td>1954-55</td>
<td>1338.8</td>
<td>9.6</td>
<td>12.4</td>
<td>26.4</td>
<td></td>
</tr>
<tr>
<td>1955-56</td>
<td>1624.2</td>
<td>14.1</td>
<td>18.4</td>
<td>32.2</td>
<td></td>
</tr>
<tr>
<td>1956-57</td>
<td>1783.1</td>
<td>11.2</td>
<td>14.6</td>
<td>12.2</td>
<td></td>
</tr>
<tr>
<td>1957-58</td>
<td>1864.4</td>
<td>4.4</td>
<td>8.6</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>1958-59</td>
<td>1709.3</td>
<td>19.0</td>
<td>22.3</td>
<td>37.6</td>
<td></td>
</tr>
<tr>
<td>1959-60</td>
<td>2280.4</td>
<td>20.1</td>
<td>24.4</td>
<td>41.7</td>
<td></td>
</tr>
<tr>
<td>1960-61</td>
<td>2937.2</td>
<td>19.0</td>
<td>23.7</td>
<td>45.3</td>
<td></td>
</tr>
<tr>
<td>1961-62</td>
<td>2276.4</td>
<td>24.5</td>
<td>30.5</td>
<td>44.6</td>
<td></td>
</tr>
<tr>
<td>1962-63</td>
<td>2246.0</td>
<td>43.5</td>
<td>49.6</td>
<td>55.8</td>
<td></td>
</tr>
<tr>
<td>1963-64</td>
<td>2779.8</td>
<td>12.3</td>
<td>14.7</td>
<td>34.2</td>
<td></td>
</tr>
<tr>
<td>1964-65</td>
<td>3645.7</td>
<td>9.1</td>
<td>14.8</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td>1965-66</td>
<td>4245.5</td>
<td>35.7</td>
<td>42.3</td>
<td>57.3</td>
<td></td>
</tr>
<tr>
<td>1966-67</td>
<td>2636.1</td>
<td>42.8</td>
<td>43.6</td>
<td>54.8</td>
<td></td>
</tr>
<tr>
<td>1967-68</td>
<td>3788.4</td>
<td>32.5</td>
<td>37.3</td>
<td>51.0</td>
<td></td>
</tr>
<tr>
<td>1968-69</td>
<td>5055.9</td>
<td>5.5</td>
<td>6.7</td>
<td>29.2</td>
<td></td>
</tr>
<tr>
<td>1969-70</td>
<td>6834.6</td>
<td>11.8</td>
<td>14.1</td>
<td>36.2</td>
<td></td>
</tr>
<tr>
<td>1970-71</td>
<td>5950.3</td>
<td>22.4</td>
<td>25.2</td>
<td>45.2</td>
<td></td>
</tr>
<tr>
<td>1971-72</td>
<td>5324.0</td>
<td>20.7</td>
<td>22.2</td>
<td>39.5</td>
<td></td>
</tr>
<tr>
<td>1972-73</td>
<td>8506.8</td>
<td>20.5</td>
<td>23.4</td>
<td>43.6</td>
<td></td>
</tr>
<tr>
<td>1973-74</td>
<td>8905.0</td>
<td>5.9</td>
<td>7.8</td>
<td>23.6</td>
<td></td>
</tr>
<tr>
<td>1974-75</td>
<td>12857.5</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>1975-76</td>
<td>10925.2</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>1976-77</td>
<td>12951.8</td>
<td>0.6</td>
<td>1.3</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>1977-78</td>
<td>15651.8</td>
<td>5.6</td>
<td>13.3</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>1978-79</td>
<td>12472.7</td>
<td>5.9</td>
<td>10.9</td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>1979-80</td>
<td>10111.8</td>
<td>8.0</td>
<td>13.6</td>
<td>18.1</td>
<td></td>
</tr>
<tr>
<td>1980-81</td>
<td>21839.9</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>1981-82</td>
<td>34007.3</td>
<td>1.7</td>
<td>2.8</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>1982-83</td>
<td>28984.3</td>
<td>18.6</td>
<td>29.7</td>
<td>36.3</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Value of Sugar Output: Rs. Million
- Total cost of Protection: as Percentage of Sugar Output Value
- Rent-Seeking Costs: as Percentage of Sugar Output Value
- Combined Costs: as Percentage of Sugar Output Value
## TABLE 7.7

INDIAN SUGAR - WELFARE COSTS OF PROTECTION
AGGREGATE LOSS DUE TO EXPORT SUBSIDY

<table>
<thead>
<tr>
<th>YEAR</th>
<th>p^E</th>
<th>p^I</th>
<th>q^E</th>
<th>(p^E - p^I)q^E</th>
<th>(p^E - p^I)q^E, q^E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52</td>
<td>190</td>
<td>253</td>
<td>15.0</td>
<td>649</td>
<td>7935.0</td>
</tr>
<tr>
<td>1952-53</td>
<td>878</td>
<td>324</td>
<td>9.9</td>
<td>494</td>
<td>4890.6</td>
</tr>
<tr>
<td>1953-54</td>
<td>868</td>
<td>317</td>
<td>16.1</td>
<td>491</td>
<td>7905.1</td>
</tr>
<tr>
<td>1954-55</td>
<td>792</td>
<td>356</td>
<td>27.0</td>
<td>436</td>
<td>11772.0</td>
</tr>
<tr>
<td>1955-56</td>
<td>780</td>
<td>665</td>
<td>40.0</td>
<td>115</td>
<td>4600.0</td>
</tr>
<tr>
<td>1956-57</td>
<td>810</td>
<td>810</td>
<td>193.0</td>
<td>193</td>
<td>4954.5</td>
</tr>
<tr>
<td>1957-58</td>
<td>876</td>
<td>509</td>
<td>135.0</td>
<td>367</td>
<td>12150.0</td>
</tr>
<tr>
<td>1958-59</td>
<td>890</td>
<td>489</td>
<td>49.0</td>
<td>401</td>
<td>9649.0</td>
</tr>
<tr>
<td>1959-60</td>
<td>915</td>
<td>464</td>
<td>56.0</td>
<td>451</td>
<td>21256.4</td>
</tr>
<tr>
<td>1960-61</td>
<td>690</td>
<td>478</td>
<td>284.8</td>
<td>193</td>
<td>54966.0</td>
</tr>
<tr>
<td>1961-62</td>
<td>736</td>
<td>396</td>
<td>418.0</td>
<td>340</td>
<td>35843.0</td>
</tr>
<tr>
<td>1962-63</td>
<td>755</td>
<td>675</td>
<td>432.3</td>
<td>80</td>
<td>21157.5</td>
</tr>
<tr>
<td>1963-64</td>
<td>890</td>
<td>815</td>
<td>282.1</td>
<td>75</td>
<td>13392.5</td>
</tr>
<tr>
<td>1964-65</td>
<td>880</td>
<td>370</td>
<td>314.1</td>
<td>425</td>
<td>165508.8</td>
</tr>
<tr>
<td>1965-66</td>
<td>885</td>
<td>421</td>
<td>356.7</td>
<td>464</td>
<td>74328.0</td>
</tr>
<tr>
<td>1966-67</td>
<td>1001</td>
<td>675</td>
<td>228.0</td>
<td>326</td>
<td>16900.0</td>
</tr>
<tr>
<td>1967-68</td>
<td>1140</td>
<td>971</td>
<td>100.0</td>
<td>169</td>
<td>16564.0</td>
</tr>
<tr>
<td>1968-69</td>
<td>1160</td>
<td>958</td>
<td>82.0</td>
<td>202</td>
<td>85956.0</td>
</tr>
<tr>
<td>1969-70</td>
<td>1011</td>
<td>764</td>
<td>348.0</td>
<td>247</td>
<td>90345.0</td>
</tr>
<tr>
<td>1970-71</td>
<td>1236</td>
<td>951</td>
<td>317.0</td>
<td>285</td>
<td>16422.0</td>
</tr>
<tr>
<td>1971-72</td>
<td>1264</td>
<td>1103</td>
<td>102.0</td>
<td>161</td>
<td>5050.0</td>
</tr>
<tr>
<td>1972-73</td>
<td>1707</td>
<td>1687</td>
<td>252.5</td>
<td>20</td>
<td>7192.0</td>
</tr>
<tr>
<td>1973-74</td>
<td>4878</td>
<td>4878</td>
<td>695.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1974-75</td>
<td>3933</td>
<td>3933</td>
<td>1201.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1975-76</td>
<td>2676</td>
<td>2552</td>
<td>500.0</td>
<td>124</td>
<td>7192.0</td>
</tr>
<tr>
<td>1976-77</td>
<td>2786</td>
<td>2786</td>
<td>70.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1977-78</td>
<td>1808</td>
<td>1787</td>
<td>738.0</td>
<td>21</td>
<td>15498.0</td>
</tr>
<tr>
<td>1978-79</td>
<td>2240</td>
<td>2123</td>
<td>564.6</td>
<td>21</td>
<td>66058.2</td>
</tr>
<tr>
<td>1979-80</td>
<td>5029</td>
<td>5029</td>
<td>233.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1980-81</td>
<td>3691</td>
<td>3175</td>
<td>106.0</td>
<td>516</td>
<td>54696.0</td>
</tr>
<tr>
<td>1981-82</td>
<td>3165</td>
<td>2931</td>
<td>504.0</td>
<td>234</td>
<td>117936.0</td>
</tr>
</tbody>
</table>
FOOTNOTES TO CHAPTER 7

1. The combined costs add up to around 60 per cent in some years if the value of the export subsidy on the production cost side is added.

2. Sugar producers have consistently continued to ask the government to continue the export subsidisation scheme in order "to earn scarce foreign exchange". The annual addresses of the President's of the Indian Sugar Mills Association have repeatedly extolled the scheme for obvious reasons. See Chapter 8 for a discussion of interest group aspects.
Introduction

There are two main theories of economic regulation that have been proposed to explain the proliferation of regulation in developed and developing economies. The first and older "Public Interest" theory is more often just assumed rather than articulated to any great extent. This is the predominant view behind the regulatory actions of governments, particularly those in developing countries like India where due to historical reasons and because of gross inequalities in the distribution of wealth the market system is deemed not to work. This view holds that regulation is enacted in response to the public's demand for the correction of inefficient or inequitable market practices and failures and for the achievement of desirable social objectives.

According to the "Capture" theory, regulation is supplied in response to the demands of interest groups competing among themselves to maximise the incomes of their members. The argument is that maximising behaviour on the part of both regulators and the regulated results in the "capture" of the former by the latter. This leads to outcomes quite different.
The proponents of the capture theory do not hold a monolithic view. Many variants can be distinguished. Posner (1974) points out the capture theory is "espoused by an odd mixture of welfare state liberals, muckrakers, Marxists, and free market economists...". However, in its specific potentially testable version put forward by economists, this theory has as its basis the rationality postulate that people seek to maximise their self-interest rationally. This theory uses the tools of supply and demand and market analysis to explain the causes and consequences of regulation.

In the Indian planning process since independence, the official objective in all the documents relating to the formulation and imposition of controls and policy interventions has been the desire to serve the public interest. There is little doubt that when the framework of planning and controls was originally adopted, the concerned planners and government officials really believed that the public interest would be best served by the regulatory regime. The particular pattern of a "mixed economy" adopted with a large private sector and increasing government participation in productive and regulatory activity was not seen as leading to any undesirable consequences since it was thought that government could always direct the economy to serve the public good. Interest group pressures were not seen as a major impe-
diment to achieving public good.

However, the subsequent history of legislation and regulatory activity has been described by a number of economists, commentators and even governmental committees as being detrimental to general economic welfare and subservient to special group interests. While this view is widespread, no systematic studies or tests has been conducted to see whether in fact special interest groups have been able to capture the regulators in any particular sector of the economy. In this chapter, I develop an empirical test for the Indian sugar industry to see if there is any evidence to support the hypothesis of capture by the participants in the industry.

A brief discussion of the theory of economic regulation and its predictions regarding the specific nature of capture are presented first. Next I discuss the qualitative evidence regarding capture in the Indian sugar industry. I then outline the structure of tests that can be conducted to investigate capture and other regulatory effects. The major test uses multinomial logit analysis in the context of maximum likelihood estimation. Simple regression models are also used. The empirical results are then presented and discussed.

Some Predictions of the Theory of Economic Regulation

165
As Stigler (1971) states "the central tasks of the theory of economic regulation are to explain who will receive the benefits or burdens of regulation, what form regulation will take, and the effects of regulation upon the allocation of resources." The theory offers a number of testable predictions but also suffers from some theoretical deficiencies.

The major means by which an interest group may attempt to solicit the coercive powers of the state are the following:

1. A direct subsidy of money
2. Control over entry by new rivals
3. Price and quantity controls over existing participants
4. Control over substitute and complement products and services

The main aim of such solicitation of the coercive powers of the state is to maximise the joint-income of the members of the interest group. The theoretical insights of cartel theory would seem to be particularly relevant here in identifying the costs and benefits of capture. However, in contrast to the predictions of cartel theory, the value of capture is greater among industries for which private cartelisation is costly or infeasible - e.g. in industries that lack high concentration, have elastic demands for their products and where natural barriers to entry do not exist. In other words, they lack substitutes to regulation. Another characteristic that
discourages cartelisation but encourages regulation is the
(large) number of industry/group participants who have voting
power and hence potential coercive interest group power. Such
large numbers also increase the likelihood of an asymmetry of
interests that will encourage broad participation in the
coalition seeking regulation thus limiting the free-rider
problem. Also the likelihood of obtaining protective
legislation is likely to be high where the number of employees
in the industry is great. The argument here is that since the
benefits of protective legislation can be divided between the
firms and the employees through collective bargaining, the
firms should be able to induce employees to "lend" their
voting power towards obtaining protective legislation.
However, there are costs such as the reduction in the number
of employees as a result of curtailment of output consequent
to favourable legislation which may prevent such a "loan" of
coercive power. In any case, such costs will be considered in
the process of bargaining within the firm for the benefits of
the protective legislation.

Other predictions can also be adduced from the theory of
economic regulation which are pertinent to this study. As a
corollary to the issue regarding the "importance of large
numbers", the small firms in the interest group receiving
favourable regulation would obtain a greater than
proportionate share (with respect to their contribution to
industry output) of the benefits and exercise a larger influence than they would in an unregulated industry. This outcome would be the result of their equal status to large firms in terms of voting power and the threat of their withdrawal of support. Another obvious prediction of the theory of economic regulation would be that the price is likely to be higher and the output of an industry lower after capture. An observable counterpart would be to examine the price, output and profit data in periods of regulation and deregulation if in fact such observations could be obtained.

One of the shortcomings of the capture theory is that it cannot predict which specific industries will be regulated and then "captured" (see Posner, 1974). For example, why is it that the bicycle or soap industries do not capture regulations while the sugar and cement industries in India do. It is necessary here to specify conditions which will make cartelisation through regulation difficult despite the industry exhibiting all the other characteristics necessary for such cartelisation. A number of underlying parameters constraining the incidence of capture-type regulation can be conjectured. These are discussed below.

The considerations limiting cartelisation through regulation have to do with the competitive structure of the industry and the transaction costs that underlie such structures. The major industrial structure considerations that may prevent the
cartelisation through regulation outcome would include:

(1) The economic bargaining power of buyers or other participants with diametrically opposed interests. Thus, for example, the economic power of automobile, truck and two-wheeler manufacturers may constrain the ability of the tyre industry to get favourable legislation. Even here, coalitions may form if the transaction costs of coordination, collusion and free-riding are low. However, the presence of large, equally powerful opposing interest groups would reduce the ability of a particular industry to get favourable legislation.

(2) The economic power of suppliers with diametrically opposed interests. In the case of the bicycle industry, for example, the power of the suppliers of steel, tyres, etc. constrains the ability of this industry to get favourable legislation. This is the other side of the coin with respect to point (1) above. Once again, favourable legislation may still be obtained if one interest group can coopt the other as in the case of large industries like steel, etc.

(3) The contestability of the market (cf. Baumel, 1982) despite captured regulative barriers to entry. This happens, for example, in the case of the Indian soap industry where despite barriers to entry created by the pre-emption of capacity by the large-scale manufacturers, the unlicensed small-scale sector can erode the benefits of capture by selling their cheaper product.
(4) The presence or development of substitutes. The presence of jute or cellulose based packaging materials has acted as a powerful deterrent for synthetic and plastics based packaging manufacturers in a developing country like India. This constraining factor may be overcome by the regulation capturing industry demanding and obtaining favourable legislation over such substitutes.

In addition to the factors listed, the costs of integrating, forward, backward or horizontally; the costs of organising and negotiating the process of cartelisation by regulation; the costs (and ease) of free-riding, and the costs of internalising the regulation will define the ability of an industry to get favourable legislation.

On the supply side, the nature and structure of the political process; the legislative-judicial structure and the determinants of political influence need to be specified and would determine the outcome of the capture process (see Posner, 1974). For example, one-party dominant political systems are more likely to welcome capture and supply regulation than multi-party systems where the threat of entry will act as a constraining factor. I do not go into great detail on this aspect.

Posner (1974) and others have pointed out the shortcomings of the economic theory of regulation. The major criticism is that virtually any observations can be reconciled
with the theory and if it is pushed to its logical extreme "it becomes rather incredible, because it excludes the possibility that a society concerned with the ability of interest groups to manipulate the political process in their favour might establish institutions that enabled genuine public interest considerations to influence the formation of policy." (Posner 1974). Nevertheless critics like Posner maintain that the success of economic theory in explaining other areas of nonmarket behaviour and the potential refutability of the theory does sustain the hope that the theory can be improved upon by the study of instances of "successful" capture and the development of rigorous tests. The analysis and tests presented in the next few sections attempt to do this.

Regulation and "Capture" in the Indian Sugar Industry

The history of the growth and regulation of the Indian sugar industry has been presented in an earlier chapter. In this section I present evidence on the regulatory process in this industry which would seem to provide support for the capture theory.

Formal protection to the Indian sugar industry was granted for the first time in 1932 as a result of representations by the then existing sugar manufacturers and the large-scale sugarcane growers. The Sugar Industry (Protection) Act, 1932 granted protection for the sugar industry for a period of
14 years ending 31st March, 1946. Subsequently, after two upward revisions of the protective duty were made, the Sugar Industry (Protection) Act, 1939 was passed, fixing the import duty at a slightly lower rate. The rates of duty over this period varied from 100 to 250 percent. On expiry of the period of protection, extensions were granted on the basis of repeated representations from the sugar industry due to the presence of alleged "abnormal" conditions in the industry. Most of the subsequent investigations were of a "summary" nature since the Indian Sugar Mills' Association, and other private and government bodies recommended that due to the conditions being "abnormal and unstable" a detailed inquiry into costs and other factors should be postponed.

The ostensible aim of granting protection to the sugar industry has been twofold:

(1) to encourage the development of the sugar industry along modern lines especially in the face of declining sugar prices in 1930-21.

(2) to improve and stabilise the demand for sugarcane from centrifugal sugar factories and thereby create favourable conditions for the cultivation of high-yielding sugarcane.

However, subsequent Tariff Board enquiries revealed that "the benefit of protection had been reaped almost entirely by the factory owners and not by the cane grower for whose benefit the protective scheme had been primarily devised."
Consequently, an excise duty on factory sugar was levied in 1934 in order "to neutralize the extra protection enjoyed by the industry and at the same time to recoup a part of the sugar (customs) revenue lost through protection." (Indian Tariff Board Report, 1949, p. 6). Simultaneously, legislation was passed enabling provincial governments to enforce a minimum price to be paid by the factories to the cane grower. When the price of imported sugar went up in 1938, some provincial governments imposed a cess on cane supplied to the factories and tightened the enforcement of the minimum sugarcane price regulation.

In 1936-37 there was overproduction of sugar in India and a consequent slump in prices. The two largest sugar producing provinces, on the urging of the industry passed legislation in the form of the Bihar Sugar Factories Control Act (1937) and the United Control Act (1938) in order to "stabilize prices at a remunerative level ... and to control the development of the industry." Similar acts were enacted in other provinces. These acts controlled entry into the industry by prohibiting the construction of a new factory or additions or extensions to the plants of existing factories, except with a license from the provincial government concerned. Simultaneously, the government allowed the industry to set up a central marketing organisation called the Indian Sugar Syndicate in July 1937 on
a "voluntary basis", with an initial membership of 92 factories to regulate supplies and prices. Then, under the provincial acts, membership of the syndicate was made a condition for the grant of a crushing license to a factory, thereby compelling all factories to be members and market their sugar subject to the rules of the syndicate.

These actions led to further overproduction of sugar in 1939-40 and 1940-41 and the industry recommended that in order to get rid of the surplus it was necessary to (a) reduce the price of sugar and (b) curtail its production for at least two seasons. The industry also demanded that the minimum sugarcane price be reduced substantially to bring down the cost of production of sugar. When the U.P. and Bihar governments did not agree to the last of these demands, the Sugar Syndicate closed down its factories in April 1940. The provincial governments in turn withdrew recognition from the Syndicate, a number of members withdrew and prices dropped below the Syndicate's floor price. The industry pressed for re-recognition of the Syndicate, which was granted but with conditions whereby the provincial governments were to set prices and quotas for production, nominate the Syndicate's Executive Officer and require the Syndicate to be a purely marketing organization. Subsequently, in 1940-41 and 1941-42 production quotas were set by the governments and prices were raised as a result.
In April 1942, the Government of India instituted central control over the industry by an order under the Defence of India Rules.

"The objective of the control was to ensure an equitable distribution of available supplies of sugar among the various heads of demand in the consuming areas and to make the fullest use of the available transport facilities. The control fixed the ex-factory selling prices of all grades of sugar produced in the country. All movement of sugar from one province to another was subject to permits issued by the Sugar Controller. The wholesale and retail prices were fixed by Provincial Controllers after taking into account the ex-factory prices of the grades concerned, transport and other charges to the area, octroi and other taxes actually paid and the wholesalers' and retailers' incidental charges." (Indian Tariff Board Report, 1949, p. 13-14).

The Sugar Syndicate functioned merely as an agency of the Central Government for the purposes of the marketing of sugar but maintained considerable influence over the various policies of government. It is interesting to note that the Indian sugar merchants who formed a strong interest group went along with the policies of the Sugar Syndicate in the pre-war and war years because of the attractive margins they were able to obtain. However, whenever these margins dropped, strong protests were registered to the concerned governments regarding "unjustifiable profits of the members of the Syndicate." The large number and small size of the sugar merchants considerably hampered their organisation into a cohesive lobby group however.

The war period of complete control over the sugar
industry (which was extended to the indigenous gur industry) saw the development of a huge black market. Hirsch (1961), for example, reports that as much as 50 percent of sugar allocations of the central government were sold on the black market. Production shot up and reached record levels in the first few years. Subsequently, production declined because the government introduced a scheme for paying sugarcane growers in certificates which could not be cashed until the end of the war. This diverted sugarcane to the production of gur (as also the substitution of area growing cane for remunerative alternative crops). Profits however remained buoyant as is reported by Hirsch (1961).

In December, 1947 the government decontrolled sugar subject to overall policies on production and prices established by it. The Sugar Commission was set up by the states of U.P. and Bihar and considerable friction ensued between the Commission and the reformed Syndicate. Matters reached a head in May 1949 when the Syndicate released for sale a much larger proportion of production than permitted by the Sugar Commission and central government policies and announced its intention to export the commodity. Sugar disappeared from the market and high prices prevailed. The industry made record profits. The government and the Sugar Commission of Bihar and U.P. withdrew their recognition and the Syndicate was liquidated.
In September, 1949 the Central Government reintroduced price and release controls similar to the wartime controls. These restraints are purported to have caused a reduction in production and a spurt in black market prices. (Meanwhile, the industry was successfully able to lobby the government for the continuation of protection for two more years.) Consequently, the government in order to provide an incentive to the industry permitted one half of the production over the basic quota of each sugar factory to be sold on the open market. This policy provided a substantial stimulus to the growth of both production and capacity. The improved availability of sugar and the record profits of the sugar producers led to the decontrol of sugar. The industry actively lobbied for the removal of controls in the expectation of further price rises by restraining output. Prices did rise in 1954-55 after a period of initially increased production and low prices in the first two years immediately following decontrol. The industry made high profits during 1956-58 even as production declined. Increasing pressure was brought to bear on the government by consumer bodies and the lay public. This time the industry actively resisted the reimposition of controls but once the reintroduction seemed a fait accompli the industry requested and succeeded in getting a Tariff Commission study into the cost and price structure of the industry.
Prices were revised as a result of the Tariff Commission enquiries of 1958 and 1960. Consequently, the sugar production and availability improved considerably in 1959-60 and 1960-61 once complete control was reintroduced in 1959. Profitability rose to a record high in 1960-61 (profits after tax as a percentage of net worth were around 16% while dividend payout was around 13%). The industry however continued to complain bitterly that the level of profit allowed was grossly inadequate despite the actual record performance and the granting of substantial excise duty concessions by the government. Perhaps this was a case of the industry becoming too greedy. Pressure on the government was stepped up for decontrol, which the government did in September, 1961.

This time however, profitability fell considerably as profits after tax as a percentage of net worth fell to 7.3% in 1961-62 and 3.4% in 1962-63. Production declined and on the instigation of the industry full control was reintroduced in April, 1963. Profitability ratios climbed back to the 10-12% level and remained there until 1967-68.

The year 1966-67 experienced a bad crop as sugarcane acreage was low and cane production fell drastically causing a sharp increase in cane prices. This substantially reduced the profitability of the sugar industry and especially its ability to pay the higher cane prices given the control on sugar
prices. Consequently, cane was diverted to the production of gur and Khandari. The industry once again actively began to lobby for decontrol.

This time the government announced a policy of Partial Decontrol whereby a certain percentage of the output of the industry was procured by the government to be sold through the public distribution system while the rest could be sold in the open market at uncontrolled prices. As Baru (1977) points out, such a policy was predicated on the government's desire to simultaneously achieve two interest group objectives: (a) to assure a "reasonable" price to the increasingly vocal and politically important urban consumer and (b) to ensure the industry "reasonable" profits while stabilizing production and paying "reasonable" prices to the cane-producer lobby.

The Agriculture Prices Commission's commented on the new policy as follows: "The consumer has been provided his basic requirement at a fair price and yet through the provision of a free market in the commodity, the sugar industry has been allowed the flexibility - not available in a regime of complete control - of paying for cane a price higher than the minimum statutory price so as to enable it to compete with Gur and Khandari." [APC (1970) p. 1]

The Indian Sugar Mills Association (ISMA) which had actively lobbied for decontrol was delighted with the policy of partial control. A few months before partial decontrol,
the President of the I.S.M.A., Mr. M.R. Sherwani, M.P. had commented on the poor sugar situation and suggested that "... the best remedy is to decontrol sugar with immediate effect on the lines of the Cement Industry" (Presidential Address to the 34th A.G.M., I.S.M.A., 11th April, 1967). Following the announcement of the policy of partial decontrol, the next President of the I.S.M.A., Mr. V.D. Jhunjhunwala in his 1968 Presidential Address complimented the government for its "boldly conceived" policy while emphasising the need for "orderly" sales arrangements and adherence to the monthly release mechanism. As part of a pattern to be repeated, he implored the government for higher "levy" prices while demanding an increase in the "free sale" quota. A clear example of the adage of having their cake and eating it too.

Partial decontrol continued until May, 1971 when sugar prices were decontrolled and the distinction between levy and free-sale sugar was obliterated. The more efficient producers (in the tropical Western and Southern regions) had been pressing for total decontrol while the major (inefficient) producers had been demanding higher prices. Decontrol caught the Northern-producer dominated I.S.M.A. by surprise. To quote Mr. Somaiya, President of the I.S.M.A.:

"Each one of us therefore legitimately looked forward to the announcement of new increased levy prices... It is therefore, no exaggeration that Government's decision to decontrol sugar, apparently as an alternative to price increase, came, somewhat, as a surprise to the industry. Lest I may be
misunderstood, I would like to clarify here that we are not averse to decontrol. In fact, with our abiding faith in the market mechanism we cannot but think in terms of freedom from controls.” (Presidential Address, 38th A.G.M., I.S.M.A., 9th June, 1971, p. 9).

Despite Mr. Somaiya's "abiding faith in the market mechanism" he went on to ask for special follow-up measures to "impart the much needed stability to the country's sugar economy on a long term basis." These measures comprised control over monthly releases, easier bank credit, freight control, maintenance of gur prices, regulated licensing of new capacity, excise and specific duty rebates, increased exports etc. It is instructive to quote Mr. Somaiya's rationale for control over monthly releases despite his alleged belief in the market.

"Even after decontrol, government would, as in the past, continue to regulate the monthly releases of sugar. This leverage could be effectively employed for maintaining prices at the desired level... There is no need for releasing additional quantities to provide cushion for lapsed quotas as no such possibility will now exist." (Ibid., p. 11, emphasis added.)

Equally instructive was Mr. Somaiya's case for excluding the sugar industry from the exempt list for investments below Rs 10 million - on the ostensible grounds that otherwise the growth of the industry would be "distorted". Thus the I.S.M.A. was allegedly allowing the market mechanism to work by creating barriers to entry!

Hostilities with Pakistan in the Bangladesh-liberation
Of late 1971 provided the industry, despite its ostensibly divergent internal interests and a rising trend of prices, an opportunity to lobby for and voluntarily offer to operate the partial decontrol scheme. This was granted as the influential *Economic and Political Weekly* (EPW) put it,

"The 200-odd sugar mills with their vastly varying efficiencies had, after all, never welcomed full decontrol — the marginal mills because, with the easier supply position especially since 1969, they would never get the "support" of the levy price for their lower free market price and the more efficient mills because under a quota system they could not hope to cut into the markets of other mills. Now with partial control reimposed, they can make the most of discriminatory pricing." (EPW, January 8, 1972, p. 49).

What followed the reintroduction of partial control was a period of phenomenal growth for the industry in terms of output and prices (weighted average) between 1971-72 and 1977-78 (they grew by 108% and 58% respectively). The industry also achieved record profits (except for the crop-failure year 1975-76) as free sale prices reached astronomical levels (e.g. the 1976-77 free sale price was Rs. 4608 in 1970-71, a 150% increase). What is most interesting is that prices rose even as production increased far in excess of the growth in demand, in defiance of the "laws of economics!" One has only to look at the underlying regulatory arrangements to see that the paradoxical situation can be explained. The consequent pattern of monthly releases (and build up of sugar stocks) and exports clearly indicates that the government behaved as if it
were a cartel manager on behalf of the sugar industry by restricting monthly releases and providing cheap credit and storage facilities during periods of good availability and then exporting the sugar (since sugar cannot be stored for long periods of time) at a loss (with a few years an exception) after having paid the private producer a "fair" price. During periods of poor availability and high prices, when weather conditions had been unfavourable and/or there had been a diversion of cane supplies to the indigenous gur/Khandsari industry because of favourable conditions there, it either increased the "free-sale" releases or deregulated the industry only to reintroduce regulation on the behest of the industry as soon as prices began to fall.

This is precisely what happened in the 1977-78 season. Prices reached a high Rs. 4600 per metric tonne in the free market in 1976-77 with a record output of 4.85 million metric tonnes. The industry put forward a strong pleas for decontrol of prices from the beginning of the 1977-78 sugar season (October 1977) while requesting the government to keep control over monthly releases. Export prospects were extremely bleak with international sugar prices at an all-time low. The government accordingly told a section of the industry that the "Union Government wanted to remove all unnecessary controls as 'they lead to corruption.' The Centre would like to remove the control of sugar, as the country was having
enough production." The election for the first time of a non-Congress-Party, avowedly pro-business Janata Party government in March 1977 had provided an extremely receptive ear for the industry's pleas.

Accordingly, the government took steps first to bring down the level of monthly releases in early 1978 as free-sale prices began to fall. It then announced that it would export 650,000 tonnes of sugar during the 1978 year with a tentative provision of an export subsidy of Rs. 300 million. This was done at a time when as noted above international prices were far below even the levy price at home and were at an all time low. Terms of credit were reduced substantially through a credit-policy statement of the Reserve Bank of India. A rebate on excise duty was provided. Meanwhile arrears of payments to sugarcane growers by the sugar industry were allowed to mount to Rs. 1230 million by June, 1978. Finally on August 16, the government announced complete decontrol of the sugar industry but in its "overzealousness" removed controls over the monthly release mechanism. Sugar prices declined immediately from a free-sale price of Rs. 3630 per metric tonne in July to Rs. 1990 per metric tonne in September. The retail controlled price had been around Rs. 2200 per metric tonne at the time of decontrol. It is to be noted that the subsequent months resulted in record losses for the industry.
The industry reacted with dismay to the government's removal of control over monthly releases while welcoming the removal of control over prices. In his Presidential Address to the I.S.M.A. on October 24, 1978, where the Minister of Agriculture was present, Mr. P.K. Kanoria said,

"The industry was very much surprised at the Government's decision to dispense with the system of regulated monthly releases simultaneously with the decontrol of sugar, which is something entirely new and extraordinary. This has created panicky conditions in the sugar market and caused a heavy slump in prices... Resumption of monthly releases is necessary to increase the off-take of sugar from the mills so as to improve their liquidity. This will also help to ensure an even flow of sugar and safeguard against temporary bottlenecks such as transport stocks to meet the local consumption requirements. Sir, withdrawal of the well-devised system of regulated monthly releases, which has stood the test of time, is neither in the interests of the cane growers nor the industry. Even the long-term consumer interest would be best served through such regulated releases ensuring adequate availability of sugar throughout the year at reasonable prices.... Another serious drawback of the new policy is the absence of provision for a buffer stock of sugar. This has, in fact, assumed added importance in view of the accumulation of large stocks of sugar with the industry, produced, in deference to the government's wishes.... The Association has, therefore, been urging on the Government the need for creation of a buffer stock at least one million tonnes of sugar to ease the burden of disproportionately large stocks."

(Presidential Address, 45th A.G.M. of I.S.M.A., p. 4 & 5).

This section of the Presidential Address is quoted at length to illustrate the sugar industry's seemingly perverse economic (or rather lack of) logic in requesting restriction of monthly releases of sugar in order to increase the off-take
of sugar from the mills at a time of excellent availability of the commodity. In addition, the request for buffer stocks is made by claiming "long-term" benefits for the consumer and growers in addition to blatantly emphasising its benefits for the industry. The I.S.M.A. President then went on to make a plea for a forty percent reduction in excise duty and raise the bogey of future scarcity conditions and demanded that "virorous efforts should be made to export the entire quota (of 650,000 tonnes) so as to avoid any shortfall, especially in a year of glut." The exports were, naturally, to be subsidised by the government.

As the Economic and Political Weekly (October 21, 1978, p. 1751) notes the powerful western co-operative sugar mills attempted to devise a "gentleman's agreement" to control releases and sustain prices but the arrangement fell apart because of internal dissension between the co-operative and private sector mills. Meanwhile, the financial press recorded the efforts of sugar mills in different parts of the country to obtain government intervention to prop up prices. The North Indian sugar industry (as represented by the I.S.M.A.) meanwhile attempted to establish a dialogue with the government to reinstate the system of monthly releases, establish a buffer stock and scrap the excise duty.

The industry was successful in obtaining very easy credit and the establishment of a buffer stock of 500,000 metric
tonnes, with a provision to raise this to one million tonnes should "circumstances so dictate." The government as of March 1, 1979 allowed the industry to establish a voluntary mechanism for control over monthly releases. The Minister of State for Agriculture (who was the person addressed by Mr. Kanoria in the aforesaid Presidential Address) made a statement on March 12, 1979 that the government would not interfere with sugar prices "so long as the interests of sugarcane producers and sugar consumers (sic!) were safeguarded" (EPW, April 7, 1979, p. 643).

Sugar prices shot up by 20-25% in the following months. This led to widespread public dissatisfaction. As the EPW notes,

"There was a hue and cry from the press and public which compelled the government to reintroduce an element of official control on the quantity of sugar released for sale every month. Industry, realising that its game of monthly releases had been through, persuaded the trusted bureaucrats of the Sugar Division of the Union Food Ministry to bring monthly releases under government control." ("Unwanted Control," EPW, June 23, 1979, p. 1028).

Government control over monthly releases of sugar was reinstated on June 4, 1979. Full price control was reintroduced on September 9, 1979.

The industry's reaction to the reimposition of control is instructive. All sections of the industry immediately demanded an increase in the controlled price while arguing for a return to the "well-tested" system of dual-price control.
The President of the I.S.M.A., Mr. V.L. Dutt in his annual address on October 31, 1979 lamented "such a sudden and pathetic end of the policy of decontrol of sugar." He suggested that the government adopt a "long-term policy" with the "system of monthly releases an integral part of the policy to ensure an economic price level", relief in excise duty and the building up of buffer stocks. He hinted at a return to partial control with "remunerative" controlled prices for the levy quota if a return to total price decontrol was not agreed to by the government.

Subsequently, on December 17, 1979 the government reintroduced the system of partial control with a 65:35 ratio for levy versus free-sale procurement quotas. Both the levy price and the free-sale price rose by 15-50% in 1979-80. Drought conditions and industry supply behaviour e.g. non-payment of cane arrears to farmers in 1978-79 combined for a 600,000 tonnes decline in sugar production in the 1978-79 season. A further precipitous decline of 2 million tonnes took place the next year due partly to extremely unfavourable weather conditions (both drought and cyclone disasters in sugarcane areas) as well as the diversion of cane to the production of uncontrolled gur and khandsari manufacturing units which were able to pay high prices to cane-growers because of the previous year's supply behaviour of the sugar industry.
It is interesting to note that after average after-tax losses per unit of Rs. 3.5 million in 1978-79 and Rs. 1.95 million in 1979-80 (the two decontrol years), profits bounded back to a healthy Rs. 2.25 million per unit in 1980-81. It is also interesting that in the annual address of the President of the I.S.M.A. at the 47th A.G.M. held on 16 January 1981, the incumbent, Mr. D.D. Puri made only some brief comments on the steep decline of availability of the commodity (blaming this on the government's 1978-79 removal of the monthly release mechanism) and the high prices prevailing (average free-sale price of Rs. 7,500 per metric tonne in 1980-81 versus Rs. 3,500 per metric tonne a year before and average levy price of Rs. 2,600 per metric tonne in 1980-81 versus Rs. 2,115 per tonne in 1979-80). Instead he claimed that "the year 1980 will long be remembered as a year in which India sold the cheapest sugar in the world!" (47th A.G.M. Presidential Address, p. 5). He then went on to launch a virulent attack on the khandsari industry (which accounts for a meagre 5% or less of sweetener production) as a proxy for a direct attack on the gur industry (a delicate subject given the government's and the presiding Agriculture Minister's solid agrarian roots) as "the greatest single menace to the Indian sugar industry" (ibid., p. 8). He demanded control over sugar prices and pleaded for the fixation of an "economic" price for cane, the main cost element for the sugar industry! (One can only surmise that this was
done in the expectation that the government would not decontrol prices or monthly releases and consequently raise levy prices in accordance with the increase in the input price.) The President then outlined the policy the government should adopt:

"Briefly, therefore, we feel the policy should be based on—

1. Decontrol (of prices) — all at one stroke or phased over not too long a period of time.
2. An economic price being notified as minimum price of cane.
3. Control of releases.
4. An economic price of sugar.
5. An effective scheme for buffer stock and export.
6. Adequate relief for weaker sections of the industry."

(ibid., p. 11, brackets mine).

And at a time of great scarcity, the President attacked the government's policy of licensing new capacity by stressing the need to economise on "scarce capital resources" by only permitting expansions of existing units, fixing "cane availability" areas so that other units will not "encroach on the cane area of the existing units" and by a need to increase the incentives for (new units and) expansion projects. As an example of blatant economic lobbying for clearly identified sectional interests (of the high-cost North Indian sugar industry), the 47th Presidential Address is an unsurpassed document.

After the recovery of sugar output by almost a million tonnes in 1980-81, production increased by almost 3.5 million
tonnes to 8.5 million tonnes in 1981-82 as a result of favourable weather conditions, the government's raising of both the statutory minimum cane price and levy prices as well as high prevailing free-sale prices. The industry once again reiterated the need to decontrol prices while retaining control over monthly releases during the course of the 1981-82 season. The address of the President of the I.S.M.A., at its 48th A.G.M. held on February 3, 1982, focussed on the International Sugar Agreement and the need to set up a global buffer stock to relieve the alleged "sickness of the Indian sugar industry." All this at a time when output was at an all-time high with prices also at historically high levels and the industry making an unprecedented high average per unit profit of Rs. 3.10 million! A major part of the Presidential Address was devoted to discussion the causes and cures of the "sickness".

The compliance of the government to the I.S.M.A.'s demands is evident from the Agriculture Minister, Mr. Rao Birendra Singh's Inaugural Address (in reply) to the I.S.M.A. President's Address at the 48th A.G.M. He agreed that the buffer stock was an excellent concept; the greater quantities of sugar would be exported on a long-term basis to mop up any excess of sugar production over the buffer stock limits; that the government would raise the statutory minimum cane price; that in order to ensure a sustained level of performance of the industry a Development Fund was being created by the
Centre for Modernisation and Rehabilitation, R&D and cane development to sustain the weaker units; that though the government was in disagreement with the I.S.M.A. viewpoint on the "sickness" of the industry it was nevertheless setting up stringent guidelines to ensure that no new project or expansion would be permitted until it was clearly established that this would not affect the cane availability of neighbouring sugar units; and that the government would ensure that sugar prices are maintained at a level which not only gives the industry an "adequate" return while ensuring "reasonable" prices to consumers (a clearly incompatible goal given the inefficiency of the industry and the markedly cheaper international prices) through "careful" regulation of the monthly releases of sugar. The Minister also pointed out that on the behest of the sugar industry, the government had taken steps in the 1980-81 season to control the khandsari industry by imposition of restrictions on prices, procurement, etc. The independence of the government, more particularly the Ministry of Agriculture, in setting its policies with the alleged interest of the general polity in mind is brought into serious question by this and previously outlined actions of the responsible agencies in the light of industry pressures.

With regard to the industry's own views on the complete 1981-82 season, we once again return to the Presidential Address made to the 49th A.G.M. of the I.S.M.A. on March 25,
"I am glad to report that in the productivity year 1982... the sugar industry has achieved an all-time record output... With this record output India has emerged as the world's largest producer of sugar, surpassing the production of other large producers like Brazil and Cuba. Admittedly, such an output has been far in excess of our requirement and consequently we have carried forward an unmanageable stock... the foregoing clearly underlines the dimensions of the present crisis in the sugar industry. In brief it is the problem of output being far in excess of the actual requirement with the inevitable consequence, of rising stocks with the mills."


The President, Mr. Kothari then went on to complain about the high cane prices in excess of the statutory minimum price the industry itself had argued should be raised in the previous season. He also pointed out that "the maintenance of a reasonable level of free market price through the mechanism of monthly release has to be an essential feature of the sugar policy". (He then castigated the Ministry of Agriculture for its "ill-conceived" policy of indiscriminate releases of sugar during the 1982-83 sugar season.) This time his criticism was directed against the gur and khandasari industries for selling too cheap and not taking up their "due share" of cane supplies and for not caring enough for the interests of the cane-grower. (The interests of the consumer which were so dear to the I.S.M.A. in the previous year's Presidential Address do not even get a mention in the 1983 Address.) The President of the I.S.M.A. then went on to request an increase in the
statutory minimum price (despite his earlier complaint about cane prices being too high), reduction of monthly releases at "prudent" levels to support an "economic" free-market price; stepped-up exports; increase of the buffer stock to 1.5 million tonnes; reduction of the excise duty on sugar (he applauded the announcement of the removal of the excise duty on bagasse and press-mud, two important by-products); liberalisation of credit; reduction of bank interest charges by administrative fiat; a suggested suspension of licensing of new capacity; and the banning of the system of "state advised cane prices" where state governments fix cane prices higher than the statutory minimum on which the levy price paid to the sugar factories is based.

In closing the discussion on the vicissitudes of the alternating regime of control, partial control and decontrol of the Indian Sugar Industry (this study covers only the period 1951-52 to 1981-82 in detail), it is necessary to summarise the major theoretical underpinnings of the argument being made here. Looking at the evidence, it would seem that the regime of controls and the agencies of the government such as the Ministry of Agriculture can be viewed as a mechanism for the capture of monopoly rents in the sugar sector of the Indian economy by the producers of the commodity. The government and the control regime would therefore be expected to maximise the value of such rents subject to the constraints implied by other interest group pressures and the
considerations underlying the initial adoption of controls. The permanent removal of controls or significant modifications in the control regime would necessarily refute this hypothesis. The pattern of developments since 1932, and more particularly since 1951 do not provide such a refutation. The government seemed to behave in a manner consistent with the maximisation of monopoly rents by producers.

The history of regulation in the Indian sugar industry would seem to bear out the predictions of the theory of economic regulation outlined in Section 8.2. The sugar industry fits the mould of an industry that lacks high concentration and where natural barriers to entry do not exist so that there is a lack of private substitutes for regulation as a means of garnering joint-monopoly rents. Sugar producers have been successful in the solicitation of the coercive powers of the state to restrict entry, obtain price and quantity controls over existing participants and obtain subsidies and favourable treatment throughout the period of study. While the industry had not been so successful in obtaining controls over substitute products like gur and khandari, this seemed to be more a function of natural constraints imposed by the almost completely unorganised and highly fragmented and atomistic character of these largely inefficient and backward industries. Even here the sugar industry did succeed in getting controls imposed on the
khandsari producers in 1980-81. In 1968, a Gur (Regulation of Use) Order had been enacted in order to ban the use of gur for certain purposes most importantly the distillation of alcoholic liquor. It certainly was not for a lack of trying that controls could not be imposed on the gur and khandsari industries.

An indication of the extent of monopoly power is the amount by which price exceeds marginal cost or some other similar conventional index. In the absence of any data on marginal cost, a comparison between domestic and international prices is instructive. Unweighted and weighted (using proportions of amounts sold in controlled and free markets weights) domestic prices were anywhere from one and a half to two times world C.I.F. prices for most of the years of the 1951-82 period. This comparison is shown below for important years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Control Price</th>
<th>Domestic Free market Price</th>
<th>Weighted Price</th>
<th>World C.I.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52</td>
<td>969</td>
<td></td>
<td>969</td>
<td>593</td>
</tr>
<tr>
<td>1962-63</td>
<td>1035</td>
<td>1149</td>
<td>1052</td>
<td>614</td>
</tr>
<tr>
<td>1968-69</td>
<td>1350</td>
<td>1858</td>
<td>1421</td>
<td>1158</td>
</tr>
<tr>
<td>1977-78</td>
<td>1700</td>
<td>3768</td>
<td>2424</td>
<td>1609</td>
</tr>
<tr>
<td>1981-82</td>
<td>2870</td>
<td>6200</td>
<td>4036</td>
<td>3525</td>
</tr>
</tbody>
</table>

These price differentials existed despite India being a relatively efficient producer of sugarcane and having relatively low costs of labour. However, such a comparison is necessarily a crude one in the light of the lack of appropriate cost data.
The large number of industry participants also made private cartelisation difficult, though in the early years the Indian Sugar Syndicate had managed to operate successfully for a fairly long period of time. While it is true that there were a number of diverse interest groups (such as the high-cost Northern producers represented by the I.S.M.A. and the more efficient Western Co-operative producers represented by the N.C.C.S.F.) within the producer group, this significant asymmetry of interests itself resulted in the formation of a broad coalition to obtain favourable legislation.

The sugar industry is also a major employer with over 250,000 direct jobs in the factories and with over 20 million cultivators producing sugarcane (of course, only 30-40% of cane is used for producing sugar). This makes the sugar industry a particularly attractive recipient of protective legislation from the point of view of the government. Trade union interests also tend to be convergent with the demands of the producers for "captured" controls thus further increasing the likelihood of such legislation. It is to be noted that while there have been periods of friction and strife between the industry and its employees, these divergent interests have coalesced at critical junctures to demand protective legislation. The evidence does not refute the hypothesis that employees did "lend" their coercive voting power in obtaining favourable legislation.

Quite clearly the prediction that price is likely to be
higher after imposition of controls is borne out by the behaviour of prices after every episode of decontrol and subsequent reimposition of controls. Prices have in any case been much higher than corresponding international prices. However, it is not quite clear that output has been lower as a result of the controls because of the specific form of the controls and government supports. Monthly releases have been restricted procyclically however as noted by Baru (1977) and various commentators in the E.P.W., so that it would seem that this prediction is also not refuted. Profits certainly have been positively correlated with periods of control and maintenance of the monthly release mechanism.

In a subsequent section, I discuss some econometric tests designed to test these and other predictions. The empirical evidence does not seem to refute the predictions.

This section has attempted to show that regulation in the sugar industry was "captured" by the organised sector sugar producers and potential entrants. Before I go on to empirically test some of the propositions advanced here, it is necessary to examine the various other interest groups that exist in the sugar sector and how their interests were or were not served. This is done in the next section.

8.4 Interest Group Behaviour in the Indian Sugar Industry

The previous section provided a detailed discussion of
the "capture" of regulation in the Indian sugar industry by
the powerful producer lobby. There I argued that instead of
reacting passively to the interests of the legislators and
bureaucrats who administered the controls imposed on the
industry, the producers instigated and spent resources to get
the "controllers" to conform to their circumstances and
interests and evaded the consequences of any "aberrant"
controls. Thus, in my view, the producers themselves
attempted to shape the regulations and their power to do this
was quite substantial.

The question then to be asked is what about other distinct
interest groups within the sugar sector? Wouldn't they act in
their own interest to shape the regulations to their benefit
thus constraining if not negating the efforts of the
producers? A detailed examination of the interaction of the
various interest groups would be quite complex and worthy of
study in a game-theoretic framework. However, I limit myself
here to identifying the characteristics and objectives of the
various interest groups involved and how the sugar control
regime did or did not (and why not) help them to achieve their
objectives.

(a) Consumers: This is the quantitatively largest interest
group in the sugar sector. This group can in turn be
subdivided into two sub-groups - the poor, rural consumers and
the generally richer, urban consumers. I have argued that
consumers as a whole lost as a result of the imposition of protection and controls on the sugar industry. The uncompensated consumption costs of protection were shown to be as high as 12-15% of the value of output produced. In fact, the private cost to consumers of the regime of protection and controls due to the higher overall prices and reduced output may be as high as 20-50% of the value of sugar output. Besides this, the periodic shortages and nonavailability and the need to buy in the black market entail other inconvenience, shoe-leather and uncertainty oriented transactions cost. The unrequited wealth transfers from consumer to sugar producers, traders and sugarcane farmers can at most be cynically regarded as necessary for maintaining the "family farm" (in this case the "big landlord's family farm") and sustaining a "self-reliant indigenous sugar industry." The controls certainly did not achieve their avowed purpose of protecting the consumer interest. Within the consumer group, it has been stated by many (e.g. Baru (1977, 1980), E.P.W. (various issues)) that the system of controls has subsidised the rich urban consumer at the cost of the poor, rural consumer. The consumption data quite clearly shows that sugar is consumed largely by the highest income groups in both urban and rural areas. A majority of the rural population consumes gur as the major sweetening agent as also some of the lowest income groups in the urban areas. However, given the distribution of the rural
to urban population (80:20), the rural area accounts for a larger proportion of total consumption (60:40). The largely urban nature of the public distribution system through which the levy portion of total sugar production in any given year (approximately two-thirds of the total) has been distributed since 1966-67 also results in the better availability and more equal distribution of sugar in the urban areas.

During the dual-pricing, partial control regime since 1967-68, urban consumers have quite clearly obtained larger benefits as compared to rural consumers, at least with regard to the levy proportion. Originally conceived of as a cross-subsidisation scheme of the poor by the rich, this scheme has created increased demands for levy sugar unrelated to the protection of the poorer sections. However, the existence of a free-sale market has also been a leveller of benefits because high income urban consumers have had to pay higher prices for quantities bought on this market. Domestic sugar, while priced above the cheaper alternative world market counterpart (except in the years 1974-77 when world market prices exceeded domestic levy prices), has not been available to rural and urban consumers in quite the same quantity and at the same average price during the control regime. Higher and middle-income urban consumers have benefitted more than both lower income urban and rural consumers (except for the more affluent) at large. However, this unequal distribution is not
a contentious political or public-policy issue in a "scarcity" economy where any availability is itself seen by consumers as a great thing. Widespread rural and lower-income urban illiteracy (70-80%) and the prohibitive costs of organising the world's second largest rural population as a cohesive interest group have contributed to this situation (the high costs of organising are also responsible for a lack of a rural-urban coalition for lobbying for the removal of protection for the sugar industry).

The middle-income and high-income urban consumer has however been a sporadically important factor with regard to government regulations and the control regime. The consumption tax effect on the ban on imports has not been visible to the consumer because since 1932 imports have been marginal if not largely non-existent. An economic development strategy of "self-sufficiency" since independence in 1947 has insulated the consumer from knowledge or concern regarding world-market availability and prices (liberalisation in the early eighties has however had some impact on this isolationist tendency). However, during periods of scarcity and/or high prices (such as the episodes in 1977-78 and 1980-81 described in the previous section), particularly when these episodes coincide with general elections, pressure on the government does build for relaxing the control regime. This happened in 1977-78 but coincided with the desires of the
industry.

It is interesting to note that in the periodic enquiries made by the Tariff Commission and by the Bureau of Industrial Costs and Prices as well as the special enquiries instituted by a series of commissions/committees since 1947 (six major and a host of minor ones), the viewpoint of the consumer has never been solicited. While the various enquiries have had a preamble where the welfare of the consumer is laid down as a guiding principle, there is no mention of consumer surveys or representations made in the reports. It was only the Dagli Committee on Controls and Subsidies (1979) that attempted to obtain the views of consumers in the course of studying the effect of controls on over fifteen commodities, among which sugar was one of those studied. In this particular case, the consumers generally recommended decontrol.

(b) Sugar Producers: As already discussed, producers represent the most powerful and influential pressure group in the Indian sugar economy. However, within the producer group, divergent interests are represented by the older, high-cost and largely private sector joint-stock companies in the northern states of Bihar, U.P., Punjab and Haryana and the newer, more efficient and largely co-operative companies (though there are a large number of joint-stock companies in Tamil Nadu) in the western and southern states of Maharashtra, Gujrat, Karnataka, Andhra Pradesh and Tamil Nadu. The former
group is located in the sub-tropical region of the country and is considerably less efficient in both cane production and conversion as compared to the tropical region comprising the latter states.

We have already discussed in detail the pressures exerted and the success achieved by the high-cost northern sugar producers as represented by the I.S.M.A. The co-operative factories themselves are a result of the government's licensing policies during the sixties and seventies when explicit preference was given to the establishment of such factories. This licensing policy itself was the result of the success of grower's co-operatives and pressure exerted by prominent state and national politicians closely connected to the sugarcane economy in the state of Maharashtra, who saw the establishment of the co-operatives as a means of building a power base. The ostensible objective of establishing such co-operatives was the protection of the interests of small and medium growers. However, as the Sugar Inquiry Commission (1974) and a number of commentators (e.g. Baru (1977), Bavishkar (1968, 1980)) have noted, the co-operatives have come to be dominated by a few shareholders and families largely comprised of big landowners. The Sugar Inquiry Commission (1974) for example notes,

"... Thus the advantages which accrue to a cooperative factory are enjoyed by a very small number of cultivators only. In some cooperative factories there is a reluctance on the part of the
existing members to enlarge the membership of the factory. It is said that the cooperative factories have become a close preserve of a limited number of shareholders and families ... The cooperative factories in Maharashtra and Gujrat also pay high prices for cane to their members whose number is limited. This also is leading to the creation of marked economic and social disparities among the rural people." (Report of the Sugar Industry Enquiry Commission, 1974, p. 74, paragraph 5).

The report also indicates how the more affluent co-operative members purchase cane from poorer members at low prices and sell to the co-operative at high prices. Thus it would seem that the co-operatives instead of being the envisaged instruments of social policy have become the tool of powerful interests.

The I.S.M.A. and private factory owners did come out strongly against the change in government licensing policy favourable to co-operatives. They strongly protested the exemption of payment of income and other corporate taxes granted to the co-operatives on the grounds that this would provide enormous financial power and a strong competitive advantage to the co-operative sector. Though an uneasy truce has existed during the seventies between the two groups, instances of conflict over policy issues are not difficult to find. As a recent example, the President of the I.S.M.A. said at the 48th A.G.M. (1982),

"The keen competition amongst the cooperative factories to encroach upon the cane of the neighbouring units is now a common practice. It hardly needs any more data to show that this has been the direct result of the ill-conceived policy
of licensing new units in close proximity to existing factories without due regard to the availability of cane." (Presidential Address, 48th A.G.M., I.S.M.A., pp. 8-9).

As already noted, the co-operative factories have by and large supported the initiatives of the joint-stock factories in manipulating the regime of control. They have been a powerful lobby in raising the minimum price of sugarcane because of their vested interest as farmer-growers. Through their umbrella organisation, the N.F.C.S.F., they have acted in concert with the I.S.M.A. in raising levy prices and controlling monthly releases. They were also at the forefront in forming the scheme of voluntary distribution in January, 1972 and the short-lived "gentleman's agreement" in 1978-79 when prices plummeted after decontrol. However, as a number of commentators have noted, their interests are not always congruent with those of the joint-stock companies. As the more efficient producers of the commodity, they have sometimes been in favour of decontrol especially when prices are at a peak.

In accordance with my main hypothesis, the least efficient producers in Bihar and eastern U.P. have always been the most vociferous supporters of the control regime. In various submissions to parliamentary and official committees and commissions they have pleaded for the continuation of controls and differential levy procurement prices. Due largely to their efforts, the initial uniform levy procurement prices
were changed to differential levy procurement prices by dividing the country into a number of zones (in 1981-82 there were 22 different levy procurement price zones). The result of this has been the protection of these highly inefficient sub-tropical regions from competition from the more efficient tropical regions. Consequently, prices to consumers have in general been higher than they would have been in the absence of such protection.

Thus, the interests of the sugar producers were by no means monolithic. Nevertheless, in line with the predictions of economic theory they did manage to form a broad-based coalition to lobby for and succeed in getting favourable regulation.

(c) Gur and Khandasri Producers: While they constitute the single, largest group after consumers, gur and khandasri producers have not been an important factor in the imposition of controls if only because of their widely-dispersed, unorganised, cottage industry nature. Gur and khandasri units have been virtually free from controls on both input and output prices. Gur production has not been taxed and even though the production of khandasri has been taxed in recent years, it has been taxed at much lower effective rates than mill sugar (excise taxes on khandasri in 1977-78 were Rs. 93 per tonne as against Rs. 466 per tonne of sugar).

It is not quite clear whether the gur and khandasri units
have on balance gained or lost from the controls imposed on the sugar industry. Sugar industry representatives have always complained about the lack of controls on gur and khandasari (of course, controls favourable to the sugar industry) and how this has benefitted the gur and khandasari industries. Most of these complaints centre around the exemption from taxes, regulation of production, and licensing and most importantly the competition for sugarcane during poor crop years. I do not discuss this issue further since it has been discussed elsewhere and since the costs of organising a cohesive interest group and/or being able to apply controls to these industries remain prohibitive.

(d) Cane-growers: The cane-growers constitute a significant "latent" interest group in the Indian sugar industry. Cane-growers form a large and widely dispersed, heterogeneous group chronically difficult, if not impossible to organise. Consequently, their interests have been represented by the farmer-politicians who have used their agrarian political base to garner economic rents from themselves. A significant number of Cabinet Ministers (and even one Prime Minister), Chief Ministers and Members of Parliament have represented agricultural interests particularly that of the sugarcane sector. This has especially been the case for the states of U.P., Maharashtra, Bihar and Andhra Pradesh.

The cane growing and sugar-producing interests have been
combined in the case of the co-operative factories (which account for over fifty per cent of the units and also output) as well as the large joint-stock companies. As Baru (1977) notes, land-owning and cane-growing interests control a large number of co-operatives and joint-stock companies, so that the cane-growers interests get represented adequately at the regulatory policy levels despite the difficulties in organising this interest group.

An analysis of the statutory minimum cane-price policies of the government and the special incentives and exemptions provided to cane-growers does not seem to refute my contention that this has been a latent but influential interest group. Very often the raising of the statutory minimum price and the establishment of a premium by the state governments over the centrally-fixed minimum price has defied conventional economic logic as embodied in costs and market conditions. However, once the cane-grower-producer nexus is taken into account, this defiance of economic logic stands explained. There are a number of other areas where cane-growers have been unsuccessful in obtaining favourable governmental action such as for example the periodic building-up of arrears of cane dues by the sugar industry. This however does not constitute refuting evidence since the arrears of cane dues are generally found to build-up for the (majority) small farmers and not for the co-operatives or large farmers.
Even if the politician-cane-grower-producer nexus was to be ignored, the formula for linking levy prices to the statutory minimum cane price ensures that the interests of cane-growers in general are taken care of.

(e) Traders: This is an interest group that has not been at the forefront but has nevertheless exerted pressure to maintain controls over the industry. Trader bodies such as the Bombay Sugar Merchants Association, The Khanpur Sugar Merchants' Association and the Fair Trade Practices Association have lobbied for high statutory minimum cane prices, increased levy sugar proportions and allotments and control over monthly releases and levy prices. The following excerpts are illustrative with regard to extension of the levy sugar allotment and distribution system,

"... The Bombay Sugar Merchants' Association as well as the Fair Trade Practices Association... consider that the distribution system is not effective in as much as it operates only in major urban areas covering a small portion of the population while millions of others living in towns and villages do not derive any benefit from the distribution arrangement." (Tariff Commissions Report on the Cost Structure of and Fair Price Payable to the Sugar Industry, 1973, p. 65)

The desire to maintain control over monthly releases and the congruence of objectives with the producers is evident from the following quote,

"The gur and khandasari seasons are in full swing but it is in the interest of neither wholesalers nor the industry to boost supplies in the market. Though sole selling agency agreements were abolished five years ago, it is not at all difficult for the
industry to persuade wholesalers to regulate supplies in the interest of both. It is a well known fact that the Federation of Sugar Cooperative Factories, for instance, acts as a monopolistic body and refuses to sell by tender below a certain price." ("Fruits of Collusion", EPW, December 31, 1977, p. 2146)

But the interests of the trade and the industry as represented by the government are not always in congruence as is demonstrated by this quote,

"... And yet the free market quota for this month has been reduced by 10,000 tonnes to 80,000 tonnes. The Bombay Sugar Merchants' Association has urged the government to raise substantially the quota for both August and September." ("Short Memory", EPW, August 19, 1975, p. 1180)

The trade has also benefitted immensely from the controls through the black-marketing of sugar. As Baru (1977) reports,

"Another significant aspect of sugar availability on the open and controlled markets which cannot be substantiated by concrete data is the large-scale diversion of levy sugar onto the open market by dealers and consumers. In a recent statement (footnote: The Hindu p. 1, Col. 7, September 26, 1977) the Union Minister of State for Agriculture and Irrigation admitted that in states like U.P., Bihar, M.P. and Rajasthan, not even 10 percent of the sugar meant for rural areas ever reaches them. Further, he observed levy sugar has become one of the biggest sources of corruption and the amount involved in the racket was Rs. 1,500 million to Rs. 2,000 million" (Baru, 1977, p. 39)

I have also estimated elsewhere the extent of the leakage of sugar from the controlled to the free-sale market.

Thus the traders have been an important interest group lobbying for the continuation of controls and who seem to have gained from the imposition of controls.
(f) **Employees and Unions:** The employees of the sugar industry (as distinct from the cane-growers) and their unions have also been an important interest group in maintaining controls. They have also been strong proponents for the continuation of protection to the sugar industry as is evidenced by the representations made to the various Tariff Commissions that examined the issue (e.g. the 1949 and 1950 Tariff Commission Reports).

With regard to the maintenance of price and distribution controls, especially under the partial control regime, the unions have argued strongly in favour of such controls presumably with the awareness that such a control regime benefits their constituents with higher wages and greater leverage over the actions of the industry. However, there have been instances of severe disagreement over substantial issues. The most glaring example was the demand for nationalisation of the U.P. sugar industry adopted by the I.N.T.U.C. (discussed before) which was opposed by major sections of the joint-stock industry. Even though subsequently adopted as a major recommendation by the Sugar Industry Enquiry Commission (1974), the industry was not nationalised.

(g) **Government & Politicians:** In more traditional theories of regulation, the actions of the government are modelled as being in the public good. However, in the view taken here, 1
model government as composed of individuals, who while they may well have the public good in their utility functions, are nevertheless self-interested individuals also afflicted by motives such as power, greed etc. I also view the government as composed of legislators (demanders of government output) and the bureaucracy (suppliers of government output), but each in turn a collection of many sectional interests and individuals and bureaus. Each seeks its own political and economic rewards inextricably linked to the others in the "industry". Given the nature of the environment, they indulge in rent-seeking activities that increase the social cost of government.

In the case of the Indian sugar industry, there are two main levels of government and a number of specialised bureaus that have constituted important interest groups. At the governmental level, there is the Central Government and then there are the State Governments, especially those where the sugar industry is mainly located. A number of government bureaus such as the Ministry of Food and Agriculture, the Ministry of Finance, the Ministry of Industry, the Department of Village and Small Industries and the department in charge of co-operatives (the composition and boundaries of these bureaus have changed from time to time) have jurisdiction over the activities of the sugar industry.

Before describing the interests and activities of each of 
these sub-groups, it is necessary to point out the nature of
the Indian political system which makes patronage, rent-
seeking and capture possible. India is a parliamentary
democracy with two houses of Parliament to which members are
elected every five years (a portion of the members of the
upper house are appointed). Membership of the ruling party
brings with it tremendous political power and prestige out of
proportion to that in the west (perhaps because of the
remaining vestiges of an imperial style of government[—left
behind as the inevitable legacy of over two hundred years of
British rule). While the political opposition should in
theory hold the ruling party in check, in India the dominance
of the Congress Party in the Parliament for twenty-seven of
the thirty years considered in this study (longer if one takes
into account the system of dyarchical government before
independence) has weakened considerably the checks and
balances designed by the constitutional fathers.
Consequently, widespread patronage and corruption have been
the rule rather than the exception, especially in a highly
controlled economy like the Indian one.

The system of controls introduced by the government
(initiated by the political members of Parliament) thus cannot
be viewed as exogenous acts done for the public good. Shourie
(1973) puts it this way,

"... controls are just devices to ensure that
patronage rests securely in the hands of the
official and the politician. Our controls enrich individuals (and this is one of the factors that contribute to their durability), but they have been disastrous for the productive system... controls have, encouraged within the government and outside a kind of enterprise that does not help production. Enterprise has now come to consist of acquiring quotas, agencies, licenses, and selling them in black markets, of pre-empting licenses, of getting the government to ban further licensing of units wanting to make one's product, of greasing palms. Within the government, too, enterprise has come to consist of pushing files, of roping others into a decision, of finding ingenious ways of invoking or dodging rules.... The ones who get recruited to government offices and who rise in them are those who push files controlling the sugar industry, not those who can help cane-growers build co-operative institutions." (Shourie, 1973, pp. 1467 and 1469)

Shourie's sanguinity with respect to co-operatives however ignores a critical element on the Indian sugar scene. The government's promotion of co-operatives (which have got licensing preference since the late fifties) was itself the result of pressure from rural politicians within the ruling party. As articles in the Economic and Political Weekly and India Today, two leading investigative news journals, and by Indian academics (Baru (1977, 1980) and Bavishkar (1968, 1980) have documented that the sugar co-operatives have been dominated by both national and state-level Congress politicians. This is especially true in the states of Gujrat and Maharashtra, which account for over fifty percent of the co-operative sugar factories). In fact, as reported in Indian Today (July 15, 1984. p. 21-22) a large number of the ministers in the Maharashtra State Cabinet were connected to the
co-operative sugar industry in 1964 (this being the rule since independence). Other politicians at the Centre and in the states of U.P., A.P., M.P. and Bihar have had connections with the joint-stock sugar industry. In fact, state and central elections have been known to be fought on the "sugar ticket."

This interlocking between political power and sugar factory ownership has produced the propensity for regulation favourable to the industry. The politicians who have succeeded in obtaining such legislation have enriched themselves monetarily as well as through the enlargement and consolidation of a strong power base in the sugar sector. The statement from the EPW quoted earlier emphasises the extent to which the politics-regulation network extends.

With regard to the Central Government bureaucracy, the theory of bureaus (cf. Niskanen (1971)), provides a useful framework for analysing the actual outcomes. In this view, bureaucrats and politicians are modelled as pursuing their selfish, private interests rather than those of the body politic. Position and power within the Indian Civil Service is defined by the perceived power and importance of the department which the civil servant controls. Consequently, there is a competition for regulation by which each department is able to enlarge its sphere of control and power. This provides an impetus to creating regulation and controls over industries. The process is facilitated by the economic
motives of corrupt legislators, officials and government functionaries (let it be said that the Indian Civil Service does have a majority of officials who are incorruptible but political and career-related pressures have made even this cadre of honesty and integrity susceptible). Capture is then achieved by a confluence of motives of the regulators and the regulated. Politicians and legislators in their interest of enlarging and consolidating their power base, seeking patronage and political rents and money and privilege enact legislation to enrich themselves at a cost to the consumer and electorate at large. The costs they incur in this process are those of exposure and censure but given the workings of the Indian political and administrative system where such activity has come to be accepted as a way of life, the benefits far exceed the costs. Government officials and bureaucrats in their desire to build their prestige and power (and to gain monetarily) recommend and administer such legislation. The costs are minimal since they are protected by the politicians in power and the process being by and large shielded from public scrutiny (except for the newspaper media, the radio and T.V. media are owned and operated by the government). The regulated industry benefits and pays off the politician/official in increased patronage, contributions and liquid funds. The trade and agricultural interests benefit from favourable controls over their activities (e.g. minimum
price regulations, public distribution outlets with guaranteed throughput and profits etc.). The larger and unorganised groups like the consumers (except for the "vociferous" urban consumer at times when prices get too high or the commodity gets too scarce) are the major losers.

The above analysis would seem to predict stable or ever enlarging controls instead of the on/off type of controls witnessed in the Indian sugar industry. However, it is my contention that the gyrations in regulation that occurred in the Indian sugar industry were the result of the domination of the political legislators over the Indian administrative and planning system and their links to the sugar and cane-growing industries. Government officials were reluctantly willing to allow a reduction of their ambit of power qua regulation (with a fair expectation that it would be reinstated in the future) because of the costs of resisting political pressures and the gain from economic patronage by the industry. It is revealing that throughout the period 1932-82, protection was never removed (except for the aberration of the Tariff Commission's (1950) recommendation for withdrawal), the statutory minimum price scheme for cane once instituted was never removed and the system of monthly releases maintained except for the brief (and aberrant) episode in 1977-78. Thus the events that were witnessed in the Indian sugar industry since independence, especially in the period after the introduction of partial control
do not refute the major hypothesis of capture.

It is evident that rent-seeking competition within the government and politicians' interest group is likely to show up in periods of turmoil and conflict over the specific type and incidence of regulation. Such instances are not difficult to find. The conflict between the state governments, the Central Government, and the representatives of the industry over the minimum cane support price legislation epitomises the existence of such conflicts of interest. The state governments have from time to time enacted legislation (presumably on the behest of politicians who represent cane-growing constituencies) for the payment of minimum cane prices by the industry that are above the statutory minimum price set by the Centre. The co-operative sugar factories have never objected to this since in any case their interest and practice is to pay the cultivators high prices as a means of distributing profits from operations. But the I.S.M.A. has come out strongly against the state governments, as is chronicled by statements by its President at the A.G.M. (only the statutory minimum price is taken into account in fixing the statutory levy price). The Central Government has objected to the state governments (especially during periods when the state concerned has been ruled by the opposition). Thus it can be seen that the interests here too are by no means monolithic but that subject to some broad agreement on
garnering rents for the various interest groups as a whole. There is competition for a share of the rents which may lead to conflicts of interest.

In summary, there are a number of diverse interest groups that have benefitted from the regime of controls imposed on the sugar industry. The producer groups however, emerges as the most powerful and influential group. None of the evidence examined would seem to refute the hypothesis that the sugar industry represents a prime example of capture of the controllers by the controlled.

With regard to the influence of the structure of the industry on the pattern of regulation, the lack of power of the sugar consumers and the high costs of organising them permitted the sugar industry to wield wealth-maximising influence over the regulators without the buyer group acting as a deterrent. Even though portions of the sugarcane producers are powerful and well-organised, the sugar producers managed to either co-opt the cane-growers (especially in the form of the co-operative sugar factories) or were able to use legislation that also favoured the cane-growers (such as the statutory minimum cane-price legislation) to forge a congruence of interests. Other major interest groups such as the unions were also similarly dealt with.

The contestability of the Indian sugar market is low especially given the control over licensing that was an en-
during feature of the control regime. This threat of entry was also reduced given the poor substitutability between sugar and gur for most consumers (gur is an inferior substitute). Given the structure of organisation and other transaction costs discussed above, and the nature and structure of the Indian political process, conditions for the capture of sugar industry regulation was not only feasible but very likely. The demand for favourable regulation from the industry and its supply by the politician-legislator-administrator provided for the capture of regulation.

It is also interesting that while some backward integration did take place in the sugar industry to get control over sources of input-supply (in the case of the co-operatives), no such forward integration took place. This may reflect the atomistic nature of sugar demand in a developing country like India where the organised confectionery-foodstuffs-drink industry constitutes a small proportion of total demand unlike in the counterpart industry in developed nations.

Empirical Tests of Capture in the Indian Sugar Industry - Interest Groups and the Control Regime

The analysis of interest groups and capture of regulation in the Indian sugar industry presented in the previous section reveals a recourse to the regulatory process which is both complex and specific. Consequently, the major hypothesis
advanced of capture of the regulators by the producer and cane-growing interests acting through their legislator-bureaucrat proxies becomes a difficult hypothesis to test. In this section, I develop some tests which attempt to examine this hypothesis.

The previous section argued that sugar producers have used price and distribution controls to raise their incomes and keep prices at a high level. I argued that in effect producers got government to behave as a monopolist on their behalf restricting output and keeping prices at a level consistent with maximising joint-monopoly profits. Nevertheless, the period studied (1951-82) witnessed periods of on-off controls. This seems to constitute refuting evidence for the capture hypothesis since the industry should have succeeded in keeping controls on permanently so as to keep prices and income at a high level throughout the 1968-81 period. However, I had argued there that this was consistent with interest-group behaviour within the sugar producer group. It was also the result of the sugar industry's desire for maintenance of quantity controls while demanding removal of price controls. By obtaining control over prices, one margin for interest group pressure on changing government officials and legislators would be removed while keeping control over favourable quantity regulation through the one instrument which would ensure monopoly profits for the industry when
private cartelisation was difficult to achieve. Of course, rent-seeking activity will dissipate some (or all) of this monopoly profit.

The discussion on the various interest groups in the previous section throws further light on the on-off phenomenon of controls. The economics of collusive behaviour can be used to explain this phenomenon. Maximisation of the joint-income of all firms in the industry requires that output be produced at the point where industry marginal revenue equals marginal cost. In the case of the Indian sugar industry, since private cartelisation is difficult, this is achieved during periods of control by the government as agent for the industry restraining output to such a point (we cannot empirically verify this but only assert that the government behaves as if this were so). But when this happens, each firm (especially the more efficient ones) have a strong incentive to depart from the collusive equilibrium so established since the firm that is successful in doing so while all others maintain output at the collusive solution can maximise its own income. This tendency is particularly attractive to the efficient (tropical region) producers. Since prices and quantities are controlled by the government as agent they begin pressuring the agent for removal of the quantity controls in the expectation that prices will remain high as other producers maintain output or are driven out of the industry because of
their relative inefficiency. There is resistance to this from the less efficient (sub-tropical region) producers but they too finally succumb to the bait of further increasing their incomes especially during periods of high profits. However, they argue for the removal of the price controls while maintaining quantity controls since they can only benefit by less output raising prices further. The net result is that the government as agent either removes both types of control (as happened in 1952-58 and 1978-79) or removes price controls depending on which of the two interest groups prevail.

Once controls are removed and profits begin to erode as a result of competition, the inefficient producers begin to clamour for control and the situation returns to the status quo ante when the efficient producers join in. Thus one would expect the removal and imposition of controls (the turning points) to occur when producer income is high and low respectively.

Pressure to remove controls when profits are high provides a refutable prediction for testing the applicability of the capture hypothesis of regulation in the public interest. The public interest theory of regulation would predict that high profits would result in the imposition of controls as regulators with the public interest in mind imposed such controls. Consequent to the imposition of controls, profits would be expected to decline since the
"enlightened" regulators would impose binding controls to reduce profits. Thus, in a regression with controls as the dependent variable and profits as an independent variable the latter variable would exhibit a positive sign (and a negative sign when the roles of the two variables are switched).

On the other hand, the capture theory would predict that as profits increased interest group pressures would build to remove the controls so that in a regression with controls as the dependent variable and profits on the right hand side, the sign attached to the latter variable would be negative. However, when the roles of the two variables are switched we would expect the sign of the controls variable to be positive if indeed the regulators have been captured by the regulated. This provides a means of testing for the tenability of the capture hypothesis by looking for a negative sign in a regression with controls as the left hand side variable and profits on the right hand side.

Pressure to remove controls on the part of the "vocal" urban consumer group would, however, work in the opposite direction. When prices, especially in the free market or black market are high urban, consumers would clamour for the imposition of controls since they would then be assured of getting the commodity at low "controlled" prices. During periods of low free market prices, these "vocal" consumers would be willing to accept the removal of controls. Thus free
market prices and the imposition of controls would be expected to be directly related at least on account of 'vocal' consumer pressure. Thus, free market prices would exhibit a positive sign when controls are regressed on this variable.

Both sugar and sugar-cane producers would favour removal of controls on sugar prices only when there is an excess of cane output which cannot be absorbed by the gur and khandsari industries. During periods of output when the gur and khandsari industry are buying their share of cane, both sugar and cane producers would willing to accept the statutory (and state fixed) minimum prices especially since these prices are the determining factor for sugar output prices. However, when cane output is excessive both sugar producers and cane growers would be interested in the removal of controls so that both benefit through prices below the statutory minimum cane price should higher sugar prices not materialise following decontrol. Thus there would be an inverse relationship between cane output and the imposition of controls.

The interests of the gur and khandsari industry would be to see the imposition of controls on the sugar industry when gur and khandsari output is high (and prices low) since then sugar producers would be prevented from competing with the gur and khandsari industry for the consumer's dollar because of the high statutory minimum price they are forced to pay which ultimately accounts for the higher levy and free-sale prices.
Sugar producers on the other hand would like to see the removal of controls when gur prices are low since then they could compete with gur and khandsari producers. Cane growers would also like to see the imposition of controls when gur prices are low since this would provide them with high prices for their output from sugar producers at a time when gur and khandsari producers are not able to pay high prices.

Given these various expected relationships it would be instructive to test whether in fact the behaviour of the various interest groups involved in the Indian sugar industry does in fact conform to the pattern of imposition and removal of controls over the 1951-82 period. I use a logit framework to test for the applicability of the effect of various interest groups on the imposition of controls in the next section.

**Empirical Tests of Capture and Results**

In order to test the capture hypothesis, I use a multinomial logit model in a maximum likelihood estimation context. This was done since I was attempting to explain the imposition or removal of controls (a binary variable) as the result of the actions of various interest groups. Therefore, I regressed the controls variable (where 1=control, 0=decontrol) on the income (profit after tax) of producers, price of sugar ('free-sale' price), cane output and the price of gur as proxies for the interests of the various groups involved in
the sugar industry as discussed in the previous section. The regression was run over the period 1951-82 which witnessed a number of changes in the control regime.

The regression that was run using the multinomial logit subroutine was:

\[ C = a_0 + a_1 Y + a_2 F + a_3 C + a_4 P + t \quad (8.1) \]

where

\begin{align*}
C &= \text{Control variable (0=decontrol, 1=control) in year } t \\
Y &= \text{Producer income (Profits after tax) in year } t \\
F &= \text{Free-sale price of sugar in year } t \\
C &= \text{Cane output in year } t \\
P &= \text{Price of gur in year } t \\
t &= \text{Price of gur in year } t
\end{align*}

The regression was run for the 1951-82 period.

The rationale for the signs expected a priori on the \(X.H.S.\) variables has already been provided. The producer income variable (aggregate after-tax profits of the industry) is intended to capture producer group pressure. High profits are likely to lead to a desire for decontrol of prices in the expectation that the industry can reap higher profits through even higher prices. Thus the turning points of high profits are likely to be associated with the removal of controls giving a negative sign. As discussed a positive sign would imply capture while a negative sign would imply that the controls were imposed in the public interest. Further, since
lagged profits may also be a good indicator for predicting the removal of controls, the Y variable was run lagged. This would also overcome any problems of reverse causation or spurious regression because of the two way relationship between profits and controls.

The free-sale price variable is meant to capture the interest-group pressures of the 'vocal' urban consumer. High free-sale prices would be associated with a demand for a further extension of the ambit of controls so that these consumers could get more of the commodity at the low controlled prices. Similarly, when prices are low during periods of decontrol because of competitive pressures, these consumers would be quite content to let decontrol continue. Thus the sign on this variable would be expected to be positive.

The cane output variable is intended to proxy for the interests of cane growers. As explained above, high levels of cane output would be associated with pressure for the removal of price controls in the expectation that higher prices could be obtained for the cane based on higher sugar prices for the industry. The simultaneous removal of statutory minimum price control would facilitate flexibility in receiving prices below the statutory minimum price should the higher sugar prices not materialise following decontrol. The sign would thus be expected to be negative.
The price of gur variable is meant to capture the interest-group pressures (if any) of gur and khandisari producers. In line with the discussion above, the sign on this variable would be expected to be negative.

The results are reported in Table 8.1. It can be seen that all the variables exhibit the expected signs. It can also be seen that producer's current incomes, cane output and the price of sugar are significant at the 10% level while the price of gur is significant at the 20% level. However, the log-likelihood of the regression is low indicating low explanatory power.

Nevertheless, the results can be interpreted as providing support for the capture hypothesis. Producers' interests were preserved in the sense that both the producer incomes variable (in its concurrent version) and the cane output variable were found to have the right sign and significance in the regression. However, the lack of significance and the smaller coefficient of the $\eta_{t-1}$ variable weakens the support for the hypothesis of capture represented by this variable. Nevertheless, the negative sign still supports the capture hypothesis as against the alternative public interest hypothesis. Consumer interest-group pressure were seen to be less important though nevertheless significant. The interest-group pressures of gur and khandisari producers were however of less importance though exhibiting the expected sign in the
An additional test of the implications of controls for two of the interest groups can be gauged from results presented earlier in Tables 5.1-5.3 and repeated in the bottom half of Table 8.1. In the sugar demand function regression, it can be seen that the controls variable exhibits a negative sign implying that the imposition of controls was associated with a reduction in demand for sugar. This result would seem to suggest that my earlier hypothesis that controls were detrimental to consumers cannot be rejected, especially when the control variable is interpreted as a shift variable representing the effect of consumer expectations as a result of the change in control regime. Similarly, in the sugar supply function regression, the control variable is positively related to sugar output, a somewhat puzzling result since I argued earlier that controls enabled the sugar producers with the government as agent to behave like a profit-maximising monopolist and reduce output. However, the output reduction is with respect to monthly releases and not production. The effective separation of production and release of supplies to the consumer causes this result. In fact, if as I have argued, the imposition of controls results in higher prices and overall profits for the sugar producers, the positive sign is evidence that the hypothesis that controls were in the producers' interest cannot be rejected.
Thus, on the basis of the foregoing results we can surmise that government controls on the Indian sugar industry do not seem to have been imposed with some general "public good" in mind but seem to have been influenced by the interest groups in the industry. The influence of the producers in particular seems to be important and it would seem from the results that the hypothesis of capture cannot be rejected on the basis of the evidence. The results reflect what may be termed the interest-group demand for governmental controls. Thus regulative behaviour cannot be treated as exogenous but itself the outcome of a process of lobbying by interest groups. This provides support for a theory of endogenous governmental action.
## Table 8.1

**INDIAN SUGAR - CAPTURE ANALYSIS RESULTS**

<table>
<thead>
<tr>
<th>Dependent</th>
<th>Independent Variables</th>
<th>Log Likelihood</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Coefficients with t-statistics)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1. LOGIT ANALYSIS

#### A. Contemporaneous Version

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>F</th>
<th>C</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coeff.</td>
<td>5.396</td>
<td>-0.006</td>
<td>0.006</td>
<td>-0.0008</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(2.149)</td>
<td>(1.927)</td>
<td>(1.729)</td>
<td>(1.983)</td>
</tr>
</tbody>
</table>

#### B. Lagged Version

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>F</th>
<th>C</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coeff.</td>
<td>4.424</td>
<td>-0.004</td>
<td>0.004</td>
<td>-0.00009</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(1.672)</td>
<td>(0.797)</td>
<td>(1.136)</td>
<td>(1.989)</td>
</tr>
</tbody>
</table>

### 2. DEMAND ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>Q</th>
<th>W</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coeff.</td>
<td>2430.470</td>
<td>-9.906</td>
<td>-0.230</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(7.461)</td>
<td>(2.058)</td>
<td>(0.813)</td>
</tr>
</tbody>
</table>

### 3. SUPPLY ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>Q</th>
<th>W</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coeff.</td>
<td>315.363</td>
<td>1.503</td>
<td>-0.127</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(1.136)</td>
<td>(3.935)</td>
<td>(3.594)</td>
</tr>
</tbody>
</table>


3. See particularly Bhagwati and Desai (1970), Bhagwati and Srinivasan (1975), Jha (1980) and the reports of the Dagli Committee (1979), the Hazari Committee (1967) and the Santhanam Committee (1964).

4. See Section 4 of Posner (1974) for a discussion. However, it still remains true that a smaller number of firms in the industry facilitates the organisation of the industry for effective political action.

5. See Stigler (1974) who proposes that each member of an industry will have an interest in participating in the coalition seeking protective regulation when there is a significant asymmetry among the positions of industry members because of the differential impact of any regulation attained on each member.

6. This section draws on Hirsch (1951), the Indian Sugar Yearbook (various years), the Economic and Political Weekly (various issues) and various government reports and proceedings.

7. The 1932 Act helped the industry by effectively shutting out the highly competitive Javanese sugar industry. Imports declined from 500,000 tonnes in 1931-32 to 390,000 tonnes in 1932-33 to 24,000 tonnes in 1936-37. Imports never exceeded 30,000 tonnes until 1950-51.

8. Profitability ratios have been obtained from various issues of the Reserve Bank of India Bulletin.

9. The impact of industry and other interest groups on the see-saw evolution of government policy is reflected in this quotation from the 1965 Sugar Enquiry Commission (Sen Commission) report:

"In the absence of a well thought out comprehensive long-term policy, decisions taken in regard to prices, production, controls and licensing have only too often been influenced by competing interests." (1965, p. 159).
10. The latter reference was to the removal of price and distribution controls on cement by the government during the years 1966 and 1967, which ironically was subverted by the cement producers themselves. The more efficient cement producers had welcomed the move but the industry introduced voluntary industry controls over distribution and releases by setting up a Cement Allocation and Coordinating Organization (CACU). The internal dynamics of CACU and the less efficient (and majority) groups active opposition to the removal of controls was successful in forcing the government to reintroduce controls in late 1967. This pattern was repeated after the decontrol of 1971. More on this in the section on the cement industry.

11. Baru (1977) contains an excellent discussion of the interest group nature of state intervention in the sugar industry during the period of partial control up to 1977. The pages of the Economic and Political Weekly provide a fascinating and damning expose of the gyrations of the regulatory regime in sugar too detailed to be adequately discussed here.

12. Baru (1977) demonstrates this quite convincingly by examining the data (see p. 34 and 35). This situation is reflected in this analysis from the Economic and Political Weekly, "In its propaganda the industry always tried to make out that the sugar mills are run for the benefit of the "20 million sugarcane growers". On this basis whenever the industry finds sugar stocks accumulating and the free sale sugar price falling, it demands a cut in the monthly quota, extension of at least a fortnight in the dispatch period and easy credit. But while the industry's heart bleeds for the sugarcane grower, the sugar magnates think nothing of holding back payments for cane to the farmers, they delay crushing and even threaten to close down their factories. It is not surprising that the industry's views finally prevail since all official and semi-official committees concerned with the industry are crammed with spokesmen of the industry and trade."

13. See the section on "Industry and Engineering" in the Indian Express, September 21, 1977, p. 9 and then December 2, 1977, Speech of Mr. A.S. Kula at the 44th A.G.M. of the I.S.M.A.
14. The statement of Mr. Ruia of the I.S.M.A., at its 44th A.G.M. is a classic in this regard (p. 7-8). He chastises the government for cooling towards exports and "forgetting the large rupee profits made by the exchequer on previous exports," for not boosting internal consumption adequately while releasing too much sugar and forcing "the sugar industry to join the list of sick industries." All this when in the previous financial year 1976-77 the industry had made record profits and exports have consistently been subsidised.


17. Joshi (1973) in the context of what has been called the "Sugar Cycle" has argued that, "in trough years of the acreage cycle, when there is a general scarcity of sweetening agents, gur prices rise sharply and the sugar factories have either to pay a price higher than the statutory minimum, or else, make do with less sugar-cane than they would normally have crushed at the prevailing statutory minimum price.... The inability of the sugar industry to obtain enough sugar-cane at the statutory minimum price to meet all its requirements has come to be known as the phenomenon of "diversion." But whatever be the outcome of scarcity of sugar-cane - rise in the price of sugar-cane above the the statutory minimum or "diversion" - there is a significant fall in the proportion of the cane crop purchased by the sugar mills." (1973, pp. 432 and 434)

18. As an example of the virulence of this attack I quote the following extract "In 1977-78, the victim (of the khandsari sector) was the canegrower. Last year it was the consumer. They are birds of prey who fatten on those that are in the most difficult position. They squeeze the consumers where there is shortage and the grower when the position is comfortable." (op.cit., p. 7, brackets mine)

19. As a result of the shortfall in domestic production in the 1980-81 season, the government decided to import about 200,000 tonnes at a cost of Rs. 1,000 million
while banning export. This policy was severely criticised by the industry (see Presidential Address to 48th A.G.M. of I.S.M.A.)

20. Actually, the "sick" cooperative sector which accounted for the majority of losses in the "bad" 1978-80 years showed losses (and very low profits in "good" years) by paying very high prices to cane producers who, of course, are their member-owners, so profits are understated.

21. Baru (1977) and Bavishkar (1968, 1980) detail the intra-sugar industry interest groups particularly the interest-group behaviour of the cooperative sector. An examination of the annual statements of the N.C.C.S.F. revealed a broad consonance of agreement on control issues with the I.S.M.A. with particular points of divergence (details on N.C.C.S.F. A.G.M.'s could not be provided because I was not able to get copies of the proceedings).

22. Such "loans" of voting power are evident in the representations made to various Tariff Commission enquiries into the need for continued protection and revision of prices as well as to the various Sugar Industry Enquiry Commissions. An exception is supposed to be the 1970 demand of the Indian National Trade Union Congress for the nationalisation of the Northern (U.P.) sugar factories. Even here the move is alleged to have been orchestrated by the mill-owners in order to get compensation in excess of going-concern value (EPW, May-August, 1971).

23. See Baru (1977) and the National Sample Survey Tables on Consumer Expenditures (various years).

24. Bavishkar (1968, 1980) has documented the close nexus between politics and sugar co-operatives in Maharashtra.


27. For example see p. 169 of the Dagli Committee Report (1979) quoted in Chapter 3. This section also sets out some of the other divergent interests.

28. A study of the I.S.M.A. and N.F.C.S.F. would be of great
analytical interest from the standpoint of the theory of large interest group formation and behaviour (cf. Olson (1982), especially Chapter 6). I do not intend to pursue this task here.

29. See EPW, 1982, pp. 2153-54 "Growers' Lobby Prevails Again" for a discussion on how traders' interests are represented.

30. Chapters 3-4 of Hirsch (1961) contain a dated but excellent description of the trading channels and their characteristics in the Indian sugar industry.

31. For a similar approach but which treats government as a monolithic entity with a common interest and goal, see Johnson (1975).

CHAPTER 9
ESTIMATES OF LEAKAGE OF SUGAR

The Leakage Problem

In previous chapters it has been pointed out that incentives exist for the diversion of levy sugar to the free-sale sugar market. The price difference between the two markets creates a strong incentive for producers, dealers and consumers to divert levy sugar onto the open market. As Baru (1977) notes,

"In a recent statement (The Hindu p.1 col 7, September 26, 1977), the Union Minister of State for Agriculture and Irrigation admitted that in states like U.P., Bihar, M.P. and Rajasthan, not even 10 per cent of the sugar meant for rural areas ever reaches them. Further, he observed, levy sugar has become one of the biggest sources of corruption and the amount involved in the racket was Rs. 1,500 million to Rs. 2,000 million'. (In an extensive discussion with officials in the Directorate of Sugar, Government of India, we were told of the many ways in which levy sugar finds its way into the open market. One officer also confessed that measures to counter this racket have had only a marginal impact given the magnitude of the problem." (Baru, 1977, pp.39 and 44 with footnotes in brackets)

A number of government committees and commissions have identified the problem of leakage in sugar and other commodities. The Dagli Committee on Controls and Subsidies (1979) points out the existence of this problem for a number of controlled items including foreign exchange. In a study done for the Associated Chambers of Commerce and Industry, the National Council of Applied Economic Research notes,
It is logical to expect that in a situation where there were two clearly differentiated markets for the same product, one offering much larger gains, producers would be inclined to stake a claim for a share. However, since the gains are illegitimate, the willingness to take a share in them would not be uniform and would be determined variously by individual units depending upon their relative scrupulousness."

(NCAER, 1978, p.38)

Gulati (1977), in a micro-level study of the rationing system, shows that,

"... one can either surrender the sugar entitlement (on the ration card) in part or full, to the ration shop itself (but this is illegal), or draw the whole sugar ration, and then sell it in part or full (which is not legal) to a tea shop or even to some households in the neighbourhood."

(Gulati, 1977, p.324)

Given the existence of the free-sale market in the Indian sugar sector, there is no black-market of the type found in the case of a completely controlled commodity like cement. Black-market incomes are generated when a part of the levy-sugar quota is diverted or leaks to the free-sale market either at the producer/procurement/trader or ration-card holder level. Direct estimation of the diversion at the producer/procurement and trader levels by the examination of production and sales records is ruled out on cost and accessibility considerations. Direct estimation at the ration-card holder level is infeasible. However, indirect estimation using micro-consumption data is feasible. In the next section the quantum of such leakage is estimated indirectly using national cross-section consumption data and properties of
An Indirect Procedure for the Estimation of Levy Sugar Leakage

Since direct estimates of the leakage of levy sugar to the free-sale market cannot be obtained, an indirect estimation procedure using Engel Curves was adopted. Cross-section expenditure data by various income-classes has been collected in the course of the National Sample Surveys (NSS) conducted by the Central Statistical Organisation in selected years. Comprehensive surveys of consumer expenditure including details on various food items such as white sugar were undertaken under the NSS during the years 1961-62, 1967-68, 1970-71 and 1973-74. In addition, the Indian Institute of Public Opinion (IIPU) conducted a comparable survey of consumer expenditure for 1977-78. The surveys have been done separately for the rural (comprising approximately 80% of the total population over the 1960-80 period) and urban areas (except for the IIPU 1977-78 urban cross-section consumption data which is not comparable).

Given the available data, it is possible to use the properties of Engel Curves to estimate the amount of leakage. The exercise is possible because in one of the years 1961-62, there were no price and distribution controls and consequently this year can be used as a base year of 'no-controls' when sugar consumption was unconstrained. In principle then, an Engel Curve of unconstrained consumption can be constructed by
running a regression on the 1961-62 cross section data and using the coefficient estimates to obtain 'unconstrained' consumption estimates during partial-control years. Comparison of these estimates with actual levy quotas would provide an estimate for the leakage.

As noted in earlier chapters, the market for sugar in India prior to 1967-68 was characterised by periods of total control of pricing and distribution and short periods of total decontrol (between the years 1952-53 and 1957-58 and for the years 1961-62 and part of 1963-64). Consequently, consumption estimates for various income-classes for these periods can be used to develop projected 'free-market' consumption estimates for partial control periods and a comparison of these projected 'free-market' consumption estimates with actual per capita levy sugar quotas for every income class in control years would provide indirect estimates of the amount of leakage. Conceptually, this procedure involves the construction of Engel Curves for sugar based on the cross-section data under free-market conditions (decontrol years), projection of estimated consumption for partial control periods using the Engel Curves so developed and the estimation of the quantum of leakage by comparison with the levy quota per capita in these years.

The appropriateness of such a procedure is borne out by considering the features of the Indian market for sweeteners.
discussed in Chapter 3. The manufacture of white sugar is done in the organised sector, while the manufacture of gur and khandsari are in the unorganised, largely rural sector. There are no price, distribution or other controls (though the government has attempted to impose controls on gur on the behest of the sugar industry) on these inferior substitutes. Prices for gur fluctuate but are typically less than the controlled price of sugar while prices of Khandsari fluctuate around the controlled price of sugar and are less than the free-sale price of sugar. As noted in the excerpts quoted earlier, consumers in lower income classes particularly in the rural areas divert their ration to the free-sale market and consume the inferior quality gur and khandsari. The producers of sugar and the trade also divert sugar particularly in the rural areas where the distribution network is relatively underdeveloped and considerable scope exists for such diversion by indulging in rent-seeking activity with government officials.

The use of the unconstrained estimates as benchmarks for the calculation of leakage constitutes a limitation of the approach. To the extent that there have been systematic changes in a myriad of variables affecting sugar consumption such as tastes, prices, the technology of consumption caused by increasing urbanisation, monetisation, the development of new foods etc., the estimate is likely to be biased. However,
it is difficult to determine either the magnitude or direction of error that these omissions introduce without a careful multivariate analysis. The latter was made difficult by the lack of availability of data.

Implementation of the Estimation procedure and Empirical Estimates

Data on total consumption expenditure and expenditure on sugar for different income classes was obtained from the Reports on Consumption Expenditure published as part of the N.S.S. conducted by the Central Statistical Organisation (for 1961-62, 1967-68, 1971-72, and 1973-74) and from A Report on An Integrated Sugar Policy for India 1977-1984 published by the I.I.P.U. in 1977. The N.S.S. reports provide the distribution of persons by thirteen expenditure classes for rural and urban areas respectively. Since average consumption expenditure for the 'partial-control' years had to be deflated to 'base year' (1961-62) price levels and only decile class specific price indices provided by Radhakrishna and Sharma (1973) were available, the thirteen expenditure classes were reduced to ten by the assumption of lognormality of the distribution of the population with respect to per capita total consumption expenditure as is assumed by Iyengar (1960, 1968) and Radhakrishna and Sharma (1973). This log-normality assumption is frequently used in studies on consumption expenditure and population.
The procedure of estimating the Engel Curves and the quantum of leakage was as follows:-

(1) The N.S.S. cross-section data for the base 'no-controls' year, 1961-62 was used to run the following regression so as to estimate separate Engel Curves for rural and urban areas,

\[ {\text{CES}}_i = \alpha_0 + \alpha_1 {\text{TCE}}_i + e \]  

where

\( {\text{CES}}_i \) is the per capita consumption expenditure on sugar (Rs./month) for income class \( i \) during 1961-62.

\( {\text{TCE}}_i \) is the per capita total consumption expenditure (Rs./month) for income class \( i \) during 1961-62.

(2) The decile class specific price indices provided by Radhakrishna and Sharma (1973) were used to deflate the actual per capita total consumption expenditure for each income class in the 'partial control' years (1967-68, 1970-71, 1973-74 and 1977-78) to 1961-62 levels.

(3) The deflated per capita total consumption expenditure estimates obtained for each income class in (2) above were plugged into the regression equation (9.1) to obtain the estimated per capita consumption expenditure on sugar (CES) for the corresponding 'partial control' year \( i \) for each income class.

(4) The estimated per capita sugar expenditure so obtained in (3) was converted to the corresponding current price
level for each year using the general price index for all commodities contained in Radhakrishna and Sharma (1973).

(5) The quantum of estimated sugar consumption per capita for each income class was obtained by dividing the estimated consumption expenditure per head obtained from (4) above by the levy sugar price prevailing in each of the 'partial control' years.

(6) The per capita actual levy sugar quota for each of the control years was then computed from the published data on levy sugar availability. This task was simplified in terms of the allocation of sugar to different income classes by the government's policy of allotting the same levy sugar quota per head irrespective of income levels.

(7) Estimates of leakage were obtained by comparing the actual per capita levy sugar quota obtained in (6) above with the per capita consumption estimate obtained in (5). If the per capita levy quota exceeded the estimated per capita consumption of any income class then the excess was taken to be the leakage from the levy market to the free-sale market.

(8) The total quantum of leakage of levy sugar into the free-sale market was then obtained by aggregating over income classes and by pooling together the estimates for urban and rural areas using appropriate weights based on the geographical distribution of the population.
The Engel curves actually obtained by implementing the procedure were the following:

1) Rural Areas - All India (Based on 1961-62 N.S.S. Data):

\[
\text{CES}_R = -0.9461 + 0.082986(TCE)_R \\
\text{R}^2 = 0.944 \\
\text{D.W.} = 0.71
\]

2) Urban Areas - All India (Based on 1961-62 N.S.S. Data):

\[
\text{CES}_U = -1.6899 + 0.81860\log(TCE)_U \\
\text{R}^2 = 0.918 \\
\text{D.W.} = 0.58
\]

It can be seen that a linear function for the rural areas and a log function for the urban areas provided the best fit. This is consistent with the results contained in the IIPU Report (1977) and James (1980) and the fact that urban consumers have a relatively higher consumption level of sugar for all income classes as compared to the rural areas. As the IIPU Report puts it,

"... the demand for sugar in urban areas does, indeed, taper off in its rate of increase after consumer expenditures reach a per capita level... of about Rs. 60 per capita per month. But this is by no means the case in rural areas where there is obviously a powerful thrust for more sugar as incomes rise." (IIPU, 1977, pp 6-7)

The quantum of leakage of levy sugar calculated using the Engel Curve conversion procedure is given in Table 9.1. The tonnage varies from 28.8% of levy output 1967-68, the first
year of the partial-control regime to 1.4% in 1977-78 when a number of the features of partial control were relaxed. The market value of the leakage varies from Rs. 35.1 million in 1977-78 to Rs. 1195.8 million in 1970-71. These numbers are considerably less than the figure quoted by the Indian Union Minister for Agriculture in the 1977 newspaper piece quoted at the beginning of the chapter. This reflects the conservativeness and the approximate nature of the procedure adopted. This aspect is discussed in the next section.

It can thus be seen that the quantum and value of leakage of sugar from the levy to the free-sale market as calculated using the indirect estimation procedure is quite large. The leakage value itself directly translates into 'black' money in the Indian underground economy with all the resultant distortions on economic activity and public morality.

Limitations and Strengths of the Indirect Estimation Procedure

The indirect procedure for the estimation of the amount of leakage from the levy to the free-sale market has a number of limitations. These limitations are likely to make the estimates necessarily imprecise but nevertheless provide some idea of the magnitude of the leakage problem. The estimate is also likely to be an underestimate because of the inherent features of the procedure adopted. These issues are discussed
A major limitation of the procedure is that it assumes stability in the structure of consumption over a period almost twenty years apart (1977-78 versus 1961-62) when the country was in fact developing quite rapidly with consequent changes in structure. The availability of only one year's data (1961-62) when there were no controls is likely to limit the reliability of the estimates. Between 1961-62 and 1971-72 the economy went through a period of rapid monetisation and industrialisation when rural areas become increasingly exchange-oriented with an increased penetration of sugar as a sweetener. This feature is however likely to bias the estimates downward since with increased monetisation consumers, especially in rural areas, are going to be facilitated in their ability to sell sugar on the 'black' market (or in this case illegal component of the open market). However, the direction of bias due to other factors such as the price, technology of consumption, etc. are likely to be uncertain.

The fact that the estimates of leakage reduces in later years (e.g. 1977-78) also points towards this limitation of the procedure. If the estimates had been revised to account for a 'shifted' Engel Curve in the seventies, the lower figures may have been revised upward.

The Engel Curves estimates themselves are obtained by
aggregating the cross-section data on different income classes. This aggregation may be excluding certain important component effects such as higher income classes not availing of their levy sugar quota thus leading to a further leakage to the open market of these amounts by the concerned middleman. This is likely to bias the estimates downwards again.

The relevant price for the lower income classes should be the open-market price and not the levy price. Consequently, actual consumption by the lower income classes may be lower than that recorded by the NSS survey procedure, particularly because of the non-essential nature of sugar and the existence of gur as a substitute. Once again this is likely to bias the estimates downwards.

Despite these limitations, the existence and probable magnitude of leakage in the partially suppressed market in sugar is indicated by the results of this chapter. The existence of such leakage as a source of corruption and black money should give policy-makers a rationale for reconsideration of the policy regime and freeing up of market forces to increase consumer and national welfare.
### Table 9.1

**Leakage of White Sugar Calculations**

*(Based on 1961-62 Engel Curves)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity of Leakage Rural</th>
<th>Quantity of Leakage Urban</th>
<th>Quantity of Leakage Total</th>
<th>Market Value of Leakage Rural</th>
<th>Market Value of Leakage Urban</th>
<th>Market Value of Leakage Total</th>
<th>Leakage Quantity as % of Total Levy Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967-68</td>
<td>629570</td>
<td>16460</td>
<td>646030</td>
<td>1082.9</td>
<td>28.3</td>
<td>1111.2</td>
<td>28.8</td>
</tr>
<tr>
<td>1970-71</td>
<td>646020</td>
<td>2860</td>
<td>648880</td>
<td>1190.6</td>
<td>5.2</td>
<td>1195.8</td>
<td>17.4</td>
</tr>
<tr>
<td>1973-74</td>
<td>258220</td>
<td>2350</td>
<td>260570</td>
<td>983.3</td>
<td>9.0</td>
<td>992.3</td>
<td>6.6</td>
</tr>
<tr>
<td>1977-78</td>
<td>9310</td>
<td></td>
<td>9310</td>
<td>35.1</td>
<td></td>
<td>35.1</td>
<td>1.4</td>
</tr>
</tbody>
</table>
FOOTNOTES TO CHAPTER 9

1. The method used was developed independently but refined after a discussion with R. Rajagopalan of the Indian Institute of Rural Management, Anand, India. Rajagopalan has used this method to estimate the amount of leakage in his thesis. The method is similar to the one used by Gutmann (1977) and Feige (1979) in the estimation of the underground economy in the United States.

2. The low figure for 1977-78 is also due to the incompleteness of the I.I.P.O. survey.


4. See Chandavarkar (1977) and Ghatak (1978) for a discussion of the effects monetisation and development on consumption and investment patterns.

5. This is parallel to the black-market case for a completely suppressed commodity where the relevant price for the consumer is the black-market price and not the rationed price. See Tobin (1952) for a discussion.
CHAPTER 10

A BRIEF OVERVIEW OF PROTECTION AND CONTROLS
IN THE INDIAN CEMENT INDUSTRY.

Introduction

Cement manufacturing is an old and well established industry in India. It employed over 100,000 persons (including persons employed in limestone quarrying) in 1981-82 and accounted for around 1.3% of industrial production. India ranked as the eighth largest producer of cement in 1981-82. There were 66 integrated cement plants, three mini-cement plants and two special-products plants in that year with an installed capacity of around 30 million tonnes per annum and actual production of 21 million tonnes.

Cement was first produced in India in 1904 but the industry began to grow rapidly in the mid-thirties and during the Second World War after it was granted protection by a recommendation of the Tariff Board. The government, under pressure from the industry progressively lowered the quantum of imports in order to encourage the domestic production of cement. The Tariff Board in a 1924 report explicitly recommended the setting up of a coordinating body of producers (set up as the Indian Cement Manufacturers Association in 1925) to coordinate the marketing and pricing of cement in "an orderly manner". The Cement Marketing Co. of India Ltd.
was formed in 1930 to "promote and control the sales and distribution of cement" (Podder, 1966 p.5).

With the cartelisation of the industry in the form of the Cement Manufacturers Association (CMA) and the fixation of prices by the industry came a corresponding rapid expansion of the industry. Between 1925 and 1937 production capacity increased from around 450,000 tonnes to 1.5 million tonnes. However, chiselling on production quotas produced cut-throat competition undermining the intent of the CMA. Subsequently, in 1936, all the cement companies but one merged to form the Associated Cement Companies. A new group immediately entered the industry with five new factories and a second price-war ensued. The CMA was reactivated to work out a reapproachment between the two groups which resulted in a stabilisation of prices and profits to the advantage of both groups. By the time of independence in 1947, the installed annual capacity had increased to around 3.3 million tonnes with an actual production of 2.95 million tonnes in 1950-51 at the beginning of the first Five-Year Plan.

Post-Independence Growth

The annual rate of growth of installed capacity averaged about 9% during 1950-51 to 1971-72 but declined to about 3% during the period 1971-72 to 1978-79 mainly due to restrictive government policies with regard to licensing and pricing. The
growth of installed capacity and production recovered in 1979-80 following the relaxing of government pricing and licensing policies. Table 10.1 shows the growth in capacity and production in the post-independence period.

The post-independence period also witnessed other developments in the industry. The government adopted a conscious strategy of self-sufficiency not only in cement production but also in cement machinery manufacture. There was a shift from the more energy-intensive and less efficient wet process cement kilns to more efficient dry process kilns. There was also a shift to large kiln sizes in the setting up of capacity. The 1970's witnessed severe shortages in the availability of coal, railway wagons, power and chronic labour problems, and the consequent decline in the growth of the industry. As already mentioned throughout this period installed capacity and production stagnated because of two policy measures:

(a) restrictions on the licensing of new capacity in order to limit the expansion of the large industrial houses that controlled the major share of capacity in the industry and

(b) a policy of "inadequate" increases in prices so as to ensure an "adequate" rate of return on investment.

The government also embarked on a policy of introducing and increasing the share of the public sector in the industry by setting up the Cement Corporation of India in 1965. By
1980-81, there were 17 public sector plants out of the sixty-six integrated plants which accounted for about 15% of the installed capacity in the industry.

Imports have been virtually nonexistent for most of the period since 1950-51 though small amounts (0.03-0.10 million tonnes annually) were imported in the 1961-65 period. However, since 1977-78 because of the chronic shortages the government has been importing about 1.3 to 2.0 million tonnes annually. The government has also followed a policy of subsidising the export of small amounts (about 0.10 to 0.30 million tonnes per annum) of cement till 1976-77.

Since the early sixties there has existed an almost chronic shortage of cement in India - all except for the years 1966 and 1967 when there was partial decontrol of prices and distribution as also in 1976 when the government restricted construction activity. The shortage has been variously estimated (e.g. Dagli Committee Report (1979), Tariff Commission (1974)) to be between 15-25% of annual consumption. A thriving black market has existed in the product throughout the period (cf. Dagli Committee Report (1979), NCAER (1978)). Black market prices have been reported in the lay press to be between 25-200% higher than the controlled prices. Since 1968, there has existed a three-tiered system of distribution which has resulted in the creation of a number of margins for rent-seeking activities and widespread corruption.
Framework of Controls in the Indian Cement Industry.

The post-independence period has been one of licensing, price and distribution controls on the entire output of the industry except for the years 1966 and 1967 when there was complete decontrol. The chronology of controls is presented in Table 10.2. Starting with the uniform price controls fixed by executive order during the 1947-1953 period, the Tariff Commission recommended 'base prices' for eight companies and differential prices for higher-cost units on a cost-plus basis in 1953. The government fixed differential prices on the basis of this recommendation. Subsequently these prices were revised in 1956 (temporary uniform price and reversal) and in 1958 on the basis of another Tariff Commission enquiry.

In 1961, the Tariff Commission, on the basis of a fresh enquiry recommended ten separate retention prices and an escalation price formula for increases in the prices of coal and fuel. The government however fixed a uniform retention price at the lower end of the recommended range.

Ex-works cement prices were increased four times between 1961 and 1966 as a result of intensive lobbying by producers. The producers also made a strong representation for decontrol of the industry and as of January 1966 cement was decontrolled 'so that producers could launch their expansion programmes'. Distribution controls were removed while price controls were partially remove. However, a central coordinating
organisation of producers called the Cement Allocation and Coordinating Organisation (CACO) was set up to regulate the production and distribution of cement. The Central and State governments were assured a maximum of 50 per cent of total production under this scheme. Licensing of capacity was also decontrolled in July 1966. A large amount of capacity (over a million tonnes) was installed over the next two-year period.

However, the 'voluntary' control over the industry described in the previous paragraph was replaced by Government control over the industry in January 1968. This was due to substantial pressure from small and single unit producers, public sector units and state governments to reimpose controls since they argued that "the supply position was not good."

What followed was a long period of price and distribution controls under the cement control order of 1967. Uniform F.O.R. prices with multiple ex-works prices were periodically implemented and revised. A formalised system of freight and price pooling was adopted to ensure a uniform price to the consumer. Higher uniform (ex-works) retention prices were fixed under a Tariff Commission enquiry in 1969 and these were revised in 1973 and 1974. After that prices were changed from time to time but a feature of these price changes was the fixation of prices at a level much lower than that recommended by the appropriate government tariff body. There was a marked slow-down in the growth of capacity and production from 1974.

259.
to 1979 due to "the lack of adequate investment opportunities in the cement industry in response to the low retention price as fixed under the Tariff Commission formula" (Dagli Committee, 1979, p. 284).

Finally in 1978-79, the price formula was revised and substantial price increases granted resulting in a recovery of the growth of installed capacity and production. The system of controls was finally changed in 1981-82 when the full-control regime was replaced by a partial-control regime similar to that prevalent in the sugar industry. Licensing controls however were retained throughout the 1969-1982 period except for the 1966-1969 period.

As already discussed, with the exception of the years 1966 and 1967, there has been a government controlled system for the distribution of cement since 1958. Prior to 1958, cement distribution had been in the hands of the government-owned State Trading Corporation since July 1956. This corporation was also to channelise the imports and exports of cement subsequently. Even during the 1951-56 period the distribution of cement through private marketing companies were controlled by the government. As also noted above, during the two years of decontrol in 1966 and 1967, a producer body (CACU) "voluntarily" controlled the distribution of cement. Thus, throughout the 1951-82 period the distribution of cement was controlled in one way or the other.
Under the centralised system of distribution that prevailed since 1958, the Office of the Cement Controller in the Ministry of Industry was made responsible for regulating the distribution of cement after assessing its likely availability and demand. Cement was distributed under the Central Government Quota and the State Government Quotas. Each of these categories was further subdivided between reserved categories under rate contract (RC) and other than rate contract (ORC) sales. RC sales denoted cement requirements of the Central and State Governments where as ORC sales referred to the reserved categories earmarked for high priority industries sponsored by the Central Government. In addition to these two categories, State Governments administered the "Free-Sale" category which referred to sales to the general public. Previously, in the fifties and sixties the distribution of "free-sale" cement had been done through independent selling agencies appointed by producers and with definite marketing zones earmarked. Widespread black-marketing and corruption led to a new distribution system being introduced in most parts of the country from October 1, 1968. The new policy vested the full responsibility of distribution of cement to the State Governments. Needless to say, the magnitude of black-marketing of the commodity has not abated as a result of this change.

In terms of magnitude, the "Reserved Category" comprising
both the Central and State Government quotas has varied between 40 per cent and 70 per cent of total sales.

The industrial licensing controls that have applied to the cement industry under the 1951 Industries (Development and Regulation) Act cover both the setting up of new capacity and the expansion of existing capacity. In addition, particularly since 1973, these policies have discriminated against large business houses and in favour of smaller applicants who have not been in a position to subsequently implement the licenses granted to them. Preference has also been given to the public sector in implementing new capacity but has been delayed considerably due to the longer gestation lags involved in implementing public sector projects because of administrative inefficiencies and lack of implementation capability.

The system of distribution, licencing and pricing, particularly the system of freight-pooling to equalise the price of cement to the consumer all over the country, has played a critical role in influencing the locational pattern of the industry. It has led to a concentration of capacity in the South, with relatively superior quality limestone, and a bias against setting up capacity in heavy cement-deficit areas in the North and East. The average lead-distance for cement transportation has steadily increased since freight-pooling was introduced in 1968. Cross-hauling of cement between North and South has been a common feature putting a
severe strain on the already overburdened transportation system.

All these features of the control system have contributed to the situation of acute cement shortages and black-marketing alluded to earlier. For example, since 1976, a year of adequate supply because of government restrictions on consumption, there has been a steady decline in the availability of cement on the open market. Open-market availability declined from 10.4 million tonnes in 1976 to 8.7 million tons in 1979 due in part due to supply constraints and to increases in government offtake. The cement 'shortage' has weighed most heavily on private users though it is also very often the case that high priority projects of the government have been held up due to the non-availability of cement.

Like the sugar industry, controls in the cement industry have been actively instigated and supported by a majority of manufacturing and trading interests within the industry. This is borne out by the representation made to the government by the CMA whenever there has been an attempt in 1968 to decontrol the industry. As the Economic and Political Weekly puts it,

"Under the protection of retention price and freight pool, cement manufacturers have generally revelled in a seller's market with cement production always slightly short of demand. In 1968, when it appeared that supply was at last exceeding demand, they managed to secure subsidised export in the name of 'cultivating an export market potential' and got the
decision to end price control from January 1969 waived on the pretext that the more distant markets within the country would suffer."

(EPW, "Shortage" at Last!, March 13, 1971 p.602)

The intense lobbying by the industry that followed the announcement of the intention of the government to decontrol the industry was commented on as follows,

"The decision to decontrol cement was reversed in December 1969 ... Industry had wanted control to continue and there was no paradox here. With the cement market showing evidence, after nearly three decades, of turning into a buyer's market, the majority, of cement manufacturers were shying away from the novel experience of competition. The industry's agitated pressures on Government were supported by the Madras High Court's decision which made the question of decontrol sub judice ... Control has benefited producers by pegging prices to costs and indirectly encouraging producers to operate as a cartel."

(EPW, Uses of Cement Control, March 20, 1970 p.584-
85)

Not all producers have been in favour of the continuation of control. The largest and most geographically diversified producer, Associated Cement Companies Ltd. (ACC) has consistently argued for the removal of controls particularly under the Chairmanship of Nani Palkhiwala, a prominent Indian barrister and champion of free markets. His remarks after partial decontrol of cement was announced in 1981-82 reflect the vested interests that were embedded in the control regime.

"The Dark Age of the grey product ended on February 28, 1982. That date represents a milestone in the history of cement. The industry has writhed for four decades under the crushing burden of wholly irrational price control. Politicians and bureaucrats in public administration, and racketeers and buccaneers in private deals, made fortunes at
the expense of the common man and the exchequer, while the honest manufacturer was left with no resources even to maintain his plant. Cement control had to result in one Chief Minister being summarily deposed and two others being severely discomfited, and the generation of black income from cement had to reach the level of Rs. 7000 million per annum before the king-size folly of controls dawned upon us." (Chairman's Statement at the A.G.M of A.C.C, December 17, 1982).

The Tariff Commission Report (1974) also pointed out the malpractices that occurred at times of cement shortage and especially focussed attention on the gains made by stockists/dealers and manufacturers and their interest in retaining control. These malpractices included charging black-market prices, leakages of cement from the Government quota, collection of advance payment for supply and subsequent delay of delivery of cement as well as adulteration and tampering with packaging.

In evidence tendered to the Dagli Committee on Controls and Subsidies (1979), one regional Cement Stockists Association indicated that "the beneficiaries of black market operations have in the past been substantially the manufacturers, the rough distribution of the "margin" between the manufacturer and stockist being 3:1." The Dagli Committee went on to note,
in terms of black money generation through controls are too well known to be recounted. A major source of leakage of cement, according to the cement stockists and distributors is from government projects, where the contractors engaged in construction do not use the quantum of cement allotted and siphon it off for sales in the black market."

(Dagli Committee (1979), pp. 289-90)

The experience of comprehensive controls in the Indian cement industry has thus been similar to that in the sugar industry with the creation of a number of margins for rent-seeking, corruption and welfare losses to society. The economic consequences of these controls are examined in the next few chapters.

Nature of the Full Control Regime in the Indian Cement Industry

I briefly summarise the salient features of the control regime in the Indian cement industry in order to facilitate an understanding of the analysis that follows.

The structure of the regime of full control applied to the Indian cement industry is given in Figure 10.1.
The government, through the office of the Cement Controller (C.C.O.), regulates the procurement and distribution of the cement produced by fixing various priorities and quotas for the different categories of consumers. Licensed stockists and government agencies are responsible for the physical distribution of cement according to the directives of the Cement Controller's office under Central, State government and Free-Sale Quota categories. Stocks are controlled similarly with exports and imports also channelised through government agencies like the State Trading Corporation of India. Producers are paid a retention price based on the periodic...
reviews of the Tariff Commission while cement consumers obtain their allocations at a uniform price arrived at through a system of freight-pooling. Prices are announced in advance of actual production or consumption.

Black-markets in cement have been a common feature with both producers and stockists-agents allegedly diverting supplies to these markets.

The intervention of the government between the producers and final consumption sectors effectively works to separate the demand and supply sides of the Indian cement market. It is the government's policy response to the interest groups and shortage/excess situation which brings demand and supply into equality. Stocks and exports/imports along with activities in the black markets are factors in achieving this equality. These factors and the price-setting feature of the system therefore permits the separate estimation of demand and supply as has been done in the following chapters.
### Table 10.1
*Summary of Growth of the Indian Cement Industry*

<table>
<thead>
<tr>
<th>YEAR</th>
<th>INSTALLED CAPACITY (Million tonnes)</th>
<th>PRODUCTION ACHIEVED (Million tonnes)</th>
<th>CAPACITY UTILIZATION (%)</th>
<th>AVERAGE RATE OF GROWTH OVER PREVIOUS FIVE YEAR PERIOD (CAPACITY)</th>
<th>(PRODUCTION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>3.28</td>
<td>2.95</td>
<td>90</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1955-56</td>
<td>5.02</td>
<td>4.60</td>
<td>92</td>
<td>8.9</td>
<td>9.3</td>
</tr>
<tr>
<td>1960-61</td>
<td>9.30</td>
<td>7.97</td>
<td>86</td>
<td>13.2</td>
<td>11.2</td>
</tr>
<tr>
<td>1965-66</td>
<td>12.00</td>
<td>10.82</td>
<td>90</td>
<td>5.2</td>
<td>6.2</td>
</tr>
<tr>
<td>1970-71</td>
<td>17.61</td>
<td>14.35</td>
<td>82</td>
<td>8.2</td>
<td>5.8</td>
</tr>
<tr>
<td>1975-76</td>
<td>21.14</td>
<td>17.27</td>
<td>82</td>
<td>3.7</td>
<td>3.8</td>
</tr>
<tr>
<td>1980-81</td>
<td>26.59</td>
<td>18.56</td>
<td>70</td>
<td>4.6</td>
<td>2.5</td>
</tr>
<tr>
<td>1981-82</td>
<td>29.29</td>
<td>21.07</td>
<td>72</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>YEAR/PERIOD</td>
<td>TYPE OF CONTROL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1925</td>
<td>Tariff Protection; Voluntary Price and Distribution Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1942</td>
<td>Government Price and Distribution Control under Defence of India Rules</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1946 - 51</td>
<td>Government Price and Distribution Controls by Executive Order</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1951 - 53</td>
<td>Government Licensing and Price Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1953</td>
<td>Government Licensing and Price Controls (Tariff Commission); Voluntary Distribution Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1958 - 66</td>
<td>Government Licensing, Price (Revised Tariff Commission) and Distribution Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960 - 67</td>
<td>Decontrol of Prices and Distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>Voluntary then government control over Price and Distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968 - 78</td>
<td>Government Licensing, Price and Distribution Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978 - 81</td>
<td>Central Government Price and Licensing Control and State Government Control over Distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. This section is based on NPC (1978) and Podder (1966).

2. The material in this section is based on the Dagli Committee Report (1979), NCAER (1979), NPC (1978) and various Tariff Commission Reports (e.g. 1953, 1961, 1974).
CHAPTER 11

MODELS OF ECONOMIC BEHAVIOUR IN COMPLETELY SUPPRESSED MARKETS

Introduction

The economic analysis of completely suppressed markets giving rise to black markets has received considerable attention by economists. Moulding (1947), Bronfenbrenner (1947, 1949), Browning and Culbertson (1973), Cheung (1974), Galbraith (1946, 1952), Gohesay (1966), Gould and Henry (1967), Michaely (1954) and Mukherji, Pattanaik and Sundrum (1980) have analysed the economic consequences of binding price controls on a commodity in terms of the black markets that arise from such regulation. The imposition of complete price and distribution controls on a commodity typically gives rise to black markets where some amount of the output is sold and bought illegally as a means of circumventing the price and quantity controls. Circumvention may also take a variety of other forms such as quality and quantity adjustments and pairing or tying the purchase of one commodity to another.

In this chapter, I model the behaviour of consumers and producers in markets where the government procures and sells all the output produced privately of a particular commodity at a fixed price with sales banned otherwise. Once again, the
analysis is carried out assuming the absence of lobbying and capture-type DUP behaviour. The insights of the analyses mentioned above are used to model completely suppressed market behaviour. Then derive implications regarding the diversion of economic activity to other uncontrolled margins. Some qualitative implications are finally derived in terms of rent-seeking and capture-type behaviour.

Derivation of Demand Functions in Completely Suppressed Markets

In order to simplify the discussion, consider a consumer under price and distribution controls as shown in Fig. 11. Let $X$ represent the completely suppressed (price-controlled) commodity and $Y$, money income or all other goods. $X$ represents the amount of the commodity $X$ that can be bought with initial income $OM$. In a situation of no controls, the consumer will attain equilibrium at the point $L$ where his highest attainable indifference curve is tangent to the budget line, $MN$. He will consume $OA$ of $X$ and spend $OD$ on all other commodities.
Suppose now price control is introduced and the relative price of $X$ changes from $OM$ to $OM'$. If there is no rationing of the commodity, the consumer's equilibrium position will shift to $M'$ with a larger quantities $CB$ and $CE$ of both $X$ and all other goods being consumed. The consumer now attains a higher level of utility represented by indifference curve $I_1$. If the consumer's income were now to be reduced so that he could only attain the original consumption bundle given by $L$, nevertheless he would choose a bundle given by point $N'$ on the new budget line $M'N'$ drawn parallel to $MN'$ through $L$. This is because he could attain a higher level of satisfaction on indifference curve $I'_S$ consuming relatively more of the $S$. 

**FIGURE 11.1**

**CONSUMER CHOICE IN COMPLETELY SUPPRESSED MARKETS**

274
now cheaper good X. The amounts of X and Y consumed would be \( QC \) and \( OF \).

No sensible government would be able to sustain such a price control scheme for long. Some sort of rationing would normally be introduced along with the price controls, thus preventing each consumer from obtaining more than some maximum quantity of the controlled commodity. Suppose \( OQ \) is the amount of the ration-quota fixed for this consumer (usually, it will be less than the original amount \( OA \) of the commodity consumed in order to maintain solvency of the scheme but could be larger). Then it will no longer be possible for the consumer with income \( OM \) to reach the point \( M_e \). Instead a new equilibrium will be attained at the point \( R' \), where \( MN' \) cuts \( QQ' \), the ration-line. \( R' \), however, now lies on a lower indifference curve \( I_1' \) (for expositional purposes the same as the initial unconstrained indifference curve attained) than \( e_0 \) the point \( M_e \). This implies that the consumer is worse off under rationing than in a free market, given that prices and income are the same in both cases. He will now consume less of the controlled commodity - \( OQ \) rather than \( ON \) - and more of the other commodities - \( OG \) instead of \( OE \).

Let us now suppose that \( OQ \) is less than the consumer's actual requirement (say that he is building a house and the amount \( OQ \) of cement allotted to him at the controlled price is inadequate). Given that the consumer's notional consumption
requirement point is the same as that given by the point \( M \), the consumer will be willing to spend income \( RR' = EG \) (or more) to get the additional amount \( Q_B \) of the rationed good. Given that no amount of extra \( X \) can be obtained at the controlled price, the consumer will be prepared to buy the amount in the black-market by paying higher prices (there will also be costs of apprehension and opprobrium attached to getting caught in the black market which will make the black market price higher). If \( MN'' \) is the budget line obtained by factoring in apprehension/punishment costs into the black-market price, then the consumer could achieve a higher level of utility given by the 'black-market' indifference curve \( \Gamma \). The black-market price inclusive budget line could very well be steeper than the status quo ante budget line \( MN \) but for this consumer it would be attractive to direct his purchases along this line as long as he could achieve a higher indifference curve than \( \Gamma \).\( \Gamma 
\)

Using the apparatus in Figure 11.1, demand curves for the consumer can be derived. A price-consumption curve can be obtained by drawing a family of lines through \( M \), keeping track of each corresponding free-market and constrained market (black market) relative locus. (In fact with black market costs factored in to the budget line, the intercept on the \( Y \) axis, may be different from \( M \).) This should provide free-market and black-market demand curves. Similarly, income-
consumption curves can be derived by drawing lines parallel to $MN'$ and $MN''$. It can be seen that both the price-consumption curve and the income-consumption curve and the income-consumption curves will coincide with $QQ'$ as long as $ON'$ is greater than $QQ$. This is to be expected, since if rationing is binding and enforceable and there is no rent-seeking, all additional income has to be spent on non-rationed goods and therefore there is no substitution effect in the rationed market. However, this is not true in the accompanying black market and therefore both income and substitution effects can be derived and demand curves obtained. The diagram then acts as a serious limitation to demonstrate this.

The consumers choice problem with respect to operating in the black-market could be shown differently from Figure 11.1 but similar to Figure 4.1. In that case however the analysis would have to be modified to include the effects of apprehension/punishment costs in one segment of the kinked budget line. The broad analysis would however be similar.

The above analysis is however constrained in its generality by having to factor in the costs of purchasing in the black-market into the budget-line. It is more instructive to make the penalty structure more explicit in the analysis. I attempt to incorporate this aspect below. The analysis is conducted at the market level instead of for the individual consumer.
The simplest representation of the situation in a completely suppressed market for a single commodity has been shown in Figure 6.2. There it was shown that at the government-controlled price OP, only Q will be supplied and rents will be created by obtaining allocations at the controlled price OP and reselling the quantities so obtained at the black-market price OP. The maximum size of the rents so generated will be \( P \cdot \text{CAP} \) which will be wasted in rent-seeking and other directly unproductive costs such as waiting time in queues, bribery and corruption, lobbying, pay offs, concealment and detection costs.

The diagram can be extended to incorporate the effect of rationing (which is inevitable for any price control scheme) and a penalty structure. This is shown in Figure 11.2.
Suppose the ration issued to consumers is \( OQ \) and the government penalises anyone caught buying more than the rationed quantity with an amount equal to \( AF \) (greater than \( AC \) the black-market premium) per unit of the commodity purchased. The demand curve for the controlled commodity then becomes \( DAFG \). Similarly if a seller violating the controls is charged a penalty equal to \( HC \) (greater than \( AC \)) per unit, the supply curve then becomes \( SCHI \). In this case black-market supply and demand segments of the modified curves namely \( HI \) and \( FG \) do not intersect and because of the extremely onerous penalty structure (which in this deterministic framework applied with complete certainty) there is no black market.

However, if the penalty structure were less onerous so that the penalty per unit were less than the initial black-market price paid per unit, we might get modified demand and supply curves given by \( DAF'G' \) and \( SCH'I' \) for example. In that case \( P' \) would be final equilibrium price in the black market and could lie above or below the free market price. The penalty in this case acts as an excise tax on sellers and a consumption tax on buyers. It can be seen that the larger the penalty on buyers the lower the black-market price while the opposite is the case for penalties on the seller. Of course in the case of either type of penalty the quantity black-marketed is reduced assuming that there is no rent-seeking or other DUP-type activity. Thus in a world without rent-
seeking, penalties on buyers are a better measure than penalties on sellers if the objective is to lower the price in the black market. The practical difficulties of enforcing penalties on buyers may however suggest that penalties may be applied more successfully to sellers.

It is to be noted in the deterministic analysis without rent-seeking presented above that with DA\(\text{F}G\) and SCHI as the relevant demand and supply curves and rationing of OQ of \(X\), buyers always gain the area \(\text{PCBP}\) minus area \(\text{ABE}\), i.e. the net transfer from sellers to buyers minus the loss in consumer surplus. Sellers, on the other hand, lose the net transfer, \(\text{PCBP}\) plus the producer surplus lost, \(\text{CBE}\). The price control and rationing scheme has the result of giving buyers income equal to \(\text{PCAP}\), which is the value of the ration rights granted obtained by multiplying the amount of commodity represented by the ration rights by the relative price they would command if there were a free market for such rights, \(\text{BC}\).

However, with rent-seeking the gains to buyers are likely to prove illusory. The unfulfilled demand \(\text{CJ}\) at the controlled price will translate into a black market as described before. Both buyers and sellers will engage in rent-seeking activity, in the limit competing away the whole area \(\text{PCAP}\) as an additional deadweight loss to society in addition to the two triangle losses \(\text{ABE}\) and \(\text{BCE}\) as well as the reduction in output and the raising of the actual underlying
price level (including black-market prices) above the official price level. Since price ceilings, rationing and enforcement are seldom likely to be completely effective, the waste of resources entailed by black-markets and rent-seeking is likely to be substantial.

Derivation of Black-Market Demand Curves

The above analysis provided the rudiments of the determinants of the black-market demand curve. The analysis was simplified considerably because it (a) implicitly assumed that the legally sold quantity is purchased only by those who would normally be prepared to pay the highest prices for it in a free market; (b) it assumed that black market demand is unrelated to black market supply in that the black-market demand curve implies an unchanged excess demand at the controlled official price.

As already mentioned, earlier approaches to the consumer's choice problem in the presence of black markets have ignored the incorporation of the penalty function on the demand side. In Appendix 11.1, I present a model of consumer behaviour in a completely suppressed market in the presence of both the official legal ("white") market and an illegal ("black") market. The consumer's maximisation problem can be modelled in a manner similar to that in "partially suppressed" markets with there being two markets for the
controlled commodity with two different prices. However, a number of features are different. Firstly, there is the inclusion of penalty and likelihood of detection functions associated with transacting in the black market. It is necessary to take this aspect into account in order to properly model behaviour in black markets. Secondly, unlike the free-sale market in the partially suppressed markets case, the black market is not a residual market but an interconnected market were black-market transactions are the outcome of a utility-maximising decisions made by consumers in order to meet their unfulfilled demands for the controlled commodity after taking into account the costs of participating in clandestine transactions. Consumer (and producer) behaviour is typically more constrained and amounts transacted in the black markets are typically (clandestine) diminutions of the amounts sold in legal markets.

The model presented in Appendix 11.1 is based on the following assumptions:

(1) The black market (and the white market) is assumed to be perfectly competitive and involve only one commodity.

(2) Each buyer always buys the amount provided in the official market at the controlled price and satisfies his unfulfilled demand in the black market after taking into account the costs of operating in such markets.

(3) The buyer does not resell the amount obtained in the
official market or the black market.

(4) There are penalties associated with buying in the black market.

Assumption (4) may seem a unrealistic given the difficulties of monitoring and penalising buyers. However, the majority of communist-bloc countries and a number of developing countries have laws that incorporate this feature in developing countries, apprehended buyers of black-marketed commodities face penalties if for no other reason than the existence of what has been called 'black money' (which represents income earned through illegal activity such as tax evasion and used to purchase black-market commodities) in such transactions. Governments are typically interested in unearthing 'black' money and therefore impose stiff penalties on both buyers and sellers in black-market transactions. For example, a commodity like cement, the production and sale of which is completely controlled in a number of developing economies, is usually monitored on the demand side by spot checks on suspicious construction and the requirement of having an official sales receipt on the part of the buyer.

Alternatively, the penalty function on the buyer's side can be looked upon as a cost function associated with the moral denigration of black market activity in most societies. Thus in the model, the buyer experiences an added cost for buying in the black market which increases both marginally and
at an increasing rate as the amount bought in the black market increases as also with the penalty (fine, jail sentence etc.) associated with the extant laws.

The consumer's maximisation problem detailed in Appendix 11.1 can therefore be characterised as the following expected utility maximisation problem:

\[
\begin{align*}
\text{Max } E(U) &= U(X, r)U(X, X, C(X, 1)) \\
&+ [1-D(X, r)]U((X, X, 0))
\end{align*}
\]

subject to

\[
\begin{align*}
&\text{B B W W} \\
P_x + P_x &= I - P_x = I \\
&\text{1 2 2 2 2 2}
\end{align*}
\]

where, the subscripts 1 and 2 denote the goods (good 2 is controlled), W and B stand for white and black, D() and C() represent the probability of detection and the cost function respectively, r and I represent resources expended by the authorities and the severity of the laws respectively.

Solving the maximisation problem gives the following black market demand curve,

\[
\begin{align*}
X &= f(P_x, P_x, P_x, X, 1, r, I) \\
&\text{2 1 2 2 2 2}
\end{align*}
\]

Thus black-market demand is a function of prices in the uncontrolled, black and white markets, the amount purchased in the white market, the laws and resources expended by the police and income.

Comparative static analysis gives the following results,
i.e. the following propositions are true:

**Proposition 1**  A unit increase in the resources spent on detection and apprehension may or may not reduce the amount of the commodity bought on the black-market.

**Proposition 2**  A unit increase in the tightness of the laws may or may not reduce the amount of the commodity bought on
the black market.

**Proposition 3** An increase in the black market price of the controlled commodity reduces the quantity demanded in the black market.

**Proposition 4** An increase in the amount of the official (white) quota of the controlled commodity will reduce the amount demanded in the black market.

**Proposition 5** An increase in the official quota of the controlled commodity will increase the amount demanded of all other uncontrolled commodities (it may be added that this is true only if the income effect for that commodity is positive).

Propositions 3 to 5 are intuitive and to be expected. Propositions 1 and 2 are surprising but are due to the signs put on the second partial derivatives of the utility function with respect to increased resources and tighter laws, in the cost function. They are likely to result in a situation where the comparative static results are a complex function of other derivatives. An intuitive explanation is provided in the appendix. The results are similar to those obtained by Mukherji, Pattanaik and Sundrum (1980) in the case of black-market supply.

The individual black-market demand function in (11.1) can be summed over all individuals to obtain the market black-market demand function.
\[ x = f(P, P', P, X, l, r, I) \] (11.8)

which is amenable to empirical estimation if data on black market prices and quantities can be obtained.

Derivation of Supply Functions in Completely Suppressed Markets

In this section a supply function is derived for a controlled commodity in the black market. The analysis is carried out for a competitive firm under black market conditions with a penalty structure incorporated. The analysis is carried out for a firm under deterministic demand conditions and penalty structures and is based on Browning and Culbertson (1973). Appendix 11.2 presents a mathematical model of competitive supply under uncertainty.

Browning and Culbertson’s analysis of competitive supply under black market conditions is predicated on the following assumptions:

1. The analysis is a partial equilibrium one in an increasing cost competitive industry with all firms having identical cost curves subject to permanent price controls.

2. It is assumed that demand curves are deterministic and are not affected by the distributional effects of price controls i.e. income effects on demand are negligible.

3. Buyers are not deterred by the penalties and transaction
costs involved in reselling in the black market.

(4) There is no rent-seeking or other DUP-type activity.

The situation of the industry and the individual firm is given in Figure 11.3.

**FIGURE 11.3**

**BLACK MARKET SUPPLY IN COMPLETELY SUPPRESSED MARKETS**

Figure 11.3 (a) shows equilibrium industry output of $Q_C$ with a controlled price $P_C$. Assuming that the penalty structure is so severe that firms sell only at the official controlled price, the firms equilibrium output is $q$ at price $P_C$ in Figure 11.3 (b). Since income effects are negligible (assumption 2) and buyers resell their official quota with impunity (assumption 3), the black market price $P_B$ depends only on total output of the industry. This makes $P_B$ the competitive black market price independent of total output.
sold in the black market. This is because assumption 2 and 3 equalize the marginal values of all consumers through exchange.

A penalty structure is incorporated by postulating an increasing linear average penalty per unit and a corresponding marginal penalty that exceeds the average penalty per unit. Diversion of output from the official to the black market will occur as long as price exceeds opportunity cost in the latter market. The marginal cost schedule in the black market equals the controlled price, \( P \) plus the marginal penalty (and if necessary any additional cost of operating in the black market). This yields \( MC \) as the black market marginal cost schedule. Black market output for the firm then is given by \( q \), the point above which \( MC \) and \( P \) intersect in Fig. 11.3 (b). Net revenue of the firm is increased by \( PP-H \). The firms supply schedule is thus given by the marginal cost curve \( MC \). Summing \( MC \) over all firms yields the industry black market supply curve \( S \). The intersection of \( S \) and \( P \) gives the quantity sold in the black market, \( Q \), with the remainder of the output \( Q - Q \) sold in the white market.

The existence of excess profit causes entry which expands industry output reducing profit because:

(a) Higher total output reduces \( P \).

(b) Cost schedules are shifted upwards as input prices are bid up.

(c) Production inefficiency results as greater total output
is achieved at a higher cost than necessary.

As cost schedules shift upward and the firm continues to maximize profit by equating marginal cost and marginal revenue in the official and black markets it produces a smaller output \( q' \), with \( q' \) being diverted to the black market and \( q - q' \) being sold at the controlled price. The firm does not operate at the minimum point of its average cost schedule since the equilibrium must occur where \( MC' = P \) since the firms finds it profitable to sell in both markets and average cost is everywhere above \( P \).

\( BLS' \) represents the total supply curve after the shifts of the cost curves and point \( L \) on \( BLS' \) indicates the average unit cost \( OA' \) of producing output \( Q' \). The supply schedule of black market sales shifts to \( S' \) after entry. The black market price is now \( P' \) and black market sales are \( q' \).

Zero-profit equilibrium is attained where total cost and total revenue are equal. Since total costs are equal to \( A'CQ' \) and total net revenue is equal to \( OP MQ' - P'P'B' \), then equilibrium is reached when \( P'P'D' = A'P'ML \).

Browning and Culbertson's (1973) presentation has the benefit of attempting to explain supply by the competitive firm in the context of the situation for the whole industry. They also incorporate a penalty structure into their analysis. As they show, different penalty structures can be incorporated. Comparative static results can also be adduced.
from the diagrammatic analysis. Increasing the magnitude of the marginal penalties for example rotates the MC schedule to the left reducing black market sales and increasing controlled market sales but leaving total output unchanged.

In order to examine some of the more non-transparent ramifications of price controls in developing countries, I mathematically model the behaviour of the competitive supplier under black market conditions in Appendix 11.2. A penalty structure is incorporated and some important comparative static results examined. Some of the more restrictive assumptions of Browning and Culbertson's analysis (e.g. assumptions 2 and 3) can be dispensed with since demand is not specifically considered in the analysis.

Model of Producer Behaviour in Completely Suppressed Markets Under Uncertainty

The producer's maximisation problem in Appendix 11.2 is that of maximising his total expected income from black marketing and official controlled sector sales:

\[
\max P \cdot W - B \cdot B = P(X, r)[P \cdot X - f(X, 1)P(1 - )X] + \frac{1 - P(X, r)}{P} X + P(1 - )X - C(X)
\]

where

\[
P, X = \text{Price and quantity in white (controlled) market: } \frac{1 - }{X} = \frac{X}{X}
\]

\[
P, X = \text{Price and quantity in black market: } X = (1 - )X
\]
\( P_B^B(r) = \text{Probability of detection with resources } r \)
\( f(X, l) = \text{Penalty (fine, jail sentence etc.) of detection with laws } l \)

\[
P_1 > 0, \quad P_2 > 0, \quad P_{12} > 0, \quad E_{12} > 0, \quad f_1 > 0, \quad f_2 > 0,
\]

\[
f > 0, \quad f_1 > 0, \quad f_2 > 0.
\]

\[
\lambda = \text{Proportion of output sold in the controlled white market.}
\]

\( C(X) = \text{Cost function.} \)

Solving the maximisation problem gives the following black market supply function

\[
X = f(P, P', X', l, r)
\]

and the following comparative static results

\[
X_B > 0
\]

\[
f > 0
\]

\[
X_W > 0
\]

\[
r < 0
\]

\[
X < 0
\]

\[
l < 0
\]

i.e. we get the following interesting propositions:

Proposition 6: An increase in the resources spent in detection may or may not reduce the quantity of the commodity black marketed.
Proposition 7: An increase in the penalty structure through a tightening of the laws may or may not reduce the quantity supplied in the black market.

As explained in the appendix these two propositions are the result of the uncertain sign of the \( P \) and \( f \) derivatives. This uncertainty can be rationalised on the grounds that an increase in black-market activity may so drastically reduce the revenue base of the government that it reduces the effectiveness of detection activity. The uncertain sign of the interaction terms is the result.

The supply function so obtained for the individual producer can be summed up with that of other producers in the industry to obtain an industry supply curve.

Other Qualitative Implications of Completely Suppressed Markets

The analysis of the previous sections did not include rent-seeking or other DUP-type behaviour other than black markets. Some of the other qualitative consequences of completely suppressing markets and the resulting black market and DUP activity can be summarised as follows:

1. Perhaps the major consequence of the imposition of price controls on a variety of commodities is the creation of incentives for participation in illegal activities such as black marketing, tax evasion etc. In countries like
India where such controls have proliferated this has resulted in the creation of a large, parallel black (underground) economy which as been estimated to constitute anywhere from 15-50% of the GNP.

(2) A direct consequence of the creation of the underground economy is the debasing of the 'trust' factor which Arrow (1974) underlies transactions in market economy and which contributes significantly to the efficiency of such economies even though it cannot be captured in a production function.

(3) The existence of a large black market severely distorts the allocative efficiency of observed prices creating many problems for the authorities, inconvenience to consumers and honest producers and to public policy. In a country like India this further confounds the whole process of planning which is based on observed prices and quantities leading to further allocative and distributional errors.

(4) The regime of controls creates a number of margins where social costs due to rent seeking in the form of lobbying, bribery, preemption of licenses, excess capacity etc. and other DUP activity. Mohammed and Whalley (1984) detail some of the costs of such activity in different sectors in India.

Many other aspects such as high administrative and other
costs, growth of non-economic industries, pervasive inefficiencies, debasing of the quality of goods, uncertainty costs due to alternation between periods of scarcity and plenty as controls are changed as a result of interest-group pressure, distributional effects of suppressed inflation etc., can be cited as major consequences of completely suppressing markets. The elimination of these costs through a process of decontrol may constitute an important source of improved allocation and distribution and growth in real national income and real consumption standards in developing economies like India.
FOOTNOTES TO CHAPTER 11

1. The analysis develops on Boulding (1946), Bronfenbrenner (1947), Browning and Culbertson (1973) and Gonensay (1966).

2. This point has been noted by Boulding (1946), Bronfenbrenner (1947), Gonensay (1966) and Michaely (1954). Plumptre (1947) provides important caveats.

3. These implications are similar to those in Boulding (1946).

4. This is the case in developing economics like India where commodities are always in short supply and the actual price level to the consumer is always higher than the stated price level for the commodity if he buys any amount on the black market.

5. Even if price controls and rationing were perfectly enforceable, substantial efficiency losses represented by the two deadweight loss triangles will result.

6. See Michaely (1954) for a discussion on these two points. He shows how the black-market demand curve can be derived from a simultaneous analysis of what he calls 'inhibited demand' and 'rationing' curves. I do not pursue his analysis since he explicitly incorporates diversion of demand and supply to and from the officially controlled market and the interaction between them. The analysis is tedious and cumbersome and in order to make it tractable in what follows I make the assumption that the consumer optimisation problem underlying the derivation of a black market demand curve proceeds as if he were in a perfectly competitive market with his consumption of the rationed good in the controlled market always being equal to the full amount of his allocation. His choice problem then becomes one of being between consumption of the controlled good in the black market vis a vis expenditure on other noncontrolled goods, given the penalty and policing structure of the law. This may not be too unrealistic in that typically the government announces the price and allocation of the controlled commodity prior to the time period in which the consumer makes his choice decision. This approach also allows the examination of the demand and supply sides of the market.
to be done separately thus abstracting from problems of identification and simultaneous equation estimation.

7. Mukherji, Pattanaik and Sundrum (1980) are an exception, though they consider the case of diversion of output by the monopolistic/competitive firm to the legal, uncontrolled market as black-marketing - i.e., a situation of black-marketing in "partially suppressed" markets. They do not consider the consumer's choice problem and the derivation of the demand curve.

8. I do not specifically model this characteristic. See footnote 7.

9. Browning and Culbertson (1973) contains an analysis of supply in black markets under both competition and monopoly. The diagramatic presentation given here is their analysis of the competitive firm under certainty. Other approaches to the problem are contained in Bronfenbrenner (1947), Michaely (1954) and Mukherji, Pattanaik and Sundrum (1980).

10. This assumption ignores the shifting of supply from the official to the black market and hence the interconnectedness of demand and supply (see Michaely 1954). This makes the analysis empirically tractable and may not be a problem given that the controlled price and quantity procurement rules are set by the government well in advance of the supply period permitting such a separation.

11. This is in contradistinction to the analysis in the previous section and to that in Michaely (1954). This has been done to abstract from the complications that are introduced if this assumption is not made. See Browning and Culbertson (1973). The rationale for maintaining it is the same one of empirical tractability alluded to in footnote 10. Relaxing both this assumption and the assumption on the demand side referred to in footnote 10 would require the development of an interactive simultaneous equation model. Attempts to do this have not been successful though this is a worthwhile task. The manner in which the control scheme is administered in the case of the Indian cement industry however permits separation.


13. The informational efficiency of the price system as central to efficient exchange (see Hayek (1937)) is
drastically reduced both on account of the original price controls and the subsequent disappearance into the not so open underground economy. It is sometimes asserted that the underground economy enhances the consumer's well-being relative to the situation of complete controls by enhancing the flow of goods and services available to him, qualitatively as well as quantitatively; and by providing a source of extra income. However, the point is that such a situation is always inferior to a situation of no controls (and therefore no black economy) when the substantial allocational, distributional, informational and other costs of DUP activity are avoided.
Appendix 11.1

Model Of Consumer Behaviour In A Completely Suppressed Market

The consumer's maximisation problem is given by

\[
\begin{align*}
\text{Max } & \quad E(U) = D(X^B,r)U(X^B,X^1,C(X^1,1)) \\
& \quad \text{s.t.} \quad X^1 > X^B + (1-D(X^B,r))U(X^B,X^1,0) \\
& \quad \quad \quad \text{subject to} \quad \begin{cases} 
W & \quad W^B \\
1 & \quad 1 \\
2 & \quad 2 \\
2 & \quad 2 \\
2 & \quad 2 \\
\end{cases} \\
& \quad \begin{cases} 
P^1X^B + PX^B = I^1 \\
& \quad \begin{cases} 
P & \quad W^B \\
1 & \quad 1 \\
2 & \quad 2 \\
2 & \quad 2 \\
2 & \quad 2 \\
\end{cases} \\
\end{cases}
\end{align*}
\]

where

- \( P^1, X^B \) = Price and Quantity of the uncontrolled good
- \( P, X \) = Price and Quantity of "completely suppressed" good sold in the while market (fixed by government)
- \( B, B \) = Price and Quantity of "completely suppressed" good sold in the black market
- \( U \) = Consumer's Utility Function
- \( D(X^B,r) \) = Probability of detection (apprehension) with resources \( r \) expended by the authorities
- \( C(X^1,1) \) = Cost function (including penalties and "moral oppobrium" costs) associated with laws 1 specifying penalties
\[ U[X, X, C(X, 1)] = U(C) = \text{Utility when caught buying in the black market} \]
\[ U[(X, X, 0)] = U^* = \text{Utility when not caught} \]

Also

\[ U_1 > 0 \quad U_1(C) > 0 \quad C > 0 \quad C > 0 \]
\[ U_2 > 0 \quad U_2(C) > 0 \quad C > 0 \quad C > 0 \]
\[ U_3 > 0 \quad U_3(C) > 0 \quad C_{12} > C \quad C_{21} > 0 \]
\[ W > 0 \]
\[ U_{12} > 0 \quad U_{12}(C) > 0 \quad D > 0 \quad D > 0 \]
\[ U_{11} > 0 \quad U_{11}(C) < 0 \quad D_{12} > 0 \quad D_{11} < 0 \]
\[ U_{22} < 0 \quad U_{22}(C) < 0 \]
\[ U_{22} < 0 \quad U_{22}(C) < 0 \quad \text{and} \quad X = X + X \]
\[ U_{21} > 0 \quad U_{21}(C) > 0 \]
\[ U_{21} > 0 \quad U_{21}(C) > 0 \]
\[ U_{1} < 0 \quad U_{1}(C) > 0 \]
\[ U_{2} < 0 \quad U_{2}(C) > 0 \]
\[ U_{1} < 0 \quad U_{1}(C) > 0 \]
\[ U_{2} < 0 \quad U_{2}(C) > 0 \]

where all \( U_i(C) < U \)

The maximisation problem can be written as the Lagrangean expression,

\[ \max L = U(X, X, 0) - D(X, r)[U(X, X, 0) - U(X, X, C(X, 1))] \]
\[ \begin{array}{cccc}
& & \text{B} \\
& & \text{B} \\
X_1, X_2 > & 1 & 2 & 2 & 1 & 2 & 2 & 1 & 2 & 2 \\
\end{array} \]
\[ + [P X + F X - 1] \]
\[ \begin{array}{cccc}
& & \text{1} \text{1} & \text{2} \text{2} \\
\end{array} \]

300
First Order Conditions

\[
\begin{align*}
\frac{\partial}{\partial x_1} & = U(x_1, x_2, 0) - D(x_1, r)[U(x_1, x_2, 0) - U(x_1, x_2, c(x_2, 1))] \\
\frac{\partial}{\partial x_2} & = \frac{B}{1 + p} \\
\frac{\partial}{\partial x_1} & = U(x_1, x_2, 0) - D(x_1, r)[U(x_1, x_2, 0) - U(x_1, x_2, c(x_2, 1))] \\
& - (U(x_1, x_2, 0) - U(x_1, x_2, c(x_2, 1)))D + p = 0 \\
\frac{\partial}{\partial x_2} & = px_1 + px_2 - l = 0
\end{align*}
\]

Equations (1), (2), (3) give us the following equilibrium conditions:

\[
\begin{align*}
U_1 - D[U_1 - U_1(C)] & = \frac{B}{1 + p} \\
U_2 - D[U_2 - U_2(C)] & = \frac{B}{1 + p} \\
\end{align*}
\]

which implies that the consumer will equate the marginal utility per dollar spent on each commodity in the various markets after adjusting for the disutility associated with operating in the black market for the second commodity. It may be noted that this adjustment has to be made for all commodities since \( W \) includes \( x \) and the consumer is assumed to operate in all three markets simultaneously.

The implicit functions are defined as

\[
\begin{align*}
B B & : (x_1, x_2, 0, 1, r, l') = 0 \\
1 2 & : (x_1, x_2, 0, 1, r, l') = 0
\end{align*}
\]
given the equation system (5) to (7) if (a) the functions \( F; F, F, F \) all have continuous partial derivatives with respect to all the R.H.S. variables, and if (b) at a point \((X, X, X, X, P, P, l, r, l')\) satisfying (5) to (7), the following Jacobian determinant is nonzero,

\[
J = \begin{vmatrix}
\frac{\partial}{\partial X} F & \frac{\partial}{\partial X} F & \frac{\partial}{\partial X} F \\
\frac{\partial}{\partial X} F & \frac{\partial}{\partial X} F & \frac{\partial}{\partial X} F \\
\frac{\partial}{\partial X} F & \frac{\partial}{\partial X} F & \frac{\partial}{\partial X} F
\end{vmatrix} = \begin{vmatrix}
\delta X & \delta X & \delta X \\
\delta X & \delta X & \delta X \\
\delta X & \delta X & \delta X
\end{vmatrix} \neq 0
\]

then the equilibrium values of the endogenous variables can be written as

\[
X = F(P, P, l, r, l') \quad (8)
\]

\[
X^B = F(P, P, l, r, l') \quad (9)
\]

or alternatively as

\[
X = F(P, P, P, X, X, l, r, l) \quad (11)
\]

\[
X^B = F(P, P, P, X, X, l, r, l) \quad (12)
\]

where (11), (12), (13) define the uncompensated demand curves for \( X \) and \( X^B \) as assumed that the consumer always consumes his ration \( X \) at the controlled price \( P \). In order to obtain comparative static results totally differentiate each of (5),
In order to find the comparative static derivatives with respect to a change in the amount of resources devoted to detection by the authorities $r$, we divide (14) to (16) by $dr$ while holding all other exogenous variable constant. This gives us the following,

\[
\begin{bmatrix}
\delta F & \delta F & \delta F \\
\delta X & \delta X & \delta r \\
\delta l & \delta l & \delta r \\
\delta X & \delta X & \delta r \\
\end{bmatrix}
= \begin{bmatrix}
\delta X \\
\delta r \\
\delta r \\
\delta r \\
\end{bmatrix}
\begin{bmatrix}
-\delta F \\
\delta r \\
\delta r \\
\delta r \\
\end{bmatrix}
\]

\[\text{(17)}\]
Note that since $|J|$ is $3 \times 3$ and since we are maximising we have $|J| < 0$. Now, using Cramer's rule, we get

$$
\begin{vmatrix}
\frac{\delta F}{\delta r} & \frac{\delta F}{\delta \lambda} & \frac{\delta F}{\delta \lambda} \\
\frac{\delta X}{\delta r} & \frac{\delta X}{\delta \lambda} & \frac{\delta X}{\delta \lambda} \\
1 & 2 & 2
\end{vmatrix}
= + 0 0
$$

Therefore, an increase in the amount of resources allocated to detection and apprehension activity may or may not reduce the amount purchased in the black market. This lack of a guarantee can intuitively be rationalised on the ground that an increase in resources devoted to detection may initially work towards the reduction of the amount bought in the black market but given the fixity of $X$, this will have to be compensated by increase in the consumption of $X$. This increase in the consumption of $X$ may not compensate for the reduction in $U$ due to the reduction in $X$ and may actually induce an increase in $X$. This is because the marginal effects on expected utility are indeterminate when complex functions are
involved incorporating multiplicative terms. Similarly, it can be shown that \( \delta X > 0 \) implying that as the laws governing

\[
\frac{\delta X}{\delta l} < 0
\]

the penalties are tightened (i.e., the penalties are made more severe) there is no guarantee that the amount black-marketed will decrease. Other comparative static results are:

\[
\begin{align*}
\frac{\delta X}{\delta B} & < 0, \\
\frac{\delta X}{\delta \lambda W} & < 0, \\
\frac{\delta \lambda_1}{\delta X} & > 0 \\
\frac{\delta \lambda_2}{\delta X} & > 0 \\
\end{align*}
\]

so that the model produces the intuitively expected results for the derivatives with respect to price.
Appendix 11.2

Model Of Producer Behaviour In A Completely Suppressed Market

In this appendix, a model of producer behaviour in a completely suppressed market is presented. The analysis models a competitive producer with the black market price parametric. The producer's only decision variable is the amount he sells on the black market, given his (perceived) penalty function and expectation of detection. The model is similar to that of Mukherji, Pattanaik and Sundrum (1980).

Let,

\[ \begin{align*}
W, W & = \text{price and quantity in the controlled (white) market. Here } X = \alpha X \\
B, B & = \text{price and quantity in the black market. Here } X = (1 - \alpha) X \\
P(X, r) & = \text{probability of detection with resources } r \\
& = X + X \\
p_1, p_2, p_{12}, p_{21} & > 0, \quad p_{12} > 0, \quad p_{21} < 0
\end{align*} \]

\[ \begin{align*}
\alpha & = \text{proportion sold in the controlled market} \\
f(X, 1) & = \text{penalty (fine, jail sentence etc.) of detection with laws 1.} \\
& = f > 0, \quad f > 0, \quad f > 0, \quad f > 0, \quad f > 0 \\
1 & 2 11 12 21 < \]

306
Total Expected Income from Black-marketing and Controlled Sector Sales

Max \[ \mathcal{E} = \max_P\left[ P(X, r) \left( X - f(X, 1) \right) P(1-\alpha)X \right] \]

where \( \alpha \) is proportion of output sold in the controlled market

\( C(X) \) = cost function

The maximand can be simplified to

Max \[ \mathcal{E} = -P(X, r) f(X, 1) P(1-\alpha)X + (P - P) X \]

The first-order conditions for a maximum are given by:

\[
\begin{aligned}
- \frac{\partial \mathcal{E}}{\partial X} &= -P(X, r)f(X, 1)P X + P(X, r) f(X, 1) P(1-\alpha)X \\
&\quad + P(X, r) P(1-\alpha)X - C'(X) = 0
\end{aligned}
\]

Knowing \( P(X, r), f(X, 1), P \), \( C(X) \) and \( \mathcal{E} \), we can determine from above. Given this optimal value of \( X \), we can find the change in \( X \) as a function of the change in \( r \). This is given by the implicit function rule (if we ignore cross effects of f).
Thus if we ignore the cross-terms \( l^\prime \) and \( f \) we get the gross result that as the amount of resources spent on police vigilance increases the quantity sold in the controlled market increases while the quantity sold in the black-market decreases. The same is true for an increase in the severity of the laws. These are intuitively expected results. However (3) \& (4) do not tell the full story.

In developing countries such as India the amount of national income black-market tends to be very large
(estimates from 15-50% define the relevant range e.g. Gupta & Gupta (1982), Wanchoo Committee (1971) etc.) Consequently the amount of real tax revenue per dollar of total (white plus black) national income has declined with the possibility that the amount of resources expended on police vigilance and detection activity and on tightening the laws etc. may have declined in real terms. An illustration of this phenomenon is provided by the following figures: -

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tax Evasion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. No. of searches &amp; seizures conducted</td>
<td>306</td>
<td>189</td>
<td>109</td>
<td>31</td>
<td>170</td>
</tr>
<tr>
<td>2. No. of successful searchers</td>
<td>293</td>
<td>186</td>
<td>106</td>
<td>79</td>
<td>169</td>
</tr>
<tr>
<td>3. Amount of assets seized (Rs. millions)</td>
<td>13.0</td>
<td>5.8</td>
<td>9.0</td>
<td>5.9</td>
<td>9.5</td>
</tr>
<tr>
<td>4. No. of prosecutions launched during the year under section 217</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>31</td>
<td>2%</td>
</tr>
<tr>
<td>5. Convictions</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
6. Acquittals

7. Compositions

8. Withdrawals

9. Size of official reported
   NNP (k. million)

10. Size of unofficial "black-market" NNP Gupta & Gupta (1982)
    Chopra (1982)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Acquittals</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7. Compositions</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8. Withdrawals</td>
<td>-</td>
<td>-</td>
<td></td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>
   NNP reported
| 10. Size of            |         |         |         |         |         |
   unofficial "black-market" NNP Gupta & Gupta (1982)
   Chopra (1982)
| 15,390                | 16,850  | 18,160  | 13,180  | 27,140  |

These figures provide some (albeit weak) support that expenditure of resources on detection and prosecution activity has not kept up in real terms with the growth of total national income. Conversations with government officials and tax authorities indicate that this has been the general trend in recent years.

Even though the model implies that the probability of detection depends on the amount marketed by the producer rather than the total amount black-marketed, we can for heuristic purposes consider the case where we allow for the possibility that police effort diminishes as the amount blackmarketed increases. Thus, there is a possibility that increased black-market activity may have decreased the rate of expenditure of resources on police detection activity.
increasing the decline in the probability of detection resulting in an interaction term $P_{21}^* < 0$. (We also consider the case where the opposite occurred and $P_{21}^* > 0$). The intuition for this superficially counter-intuitive outcome is that the increase in black-marketing activity could have so drastically reduced the revenue base of the government that it had to reduce the expenditure on police detection activity and vigilance. The growth of the size of the black-market in India according to Gupta & Gupta's estimates from 9.5% of the G.N.P. in 1967-68 to 48.78% in 1978-79, and the purported stagnation of resources on police detection and law-making would provide some support. A similar argument can be made for $f(X,r)$ so that we consider the case where $f_{21}^* < 0$ (and also $f_{21}^* > 0$). Then the change in the optimal value of $\alpha_{21}$ as a result of change in $\pi$ and $l$ is given by

$$
\frac{d \alpha_{21}}{d \pi} = -\frac{P_{12}^{*}}{F_{l}}
$$

$$
= \left\{ \left( P \left( X , \right) P \left( 1+f \left( X ,r \right) \right) P \left( X ,r \right) + P \left( X , \right) \right) + P \left( X , \right) \right\} B_{12} B \frac{12}{B_{12} B}
$$

$$
P \left( 1-\alpha \right)(1+f) + f \left( X ,r \right) P \left( X ,r \right) P \left( 1-\alpha \right)XP \left( X ,r \right)
$$

$$
\frac{d \pi}{d \alpha_{21}^{*}}
$$

$$
= - \left\{ \left( + \right) or \left( - \right) \right\}^{\left( \left( \right) \right)}
$$

$$
= - or + depending on whether
$$
\begin{array}{c}
\alpha_{21}^* < 0 \quad or \quad > 0
\end{array}
$$
Similarly
\[
\frac{d\alpha}{dl} = -\frac{F_1}{f^a}
\]
\[
= -\left\{ \left( \frac{B}{2B} Xf_1(X,1) + f_{12}(X,1) \right) \frac{(1-\epsilon)X}{L} \right\}
\]
\[
\frac{d^2\pi}{da^2}
\]
\[
= -\left\{ \left( (+) \right. \text{ or } \left. (-) \right) \right\}
\]
\[
= -\text{ or } + \text{ depending on whether } f < 0 \text{ or } 0.
\]
CHAPTER 12

EMPIRICAL ESTIMATES OF DEMAND AND SUPPLY FUNCTIONS
FOR CEMENT IN COMPLETELY SUPPRESSED MARKETS

Introduction

The models of demand and supply in completely suppressed markets could be estimated directly if data on black market prices and quantities were available. However, such data is not directly available and has to be estimated by indirect methods. In this chapter, I provide estimates of demand functions that are different from the functions derived in the previous chapter. This has been dictated both by considerations of availability of a sufficiently long time series of data, whether directly or indirectly obtained and the fact that cement is a product that has a derived demand. However, indirect estimates of black market quantities and prices will be used to estimate black market supply curves for cement.

The demand and supply functions have been estimated for the period 1951-82 using available annual data on the Indian cement industry. The estimation is done using both linear and log-linear specifications.

Once again the fact that the government controls the entire
output of the cement industry and releases this to the cement consuming public as determined by the Office of the Cement Controller, permits the separation of demand and supply for estimation purposes. The government acts as a manager of cement stocks. Thus both procurement from cement producers and supply to consumers can be treated independently from each other. Further refinement of the methods used here would have to take into account the government's behaviour and would then permit for simultaneously determined price and quantities. This would require the specification of an equation describing the variables that determine the size of the government's stock of cement and the underlying manner in which this is released. Lack of information on this aspect results in this aspect being ignored in the analysis that follows.

Data and Sources

A number of sources of data were used for the study. The data collected and the sources used were as follows:

(1) Installed Capacity and Production-Data for the year 1952 to 1964-65 from V.Podder's *Cement Industry in India*, Books I & II, and from 1965-66 to 1981-82 from the Cement Controller's Offices's (CCO's) *Cement Production and Despatches*, various issues.

(2) Per Capita Consumption and Imports/Exports 1951-52 to 1964-65 from V.Podder's *Cement Industry in India* and
from 1965-66 to 1981-82 from the C.C.O's Cement Production and Despatches

(3) Retail Price and Controlled Price of Cement - From Podder's *Cement Industry in India* and the C.C.O's Cement Production and Despatches

(4) Black Market Quantity of Cement - Calculated indirectly from input-output coefficients provided by the National Building Organisation in Podder's *Cement Industry in India* and the Planning Commissions of India input-output estimates.


(9) Police Expenditure - Obtained from various issues of the Government of India's Annual Economic Survey.

(10) Corporate Tax Rate - Obtained from various issues of the Government of India's Income Tax and Other Direct Taxes Rate Structure.


In addition to the data obtained from published sources, a number of additional variables had to be constructed from the data. The major variables constructed and used in the regressions were as follows:

(a) Cement consumption data was not directly available. Consequently, two alternative variables of consumption were constructed. These were:

(i) Apparent Consumption = Production + Imports - Exports
(ii) Calculated Consumption = Per Capita Consumption x Population

(b) A Relative Price of cement variable was constructed by taking the ratio of the Wholesale Price Index of Cement to the Wholesale Price of Manufactured Products i.e.
(c) Deflated Police Expenditure was obtained by dividing the nominal Police Expenditure series by the corresponding years wholesale price index.

Two major series were constructed to obtain estimates of the black market supply functions. These included a variable showing the quantity of cement black marketed and the black market price of cement. The former series was constructed by taking the value of construction in each year and finding the cement content of such construction in terms of a base year (1961-62 = 100) using input coefficients for the quantum of cement in the value of construction (Source-Podder's Cement Industry in India). The difference between the estimate of cement actually consumed so obtained and the reported figure of cement production was then taken as the estimate of the quantum of cement black marketed.

With regard to the black market price data, this was compiled from various sources particularly the vernacular Bombay newspaper, Vyaapar (Business/Commerce) which publishes data on black market prices, premia on import licences etc. by obtaining such quotations by actually going out and making enquiries for various commodities and other items. The data is however intermittent and was cross-checked with other sources. A sufficiently long time series could not be constructed and
estimates were only available for the period 1974-75 to 1981-82. This data was used to estimate the value of cement output black marketed during these years.

Estimation of Demand Functions for a Completely Suppressed Commodity

A black market demand curve for a completely suppressed commodity was derived in Chapter 11. Black market demand was seen to be a function of black and white market prices for the commodity, prices of other uncontrolled commodities, the quantity of the commodity sold in the white market, resources spent by the government on detection of black market activity, the tightness of laws governing punishment and income (see equation 11.2). Estimation of such a demand curve should be possible if data on all the variables can be obtained.

The study of cement as an example of a completely suppressed market presents some problems with regard to estimation. Cement is a commodity that has a derived demand and does not directly enter into the utility functions of consumers. Ideally, the demand for cement should be estimated on the basis of measuring the demand for a capital good, intermediate good or a durable consumer good within the confines of an intertemporal model. Consequently equation 11.2 is not directly applicable. Secondly, data on black market quantities demanded and black market retail prices for cement were not available for a sufficiently long period of time.
This makes the estimation of demand according to equation 11.2 an impossible task. Consequently, an alternative method of estimation of demand had to be adopted.

Since the controlled price cannot be used as the market clearing price and sufficient observations on the black market price were not available, the normal method of demand estimation could not be used. Instead an approach focussing on the end-use of cement was adopted.

The demand for cement would depend on the level of general economic activity and the level of activity in the construction sector. In addition, the demand for cement would depend on the price of cement relative to other commodities having similar user characteristics. Therefore, as a first approximation, the demand function for cement was postulated as:

\[
\text{APPCONS}_t = a_0 + a_1 \text{GDP}_t + a_2 \text{GFCF}_t + a_3 \text{RELPRCEM}_t + e_t
\]

where,

\(\text{APPCONS}_t\) = Apparent Consumption (Production + Imports - Exports) of cement at time \(t\).

\(\text{GDP}_t\) = Gross Domestic Product at 1971-72 prices at time \(t\).

\(\text{GFCF}_t\) = Gross Fixed Capital Formation at 1971-72 prices at time \(t\).

\(\text{RELPRCEM}_t\) = Relative Price of Cement at time \(t\).
In order to cross-check on the sensitivity of the estimates to the definition of the constructed consumption variable, the following estimation form was also adopted,

\[
(CALCONS) = b_0 + b_1 (GDP) + b_2 (GFCF) + b_3 (RELPRCEM) + e_t
\]

where,

\[
(CALCONS) = \text{Calculated Consumption (per capita consumption of cement at time } t \times \text{population)}
\]

and all the other variables have the same meaning as before.

It may be noted here that in the case of the APPCONS variable, what brings the consumption and available cement together is the government's management of cement stocks which are not separated.

In addition to the two basic formulations given above, other equations were also estimated. A variable reflecting the share of the modern sector in G.D.P was included to capture the effects of modernisation in the development of the economy. In addition a demand augmentation variable was included to capture the effect of controls on cement distribution. The demand augmentation variable was defined as the difference between installed capacity and actual production in any year and was intended to proxy for the effect of controls on the generation of the black market and
the resulting additional effect on consumption. The difference between installed capacity and production can be viewed as a factor representing the extent of cement shortage as reflected in the over-indenting for the product so as to receive quota in line with genuine requirements. Thus the demand augmentation factor can be seen as proxying the shortage of cement resulting from the quota system. Consequently, the sign of the coefficient attached to this variable on either interpretation would be positive. This is because the demand for cement would be augmented if there is a shortage of cement. The following additional regressions were therefore also run,

\[(APPCONS) = C_0 + C_1 (GDP) + C_2 (GFCF) + C_3 (RELPRCEM) + C_4 (SHAMOS) + e_4 (12.3)\]

and

\[(APPCONS) = d_0 + d_1 (GDP) + d_2 (GFCF) + d_3 (RELPRCEM) + d_4 (SHAMOS) + d_5 (DEMAUG) + e_5 (12.4)\]

where,

\[(SHAMOS)_t = \text{Share of modern sector in G.D.P in year } t \text{ where the modern sector is defined to include mining and manufacturing; electricity, gas and water supply; transportation and communications; trade and commerce, and construction,}\]

\[(DEMAUG)_t = \text{Demand augmentation factor (Installed Capacity minus Production) in year } t,\]
with the other variables as defined above. The regressions were run with the apparent consumption variable replaced by the calculated consumption variable also.

The DEMAUG variable has been included because of the rationale identified above and the use of this variable in the studies of Johnson (1967) and the NPC (1978). However, the appropriate dependent variable would have to be total number of indents or orders for this variable to have the correct interpretation. Using apparent consumption (APPCONS) or calculated consumption (CALCONS) makes the interpretation limited to proxying for the effect of the black market on actual measured consumption.

All the regressions were run on annual data for the 1951-82 period and for the 1961-82 period when time series data for the whole period was not available (e.g. in regression with the SHAMOS variable). Both linear and log-linear specifications were regressed.

Empirical Results for the Demand Functions for Indian Cement

The results of regressing equations (12.1) to (12.4) and other variants are given in Table 12.1 and Table 12.2 respectively. Table 12.1 gives the results for Apparent Consumption (APPCONS) as the dependent variable while Table 12.2 gives the results for the regressions with Calculated Consumption (CALCONS) as the dependent variable. It can be seen that for both types of regressions, the
independent variables explain a very high proportion (over 99%) of the variation in the dependent variable for almost all the cases. The performance of individual independent variables however merits closer scrutiny.

From Table 12.1 it can be seen that the simplest regression with Real Gross Domestic Product (GDP) and Real Gross Fixed Capital Formation (GFCF) as the independent variables explains over 99.5% of the variation in the dependent variable in the linear specification case. Both variables are significant at the .01 level. Adding other variables such as the Relative Price of Cement (RELPRCEM), the Share of the Modern Sector in G.D.P (SHAMOS) and the Demand Augmentation Factor (DEMAUG) reduces the explanatory power of the regressions with both the RELPRCEM and DEMAUG variables insignificant in all cases with the wrong signs. Only the SHAMOS variable enters the regression with the correct sign and is significant at the .10 level in all cases.

In the case of the log-linear specification, once again the variables GDP and GFCF are significant and have the expected sign in all the regressions. The explanatory power of the simple regression with just these two variables is high (99%) but is exceeded marginally by the other regressions including variously and together the RELPRCEM, SHAMOS and DEMAUG variables. Once again however, the RELPRCEM variable is insignificant and exhibits the wrong sign. The SHAMOS and
DEMAUG variables are significant and exhibit the right signs. Thus, in the case of the APPCONS dependent variable, the simplest formulation seems to be the best approximation to the demand function hypothesised in the previous section at least in the linear specification case. The non-significance of the relative price variable (RELPRCEM) is not surprising considering that the Government does not change the controlled price of cement very frequently and the Wholesale Price Index in the numerator of this ratio does not include black market prices which vary over time. The insignificance and wrong sign of the demand augmentation variable (DEMAUG) is surprising considering that it is intended to proxy from the black market created by the control regime. The explanation for this may lie in the fact that the dependent variable treats all cement produced or imported (less exports) as consumed by the public when in fact stocks with the government may be important and affecting the outcome as well as orders placed not being used as the dependent variable. The variable has the right sign and significance in the log-linear regressions and this indicates that the rate of change of this variable is in accordance with a priori expectations. Thus at least in the log-linear regression, the SHAMOS and DEMAUG variables do provide some additional explanatory power.

The poor results with respect to the DEMAUG variable would seem to reflect the problems of using this variable as a proxy
for the black market quantity as well as the limitations of interpreting this variable as reflecting the over-indenting due to the shortage of cement. This latter interpretation is made difficult by the use of the APPCONS/CALCONS variable as the dependent variable instead of orders or indents placed. Consequently, the regressions containing this variable may be conveniently ignored.

Table 12.2 presents the results for the Calculated Consumption (CALCONS) dependent variable. In the case of the linear specification, the simplest variant with only GDP and GFCF as regressors seems to perform well with high explanatory power and both variables significant at the 0.10 level. However, when the RELPRCEM is added as a regressor, the variable GFCF becomes insignificant and the price variable is significant with the right sign. The variables SHAMOS and Demaug are both significant (at the 0.15 level at worst) and exhibit the expected signs when they are included. The variant with all the regressors included exhibits the highest explanatory power but with some residual autocorrelation even after first-order GLS correction. In this case however the GFCF and RELPRCEM variables are insignificant.

In the log-linear regressions, there are some differences in the results as compared to the linear specification. The simplest variant performs well. Except in the simplest and one other variant, the GFCF variable is
insignificant and exhibits the wrong sign. The RELPRCEM, SHAMOS and DEMAUG variables however are all significant and exhibit the expected signs. Once again, because of the difficulties with regard to the DEMAUG variable, the set of focus variables is limited to the regressions, excluding this variable. However, the results do provide some indication of the importance of the black market in determining the white market demand.

Thus, in the case of the CALCONS dependent variable it would seem that GDP, RELPRCEM, and SHAMOS are all important arguments in the demand function as hypothesised. This is reassuring particularly since the calculated consumption variable is likely to capture better the actual quantity demanded in a particular time period since it is based on actual per capita consumption rather than on adjusted production. However, it is interesting that except in the simplest case, the GFCF variable which one would expect to be an important macrovariable in the demand function is not significant and bears the wrong sign. Perhaps the GDP variable adequately captures its effect.

Therefore, even in completely suppressed markets like that for cement in India, a modified demand function can adequately capture demand behaviour in the market.
Estimation of Supply Functions in Compeletely Suppressed Markets

The model of producer behaviour developed in the previous chapter should enable one to estimate supply functions under black market conditions. While the difficulties are similar to those discussed in the section on estimation of black market demand functions, there are some differences here. It is possible to indirectly calculate the quantum of cement supplied in the black market as identified in the section on data sources. It is also possible to use proxies for the resources spent on detecting black market sales and the penalties applied to apprehend black marketers. However, the lack of sufficiently long time series data makes the inclusion of black market prices in a regression of equation 11.10 difficult. Consequently, truncated and modified supply functions under black market conditions were estimated.

The supply of cement in the black market as given in equation 11.10 should be a function of the following arguments (symbols as before but with subscript C denoting cement):

\[ X = f(P, P, X, l, r) \]  

(12.5)

However, since data was not available on \( P \), the following regression was run,

\[ (BLMKTQC) = a_0 + a_1 (RELPRCEM) + a_2 (DEFLPOLX) + a_3 (CORPTXRT) + \epsilon \]  

(12.6)
where,

\[(BLMKTQC)_t = \text{Black market quantity supplied of cement in time period } t\]

\[(RELPRCEM)_t = \text{Relative (white market) price of cement with respect to all manufactured goods at time } t\]

\[(DEFLPOLX)_t = \text{Deflated police expenditure in time period } t\]

\[(CORPTXRT)_t = \text{Average Corporate Tax Rate in time period } t\]

Equation 12.6 is a truncated version of equation 12.5. Since data on black market prices with sufficient degrees of freedom was not available, the relative price of cement is being used to proxy the effect of the black market price.

If the relative price of "white" cement in the controlled market is low, producers can be expected to increase the black market supply of the commodity so as to take advantage of the higher price there. That is, producers every period can be seen as having to decide how much cement to produce for sale in the black market given the (fixed) penalty structure and the situation in the white market. When white market prices relative to all other goods are low, producers will have an incentive to divert larger quantities to the black market given the same penalty structure because of the prices higher than white market prices prevailing there. Thus, the sign on this variable would be expected to be negative. The DEFLPOLX variable is included to proxy for the effect of real resources.
expended by the authorities to apprehend black-marketers. The CORPTXRT variable is meant to proxy for the tightness of the laws and penalties for black-marketers. This is predicated on the view that the government's stance with regard to penalties will be reflected in its general predilection to penalise the corporate sector as reflected in the corporate tax rate. No other suitable proxy was available. The signs of these two variables cannot be predicted a priori (see previous chapter).

In order to test for a conventional white market cement supply function, the following regression was also run,

\[
(\text{PRODCEM})_t = b_0 + b_1 (\text{RELPRCEM})_t + b_2 (\text{GFCF})_t + b_3 (\text{GPRSAC})_t + b_4 (\text{TIME})_t + e_t \quad (12.7)
\]

where

\[
\begin{align*}
(\text{PRODCEM})_t &= \text{Reported production of (white) cement in time-period } t \\
(\text{RELPRCEM})_t &= \text{Relative price of (white) cement in time-period } t \\
(\text{GPRSAC})_{t-1} &= \text{Gross profit as a percent of sales for cement producers in year } t-1 \\
(\text{TIME})_t &= \text{Time trend variable.}
\end{align*}
\]

The left-hand side variable is predicated on the assumption that all the production reported by producers is supplied in the white market. The RELPRCEM is expected to exhibit a positive sign so that higher relative (white market)
prices result in a larger quantity produced for the white market and reported. The GFCF variable is included as a general indicator of the strength of construction activity in a particular time-period and is expected to elicit a large supply (i.e. a positive sign). The lagged GPRSAC variable is included to capture the aspect that a higher profitability on reported sales in the previous period is likely to elicit a higher white market supply in the current period (a positive sign). A time trend variable was also added to the regressions to account for any trend such as the general increase in supply due to economic growth, technological change, etc.

The black market supply regressions were run for the period 1961-82 for which data could be indirectly constructed. The white market supply regressions were run for the full period 1951-82. Both varieties of regression both were run in linear and log-linear specifications.

Empirical Results for the Supply Functions for Indian Cement

The results of regressing equations 12.6 and 12.7 are given in Table 12.3. It can be seen that the explanatory power of the white market supply regressions is good while that of the black market supply regressions is satisfactory in the linear case and unsatisfactory in the log-linear case.

In the black market supply regressions, the independent variables explain over 50% of the variation in the dependent
variable. Only the RELPRCEM variable is significant at the 0.01 level and exhibits the expected negative sign. The DEFLPOLX variable is insignificant while the CORPTXRT variable is marginally significant at the .25 level of significance. The signs of these two coefficients indicate that resources spent on detection and apprehension work in the direction (but not significantly) of reducing the quantity black-marketed while higher tax rates (and therefore the severity of penalties) have worked towards increasing the quantity of cement black-marketed.

The log-linear regression is poor and very little of the variation in the dependent variable is explained. Both variables other than RELPRCEM are insignificant.

While not striking, these results may be indicative of some of the general considerations involved in black market supply. Perhaps the nature in which the black market supply variable was constructed may be responsible for the results.

With regard to the white market supply regressions, there are a more encouraging. The explanatory power of both the linear and log-linear specifications are over 99 per cent. In addition, the RELPRCEM and GFCF variables are significant and exhibit the right sign in both regressions. The lagged GPRSAC variable is insignificant in both regressions (despite exhibiting the right sign).

Therefore there is some support that supply functions for
a commodity in completely suppressed markets can be estimated using underlying microeconomic theory. While the method used here needs to be refined considerably, nevertheless it does help identify some of the underlying variables that are likely to belong in such constrained supply functions.
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables</th>
<th>$R^2$</th>
<th>$R^2$</th>
<th>D.W.</th>
<th>Type of Regr./Pd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPCONS</td>
<td>$a_0$, $a_1GDP_t$, $a_2GFC_t$</td>
<td>.995</td>
<td>.994</td>
<td>1.96</td>
<td>G.L.S. p-.0020 (1951-82)</td>
</tr>
<tr>
<td>Coeff. (t-stat.)</td>
<td>-.14880, 0000360, 0001203</td>
<td>(17.842), (11.589), (4.468)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPCONS</td>
<td>$b_0$, $b_1GDP_t$, $b_2GFC_t$, $b_3RELPRCEM_t$</td>
<td>.995</td>
<td>.994</td>
<td>1.96</td>
<td>G.L.S. p-.0014 (1951-82)</td>
</tr>
<tr>
<td>Coeff. (t-stat.)</td>
<td>-.75860, 00000360, 0001152, 0003013</td>
<td>(5.331), (10.546), (1.816), (0.573)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPCONS</td>
<td>$c_0$, $c_1GDP_t$, $c_2GFC_t$, $c_3SHAMSt$</td>
<td>.991</td>
<td>.990</td>
<td>1.95</td>
<td>G.L.S. p-.0085 (1961-82)</td>
</tr>
<tr>
<td>Coeff. (t-stat.)</td>
<td>-.08680, 000003412, 0000922, 084360</td>
<td>(3.422), (9.550), (2.597), (1.485)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPCONS</td>
<td>$d_0$, $d_1GDP_t$, $d_2GFC_t$, $d_3RELPRCEM_t$, $d_4SHAMSt$</td>
<td>.991</td>
<td>.989</td>
<td>1.96</td>
<td>G.L.S. p-.0069 (1961-82)</td>
</tr>
<tr>
<td>Coeff. (t-stat.)</td>
<td>-.85730, 000003407, 00009908, 00017178, 00093140</td>
<td>(3.101), (8.550), (2.303), (1.030), (1.067)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPCONS</td>
<td>$e_0$, $e_1GDP_t$, $e_2GFC_t$, $e_3RELPRCEM_t$, $e_4DEMAUGt$</td>
<td>.995</td>
<td>.994</td>
<td>1.97</td>
<td>G.L.S. p-.0024 (1951-82)</td>
</tr>
<tr>
<td>Coeff. (t-stat.)</td>
<td>-.874200, 00000360, 0001150, 00052809, -.0069763</td>
<td>(5.346), (9.274), (1.691), (0.517), (0.094)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPCONS</td>
<td>$f_0$, $f_1GDP_t$, $f_2GFC_t$, $f_3RELPRCEM_t$, $f_4SHAMSt$, $f_5DEMAUGt$</td>
<td>.991</td>
<td>.998</td>
<td>1.97</td>
<td>G.L.S. p-.0014 (1961-82)</td>
</tr>
<tr>
<td>Coeff. (t-stat.)</td>
<td>-.890270, 00000342, 00009841, 00017340, .1130000, -.0043837</td>
<td>(3.514), (6.091), (2.055), (0.217), (2.003), (0.335)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 12.1 (cont'd.)
INDIAN CEMENT—RESULTS FOR
ANNUAL DATA FOR
DEMAND FUNCTIONS
(Independent Variable — Apparent Consumption—APPCONS)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables</th>
<th>Table 12.1 continued...</th>
<th>$R^2$</th>
<th>$t$</th>
<th>D.W.</th>
<th>Type of Regr./Pd.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logAPPCONS</td>
<td>$b_0$</td>
<td>$g_1$ logGDP $t$</td>
<td>$g_2$ logGFCF $t$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>-16.627</td>
<td>1.2495</td>
<td>0.28974</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(10.211)</td>
<td>(5.748)</td>
<td>(1.909)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logAPPCONS</td>
<td>$b_0$</td>
<td>$g_1$ logGDP $t$</td>
<td>$g_2$ logGFCF $t$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>-17.641</td>
<td>1.2958</td>
<td>0.23639</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(9.935)</td>
<td>(5.977)</td>
<td>(1.550)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logAPPCONS</td>
<td></td>
<td>$h_1$ logGDP $t$</td>
<td>$h_2$ logGFCF $t$</td>
<td>$h_3$ logRELPRCEM $t$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>-13.673</td>
<td>0.74198</td>
<td>0.3653</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(14.924)</td>
<td>(5.402)</td>
<td>(2.768)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logAPPCONS</td>
<td></td>
<td>$j_1$ logGDP $t$</td>
<td>$j_2$ logGFCF $t$</td>
<td>$j_3$ logSHAMOS $t$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>-14.241</td>
<td>0.74517</td>
<td>0.33197</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(11.899)</td>
<td>(5.177)</td>
<td>(2.648)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logAPPCONS</td>
<td></td>
<td>$k_1$ logGDP $t$</td>
<td>$k_2$ logGFCF $t$</td>
<td>$k_3$ logRELPRCEM $t$</td>
<td>$k_4$ logDEMAU $t$</td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>-14.059</td>
<td>0.8243</td>
<td>0.57658</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(5.673)</td>
<td>(4.292)</td>
<td>(1.874)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logAPPCONS</td>
<td></td>
<td>$l_1$ logGDP $t$</td>
<td>$l_2$ logGFCF $t$</td>
<td>$l_3$ logRELPRCEM $t$</td>
<td>$l_4$ logSHAMOS $t$</td>
<td>$l_5$ logDEMAU $t$</td>
</tr>
<tr>
<td>Coeff.</td>
<td>-15.357</td>
<td>0.88510</td>
<td>0.24942</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(11.122)</td>
<td>(3.365)</td>
<td>(1.942)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 12.

Indian cement results for annual data for demand functions

(dependent variable = calculated consumption - CALCONS)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables</th>
<th>Coefficients with t-Statistics</th>
<th>$R^2$</th>
<th>D.W.</th>
<th>Type of Regr./Pd</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALCONS_t</td>
<td>$a_0$, $a_1GDP_t$, $a_2GFCF_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>260.11</td>
<td>.00029454</td>
<td>.0001760</td>
<td>1.35</td>
<td>G.L.S. p = .298 (1951-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(6.120)</td>
<td>(2.935)</td>
<td>(1.690)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CALCONS_t</td>
<td>$b_0$, $b_1GDP_t$, $b_2GFCF_t$, $b_3RELPRGEM_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>242.72</td>
<td>.000081177</td>
<td>.0001658</td>
<td>.040903</td>
<td>G.L.S. p = .015 (1951-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(9.919)</td>
<td>(10.114)</td>
<td>(0.526)</td>
<td>(1.938)</td>
<td></td>
</tr>
<tr>
<td>CALCONS_t</td>
<td>$c_0$, $c_1GDP_t$, $c_2GFCF_t$, $c_3SHAMOS_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(1.610)</td>
<td>(5.229)</td>
<td>(1.053)</td>
<td>(4.603)</td>
<td></td>
</tr>
<tr>
<td>CALCONS_t</td>
<td>$d_0$, $d_1DFP_t$, $d_2GFCF_t$, $d_3RELPRGEM_t$, $d_4SHAMOS_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>116.73</td>
<td>.000066924</td>
<td>-.000077835</td>
<td>.519780</td>
<td>G.L.S. p = .088 (1961-8)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(2.126)</td>
<td>(6.019)</td>
<td>(0.990)</td>
<td>(2.292)</td>
<td></td>
</tr>
<tr>
<td>CALCONS_t</td>
<td>$e_0$, $e_1GDP_t$, $e_2GFCF_t$, $e_3RELPRGEM_t$, $e_4DEMCON_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>141.21</td>
<td>.000077563</td>
<td>.00008126</td>
<td>.526590</td>
<td>G.L.S. p = .126 (1951-82)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(10.153)</td>
<td>(8.846)</td>
<td>(0.811)</td>
<td>(1.503)</td>
<td></td>
</tr>
<tr>
<td>CALCONS_t</td>
<td>$f_0$, $f_1GDP_t$, $f_2GFCF_t$, $f_3RELPRGEM_t$, $f_4SHAMOS_t$, $f_5DEMAND_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>174.32</td>
<td>.000044433</td>
<td>.00001566</td>
<td>.22498</td>
<td>G.L.S. p = .191 (1961)</td>
</tr>
<tr>
<td>(t-stat.)</td>
<td>(12.71)</td>
<td>(4.214)</td>
<td>(0.020)</td>
<td>(0.941)</td>
<td></td>
</tr>
<tr>
<td>Dependent Variable</td>
<td>Independent Variables (Coefficients with t-statistics)</td>
<td>( r^2 )</td>
<td>( R^2 )</td>
<td>Type of D.W. Regr./Pd.</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------</td>
<td>--------</td>
<td>--------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>1. BLACK MARKET SUPPLY FUNCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( BLMKTQ_t )</td>
<td>( a_0 )</td>
<td>-0.11802</td>
<td>( a_1RELPRGEM_t )</td>
<td>( a_2DFLPOLX_t )</td>
<td>( a_3COMPTXRT_t )</td>
</tr>
<tr>
<td>Coeff.</td>
<td>12.238</td>
<td>(3.458)</td>
<td>( t )-stat.</td>
<td>(4.114)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>log ( BLMKTQ_t )</td>
<td>( b_0 )</td>
<td>( b_1) ( \log RELPRGEM_t )</td>
<td>( b_2) ( \log DFLPOLX_t )</td>
<td>( b_3) ( \log COMPTXRT_t )</td>
<td></td>
</tr>
<tr>
<td>Coeff.</td>
<td>42.144</td>
<td>(2.698)</td>
<td>( t )-stat.</td>
<td>(2.971)</td>
<td>( -0.81628 )</td>
</tr>
<tr>
<td>2. WHITE MARKET SUPPLY FUNCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( PRODCEM_t )</td>
<td>( c_0 )</td>
<td>0.01 ( \text{RELPRGEM}_t )</td>
<td>( c_2) ( \text{GFCF}_t )</td>
<td>( c_3) ( \text{GPRSAC}_{t-1} )</td>
<td>( c_4) ( \text{TIME}_t )</td>
</tr>
<tr>
<td>Coeff.</td>
<td>-2.2727</td>
<td>(1.647)</td>
<td>( t )-stat.</td>
<td>(1.642)</td>
<td>( 0.0001408 )</td>
</tr>
<tr>
<td>log ( PRODCEM_t )</td>
<td>( d_0 )</td>
<td>( d_1) ( \log RELPRGEM_t )</td>
<td>( d_2) ( \log GFCF_t )</td>
<td>( d_3) ( \log GPRSAC_{t-1} )</td>
<td>( d_4) ( \log \text{TIME}_t )</td>
</tr>
<tr>
<td>Coeff.</td>
<td>-1.2058</td>
<td>(1.795)</td>
<td>( t )-stat.</td>
<td>(1.973)</td>
<td>( 0.11433 )</td>
</tr>
</tbody>
</table>

\[ p = 0.278 \quad (1961-82) \]

\[ p = 0.239 \quad (1951-79) \]

\[ p = 0.105 \quad (1951-79) \]
FOOTNOTES TO CHAPTER 12

1. An intensive search was made to identify a nondurable consumer good produced and bought in a completely suppressed market. However, the major consumer goods such as foodgrains, edible oils, mineral oils, paper, textiles and cloth etc. are generally sold under partially suppressed market conditions or some variant thereof. Fertilisers and steel were other intermediate goods that were sold in completely suppressed markets but the lack of time series data on a number of aspects of these two industries presented a serious problem. Consequently, cement was chosen as an example of a commodity sold under completely suppressed market conditions since it was the only commodity that permitted the examination of the theory.

2. This variable has been included in addition to the other independent variables in equations (12.1) and (12.2) in the NPC study (1978). The formulations used here were developed independently of that study.

3. This variable is included following the formulation in Johnson (1967) and the NPC study (1978). However, the NPC study uses installed capacity as the dependent variable instead of apparent or calculated consumption as done here. Therefore, the interpretation of the demand augmentation variable is slightly different.

4. The phenomenon of over-indenting in completely suppressed markets like that for cement have been noted by a number of studies such as those of Bhagwati and Desai (1970), the Dagli Committee Report (1979) and the Hazari Committee Report (1967).

5. Johnson (1967) used this variable in his study of the Indian steel industry. Defining D as the quantity demanded and Q as the actual quantity supplied he postulated the following relationship,

\[ D = a + b(D-Q) \]

or

\[ \frac{a}{b} \quad \frac{D}{Q} \]

(1-b) (1-b)

as the reduced form of the original structural equation to be estimated by indirect least squares or two stage least squares. Ordinary least squares is used here so as to avoid the sensitivity of the estimates and consequent reliability using the other methods.
6. Details of the indirect estimation procedure are contained in Chapter 13.

7. See Chapter 13 for a detailed explanation of how this variable was estimated.

8. The effect of white market quantities is also embedded in this variable and therefore is dropped as an independent regressor. This variable was insignificant when included.

9. See the studies cited in Gupta and Gupta (1982).

10. The explanation for this may lie in the proxy chosen since higher corporate taxes may induce greater evasion through black marketing rather than just black marketing because of higher penalties.
CHAPTER 13

ESTIMATES OF THE SIZE OF BLACK MARKETS
AND THE COSTS OF RENT SEEKING IN
THE INDIAN CEMENT INDUSTRY

Introduction

The comprehensive controls over the Indian cement industry (till 1983 when partial controls were instituted) have constituted a period which the Chairman of the Associated Cement Companies Ltd. (ACC), the largest cement company in India has called "the Dark Age of the Grey Product". The magnitude of black marketing in cement has been estimated to be very high with the upper bound as much as 100% of the value of cement output at controlled prices (Rs. 8,000 million in 1981-82). India has suffered from a chronic cement shortage throughout the 1961-1982 period except for 1966 and 1967 (decontrol years) and 1976 (government restriction on construction activities).

The lower bound for such shortages in cement availability has been estimated by the Government itself to be around 10-25% of annual consumption in various years. Since 1977, there has been a growing and continuous shortage of cement. The magnitude of this shortage in 1979 for example was estimated to be at least 25% of cement availability. What this implies is that in that year the quantity of cement
supplied to the domestic market would have had to have been one quarter more than it actually was in order to clear the market at the Government-determined wholesale prices. Black market prices that have been the outcome of the control regime have been estimated to have been between 25-100% higher than the official prices at various times.

There has been no systematic attempt to indirectly estimate the quantum of black marketing in the Indian cement market and investigate the level of black market prices. In addition, no attempt has been made to estimate the extent of rent seeking costs in the cement industry. In this chapter I provide some preliminary estimates of these magnitudes on the basis of an indirect estimation procedure and market research in India.

An Indirect Estimation Procedure for the Estimation of the Amount of Cement Black Marketed

In this section, input-output coefficients in construction are used to indirectly estimate the amount of cement black marketed annually. Given the quantum of cement input required per thousand dollars of construction it should be possible to estimate the amount of cement used in construction activity in any given year if a series on value of construction can be obtained. The difference between the estimate of cement consumption so obtained and amount of
cement reported as consumed/despatched should be a reasonable estimate of the quantity black marketed subject to some limitations identified later.

Consequently, the indirect estimation procedure was implemented as follows:-

(1) Input-output coefficients of the average quantum of cement required per Rs. 100,000 of construction were obtained from a variety of sources including the National Building Organisation and the Planning Commission of India.


(3) The value of 'pucca' construction obtained in (2) was divided by 100,000 and multiplied by the average coefficient obtained in (1) above to get the estimated amount of cement consumed in each year (suitable price deflators were used to make the figures comparable).

(4) The apparent consumption of cement in each year calculated as (Production + Imports - Exports) was then
deducted from the estimated consumption obtained in (3) above to get the estimated value of cement black marketed (use of the CALCONS variable did not alter the estimates significantly except to raise them to be higher in more recent years).

The approach adopted here seems reasonable considering that the amount of apparent consumption is based on reported figures and is thus likely to be underreported given the widespread practices of black marketing reported in the lay press and in government reports. In fact the amount of estimated consumption calculated above exceeded the apparent for each one of the years considered, even when the input-output coefficient was changed around its recommended value.

The indirect estimation procedure however suffers from the following limitations:

(a) it uses an aggregate 'pucca' construction figure which itself is estimated by the Report of the Working Group on Savings. The estimates of construction are themselves the result of a 'commodity flow approach' using an input-output procedure as well through the surveys under the 'expenditure approach'. To the extent that these estimates are subject to bias, this bias is transmitted to the estimates of the quantity black marketed.

(b) An average aggregate input-output coefficient for cement
is used instead of individual input-output coefficients for each type of construction. Even though such coefficients were available for different types of construction, a similar break-up of the value of construction activity was not available. Consequently, the compositional effect of types of construction is not captured by the estimation procedure. Further refinement of the estimates would require that such a break-up be done. The input-output coefficients for the year 1961-62 and 1971-72 have been used in the estimation. To the extent that there have been revisions in the input-output coefficients as more efficient methods of construction have been developed, the estimates are likely to be biased upwards. Nevertheless compared to other estimates they seem to be on the conservative side.

(d) To the extent that with industrialisation and economic development, the rural sector has started using modern method of construction using cement and this is not reflected in the construction estimates because of incomplete statistical coverage and reporting difficulties from rural areas, the estimate is likely to be biased downwards.

(e) The major shortcoming of this method is that it implicitly assumes no substitution in demand. This is a serious lacuna which cannot be avoided given the nature
of the data.

The indirect estimation procedure can thus be substantially refined if better data can be made available. To that extent, it represents a guesstimate but one on the conservative side.

Empirical Estimate of the Amount of Cement Black Marketed and Black Market Prices

Before discussing the results of the implementation of the indirect estimation procedure it is necessary to discuss some estimates of black market prices obtained from a variety of sources. Black market prices for various commodities are periodically reported in the lay press. However, no attempt has been made to systematically compile time-series of such prices. I attempted such an endeavour with some limited success.

The Gujrati language (a language spoken in Western India) newspaper Vyaapar published daily from Bombay periodically obtains market quotations of black market prices and premia on a variety of items including commodities such as cement, paper, vegetable oil etc; durable goods like tyres; special-purpose instruments etc.; raw materials and intermediate products like steel, copper, aluminum, fertilisers, mutton tallow etc; and import licenses for the import of almost every conceivable kind of commodity. No attempt is made to systematically collect such information. However, such data is printed periodically and consequently an attempt was made to thoroughly research the
pages of the newspaper for information regarding the black market price of cement. On the basis of the information obtained and elsewhere there in an eight-year time series of black market prices was constructed. This is given in Table 13.1 along with the corresponding controlled retail price and the source from which the information was obtained.

From the table it can be seen that the black-market premium during the 1974-82 period ranged between 20 percent to 200 percent of the actual controlled retail price. There was also an increasing trend exhibited by the black market premium over the period.

The estimates of black market quantities of cement obtained by implementing the indirect estimation procedure of the previous section are given in Table 13.2. From column 3 it can be seen that in some years the quantity black-marketed constituted as much as 30-35% of actual production. In value terms this constituted from anywhere between Rs. 20 million to Rs. 850 million per annum valued at the controlled wholesale price (the retail price value would be much higher). Using the black market price shown in Table 13.1 between 1974-75 and 1981-82, the cement sector cumulatively generated about Rs. 7.85 billion in terms of 'black money' in the underground economy. This is quite a substantial figure considering the small size of the cement sector in the national economy and the relatively conservative estimates of the quantity black-
Table 13.2 also reveals a major weakness of the indirect estimation procedure. The procedure reveals substantial amounts black marketed in 1966-67 and 1967-68 when in fact the cement industry was decontrolled completely. This occurs because of the aggregate nature of the calculation as well as the fact that the construction value numbers used themselves are estimates. The procedure however does correctly predict a downturn in the amount black-marketed in 1975-76 when there was a Government enforced ban on major types of construction activity.

The black market quantum estimates contained in Table 13.2 are striking in that they show virtually no black market in cement if the estimates for the "no control" year 1967-68 are taken as the benchmark of no black market in cement. Using this year's figure as a benchmark, in only two years (1968-69 and 1973-74) was there a black market in cement [(3,990,000 - 3,930,000) = 60,000 MT and (4,5000,000 - 3,930,000) = 570,000 MT respectively]. This result is very surprising given the situation chronicled by the government, observers and the lay press mentioned earlier.

This striking result may be due to a number of possible factors. It may be due to the possibility that the controls were not binding at all despite all the evidence to the contrary. Alternatively it may be due to the possibility that
the penalties are binding and enforceable and have had a 'complete deterrence' effect. A third possibility is that the method of estimation adopted in this study is itself quite defective due to the limitations pointed out earlier and other methods have to be used to properly estimate the black market, if any.

Another explanation for the existence of a black market in cement even during periods of no control may be due to the desire to conceal sales of the commodity for other related reasons like tax evasion, general corruption levels being high requiring black income to make payoffs for inputs etc., as well as to payoff poorly paid public officials for granting licenses etc., and spillover effects on related sectors like construction, fuels etc. These activities have been documented in various government reports e.g. the Wanchoo Committee (1971) with respect to tax evasion; the Kaul Committee (1971) on foreign exchange leakage and invoice manipulation; the Maj Committee (1963) on the existence of black markets with respect to an input like steel; the Dagli Committee (1979) on effects of other controls, and in academic studies by Gupta and Gupta (1982) and Monga and Sanctis (1984) regarding the growth and size of the unreported black economy.

Among the competing explanations mentioned above, the first two ('controls nonbinding' and 'complete deterrence') seem improbable given the large body of evidence regarding
black markets in cement (e.g. NCAER 1978, 1979, Duggi Committee 1979, Palkhivala 1984 and various issues of Vyapar and the EPW). The third explanation regarding the shortcomings of the estimation method especially that of using fixed input output coefficients could very well be the cause for the anomalous results. However, it would seem that the last-mentioned reason may provide a better rationale for the results obtained.

Thus, it would seem that black-markets in cement exist for a variety of reasons not directly related to the regime of controls imposed on the industry. In no control year cement is black marketed because of factors such as tax evasion, general corruption and controls on other sectors. During periods of control on the cement industry, an additional amount is black marketed on account of these specific controls. The size of the quantum black marketed on all these counts also depends on other factors like the severity of specific and general laws and the probability of being apprehended given the resources spent on deterrence. However, the estimation method is not able to separate the amount black marketed due to the different causes and provides only a joint estimate of the total quantity sold illegally on account of all causes. This may be considered a shortcoming but nevertheless provides an estimate of the black market in cement.
Estimates of Rent Seeking Activity in the Indian Cement Industry

As discussed earlier, the cement industry in India has been subject throughout the 1951-82 period to a comprehensive system of import, licensing, price, rate of return and distribution controls. These controls have created a number of margins on which rent seeking activity takes place to obtain privileged access to imports, capacity pre-emption, quotas and avoidance of these controls.

One way to calculate the rent-seeking costs of controls would be to undertake an analysis similar to that carried out for sugar. However, the comparison of international and domestic prices has been complicated by the fact that time-series on only the controlled prices are available in the case of Indian cement while what needs to be compared are the international prices for cement and the weighted average of the domestic controlled and black-market prices. There is also some evidence that India is a competitive producer of cement and that in the long-run India need not import cement but can in fact be a cost-efficient exporter of cement if capacity and production expands sufficiently. This evidence indicates that the economic cost of producing cement in India is substantially lower than the landed cost of imported cement. Consequently, given this evidence and the data problems, the partial equilibrium framework of the costs of
protection analysis may not be appropriate.

The only feasible way to proceed to estimate the costs of rent seeking would be to either sum the value of rents calculated on each margin (e.g. import licensing, capacity pre-emption, black-marketing etc.) or to calculate the value of rents-impounded in the scheme of price controls (as shown in Figure 13.1). The former requires the imputation or collecting of a wide variety of premia data which may be difficult as discussed earlier. Consequently, the latter method is adopted.

In Figure 13.1, rents are created by obtaining allocations at the controlled price $P$ and reselling at the higher black market prices $P_C$. The differential between the official controlled and black market prices therefore provide the means by which the costs of rent seeking associated with the controls can be estimated.

![Figure 13.1](image)

**FIGURE 13.1**
RENT-SEEKING COSTS DUE TO PRICE CONTROLS
The costs of the controls would represent the deadweight efficiency losses represented by triangle ACE plus rent-seeking costs equal to rectangle P CAP. The calculation of C B the size of the efficiency losses due to curtailment of output consequent to the imposition of controls. Since estimates of elasticities are not available despite the earlier empirical analysis do not estimate these costs.

The rent-seeking costs can be roughly estimated by the following procedure. An upper bound for the rent seeking costs can be established by assuming a 100% average differential between official and black market prices as has been suggested by Minhas (1975), Srinivasan (1974) and others. My own eight-year time-series reveals a simple average differential of around 60%. With a 100% price differential the rent seeking costs work out to be equal to the value of production at controlled prices in recent years which was equal to around Rs. 8 billion in 1981-82. Alternatively, the rent seeking costs can be taken to be equal to the value of output black marketed which works out to around Rs. 3 billion (at controlled prices) over the 1974-82 period or Rs. 281 million (at official prices) over the same period. This may be interpreted as a lower bound estimate of the costs of competitive rent seeking in the Indian cement industry. Valuing this amount at black-market prices, the value black marketed works out to Rs. 1.25 billion for that year. These costs are summarised in Table
13.3.

A number of other margins for the generation of rent seeking costs and inefficiency costs of DUP activity exist in the context of the Indian cement industry. These costs need to be added to the costs of rent seeking and inefficiency due to the imposition of price controls alone. While such an assessment is not attempted here, the various margins are identified here. The other major types of controls and the associated margins for rent seeking activity can be summarised as follows:

(1) **Licensing of Capacity:** New capacity is the cement industry and expansions to existing capacity during the 1951-82 were controlled by the provisions of the Govt. of India's Industrial Licensing policy under the Industries (Development and Regulation) Act, 1951 and its various revisions. The manufacture of cement has required an industrial licence throughout this period except for a brief period between May 1966 and February, 1970. The licensing of capacity to established large houses has ostensibly been discriminated against in order to permit new entrepreneurs to set up new capacity. However, the actual situation has been characterised by the following features:

(a) Almost all official and unofficial observers agree that cement capacity has not come up as per the
licences issued.

(b) There has been a progressive trend towards the reported underutilisation of capacity over the years as was shown in Table 10.1. Reported utilization rates declined from over 90% in the 1950's to around 70% in the early 1980's.

(c) The underimplementation and the reported underutilisation of capacity noted in (a) and (b) above have gone hand in hand with chronic shortages in cement throughout the period, (except for the 1966 and 1967 decontrol years).

It is my contention that the above three features are the unintended consequences of licensing and other controls on the Indian cement industry with associated costs. As the Dutt Committee Report (1969) and the Hazari Committee Report (1967) note, industrial licences were pre-empted by large business houses as a means of deterring entry and maintaining any existing oligopolistic market structures. In the case of the Indian cement industry, while over time there was entry by a variety of new entrants, the problem was compounded by the fact that a number of new licenses were granted to entrepreneurs who had political clout but no implementation capability. The public sector Cement Corporation of India which has been actively encouraged by the government through a
conscious, preferential licensing policy since 1965, has lacked the implementation capability through bureaucratic inefficiencies and delays. Thus the Dagli Committee Report on Controls and Subsidies notes,

"... One reason why cement capacity did not come up as per licences issued was that in the interest of dispersal of ownership in the cement industry, licences were issued during the last decade to many novices who were not in a position to implement the licences granted to them ... However, the allotment of plan funds for public sector projects in the cement industry has in the past, been enormously delayed. The longer gestation period of public sector projects - partly through lack of experience in the initial years, partly because of the difficult terrain in which public sector plants have been located as a matter of policy - has compounded the problem of cement shortage."
(Dagli Committee Report, 1979, pp. 280-81)

While utilisation rates declined especially during the 1972-78 period when price increases were severely restricted, the black marketing of cement increased (see Table 13.3) indicating that the reported underutilisation of capacity was overstated. Thus while the reported average return on sales, assets or any other comparable aggregate declined over the 1972-78 period, these figures were an understatement because output was being sold on the black market.

(2) Pricing and Rate of Return Regulation - The Government's pricing policy since 1951 has been aimed at fixing the
ex-factory price to the producer as well as a uniform free-on-rail destination price of bagged cement to which incidental charges and sales taxes have been added to arrive at the retail price to the consumer. The retention prices have been fixed on various bases in the period 1951-67, the most frequent being a uniform price on the basis of the largest producer's cost (ACC Ltd) on some other average plus a percentage increase for high cost producers. These retention prices were adjusted from time to time to compensate for increases in production costs. Target rate of returns were also incorporated into these formula. After decontrol in 1966 and 1967, the government adopted a pricing formula based on the weighted average production cost of all plants and an adjusted return on total capital employed target (14%). The formula was maintained over the 1968-77 period but changed to a norm of 12% post-tax return on net worth in 1977 along with the introduction of a three-tier system of retention prices for low, medium and high-cost plants.

The consequences of the different pricing systems adopted can be summarized as follows:-

(a) The cost-plus system (1951-60) discouraged individual plants from reducing their costs since prices were adjusted downwards if efficiency gains
developed.

(b) The uniform ex-factory retention price system (1961-67) ignored the locational advantages of plants and lead to an inefficient production and distribution pattern.

(c) The target rate of return price system along with uniform retention prices (1968-77) resulted in the systematic increase in the capital intensity of the industry as shown in Table 3.4. This growth in capital intensity is consistent with the Averch-Johnson effect.

(d) The three-tier price system (1977-82) has distorted the relation between freight costs and the retention price systems while maintaining the disadvantage of target rate of return pricing mentioned in (c) above.

In addition to the inefficiencies created by the different pricing systems adopted, there have been considerable rent-seeking costs generated by industry participants attempting to influence the system of pricing controls. This is noted in various issues of the Economic and Political Weekly between 1968 and 1982 and the speeches of the chairmen of large cement companies at
(3) Freight Pooling System - A freight pooling system has been a major component of the Government's control regime. This system has been operated through a Cement Regulation Account under the control of the Cement Controllers Office. Under this system, manufacturers are reimbursed or pay in the difference between the actual freight costs incurred by them as against the pooled average freight for all manufacturers. This system coupled with the uniform retention price scheme has acted as a major disincentive to the setting up of cement manufacturing capacity in the deficit Northern and Eastern regions while concentrating the location of capacity in the surplus South with relative by superior quality limestone. The result has been that transportation costs are not included as real costs to the economy and this has led to extra demand for transportation services and congestion and breakdown of the overloaded system. There is also no incentive to sell the product in an economic market area around each plant as also no incentive to explore for new limestone deposits.

The freight pooling system has thus provided a complicated pattern of cross-subsidisation among producers and consumers in different regions with overuse...
of transportation resources, mislocation of capacity and losses of efficiency. Between 1970-71 and 1975-76 for example the average lead distance for the transportation of cement by rail increased from 456 km to 743 km.

(4) Distribution System - The cumbersome operation of the centralised allocation system for cement (at least for the major share of output) through the Cement Controller's Office has led to a number of practices such as bribery, corruption and other types of rent seeking activity. The Dagli Committee Report (1979) noted a number of malpractices by stockists and dealers and other reports in the lay press (especially the Economic and Political Weekly) have provided instances of sharing of black market profits between the regulated and the regulators. Instances of diversion to non-priority uses, multiple-indenting, non-allocation and non-delivery have been common as noted by the Dagli Committee (1979, p. 291-92) and others.

Thus the system of controls has generated a whole set of margins where DUF activity has produced substantial social costs which need to be added to the rent seeking and inefficiency costs identified in the previous section.
<table>
<thead>
<tr>
<th>Year</th>
<th>Actual Average Retail Price (Rs/50kg)</th>
<th>Black Market Price (Rs/50kg)</th>
<th>Black Market Price Differential (Rs/50kg)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-75</td>
<td>18.75</td>
<td>27.00</td>
<td>8.31</td>
<td>Vyaapar 4/3/74</td>
</tr>
<tr>
<td>1975-76</td>
<td>20.98</td>
<td>25.00</td>
<td>4.02</td>
<td>Vyaapar 7/10/75</td>
</tr>
<tr>
<td>1976-77</td>
<td>19.17</td>
<td>24.00</td>
<td>4.83</td>
<td>World Bank</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Estimate</td>
</tr>
<tr>
<td>1977-78</td>
<td>19.35</td>
<td>25.00</td>
<td>5.65</td>
<td>Vyaapar 4/9/77</td>
</tr>
<tr>
<td>1978-79</td>
<td>23.10</td>
<td>35.00</td>
<td>11.90</td>
<td>Vyaapar 7/10/78</td>
</tr>
<tr>
<td>1979-80</td>
<td>25.63</td>
<td>38.00</td>
<td>12.37</td>
<td>Vyaapar 8/5/79</td>
</tr>
<tr>
<td>1980-81</td>
<td>25.84</td>
<td>42.00</td>
<td>16.16</td>
<td>NPC Study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P.16b FN2</td>
</tr>
<tr>
<td>1981-82</td>
<td>29.10</td>
<td>85.00</td>
<td>55.90</td>
<td>EPW. 20/12/80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P.2118</td>
</tr>
<tr>
<td>Year</td>
<td>Quantity Black-Marketed (MT)</td>
<td>Percentage of Total Production (%)</td>
<td>Value at Controlled Wholesale Prices (Rs. million)</td>
<td>Value at Retail Black Market Prices (Rs. million)</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>1961-62</td>
<td>1,190,000</td>
<td>14.4</td>
<td>86.0</td>
<td>-</td>
</tr>
<tr>
<td>1962-63</td>
<td>580,000</td>
<td>6.8</td>
<td>42.6</td>
<td>-</td>
</tr>
<tr>
<td>1963-64</td>
<td>830,000</td>
<td>8.9</td>
<td>62.3</td>
<td>-</td>
</tr>
<tr>
<td>1964-65</td>
<td>2,060,000</td>
<td>21.3</td>
<td>157.2</td>
<td>-</td>
</tr>
<tr>
<td>1965-66</td>
<td>2,110,000</td>
<td>19.9</td>
<td>169.5</td>
<td>-</td>
</tr>
<tr>
<td>1966-67</td>
<td>1,950,000</td>
<td>17.6</td>
<td>179.4</td>
<td>-</td>
</tr>
<tr>
<td>1967-68</td>
<td>3,430,000</td>
<td>34.0</td>
<td>377.3</td>
<td>-</td>
</tr>
<tr>
<td>1968-69</td>
<td>3,990,000</td>
<td>32.6</td>
<td>500.9</td>
<td>-</td>
</tr>
<tr>
<td>1969-70</td>
<td>3,380,000</td>
<td>24.3</td>
<td>436.5</td>
<td>-</td>
</tr>
<tr>
<td>1970-71</td>
<td>3,140,000</td>
<td>21.9</td>
<td>415.8</td>
<td>-</td>
</tr>
<tr>
<td>1971-72</td>
<td>2,940,000</td>
<td>19.5</td>
<td>398.6</td>
<td>-</td>
</tr>
<tr>
<td>1972-73</td>
<td>3,170,000</td>
<td>20.4</td>
<td>439.3</td>
<td>-</td>
</tr>
<tr>
<td>1973-74</td>
<td>4,500,000</td>
<td>30.7</td>
<td>658.4</td>
<td>-</td>
</tr>
<tr>
<td>1974-75</td>
<td>2,360,000</td>
<td>16.0</td>
<td>428.8</td>
<td>1,274.4</td>
</tr>
<tr>
<td>1975-76</td>
<td>90,000</td>
<td>0.5</td>
<td>18.7</td>
<td>45.0</td>
</tr>
<tr>
<td>1976-77</td>
<td>1,060,000</td>
<td>5.6</td>
<td>230.9</td>
<td>508.8</td>
</tr>
<tr>
<td>1977-78</td>
<td>3,520,000</td>
<td>18.2</td>
<td>875.4</td>
<td>1,760.0</td>
</tr>
<tr>
<td>1978-79</td>
<td>1,570,000</td>
<td>8.1</td>
<td>416.2</td>
<td>1,099.0</td>
</tr>
<tr>
<td>1979-80</td>
<td>230,000</td>
<td>1.3</td>
<td>72.2</td>
<td>174.8</td>
</tr>
<tr>
<td>1980-81</td>
<td>2,110,000</td>
<td>11.7</td>
<td>673.0</td>
<td>1,772.4</td>
</tr>
<tr>
<td>1981-82</td>
<td>740,000</td>
<td>3.5</td>
<td>281.3</td>
<td>1,258.9</td>
</tr>
</tbody>
</table>

*These two years represent years of decontrol (at least partially).*
TABLE 13.3
INDIAN CEMENT-ESTIMATED COSTS
OF RENT SEEKING DUE TO
PRICE CONTROLS

<table>
<thead>
<tr>
<th>Year</th>
<th>Upper-bound Costs* (Rs. Million)</th>
<th>Middle-bound Costs** (Rs. Million)</th>
<th>Lower-bound Costs*** (Rs. Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-75</td>
<td>2,657.49</td>
<td>1,274.4</td>
<td>423.8</td>
</tr>
<tr>
<td>1975-76</td>
<td>3,589.40</td>
<td>45.0</td>
<td>18.7</td>
</tr>
<tr>
<td>1976-77</td>
<td>4,104.30</td>
<td>508.8</td>
<td>230.9</td>
</tr>
<tr>
<td>1977-78</td>
<td>4,599.26</td>
<td>1,760.0</td>
<td>835.4</td>
</tr>
<tr>
<td>1978-79</td>
<td>5,148.24</td>
<td>1,099.0</td>
<td>416.2</td>
</tr>
<tr>
<td>1979-80</td>
<td>5,551.12</td>
<td>174.8</td>
<td>72.2</td>
</tr>
<tr>
<td>1980-81</td>
<td>5,951.42</td>
<td>1,772.4</td>
<td>673.0</td>
</tr>
<tr>
<td>1981-82</td>
<td>8,008.71</td>
<td>1,258.0</td>
<td>281.3</td>
</tr>
</tbody>
</table>

* Calculated as 100% of the value of production at official controlled prices.

** Calculated on the basis of the value of the quantity black-marketed estimated by the indirect procedure (valued at black market prices).

*** Calculated on the basis of the value of the quantity black-marketed estimated by the indirect procedure (valued at official controlled prices).
## TABLE 13.4

**INDIAN CEMENT INDUSTRY—CAPITAL INTENSITY INDICES**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CAPITAL-LABOUR RATIO 1961=100</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>100.00</td>
</tr>
<tr>
<td>1962</td>
<td>95.84</td>
</tr>
<tr>
<td>1963</td>
<td>98.16</td>
</tr>
<tr>
<td>1964</td>
<td>101.67</td>
</tr>
<tr>
<td>1965</td>
<td>105.66</td>
</tr>
<tr>
<td>1966</td>
<td>105.99</td>
</tr>
<tr>
<td>1967</td>
<td>127.27</td>
</tr>
<tr>
<td>1968</td>
<td>143.45</td>
</tr>
<tr>
<td>1969</td>
<td>147.76</td>
</tr>
<tr>
<td>1970</td>
<td>170.02</td>
</tr>
<tr>
<td>1971</td>
<td>186.30</td>
</tr>
<tr>
<td>1972</td>
<td>197.26</td>
</tr>
<tr>
<td>1973</td>
<td>212.40</td>
</tr>
<tr>
<td>1974</td>
<td>225.20</td>
</tr>
<tr>
<td>1975</td>
<td>237.45</td>
</tr>
</tbody>
</table>
FOOTNOTES TO CHAPTER 13


2. See Mr. N.A. Palkhivala, *Chairman's Statement at the Annual General Meeting of the Shareholder's of the Associated Cement Companies Ltd*, December 17, 1982 for the first figure and Minhas (1975) and Srinivasan (1974) for the latter estimate.


4. Even in the case of the eight years for which black market prices are available, the analysis is difficult because of the problems associated with elasticities obtained from regressions run with only eight degrees of freedom.

5. See the World Bank Study (1980) for details.

6. This is the approach adopted by Mohammed and Whalley (1984)
CHAPTER 14

INTEREST GROUP ASPECTS OF ECONOMIC
REGULATION IN THE INDIAN
CEMENT INDUSTRY

Introduction

The comprehensive regime of controls imposed on the Indian cement industry can be viewed as the result of the desire of the Government to protect the interests of consumers while ensuring that producer interests are not compromised in line with the "Public Interest" theory of regulation. Or alternatively, it can be viewed as interest groups within the cement industry seeking to maximise the incomes of their members in accordance with the predictions of the "capture" theory of regulation. As is the case of sugar, there is evidence to support the applicability of the latter theory to the situation in the Indian Cement Industry.

The original objectives of the imposition of controls on the Indian cement industry can be analysed in terms of the official intent of each component of the control regime. The licensing and location controls on the industry may be regarded as part of the planned development strategy of balanced growth to ensure sectoral and regional balances in the production and availability of the commodity. Thus the licensing and locational controls were originally implemented
as part of a conscious national development strategy. However, as argued below, these controls later became powerful barriers in the hands of producer groups to prevent entry and reduce competition within the industry.

The foreign trade controls (ban on imports, prohibitive tariffs, export controls) were ostensibly introduced as part of the Government's overall strategy for "self-sufficient economic growth" and as a means of the preservation of foreign exchange reserves (in the case of import controls) in the early stages of development. However, the impact of producer group interests on the imposition of these controls is evident from the early stages when representations were made to the government for increasing the scope and permanently maintaining such controls.

The controls on cement prices and distribution were imposed by the Government in order to "ensure an equitable distribution and availability of cement at fair prices" (Cement Control Order, 1967). The objectives of the price controls were three-fold:

(a) ensure that consumers are able to get the product at a "reasonable" price while ensuring that the costs of large state sponsored projects in irrigation, construction etc. were able to obtain supplies at low cost in order to keep down the investment outlays for these projects.
(b) to ensure that existing producers are offered "remunerative" prices which are sufficient for them to continue production.

(c) to fix prices at a level that would be sufficient to continue to attract more capital into the industry in order to meet the expanding requirements of cement for national development.

Thus the stated objectives of price controls were mutually conflicting. A "remunerative" price for existing producers could be in direct conflict with the objective of ensuring "reasonable" prices to consumers and vice versa. Similarly, a "remunerative" price for existing units to continue production may not necessarily be sufficient for attracting additional capital into the industry. Clearly, this was a case of attempting to use a single instrument to achieve multiple objectives with the consequent failure of actually achieving the objectives.

A number of other problems existed with the regime of price controls. The wide range of vintages, sizes and technologies in a complex industry like cement with thousands of buyers made the information and administration requirements of evolving and implementing suitable criteria and systems for administered prices an impossible task. Information on constantly changing demand and supply curves was instantly required by the administering authority to effectively clear
clearly a difficult if not impossible task. The inherent complexities in evolving suitable criteria for fixing prices in the cement industry explain the inability of the Tariff Commission in its various reports to come up with a unified approach to its enquiries.

Thus while the original objectives of control of the cement industry may have been motivated by a desire to control the industry in the "public interest" the mutually conflicting objectives and complexity of administering the controls resulted in the control regime becoming a pawn to the interests of the major groups in the industry. The evidence is examined and discussed in the rest of this chapter.

Regulation and Interest Group Behaviour in the Indian Cement Industry

A brief description of the evolution of protection and controls in the Indian cement industry has been provided in Chapter 10. The discussion in this section is focussed on identifying the interest group aspects of the evolution of the control regime.

The dominant interest group in the evolution of the pattern of controls has been the producer group. As far back as 1925, the producers were able to persuade the Government to reduce imports and permit the industry to regulate the pricing and distribution of cement through the setting up of the
Indian Cement Manufacturers Association. Later in 1930 they were able to form the Cement Marketing Co. Ltd. as a monopoly seller of cement. While divergent interests within the producer group in time led to the collapse of these attempts at cartelisation, the subsequent development of the industry following India's attainment of independence in 1947 was strongly influenced by producer interests.

Perhaps the major impact of interest group pressure in the post-independence period was in the area of the importation of cement. Prior to independence some amount of cement had always been imported. After independence the import of cement was controlled by the Government in order to protect the cement industry. Amounts over a hundred thousand tonnes were imported in 1948-49, 1949-50, 1956-57 and 1957-58 when domestic production slumped but after 1959 imports were virtually banned ostensibly because of a shortage of foreign exchange but also because of pressure from producers. In fact India began exporting modest amounts after this with significant subsidisation by the Government "as a means of siphoning of the surplus stocks."

It is clear from the representations made to the Government that the cement producers in the post independence period have acted with a fair deal of cohesion in lobbying the Government for specific pieces of regulation. However, there have nevertheless been periods when the solidarity has been
broken as happened during the period of partial decontrol during 1966-68. The following discussion chronicles the evidence for the 1966-82 period only to examine the details of interest group behaviour starting with the period of decontrol.

The years preceding decontrol were a period of considerable shortage when black markets for the commodity had developed and flourished. The larger producers made representations to the Government that cement must be decontrolled if the industry was to expand production. However, the industry simultaneously demanded that in order to ensure smooth and equitable distribution of the commodity at 'reasonable' prices, a central coordinating and distribution organisation be allowed to be set up. The Government acceded to this request but introduced partial decontrol maintaining control over prices and requiring the industry to meet its own requirements first. Thus the Cement Allocation and Coordination Organisation (CACO) was set up to coordinate and regulate the production and distribution of cement—effectively cartelising the industry. With regard to prices, immediate price rises were permitted to the industry and production and implementation of new capacity increased when licensing was decontrolled in 1966. The industry reported record profits in 1966. Thus the industry seemed to have achieved the best of all possible worlds.
However, the institutional arrangements of the partial decontrol scheme had built into themselves the seeds of their own destruction. The uniform retention price and the freight equalisation pools had been retained under the new system with any losses incurred being borne in proportion to the financial capacity of the companies involved. Instead of the Government administering the pools, CACO was now the administrator. This built in a conflict of interest between the low-cost producers and high-cost producers with regard to the retention-price pool, and between the Southern and Northern units with regard to the freight equalisation pool.

Initially, the conflict remained latent as the CACO was able to raise retention prices successfully in 1966. But in July, 1967 as a result of pressure from the consumer-electorate regarding the price rise, the Government froze prices. The better availability situation that resulted from the increase in production following the initial price increases also meant that there was no shortage to exploit in the black market. This brought forth the inherent instability of the arrangement. As the Economic and Political Weekly puts it,

"CACO could not bear the strain of having to impose internal discipline. Low-cost units, deprived now of the promise of higher prices to be borne by the consumer, demand an equal share of the retention price pool. Units nearer the markets refuse to bear the freight burden of units with longer leads to the markets ... The regional imbalance in the growth of cement units, which was camouflaged until recently
by the freight compensation pool has now come into focus. The northern units are unwilling to pay for the locational weaknesses of other units."


With supply exceeding demand and the conflicts becoming sharper, CACO was finally dissolved in December, 1967. Cement distribution passed into the hands of the Government-owned Cement Corporation of India. The inefficient (and influential) Northern producers once again demanded retention price controls while the Southern producers also joined in the chorus so as to obtain freight equalisation compensation and once again complete control was reintroduced in January, 1968 by the Government with a proviso that the industry would be decontrolled at the earliest opportunity.

The cement producers however seemed to have learnt the lesson of doing away with Government as their control-enforcing agent. All the major producers made representations to the Government requesting the continuation of controls on the grounds that "consumers needed to be ensured supplies at reasonable prices." The statement of Mr. P. Suryanarayana, the Chairman of India Cement & Ltd, a large Southern producer is instructive,

"This (assurance of supplies to the consumer at reasonable prices) can be ensured only by equalising costs of production and transport (sic) in such a way that while the producers are guaranteed a fair return on investment, the consumer is equally guaranteed the supply as and when he requires, at a uniform price, instead of being placed at the mercy of changing conditions of supply or demand in a free market." (Chairman's Statement at A.G.M of India
The coalescing and compromise of interests of the different subgroups of producers is highlighted by the EPW as follows,

"The higher priced units have agreed to this less-than-equal sharing of the additional retention price pool in exchange for the continuation of the freight equalisation pool. The higher priced and more modern plants are concentrated in the South, with more than a third of their cement having to move north at heavy transport cost. The freight equalisation factor compensates them for distance from the market." ('Cement Front Against Decontrol', EPW Nov. 30, 1968)

The role of the Cement Manufacturer's Association (CMA) in achieving the compromise was important. The CMA's role is summarised as follows by the EPW,

"Basically, CMA has worked out a compromise whereby, in the emerging conditions of plenty, they would maintain prices. This could be done by asking for continued controls under which the controlled price based on costs would be a support price, and by pressing for subsidised exports so that the pressure on the internal market would be relieved and the industry could still work to its customary 93 cent to 94 per cent of capacity." ('Cement Front Against Decontrol', EPW Nov. 30, 1968).

As a result of the pressures from the producer lobby, the Government did not decontrol the industry. The speeches of the chairmen of the various cement companies made to their annual general meetings of shareholders reflected the satisfaction of the producers with this state of affairs (except for one important exception). The following excerpt gives one example,

"Panyam Cements (a large Southern producer) has expressed satisfaction over the substitution of CACO
by the Cement Corporation. It says that, with the latter taking over the functions of the former from January 1968, the freight pool has been more effectively operated and the system of issuing releases against reserved categories has been rationalised. In common with other cement units, the company has asked for increase in cement prices.

However, from this time onwards the divergent interests within the producer lobby were more and more visible. The 1969 appointment of Mr. N. A. Palkhivala, a champion of free markets and a future Ambassador of India to the U.S., as the Chairman of ACC (the largest cement producer) represented an important break in the solidarity of the producers. For the next thirteen years, till the industry was partially decontrolled in 1982, ACC continued to demand and work for decontrol often in direct conflict with other manufacturers. However, as the most geographically diversified producer with only a third of its units located in the South where the bulk of the cement units are located, this stance was a logical one for the company since it did not benefit from the freight equalisation scheme and it could face the competition that may be introduced as a result of decontrol because of the location of many of its units close to the centres of market demand.

With ACC expressing its desire for decontrol, a few others also joined in. For example Mr. S. P. Saxena, Chairman of the Bagalkot Cement Company Ltd. (a Sahu Jain group company), a low-cost producer of cement in the South-western region of the country close to major markets in the West,
welcomed the Government's announcement that price and distribution controls on cement, including freight pooling, would be abolished with effect from 1st January, 1970. However, the majority of the producers, especially those in the South remained vehemently opposed to the removal of controls.

The EPW commented on this change of the normal state of affairs with an article devoted to the developing divergence of interests within the producer group. The journal however attributed the change of tune of some members of the producer group (i.e. A.C.C and the Sahu Jain Group) as follows,

"that the Sahu Jain concerns and the Associated Cement Companies are this time in the same boat is more a coincidence. First, both are committed to expansion programmes that will materialise; and secondly, Sahu Jain's production capacity is mostly concentrated in the North which has a comparatively sparse distribution of cement units ... the Jain concerns must feel confident that on counts either of lower costs of older plants or of closer proximity to markets in the region, they can be the winners under conditions of competition ... ACC, similarly, has calculations of its own ... it is faced with the prospect of sharing with other units an allocated market ... and can benefit by undercutting and capturing its competitor's markets. (Secure Under Controls', - EPW, October 18, 1969. p. 1655)

However, despite the pressure from ACC and the Sahu Jain Group, the majority view prevailed and the decision to decontrol cement was reversed in December 1969. As the EPW (Oct. 17, 1970) noted "the majority of manufacturers came out vociferously and successfully against decontrol." The
Chairman of India Cements Ltd., Mr. P. Suryanarayana put it this way,

"I dealt with this problem (of decontrol) in my speech last year and pointed out how the removal of the uniform price to the consumer which is the basic rationale behind all other incidental controls over cement prices, would adversely affect both producers and consumers of cement in the country and more especially the producers in the South and the consumers in the North and North-east of India. You will be glad to know that the cement producers did not acquiesce in this policy decision, but made reasoned representations to the Government..." (Chairman's Speech at 24th A.G.M of the India Cements Ltd., Sept, 28, 1970 at Madras).

The 1970-77 period saw a reemergence of acute shortage in the cement market with manufacturers complaining about inadequate price increases but never (except for ACC and the Sahu Jain Group) demanding removal of controls. It also saw a continuation of some basic divergences of interest within the producer group but a united front on issues like increases in the retention price of cement, licensing policy etc. However, throughout this period the industry complained about the lack of adequate price increases while simultaneously the number of applications for new industrial licenses to manufacture cement kept rising. In their reported results, the cement manufacturers showed historically very low profits while black market prices and availability of the product reached record highs as reported in the lay press and government studies. It is instructive to quote at length from the EPW to put this situation in perspective.
"While it (the industry) has blamed the government's tardy licensing policy and price adjustment mechanism for this (shortfall of supply), the industry itself has not wanted to do without either... Licensing ... gives scope for persuasion of government in regard to location and choice of licenses ... Capital costs per tonne of cement are said to have doubled in the last four years, making entry into the industry even more difficult for the small entrepreneur. Meanwhile, the black market flourishes and prices of cement to consumers range between three and five times the controlled price ... Regulating supply so as to make it fall short of demand by one or two million tonnes creates a case for control with prices fixed on the Tariff Commission's generous cost-plus terms, keeps control of the industry in the Cement Manufacturer's Association's oligopolistic hands, and - most important of all - keeps a black market booming such that, while the several charges on the industry, such as wages, bonus, taxes and dividends are determined in relation to the controlled price, the actual price the commodity fetches is very much higher. Thus although two thirds of cement units are officially in the red their controlling interests have done very well out of them ..." ('Why Expand?' - EPW, October 6, 1973. p. 1837)

When a state of Emergency was introduced by Mrs. Gandhi, the Indian Prime Minister in June, 1975 this put a damper on 'organised' pressures for price increases, concessions etc. but nevertheless black marketing was by no means unknown. However, the end of the Emergency in 1977 brought back the 'organised' pressures of the CMA and individual producers on the government to increase administered prices; subsidise exports, argue against decontrol and press for an increase of the 14 per cent return on capital regulation. Black markets blossomed with cement commanding a substantial premium on the market. Subsidised exports of cement were increased to
771,000 tonnes in 1976 as soon as it appeared as if the supply coming on stream would exceed demand.

By 1978 however the situation had reversed itself. The new Government, elected on a free market platform, while promising to remove all obstacles to the growth of the industry nevertheless continued the system of controls but now involved itself in the import of cement of about a million tonnes. Meanwhile black market prices were reported to be some 50 per cent over the controlled price in that year. Government transferred the system of wholesale and retail distribution to the states with the ostensible purpose, of stopping the widespread black marketing being done by the industry and its chain of stockists, dealers and distributors. But this changeover only served to transfer black market profits to politicians and government functionaries with very little change in the black market premium.

The new Government however did grant greater and more frequent price increases after 1978 than the previous government had done as also allowing 'large' business houses to expand capacity - a euphemism for greater barriers to entry. This is evident from the fact that of the 35 letters of intent and 7 licences for a total of 15 million tonnes of capacity sanctioned in 1977-79, only about a couple of million tonnes was being seriously implemented in 1979. Shortages continued to rise however with ACC's annual report mentioning
an "unprecedented shortage of cement of the order of six to seven million tonnes" in 1979 versus a shortage of 2.5 million tonnes in the previous year.

The situation got worse in 1980 and 1981 with the shortfall increasing and black market prices rising to between hundred to two hundred percent over the controlled prices. This was despite the implementation of an additional three million tonnes of capacity during 1980, a significant hike in retention prices in May 1979 and 1980 and easing of transportation, fuel etc. bottlenecks. About two million tonnes of cement had to be imported at a price three times the controlled price. The EPW summed up the situation in 1981-82 in the following manner,

"The so called 'administered price' of cement is hardly administered. Against the controlled price of Rs. 27 per bag, cement in the black or 'open' market costs about Rs. 80-82. It is naive to think that only the trade and not the cement manufacturers benefit from the flourishing black market. In the circumstances, a 10-20 per cent shortage of cement has become a matter of established practice. But the fact is that, in a shortage situation with manufacturers able to secure free (black) market prices far above the government fixed prices, there has been little incentive to maximise profits through competition and expansion. Hence the absurdly high prices the consumer pays, the siphoning off of funds through the cement units into other more lucrative businesses, the seemingly low retention price for the cement units and these units' unwillingness to expand ostensibly for this reason." ("Basics and Peripherals" and 'Profitable Free For All' EPW, February 14, 1981. p. 217)

Finally, in February 1982 on pressure from consumers and certain sections of the industry a system of partial
control, similar to that for sugar described in Part I of this study, was introduced by the Government ending what Mr. N.A. Palkhivala, Chairman of A.C.C has called "the Dark Age of the Grey Product." However, if the study of controls in the Indian sugar industry is any guide other kinds of distortions and rent-seeking activity lie in store for the Indian cement industry.

Cement Controls and Capture Theory

Thus, the regime of controls and economic behaviour in the Indian sugar industry seem to bear out the predictions of the theory of economic regulation presented earlier. The chronology of events and actions detailed above point towards the capture of the controls and the controlling authorities (the Government) by the dominant interest group, the producers to maximise the value of their income subject to the constraints implied by other interest group pressures.

Cement producers seem to have been successful in obtaining control of the coercive powers of the state to do the following:

(a) Maximise joint income and rents in the controlled and black markets.

(b) Restrict entry and production through 'capture' of the licensing system by systematically pre-empting capacity.

(c) Obtain export subsidies to 'siphon off' excess
production during surplus years.

By and large, engineer a situation of shortage (except for periods covered in (c) above) as to keep an active black market alive.

The interest group of producers was by no means monolithic. While private cartelisation was attempted (e.g. during 1966 and 1967), the divergent interests created by the regime of control (because of the scheme of cross-subsidisation) came to the fore. The breakdown of the voluntary control scheme resulted in the industry participants substituting public regulation in order to overcome the costs of private cartelisation but maintaining the rents created by controls. Thus, there was a predilection to form a broad coalition in order to obtain the benefits of favourable legislation. Other predictions like higher prices after controls are not refuted. For example, producers were able to by and large get regular increases in the retention price while continuing to sell the product at higher prices in the black market.

Thus, on balance, the implications of the theory of economic regulation are not refuted in this study of controls in the Indian cement industry. While no specific empirical tests could be conducted because of a lack of data, it is necessary to examine the interests of other groups in the industry and see how these interests interacted with those of
producers. This is done in the next section.

**Interest Groups in the Indian Cement Industry**

The interest groups involved in the Indian cement industry are similar to those involved in the sugar industry. However, the differing nature of the controls makes a brief study of the various interest groups, their behaviour and their success in achieving their objectives interesting.

(a) **Consumers** - The consumer group in the Indian cement industry is quite different from that for a consumer good like sugar. Anywhere from 40 to 70 per cent of the total output of the industry is purchased by the government, either Central or in the States. This has some interesting implications.

The control regime ensures that the industry provides the government with its requirements at the controlled price with the "free-sale" category being met after meeting these requirements. Thus any shortages always impacts the "free-sale" consumers at large more than they impact the government buyers. As long as the controlled price is justified on the basis of costs etc. (and I have argued that in the case of 'capture' the price is always increased to reflect any cost increases plus excess profits), the government buyer is unlikely to act as a strong interest group in resisting producer pressures. However, to the extent that in conditions of scarcity of funds and investible resources, budgets are
likely to be far short of requirements, government departments are likely to resist price increases. But rent-seeking behaviour and the inefficiencies of bureaucratic structures are unlikely to make the different levels of governmental consumers significant pressure nodes.

Thus in the case of the consumer group, it would seem that the private consumer was essentially the major loser having to face perennial shortages and requiring to obtain his requirements periodically on the black market. However, because of their relatively smaller share in consumption and the costs involved in organising this disparate and dispersed group, the pressure brought to bear on the Government by this group is attenuated. Nevertheless, during periods of acute scarcity, such as the 1980-82 period, private consumer pressure has succeeded in getting the controllers' to modify their behaviour in partially decontrolling the industry. But otherwise this group has been ineffectual in making its voice heard.

In the various reports, representations, journals etc. and other evidence examined reference to consumers' complaints were to be found in the various Tariff Commission Reports (1956, 1961, 1974) and the Dagli Commission Report (1979). These complaints were with regard to the widespread black marketing, the non-fulfillment of allotted quotas and adulteration, quality etc. Typically, no major
recommendations were made by the concerned committees except for the further tightening and policing of controls. Thus, the evidence studied bore out the ineffectiveness of this group in attaining its objectives except for the introduction of partial controls in 1982.

(b) Producers - The interest group behaviour of producers has already been discussed in some detail in previous sections of this chapter. This interest group exerted the strongest influence on the regime of controls by and large obtaining control over the coercive powers of the state to maximise their income.

However, as pointed out this interest group was seldom monolithic especially during and after the period of partial control in 1966-67. In line with their relative efficiency and cost position, the non-integrated (particularly Southern) producers with better quality limestone but at some distance from major markets have argued successfully for the continuation of controls. It is only the geographically well diversified manufacturers (like ACC) and low-cost producers who are located close to major markets (such as Bagalkot cements) who have argued for removal of controls. But a compromise has been reached among these divergent interests in obtaining regulation that increases controlled prices while maintaining black markets especially during periods of shortage. Recognizing the inherent difficulties of private
cartelisation; this compromise has substituted the Government's allocation and distribution mechanism as an enforcement and monitoring device for maximising joint income.

Within the producer group, there would seem to be grounds for divergent interests between the private producers and the single public sector producer, the Cement Corporation of India. The latter was set up expressly to overcome the deficiencies of private sector delays in implementation, production shortfalls, geographical maldistribution and black marketing etc. However, the promise of the CCI has never been borne out. In the twelve-year period since it was set up in 1965, the CCI has managed to implement only about twenty-percent of its original targets with a two per cent share of production and three out of fifty-five manufacturing units. Progress since 1977 has been a little better but by no means impressive. The CCI has therefore never been an important pressure point except in adding its voice to the private sector chorus for higher retention prices.

(c) Traders - This group, like its counterpart in the sugar industry, has had a relatively less visible but nevertheless important role in the maintenance of the control regime in the Indian cement industry. Its influence has been tenuous during certain periods when the Government has attempted to place the distribution function completely in the hands of its own agencies (such as happened briefly during the 1978-80 period
discussed previously).

However, there is very little doubt that the traders as a group profitted immensely from the regime of controls. The lay press, various government reports and journal articles repeatedly point this out. The system of distribution throughout most of the study period whereby the "free-sale" category of cement was distributed through stockists/traders appointed by the manufacturers created a close relationship between the two. Very often the producer themselves had controlling interest in the trading companies in their market region. This created a very important margin for black marketing and other types of rent seeking behaviour.

The Tariff Commission Report (1974) for example noted the following malpractices by stockists/dealers:

(a) Charging prices greater than the controlled price of cement.
(b) Adulteration and tampering with the packing of cement.
(c) Non-payment, advance collection of dues and non-delivery of cement in many cases.

In fact, as already noted, the government-controlled system of distribution introduced on October 1, 1978 was primarily aimed at delinking the stockist/dealer from the producer.

Thus, this interest group has been an active supporter of the producer interest group in advocating the continuation of controls and as such has had and achieved objectives congruent
to that of the producer group.

(d) Employees and Unions - Very little information could be obtained on the objectives and role of this interest group in the maintenance of the control regime. It can only be conjectured that the interests here were similar to those discussed in the case of the sugar industry - support for the controls on the grounds that such controls benefit them through higher wages and greater leverage over the actions of the industry.

However, there is a difference in that the employees and trade union groups have had much to lose in the system of black marketing and 'unremunerative' prices that existed during the 1972-77 period. It would seem that price controls and black markets could be used as a channel for minimising the share of wages in the earnings of the cement industry because of wage increases being linked to changes in the CPI which does not include black market prices. However with repeated bargaining, the unions should be able to incorporate this element into their calculations and see that real prices (with black market prices accounted for) are reflected in the wage settlements. There was however no evidence available showing that this was in fact the case.

(e) Government and Politicians - The behaviour of the various levels of government and politicians in the Indian cement
industry has been broadly the same as that in the Indian sugar industry. Empire building, corruption, patronage, political rents, money and privilege have characterised the nexus between government/politician and industry. Nevertheless, in the initial years at least the politician-industry nexus was not as symbiotic as in the case of the sugar industry.

The product itself has been the source of considerable corruption and DUP activity at the government allocation and use stages. Civilian and government contractors have been known to bribe officials in the Cement Controllers Organisation in order to get priority allocations and contracts. Leakage of cement from Government quotas to the black market is also frequent. Access to cement allotments has always been a source of wealth for private individuals and this has resulted in widespread rent seeking activity. As the Chairman of A.C.C. put it "of all commodities cement has been the most prolific begetter of black money and public corruption. The widely accepted slogan is - No housing without black payment."

Thus, in line with the capture theory it would seem that unscrupulous government officials and politicians have had a vested interest in the continuation of the control regime in order to obtain private gain at cost to the public purse. The evidence obtained does not seem to
refute this contention.

In summarising this examination of interest group behaviour under the control regime imposed on the Indian cement industry during the 1951-82 period, it seems clear that the evidence is consistent with the predictions of the theory of economic regulation. In fact, the Indian cement industry provides a classic example of capture of the regulators by the regulated. As such, any hopes that the control regime worked in the public interest do not seem to be borne out on the basis of the evidence. It seems clear that decontrol would have benefitted the group that was supposed to have been benefitted the most by the controls— the consumers. The control regime instead hurt the consumer the most while producing large social costs in terms of efficiency losses, rent seeking activity and other types of DUP activity. It distorted the allocative mechanism, reducing output, raising prices and seriously undermining the moral foundations of the exchange mechanism.
FOOTNOTES TO CHAPTER 14

1. For discussion of the two theories of regulation see Chapter 8.

2. For a statement of the general objectives of licensing and locational controls see the Industries (Development and Regulation) Act, 1951 and its revisions, the Industrial Policy Resolutions (IPR's) passed from time to time and the Government of India's Annual Guidelines for Industries.


5. This can be seen by studying the Annual General Meeting proceedings for major cement companies like the A.C.C Group, the Dalmia group, the Sahu Gain Group, the Birla Group etc. The Economic and Political Weekly, which began publication in 1966 chronicles the interest group behaviour of producers for the 1966-82 period.


8. Mr. Palkhivala's annual speeches to the A.G.M of ACC repeatedly demand the removal of controls and introduction of competition in the industry in order "to generate growth with stability in the cement industry."

9. Mr. Saxena declared in his annual address to the A.G.M "viewed in the proper perspective, any opposition to decontrol and abolition of freight pooling, to say the least, is motivated by immediate considerations of imaginary difficulties rather than the long-term interests of the industry and the country as a whole." (Speech to 20th A.G.M on 30th Sept., 1969 at Bombay).


12. An interesting contrast of the divergences and
commonality of interest among the major cement producers is provided by a study of the A.G.M. speeches of the Chairmen of A.C.C. (the diversified producer) and India Cements Ltd. (the largest Southern producer).

13. My own estimates (see Chapter 12) show a rising trend in the quantity black-marketed during the 1972-77 period.

14. See for example 'Predictable Tactics', EPW, May 28, 1977, p. 859, for a detailed discussion of these events.


SUMMARY AND CONCLUSIONS

Introduction

This study has analysed the economic consequences of controls and rent-seeking activity in suppressed markets. The theoretical and empirical work has been carried out from the perspective of positive economic analysis. Economic behaviour in suppressed markets has been modelled and then been subjected to empirical tests. The empirical work has also attempted to break new ground by indirectly estimating the magnitude of hitherto unmeasured entities like the leakage or diversion of economic activity from controlled to uncontrolled margins and the size of black markets in controlled commodities. The models and estimates have been obtained by using the conventional tools of economic analysis modified to fit the specific problem situations obtained in suppressed markets.

The analysis of rent-seeking and other DUP-type activity has been receiving increasing attention from economists in recent years. Starting with the pioneering work of Tullock (1967) and Kreuger (1974), a number of economists have attempted to examine rent-seeking activity in varied institutional and regulatory contexts. By investigating and estimating the extent of rent-seeking activity in the Indian
sugar and cement industries, it is hoped that this study will contribute to the growing literature on the subject and provide public policy markers a broader focus on the intended and unintended consequences of alternative control regimes.

This study also hopes to contribute to the analysis of development problems from a microeconomic perspective. By focussing on the consequences of microeconomic interventions in developing country markets instead of macroeconomic concepts, it is hoped that this study will contribute in a small way to the understanding of the process of (under) development. While the contributions to the microeconomic development literature have been notable there is a continued need to analyse these problems from such a perspective. This would add to understanding of the macroeconomic problems of development which have been studied in the development literature.

Partially Suppressed Markets & Indian Sugar - Summary and Conclusions

This first part of this study examined the features and economic consequences of controls in the Indian sugar industry - an example of a "partially suppressed market" where a controlled market coexists with a free-sale market for the same commodity. The economic behaviour of both demanders and suppliers was modelled from the fundamental underlying microeconomic principles. Constrained market demand and supply
functions were derived with testable implications obtained from comparative static analysis. The theory of rent-seeking was also examined and empirical analogues were derived.

The constrained demand and supply functions so derived were empirically estimated using standard econometric procedures. The estimates of elasticities obtained were then used to calculate the costs of protection using Harberger and Tullock-type measures.

Leakage, or diversion of sugar from the controlled to the uncontrolled market was then estimated through an indirect estimation procedure utilising the properties of Engel Curves. Cross-section consumer expenditure survey data was used for this purpose, using the estimates from a 'no-control' year to calculate the amount that would have been consumed in 'control' years if there has in fact been no controls. Any excess of actual quota over the amount so estimated for each income class was treated as leakage and the aggregate amount of diversion of sugar supplies obtained.

Interest group aspects of rent-seeking behaviour were then investigated to test for their conformity to the predictions of the 'capture' theory of economic regulation. The objectives and actual behaviour of the various interest groups were examined on the basis of published reports, representations, journal articles etc. and the evidence did not seem to refute the hypothesis of capture. Empirical tests of capture were
then, devised and tested using empirical data and once again the hypothesis of capture could not be refuted.

The major conclusions of the study of partially suppressed markets and the Indian sugar industry are as follows:

(1) Constrained demand and supply functions different from those in free markets can be derived in the presence of controls in partially suppressed markets. The comparative static properties of such functions provide refutable predictions about economic behaviour.

(2) A major implication of modelling behaviour, in partially suppressed markets is that objectives of the policy - markets like the equitable distribution of "essential" commodities at "reasonable" prices may be mutually incompatible with other objectives like maintaining the stability of prices and production.

(3) The cross-subsidisation scheme implicit in the rationing scheme seems to have ended up subsidising the richer, urban consumer instead of the poorer, rural counterparts as originally intended. It may have also led to a higher price level in the economy.

(4) The partial control regime has led to lobbying, corruption and other types of rent-seeking behaviour which creates costs over and above the normal inefficiency costs of controls and protection.
The estimates of the costs of rent-seeking and protection obtained by applying empirical estimates of demand and supply elasticities to empirical data shows that as much as 70-100% of the value of output may have been dissipated in competitive rent-seeking activity associated with the controls. This points towards the high costs of originally well-intentioned regulatory behaviour and indicates that these costs if properly considered are likely to far exceed those obtained in conventional studies of the costs of protection.

There seems to have been a substantial leakage of sugar from the controlled to the uncontrolled market constituting as much as 2-30% of the value of sugar output.

The major interest group to have benefitted from the partial control regime seems to have been the producers of sugar. Government functionaries and politicians, sugar industry employees and unions and cane-growers also seem to have shared in the benefits. However, consumers as a whole and the aforementioned groups in their role as consumers seem to have been the losers. There has been a substantial social cost to the economy in terms of an inefficient industry, curtailment of consumption, deadweight inefficiency
losses of higher-than-import prices and substantial rent-seeking activities which have to be spread across the population. The productive and allocational efficiency of the market mechanism has been severely compromised by the regime of controls.

Empirical tests of capture of the sugar industry by the regulated producers reveal that the hypothesis of capture cannot be refuted.

Thus, a detailed study of controls in the Indian sugar industry reveals that the regime of controls has produced unintended consequences along a number of uncontrolled margins which have had a tremendous cost in terms of the productive and allocative efficiency of the Indian sugar economy.

Completely Suppressed Markets & Indian Cement - Summary and Conclusions

The second part of this study examined economic behaviour in completely suppressed markets where the whole output of the industry is controlled, both on the demand and supply side. Models of economic behaviour in such completely suppressed markets were constructed on the basis of the underlying economic theory. Demand and supply functions for a completely controlled commodity in the presence of black markets were derived. Black markets demand and supply functions were specified.
In the empirical sections, the Indian cement industry was investigated as an example of completely suppressed market. A modified aggregate demand function for cement was derived because of the nature of the product and the nonavailability of a sufficiently long series of black market price data. However, a supply function for black market cement was estimated using an indirect procedure for estimating the amount supplied on the black market. The estimates obtained in both cases point towards the soundness of the theoretical approach adopted.

The amount of cement black marketed was estimated using input-output coefficients of construction and estimating the amount of cement actually used on the basis of the reported value of construction in selected years. The difference between the estimated actual consumption of cement and apparent consumption (production + imports - exports) was taken as an estimates of the quantity black marketed. Controlled price data and black market price data for a few years obtained from a variety of sources was then used to calculate the value of the estimate of cement black marketed.

Costs of rent-seeking in the Indian cement industry were then obtained by adopting a simple approach to the calculation of these costs. No attempt was made to calculate the costs of protection in this case because of a lack of international price data and the fact that the Indian cement is a relatively
efficient industry as compared to other countries because of lower labour and capital costs.

Finally, interest group behaviour in the Indian cement industry was examined from the perspective of the positive theory of economic regulation. The evidence did not seem to refute the theory. However, empirical tests could not be designed or implemented because of the invariability of the controls (except for a brief period) and the lack of data.

The major conclusions of the section on completely suppressed markets and the Indian cement industry are as follows:

(1) Black market demand and supply functions for a completely controlled commodity can be derived from an examination of the underlying microbehaviour in such markets. Potentially refutable propositions can be derived from a manipulation of the properties of such functions.

(2) Major implications of imposing a completely controlled regime for a particular commodity or service are:

(a) The emergence of black markets to subvert the original intent of the controls.

(b) The lack of a guarantee that increased expenditure on detection and apprehension of black marketers as well as more severe penalties
will necessarily reduce the extent of black marketing.

(c) Production will be less than the competitive output and the industry will be characterised by excess capacity and Averch-Johnson type effects. The completely controlled regime leads to widespread black marketing, corruption, rent-seeking and other DUP-type activities which entail high social costs.

(4) The magnitude of black marketing in cement during the 1961-82 years lay anywhere between 0.5-35% of the quantum of cement with an average of around 15%. The value of such black marketing is estimated to have been as much as Rs. 8.0 billion in some years.

(5) The costs of rent-seeking in the Indian cement industry may have been as much as the value of cement output in some years, depending on the basis of valuation. Such an analysis ignores the costs of protection, if any.

(6) The major interest group to have benefitted from the imposition of controls were once again the cement producers. Trading interests were also major beneficiaries of controls especially due to the development of thriving black markets. Consumers and employees and unions in the cement industry were the losers (the latter because of the existence of black
markets) while once again the unscrupulous Government functionaries and politicians seem to have benefitted.

Thus, as in the case of the Indian sugar industry, the regime of controls in the Indian cement industry seem to have resulted in a number of unintended consequences with great social costs.

Some Concluding Observations

It is necessary to consider the contribution of the theoretical, historical and empirical work assembled in this study against various levels of hypotheses concerning the causes and effects of suppressing markets. Such an assessment serves to highlight the strengths and weaknesses of the work presented here and brings its contributions into perspective.

At the first level, it is necessary to examine the hypothesis that, when markets are controlled, economic activity leaks from controlled to uncontrolled margins. While no theoretical model has been provided in the case of partially suppressed markets to demonstrate this possibility, the possible extent of such leakage has been calculated in the case of the Indian sugar industry using the properties of Engel curves. It is found that the quantum of such leakage is substantial. In the case of completely suppressed markets, theoretical models of the leakage of economic activity to black markets are discussed and a crude estimate of the
quantum of leakage is obtained in the case of the Indian cement industry. The method used shows a substantial amount of cement being black marketed. However, the method used is not able to differentiate the quantum black-marketed due purely to the control on the cement industry from the quantum black-marketed for other reasons such as tax-evasion, general corruption or other controls on related activity. The evidence has thus to be considered in the light of this limitation and others concerning the estimation procedure and the data.

Secondly, there is the hypothesis that producers in controlled markets expend resources on lobbying and the like in the pursuit of rents. In the context of this hypothesis it is necessary to identify which producers actually expend resources and who benefit ex post as well as how free-rider problems are overcome. Primarily historical evidence has been assembled in this study to support the hypothesis of rent-seeking expenditure of resources. A lower bound estimate of the magnitude of rents obtained from lobbying for protection in the presence of domestic controls has been presented in the case of the sugar industry under the assumption of competitive rent seeking. These rents amount to as much as half of the value of sugar output in certain years. No attempt has been made to assess the rents generated by purely domestic controls because of the conceptual and empirical difficulties involved.
In the case of the cement industry, the value black-marketed (comprising as much as one third of the value of cement output) may be taken as an indication of the rents, though the separate estimation of the black markets due to the control regime only as against those generated by tax evasion, general corruption or other related controls could not be done.

An attempt has been made through the use of anecdotal evidence (see Chapter 8 & 14) to identify which producer groups are the major beneficiaries of the controls (e.g. the Northern producers have benefitted most from the controls in comparison to other producers in the sugar industry and the inefficient non-integrated producers have benefitted at the expense of the integrated producers in the cement industry). However, it has not been possible to predict which producers expend what amount of resources in rent seeking. A problem exists in that it is not clear why, when differences between producers are great (as in the case of the Indian sugar industry), all rent-seeking producers will continuously invest in capture activities especially those who just cover their margins. One rationalisation for the rent-seeking outcome may be that the inframarginal beneficiaries of the regulations and the regulators were able to co-opt the marginal producers by a transfer of rents to the latter in order to maintain the controls. As Borcherding (1978) and others have pointed out, if a large part of such rent-seeking activity takes the form
of politically mediated transfers through the regulative system, such a system may be an efficient joint-producer of transfer payments. My study however provides only anecdotal evidence of such transfers as in the case of the freight-pooling and retention-price system in the Indian cement industry.

It has also been argued in the study that the instability of such a cartel of variegated producers maintained by one sub-group of producers coupled with free-rider problems has resulted in the pattern of on-off controls witnessed in the Indian sugar industry. The specification of the mechanism by which free-rider problems are overcome is however not provided in this study.

The third hypothesis is that the producers not only reap rents but capture the regulators in a demonstrable and refutable sense. Evidence in the form of government responses to industry requests for various kinds of facilitating controls has been assembled from industry and public sources (see Chapter 8 & 14). A test of capture has been proposed and implemented and the results provide some (albeit weak) support for the hypothesis of capture in the case of the Indian sugar industry. No such test has been attempted in the case of the Indian cement industry.

What is not quite clear from the industry studies is the way in which the producers share out the profits if indeed
capture takes place. The role of the regulator in this is also not clarified. It may very well be that, as Baldwin (1975) and others have pointed out, the regulatory agency acts not only to arbitrate a compromise between producers involved in a constant or negative sum conflict but also to arrange for side-payments to those who suffer negative effects. Further work will require the spelling out of the mechanism by which the joint-profits are shared.

Fourthly, there is the hypothesis that regulators act in their own interests rather than those of producers (or any other interest group for that matter). It may be mentioned here that the essence of the "Capture" theory of regulation is that regulation is a device for transferring income to well-organised groups such as producers if the groups in return will provide votes, contributions and other pecuniary benefits to the regulators or politicians. As pointed out by Eckert (1972), such wealth transfers may take many forms such as the regulators obtaining employment with the organised interests once their regulating days are over. In the Indian case, producers seem to have been able to organise better than the dispersed, difficult to organise public at large and have "bought" regulators/legislators by providing them with lucrative positions in private enterprises as documented by Bavishkar (1980), Shourie and others (see Chapter 8). The relative lack of information with the average consumer
(largely rural and illiterate) and the difficulties and costs of organising an effective consumer lobby seems to have resulted in the regulators being more closely aligned to producer group interests. The evidence presented in this study supports this conjecture (see Chapter 6, 8 and 14).

Fifth, there is the hypothesis that the capture of regulators dominates any other theory of regulation such as the public interest theory. In the case of the Indian sugar and cement industries, if controls were really imposed in the public interest, one would expect to see the controlled industry opposing the restrictions, and prices and profits showing a negative relationship with respect to controls. In the case of the two industries studied, these industries have actively instigated and supported controls, and prices and profits have been positively correlated with the imposition of controls (the evidence is mixed in the case of the Indian cement industry though). The test of capture in the case of the Indian sugar industry suggests that the capture hypothesis applies as against the public interest hypothesis. This study also attempts to show how capture may be a more apt characteristic of regulation in the Indian sugar and cement industries by using historical evidence on these industries. A variety of evidence suggests that the public interest theory may not apply, though some of the troublesome aspects of distinguishing between the two types of theories remains.
As pointed out in the literature (Posner 1974, Jarrell 1978, Joskow and Noll 1981), both the capture and public interest theories suffer similar limitations in not being able to explain why regulators choose the particular instruments of regulation actually adopted and the transformation mechanism for converting the demand for regulation into specific types of controls. This study also suffers from this limitation.

It may be mentioned here that other versions of the capture theory (Demsetz 1968, Joskow 1974, Baldwin 1975, Peltzman 1976, Jarrell 1978) have argued that regulation may sometimes be a response to ex post opportunistic behaviour by governments. Thus, interest groups with diametrically opposed interests who are not able to reach voluntary agreement to effect particular bargains due to transaction costs, uncertain outcomes, externalities etc. may encourage the creation of a regulatory agency to arbitrate a compromise and distribute the benefits of the regulatory regime imposed. The creation of the regulatory agency would then forestall any efforts by politicians attempting to maximise their votes by imposing independent controls which cannot be captured, e.g. nationalisation of the industry. This captured regulation can be seen as a barrier to entry for the imposition of onerous, "uncaptured" regulations. This issue is not considered in this thesis though it is a possible explanation for the capture of regulation.
Lastly, it is necessary to examine the hypothesis that interest group behaviour is necessarily welfare decreasing. Becker (1983) has argued that interest group politics may lead to Pareto-efficient outcomes because of interest group competition. Competition for influence weeds out illegitimate claimants according to the usual rule of marginal costs equalling marginal benefits. Pecuniary legitimacy dominates because interest groups that benefit society more than they cost are eventually eliminated. If this result is true then interest group behaviour in the Indian sugar and cement industries may be seen as welfare increasing and not socially costly as argued in this study.

As Dean (1984) points out, the Beckerian approach (a) assumes no long-run political barriers to individual interest-group influence which will not yield to pecuniary rationality and (b) assumes that the collective influence maximises the joint interests of all groups. According to Dean, these two assumptions render the theory as untestable and almost a tautology. In addition Becker's results can be seen as the natural outcome of his Cournot-Nash equilibrium assumption that expenditure of resources on additional pressure by one group does not affect political expenditures by other groups. If utility functions are interdependent as is generally the case with political processes, Pareto sub-optimal outcomes are possible (see Dean 1984). Finally, Becker obtains his results
by assuming perfect information, a completely ‘revealed’ (open) political process and free entry and exit within and between interest groups.

In the case of the Indian sugar and cement industries, a number of features need to be mentioned, which may preclude the Beckerian outcome. Barriers to individual interest-group influence exist because of a dispersed, geographically remote and largely illiterate (70%) rural population which makes the organisation of consumer groups a very difficult task. Entry and exit within and between interest groups is rendered difficult by a rigid caste system where political power is non-pecuniary and based on tradition (see Olson 1982 for an economic explanation of caste though even he argues that the ‘wrong’ interest groups exercise maximum political influence because of externalities and barriers to entry). The relative lack of literacy and information dissemination channels as compared to western democracies also keeps the actions of the politicians and administrators concealed from public view so that perfect competition among all interest groups may not describe the regulatory situation. My study documents instances (see Chapters 8 and 14) where producer or regulator interest groups have erected significant barriers to other interest group influence which may prevent the Beckerian outcome.

Thus, my study provides some theoretical, empirical and
historical insights regarding the economic theory of regulation. The corroborating evidence that is presented may be less than totally persuasive but the modelling of economic behaviour in specific control regimes and the test of various implications of the theory provides a useful direction for investigating the subject of regulations and controls.

However, this study suffers from a number of limitations. The observation that all interest groups vocally seek their own interests and generate rents is hardly new. The theoretical result that price, distribution and entry regulation in different industries generates inefficiencies when compared to perfectly competitive outcomes is almost trivial. The empirical evidence based on assumptions about the existence of competitive rent-seeking is too general to provide a convincing test of rent seeking. Attempts have been made to delineate the structural elements for developing refutable hypotheses regarding rent-seeking and capture but a full-blown development of such a framework has not been achieved. For example, a more convincing test of the capture hypothesis would require a clearer specification of the dimensions of political organisation that overcome free riding problems and achieve success in building effective rent-seeking lobby groups.

Other problems include the difficulties of separating the effects of protection from the effects of purely domestic
controls. In the case of the Indian cement industry, the effects of controls in generating black markets could not be separated from the effects of tax regimes, corruption and other controls not directly imposed on the cement industry. With regard to the test on capture in the Indian sugar industry, the evidence is not very conclusive. The use of proxies (especially in the case of cement) for the estimation of demand and supply reduces the reliability of and confidence in the results. The specification of the demand equations in the case of sugar because of the type of data available as well as the aggregation of different types of consumers in terms of weighted composites makes the interpretation of the results difficult and problematic. And finally, using demand (and supply) elasticities so obtained and which may apply over only limited ranges for calculating the costs of protection using surplus triangles creates problems because this requires measurements involving larger ranges over which no sample values are available. This is likely to limit the usefulness of the estimates.

Nevertheless, by detailing the structure, theoretical issues, and empirical evidence of the effects of controls in partially and completely suppressed markets, it is hoped that this study will contribute to improving our understanding of the regulatory process and its effects in specific situational contexts. It is hoped that such a study will contribute to the
debate on the public policy process in a developing country like India. Some of the limitations of this study are common to those of other studies in this area. As Joskow and Noll (1981) note in a recent survey of the theory and practice of regulation,

"Because of ..., conceptual and empirical problems, theories of regulation must be accorded less than full scientific status. Social scientists have not yet shown convincingly that they understand what political purposes are served by regulation, why some industries are regulated and others are not, and why regulatory controls rather than other policy instruments are selected. Until answers to questions like these are forthcoming, the theory of regulation serves a convenient way of organizing historical material, but not one that is particularly rich in predictive value." (Joskow and Noll 1981, pp.39-40)

It is hoped that this study achieves the limited purpose identified in the last sentence of the quote.
1. For a survey of the rent-seeking literature see Tollison (1984).

2. See for example Meier (1977) or Todaro (1981) for conventional treatments of development economics. An excellent example of the application of microeconomic theory to the problems of development is Cheung (1969).
REFERENCES


(2) Agricultural Prices Commission, Report on Price Policy for Sugarcane, Delhi: Govt. of India Press, various years.


(5) Associated Cement Companies, Chairman's Speech to the Annual General Meeting, Bombay: A.C.C., various years.


(35) Cement Controller's Office, Cement Production and Despatches, Simla: Govt. of India Press, various years.

(36) Central Statistical Organisation, National Sample Survey Reports on Consumption Expenditure, various years.


(64) Government of India, *Income Tax and Other Direct Taxes Rate Structure*, New Delhi: Directorate of Inspection, various years.


419

The Hinde, Madras.


India Today, New Delhi.


(134) National Council of Applied Economic Research, A Study of Price Control and the Impact of Excise Duties on


National Federation of Cooperative Sugar Factories Ltd., Cooperative Sugar, New Delhi: NFCSF, various issues.


Pick's Currency Year Book, New York.


(178) *Vyaapar*, Bombay: various issues.


